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Willingness to Pay for Forest Existence Value and Sustainability

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Abstract: Uganda is richly endowed with flora and fauna. Until the early 2000s, most of the types of vegetation have remained natural/virgin forests and shrubs until recent years, when human activities have damaged them. Understanding the different ways that people value such endangered forest resources is very important. The main hypothesis in our study is that willingness to pay (WTP) for forest existence value and sustainability depends on the preference for the same values. In addition, we examined socioeconomic characteristics, such as sex, education, and household incomes, which could influence the WTP for forest existence value and sustainability. We carried out field questionnaire interviews with the aim of ascertaining Willingness to Pay (WTP) for forest existence. The WTP values were in a range between 1 and 200 USD based on the contingent valuation method (CVM). A sample with a size of 203 was interviewed in selected towns and villages in Uganda, and the data collected were subjected to statistical analysis. The cross-tabulation of the expressed preferences illustrates that 81.9% of the representative sample are willing to pay for forest existence value and sustainability. We concluded that the willingness to pay for forest existence significantly depends on the preference for forest existence values and sustainability. Our results equally express that the mean WTP in this region is 15 USD per year and that over 60% are willing to pay this amount. The socioeconomic determinants' results demonstrate heterogeneity and that over 90% of the respondents are willing to pay for forest existence, conservation, and sustainability.

Keywords: contingent valuation method; forest existence values; preference; sustainability

1. Introduction

Uganda is vastly abundant in natural forests with numerous kinds of the prominent African hard and broad leaf trees and woods. These forests support biodiversity and the entire forest ecosystem. They also contribute to national Gross Domestic Product through wood production and trade and eco-tourism, as well as benefiting the nearby communities with various non-timber products ranging from fruits, bush meat/hunting, mushrooms, and herbal medicines [1–3].

Over the years, Uganda has lost more than a half of its natural forests, and this is attributed to human activities. In 2005, Uganda had approximately 5 million hectares of natural forest, and by 2015, this had been reduced to 3.5 million hectares. The country depends much on forests for energy and commercial wood production and trade, which threatens the existence value of forests in the nation [1–3].

Forests play a multi-dimensional role in humans' and eco-systems' wellbeing [4–7]. Though many researchers, especially economists, usually focus on the market value of forest products, the trend has significantly changed other values, such as the non-use values and specifically the existence values. Forest existence value, to which we refer herein as the forest non-use value, is increasingly valued, and many people prioritize this by showing their willingness to pay to conserve the forests [7–12]. These values include regulation of floods, soil erosion, and disease outbreaks, food and water, and non-material benefits, such as recreational and spiritual benefits in natural areas.

Forest existence values, including ecosystem services such as provision, regulation, cultural and supporting services have attracted the attention of many researchers in a bid to investigate their value [13,14]. Biological diversity in relation to forest existence value usually improves other ecosystems such as water quality and flood protection, which are important for human survival but are not detrimental to the forests themselves.

Forest existence value is described as the non-use forest value [7–20], which consists of the following services, benefits, and functions: Wildlife habitat and biodiversity protection, ecosystem protection services, option forest value, bequest forest value, and the non-perceived forest values. The forest existence values, as suggested by scholars such as Bishop [8,20–34], can be best examined by the contingent valuation method (CVM) using questionnaires to obtain this nonmarket value, which is also referred to as a hypothetical assessment. Through this method, individuals/communities can express how much value they attach to such a resource [8,20–41].

This paper focuses on the willingness to pay (WTP) for forest existence value and sustainability in Uganda. As argued by many scholars and studies [8,20–34], the WTP approach is one of the few methods as regards resource valuation that expresses an individual's valuation of a given resource.

The main hypothesis of the study is that WTP for forest existence value and sustainability depends on the preference for forest existence values and sustainability. In addition, we examined socioeconomic characteristics, such as sex, education, and household incomes that could influence the WTP for forest existence and sustainability. The findings, discussions, and conclusions of our study are paramount for both policy decision making and designing, as well as implementation of further research studies as regards forest ecosystem services in global changing economies, especially where deforestation and degradation are at their highest.

2. Studied Literature

Existence value, a component of non-use value, arises from the idea that some individuals express a willingness to pay to conserve an element of biological diversity even though they neither make use of it nor intend others to benefit from it [35,36]. This could be a stand, a population, or a species that an individual simply wishes to exist.

Existence value entails the authentic feeling of individuals towards wildlife [37]. Such values differ in weight and change depending on the interests of the stakeholders. As much as the economic values are important, so are the forest authentic values in relation to the justification for conserving wildlife [38].

Wildlife also presents negative values, such as damage to humans, destruction of crops, predation of livestock, and invasive pests on the natural landscape, which are all considered anti-values [34].

As the global population continues to increase and the pressure on undeveloped wildlands intensifies, the sustenance of biodiversity through conservation of intact ecosystems has become a fundamental milestone. The rapid increase in human population worldwide has heightened the search for new opportunities to extract natural resources to meet the high demands of a large population; thus, preservation of wildlife is now a global concern. It is of great importance to prove the economic worth of biodiversity protection services since it influences policymakers to protect the environment and discredit arguments of those who exploit natural resources. Forests possess an abundance of tangible and intangible benefits to humans, but individuals seem to appreciate their existence and sustainability differently [42–46].

The linkages between biological diversity and ecological services are still unclear in recent literature. Forests regulate not only the local and global climate but also the hydrological cycle. Forests provide a large pool of genetic information that links biodiversity and ecological services and has been the focal point of numerous scientific debates [15]. According to Kreutzweiser et al. [47], it is extremely difficult for any ecosystem, be it a water body or forest, to cope with stress and shock when its biodiversity is reduced.

Despite harboring most of the earth's terrestrial biodiversity, forests cover just one third of the earth and are being degraded at an alarming rate. The World Wildlife Fund [33] asserts that the world's forests lose about 18.7 million acres each year, an equivalent of twenty-seven football pitches per minute. More than 1.6 billion people earn livings from forests, e.g., food gathering and hunting. According to Azor et al. [48], the extinction of tropical forest habitats continually increases despite the efforts by the international community, such as The World Wildlife Fund [33], towards sustainable forest management and conservation. This continued loss is attributed to different land uses, such as agriculture and other factors related to urban population growth [48,49].

Deforestation, internal degradation, or selective logging, as opposed to forest loss or fragmentation, alters the ecosystem structure and plant communities, thus threatening biodiversity and risking the forests' carrying capacity and vitality [50]. Biodiversity has declined significantly because of forest degradation, as evidenced in a wide range of taxa, such as large mammals, leaf-litter amphibians, epigeic arachnids, trees, and lianas [51]. The loss of biodiversity jeopardizes the functioning of forest ecosystems, such as water retention, organic matter decomposition, and soil nutrient recycling, which further affects the ability of forests to provide ecosystem services [51].

Ecosystems services are categorized into regulating services, such as water quality, biological pest control, and carbon sequestration; provisioning services, like food, timber, and fiber; supporting services, including photosynthesis, nutrient recycling, and soil formation; and cultural services that enhance spiritual, recreational, and aesthetic benefits [52]. From this perspective, the role of forests as providers of ecosystem services and the sanctuaries of biological diversity cannot be overvalued. However, the conservation and preservation of forests and their biodiversity, services, and functions have been lessened by the ever-increasing human population [53]. This means that large-scale forest restoration is the only way that people can meet their needs for ecosystem services without degrading the environment in the long run [42,54].

The demand for outdoor recreation has increased significantly over the years because of ongoing urbanization and the health benefits associated with an active lifestyle. Forests are an escape from modern life as they provide a tranquil and scenic environment where people can connect with nature [55].

Forest scenery provides people with a sense of place. For instance, many recreation-oriented individuals have a mutually shared dream of exploring national forests [56]. This shared aspiration showcases the romanticism and emotion linked with the landscape. Different landscape perception literature has employed terms, such as "natural beauty", "landscape quality", and "scenic beauty", to represent the aesthetic factor of the environment [57].

"Scenic value", used interchangeably with scenic beauty, represents a separate construct. In a recreational context, Paudyal et al. [58] assert that individuals take part in outdoor recreation to satisfy their preferred motivations or needs as per the expectancy–valence theory. In this theoretical perspective, recreational satisfaction is achieved when aspirations and the perceived reality of experiences are congruent. Tree density and forest type, among other physical attributes of forests, account for the widely held perception of scenic beauty among various populations. However, there is no doubt that the valuation of the scenic beauty of forests is affected by the different cultural and social traits held by the observers [58–60].

Human interaction with nature involves everything that people add to or subtract from the natural environment; viewing forest scenery greatly affects person–nature interaction [61] and forest aesthetic quality [62,63]. This ideology has been the backbone of recent research on recreation preferences and scenic beauty perception based on the contributions of experiential and socio-cultural issues. Nevertheless, Paudyal et al. [58] insist that the impact of such issues on observers' standpoints on forest recreation quality and scenic beauty is inconsistently represented in the literature.

3. Materials and Methods

The study consulted numerous scientific peer-reviewed research articles. The articles used were obtained from scientific research databases such as Web of Science, Google Scholar, and SCOPUS. They were not only consulted for previous works related to our topic of study, but also to identify the missing gaps. They were helpful in drafting and conducting the entire study, especially the introduction, methods, and discussion. The majority of these studies dealt with forest ecosystems, natural resource valuation, and WTP, respectively.

Primary data were collected from two districts in Uganda as selected by the lead researcher. The two districts selected are among the those facing severe deforestation due to population and fuel pressure. These regions are comprised of the Wakiso and Mbarara districts.

The Wakiso district is positioned in the central region of Uganda near Kampala, the capital city of Uganda, which has about 2 million people and roughly 750 square miles (1942.49 square kilometers) of land. The Mbarara district is the largest city in the western region of Uganda with a population of about 500,000 people, covering the magnitude of about 700 square miles (1812.99 square kilometers) of land. The data collected from the Mbarara district were mainly from the rural areas and villages. The aim was to reduce bias in our sample population.

3.1. Contingent Valuation Method (CVM)

The CVM is widely used in cost–benefit analysis and other environmental impact assessments to provide a monetary measure of natural resources [21–27]. CVM helps in evaluating nonmarket assets through the simulation termed the hypothetical market, whereby users are asked to express their "Willingness to Pay (WTP) or Willingness to Accept (WTA)" with respect to certain goods granted in use.

We used the WTP-approach-based CVM to obtain the non-market value of forest existence in Uganda. The data about WTP are not based on actual decisions about payment, but rather on the preferences of people as expressed in hypothetical assessments in the survey questionnaire [21–27]. Bishop [8] suggests that CVM is the only method that can help ascertain forest existence value. We asked for respondents' preferences in order to obtain the preference between the forest use and non-use values [28–32] and how this influenced their WTP.

There is no clear approach that can be used to measure forest existence value; most indigenous communities seem to have great knowledge of the value of forest existence. Most traditional people continue to consider forest existence as the bedrock of their political and cultural identity [12]. Such perspectives show that many people recognize the aspect of forest non-use value. Despite the benefit to millions of people and the entire environment that forest existence provides, it is ignored by most policymakers. This research stresses the necessity of more sensitive decision making based on informed valuation of the resource in question [9–13].

Individuals can show their WTP for conservation of an element of the environment without participating in direct use of that resource [39]. Existence value can be defined as the number of people who express their WTP so that the environmental resource exists. This draws the attention of others to do the same, even though they do not intend to use this resource. This value can be measured empirically by using a questionnaire or Contingent Valuation Method CVM [40]. This method treats existence value as a substantial component of Total Economic Value (TEV). Existence value is important in circumstances where the asset of valuation is exceptional and at times when a major decision needs to be made about its future in relation to new projects [41].

Forest existence value preference is not only determined by the silvicultural treatments and the attributes of the forest, but also human characteristics such as age, sex, income, and level of education [60]. For these reasons, examining the variation in recreation preference and perceived scenic beauty among people of different cognitive, experiential, and socio-cultural characteristics is very important [60].

3.2. Data Collection and Analysis

The investigation satisfied research ethical requirements and values. The study team leader, a PhD student, upon arrival in the selected areas of data collection, was advised to seek permission from the local leaders before carrying out the exercise in their areas. The local leaders were consulted for permission and were involved in the entire process, providing transportation for the research team. Residents cannot offer interviews without the authorization of the local leader because of security demands by the local and central governments.

A cross-sectional approach was used to conduct the research study. Data representative of the target population was collected at one point in time between 1 December, 2018 and 30 March, 2019 through structured interview questionnaires.

A probability sampling was used to isolate participants for interviewing. The members of the population had equal chances of being selected and of participation in the study. The studied villages have a combined population of about 2500 inhabitants. We interviewed 203 respondents, approximately 8% of the studied population.

The survey was subjected to pre-testing to check the appropriateness of the wording, structure of sentences, and the questions themselves. We translated from English to Lunganda and Lunyakole, which are the main local languages spoken in central Uganda and western Uganda, respectively. This is because not all respondents could use the English language.

The questionnaire was composed of the socioeconomic characteristics of the target population, such as age, sex, education, income, residence location, economic activity, and marital status.

The questionnaire was based on the following hypotheses:

Hypothesis 1. *WTP for forest existence value and sustainability depends on the preference for forest existence values and sustainability.*

Hypothesis 2. *WTP for forest existence value and sustainability depends on the sexes of the respondents.*

Hypothesis 3. *WTP for forest existence value and sustainability depends on the education of the respondents.*

Hypothesis 4. *WTP for forest existence value and sustainability depends on the household income of the respondents.*

We conducted stated preference analysis to obtain the willingness to pay (WTP) for forest existence value and sustainability. We used stated preference (SP) because it is the best approach [8,21–27,64,65] to ascertaining the WTP for a given resource based on the contingent valuation method (CVM). We estimated WTP through the selection of one of the two choices as regards one preference for which one would be willing to pay [21–27,64,65]:

(a) The use values
(b) and the non-use value/forest existence values and sustainability of forests in Uganda.

Since the method entails a choice to be made, some studies refer to this situation as choice modeling (CM) [28–31,64–67].

Lastly, we mention other methods that were consulted for the correctness of our valuation technique. The studied techniques included:

The Cost–benefit method, Hedonic pricing model, Travel cost method, Trade-off game, Replacement cost method, Costless-choice method, Relocation cost method, Opportunity cost method, and Delphi method. Below is the applicability of some of them [8,28–31,64–76].

- Amenity values which are best measured by *Hedonic pricing, CVM, Travel cost Method*
- Health values of a resource; *Response costs, Cost of illness, Human capital cost*
- Productivity values; *Replacement costs, Shadow project, Substitution cost, Response cost, Productivity change*
- Existence values; *Contingent valuation method (CVM)*

We asked: *Which forest value has your preference*?

1. *Use value: Timber, fuelwood/charcoal, forage and fodder, and recreation*
2. *Non-use forest value and non-perceived value: Option forest value, bequest forest value, biodiversity, wildlife, and scenery*

After this, the main question was asked: *Would you be willing to pay for forest existence value and sustainability?*

We conducted interviews using structured questionnaires in order to obtain the WTP for forest existence value and sustainability in Uganda based on the forest non-use values, services, and benefits. We asked people how much they were willing to pay for forest existence value and sustainability.

What would you be willing to pay for the forest existence value per year?

1. Less than UGX 17,500 or 5 USD
2. UGX 17,500 or 5 USD
3. UGX 35,000 or 10 USD
4. UGX 52,500 or 15 USD
5. UGX 75,000 or 20 USD
6. UGX 175,000 or 50 USD
7. UGX 350,000 or 100 USD or more

The rationale for the above category choices is that they fall within the academically recognized offers which have been applied before [21–27]. Our choice of units in Ugandan shillings and in US dollars was based on previous and important studies [8,21–27] where willingness to pay values ranged from 1 to 200 USD for minimum and maximum, respectively. We chose seven categories in order to broaden the spectrum of choices for the respondents. This would allow the study to obtain the lowest bid for WTP for forest existence value and sustainability, as well as the highest bid [21–27].

The collected data was subjected to both descriptive and statistical analysis using the Statistical Package for Social Sciences (SPSS).

Chi-square tests were conducted on the collected data. Additionally referred to as the Pearson chi-square test, this is advantageous for testing hypotheses when the variables are nominal. The chi-square (X^2) test, unlike other statistics, provides information on the significance of any observed differences and detailed information on precisely which groups account for any differences established.

A regression could not be run on two categorical variables, so we performed a logit model.

$$Y = \alpha + \beta X,$$

where Y represents willingness to pay (WTP) for forest existence. X represents variables like preference for forest existence values, age, sex, and education. α represents the level of significance, and β the beta coefficient.

3.3. Pearson's Correlation Coefficient Analysis

Pearson's correlation coefficient was used to find the relationship between the variables under investigation. This is a measure of linear correlation between two variables, X and Y, and is given by a covariance of the two variables divided by the product of their standard deviations. Accepted values lie between positive one (+1) and negative one (−1), where 1 is total positive linear correlation, zero (0) is no linear correlation, and −1 is total negative linear correlation. Herein, we illustrate the equations for the deliverance of Pearson's correlation.

$$\rho X,Y = Cov(X,Y)\sigma X\sigma Y,$$

where Cov is the covariance, σXσY is the standard deviation of X and Y, respectively.

4. Results and Discussion

The main hypothesis of the study was that WTP for forest existence value and sustainability depends on the preference for forest existence values and sustainability and is further influenced by socioeconomic characteristics such as sex, education, and household incomes.

The results from the survey indicate that all respondents understood the questionnaire, and their willingness to pay to conserve forests/forest existence value and sustainability was based on various factors, including their sex, education, and income. We conducted interviews using structured questionnaires in order to obtain the willingness to pay for forest existence value in Uganda based on the forest non-use values, services, and benefits.

The sample size was n = 203, of which 133 participants were in the urban area and 70 participants in the rural areas. The minimum age of participants was 18 years, the maximum was 101 years, and the mean age was 32.75 years (Table 1). A total of 60% (122) of the respondents were males and 40% (81) of the respondents were females (Table 1). This is because we randomly selected more males than females.

In addition, 48.8% of the respondents were single, 46.8% were married, 2.5% divorced, 3.9% separated, and 0.5% classified their marital status as "other". Participants with primary school education constituted 5.9% of the sample, secondary school 6.9%, high school graduate 15.8%, bachelor's degree 62.6%, master's degree 6.9%, doctorate degree 0.5%, and "other" 1.5% (Table 1). Respondents' economic activity characteristics show that 58.1% were employed, 19.7% unemployed, and 22.2% "other", which mainly included housewives and some students (Table 1).

A cross-tabulation between preference for the non-use forest value and willingness to pay for forest existence (Table 2) was conducted. It contains responses to: *"Would you be willing to pay for forest existence (so as to reduce deforestation/conserve forests in Uganda)?"* The responses from participants illustrated that 17.1% very strongly prefer the non-use forest value; 15.1% strongly prefer non-use, and 18.1% (Table 2) are very willing to pay for this value. This means that up to 50.3% of the respondents preferred forest existence value or what we refer to herein as the non-use forest values.

The cross-tabulation showed that a total of 81.9% were willing to pay and prefer forest existence value and sustainability. The remaining 19.1% were unwilling to pay for forest existence, 5% preferred but were unwilling to pay for forest existence, and 4% prefer but were neither willing nor unwilling to pay for forest existence. The remaining approximately 10.1% did not prefer and were unwilling to pay for forest existence (Table 2).

The Pearson chi-square value (0.000) which was less than 0.05; we concluded that willingness to pay for forest existence depends on the preference for forest existence value and sustainability (Table 3) at the level of significance (α) = 5% (0.05).

Linear regression could not be run on two categorical variables, so we used aa logit model. We performed correlation on sex and its impact on willingness to pay for existence. The Pearson correlation coefficient is 0.003, which implies a very weak positive relationship between sex of the respondent and willingness to pay for forest existence (Table 4). This implies that sex has a small impact or no impact at all on the respondents' willingness to pay for forest existence value and sustainability.

Table 1. Descriptive statistics for the participants.

Variable	Elements	Frequencies	Percent (%)
Sex	Male	122	60.1
	Female	81	39.9
	Total	203	100.0
Marital Status	Single	91	44.8
	Married	95	46.8
	Divorced	3	1.5
	Widowed	5	2.5
	Separated	8	3.9
	Other	1	0.5
	Total	203	100.0
Residence	Urban	133	65.5
	Rural	70	34.5
	Total	203	100.0
Education Level	Primary	12	5.9
	Secondary	14	6.9
	High School	32	15.8
	Bachelor's Degree	127	62.6
	Master's Degree	14	6.9
	Doctorate Degree	1	0.5
	Other	3	1.5
	Total	203	100.0
Economic Activity	Employed	118	58.1
	Unemployed	40	19.7
	Other	45	22.2
	Total	203	100.0

Table 2. Preference for forest existence value and sustainability and willingness to pay for the forest existence value and sustainability based on the forest functions and benefits: Cross-tabulation.

		Willingness to Pay a Fee per Year for the Forest Existence Value					Total
		Very Willing	Somewhat Willing	Neither Willing nor Unwilling	Somewhat Unwilling	Very Unwilling	
Very strongly Prefer	Count	34	9	0	2	6	51
	%	17.1%	4.5%	0.0%	1.0%	3.0%	25.6%
Strongly Prefer	Count	30	15	1	0	1	47
	%	15.1%	7.5%	0.5%	0.0%	0.5%	23.6%
Prefer	Count	36	39	7	0	3	85
	%	18.1%	19.6%	3.5%	0.0%	1.5%	42.7%
Do not Prefer	Count	4	7	1	2	0	14
	%	2.0%	3.5%	0.5%	1.0%	0.0%	7.0%
Strongly do not Prefer	Count	0	1	0	1	0	2
	%	0.0%	0.5%	0.0%	0.5%	0.0%	1.0%
Total		**104**	**71**	**9**	**5**	**10**	**199**
	%	**52.3%**	**35.7%**	**4.5%**	**2.5%**	**5.0%**	**100.0%**

Table 3. Chi-Square Tests: Preference for forest existence value and sustainability.

	Value	Df	Assumption. Sig. (2-sided)
Pearson Chi-Square	57.375 [a]	16	0.000
Likelihood Ratio	46.469	16	0.000
Linear-by-Linear Association	1.802	1	0.179
Number of Valid Cases	199		

[a] A total of 18 cells (72.0%) have expected count less than 5. The minimum expected count is 0.05.

Table 4. Impact of sex on willingness to pay (WTP) for forest existence.

		WTP a Fee per Year for the Forest Existence Value and Sustainability	Sex of the Respondent
WTP	Pearson Correlation	1	0.003
	Sig. (2-tailed)		0.961
	N	203	203
Sex of the respondent	Pearson Correlation	0.003	1
	Sig. (2-tailed)	0.961	
	N	203	203

The results (Table 5) and Coefficients (Table 6) confirm that there is a positive significance level of 0.961, which is greater than 0.05. We therefore accept the hypothesis.

Table 5. Analysis of variance.

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	0.002	1	0.002	0.002	0.961 [b]
	Residual	208.549	201	1.038		
	Total	208.552	202			

Dependent Variable: Willingness to pay a fee per year for the forest existence value and sustainability. [b] Predictors: (Constant), Sex of the respondent.

Table 6. Coefficients (sex).

Coefficients [a]						
Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	1.714	0.216		7.922	0.000
	Sex of the respondent	0.007	0.146	0.003	0.049	0.961

[a] Dependent Variable: Willingness to pay a fee per year for the forest existence value and sustainability.

The analysis presents a Pearson chi-square value of 0.057 and, since this is greater than the probability value 0.05, we accept the null hypothesis and conclude that willingness to pay (WTP) for forest non-use values does not depend on the education level of respondents (Table 7).

Table 7. Chi-Square Tests: Education.

	Value	Df	Assumptions. Sig. (2-sided)
Pearson Chi-Square	28.342 [a]	18	0.057
Likelihood Ratio	25.160	18	0.121
Linear-by-Linear Association	14.030	1	0.000
N of Valid Cases	203		

[a] A total of 21 cells (75.0%) have expected counts of less than 5. The minimum expected count is 0.01.

The chi-square value is 0.973, which is greater than the probability value 0.05, so we accept the null hypothesis and conclude that willingness to pay (WTP) for forest non-use values does not depend on the household incomes of respondents (Table 8).

Table 8. Chi-Square Tests: Household Incomes.

	Value	Df	Assumptions. Sig. (2-sided)
Pearson Chi-Square	10.421 [a]	21	0.973
Likelihood Ratio	12.556	21	0.923
Linear-by-Linear Association	2.067	1	0.151
N of Valid Cases	197		

[a] A total of 21 cells (65.6%) have expected counts of less than 5. The minimum expected count is 0.03.

Responses from: *What would you be willing to pay for the forest existence value per year*?

The stated preference results indicate that 1% of the respondents were willing to pay less than 5 USD for forest existence, 15% to pay 5 USD, 24% to pay 10 USD, 10% to pay 15 USD, 38% to pay 20 USD, 11.6% to pay 50 USD, and 0.5% to pay 100 USD or more.

The mean willingness to pay stands at 15 USD, and over 60% were willing to pay this amount to keep the forest in existence. Over 80% were also willing to pay at least 10 USD or more (Figure 1).

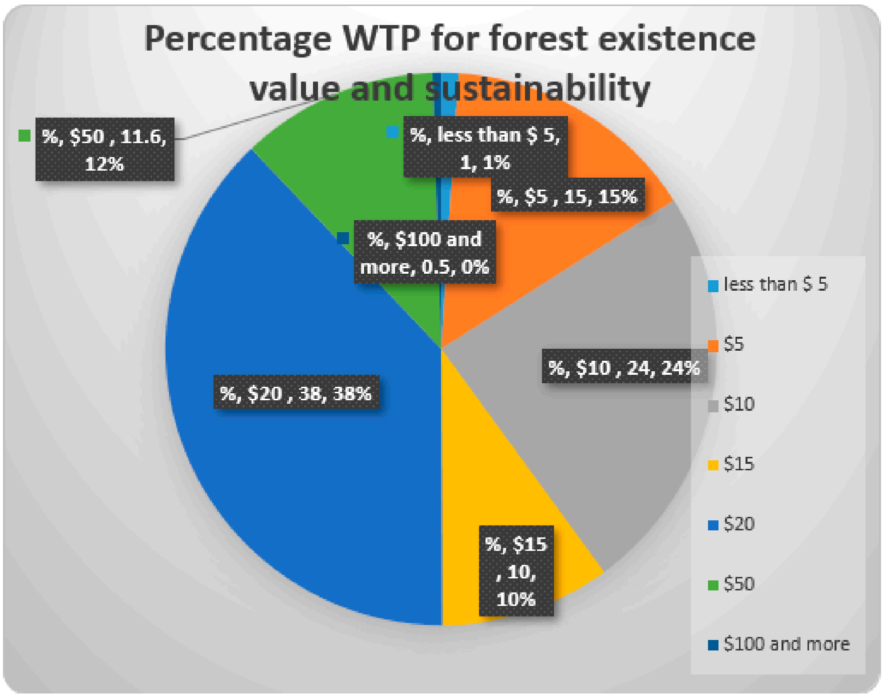

Figure 1. The percentage of willingness to pay for forest existence value and sustainability for given amount in dollars.

Our study findings are in agreement with Kearney and Bradley [68], Fix et al. [57], Paudyal et al. [58], Ojea et al. [17], Ojea et al. [36], Kendal et al. [18], Bosch et al. [19], Kharchenko et al. [20], Wainger et al. [7], and Suzuki and Parker [11], who also analyzed the non-use forest services and benefits. The sex of the participant and preference for non-use value were found to have a positive correlation with WTP. Both factors influence the WTP for forest existence. However, sex was found to have a weak positive relation compared to preference, which had a high influence on the WTP for forest existence.

Our results demonstrated that education and household incomes do not influence people's willingness to pay for forest non-use value and/or conservation of the forest in Uganda. This could have been influenced by the sample size or could be true, as participant responses were influenced by the non-use benefits associated with the forests [19,20,25–27]. This is because respondents who understood forest non-use benefits had very high WTP for forest existence values.

Forest existence value is one of the components of non-use value, from which arises the idea that some individuals are willing to pay to conserve biodiversity despite other economic and use values that forests can offer. Forest existence values include biodiversity, scenery, recreation, community integrity, wildlife, spiritual health, aesthetic enjoyment, and intrinsic rights [19,20,25–27]. While there are still limited approaches to measuring forest existence value, research shows that many people appreciate a wide range of non-use benefits and services that come from forests' conservation [19,20,25–27]. This could be the reason why, for example, a few elderly people who were part of the respondent group said that "*even though [they] do not have any source of income, and are also ill, [they] would spend [their] last coin to pay to save [the] forest*".

Stated preference (SP) and CVM are helpful for individuals in expressing their choices for environmental quality and/or use [69–76]. In our study, most of the individuals' stated preferences illustrate that over 92% respondents prefer forest existence (i.e., conservation and/or sustainable management of forests in Uganda). WTP for such conservation showed high support, with 98% willing to pay more 5 USD, 60% more than 15 USD, 11.6% for 50 USD, and 0.5% for 100 USD or more. This was based on the non-use values, of which some fall into the non-timber forest products (NTFPs), which are a community benefit and a motivation towards forest conservation [75].

Forests have been part of human societies for generations. Both the literature review and the survey (see Table 2) revealed that forests have a high existence value because they are critically important habitats with great ecological functions [7–20]. However, the literature review also indicated that how people value and use existing forests depends on the abundance or scarcity of these natural resources in relation to human needs.

The current research explored a wide range of concepts concerning forest value. These concepts explain the significance of non-use forest benefits in terms of their values to communities. In particular, the focus of the current research was on the non-use value benefits of forests in Uganda, and the results show estimated forest values. These values could help policy decision making regarding any development programs in the forest sector in Uganda.

WTP for forest existence supports forest biodiversity and sustainability through tools and programs like protected areas (PAs) programs for biodiversity protection and conservation. Furthermore, WTP supports the numerous forest resource protection and management tools for sustainable development of the resource and area in question. PAs and forest ecosystem programs are visible in countries with developed forestry management programs, such as the Czech Republic and the European Union [77–80]. This is achieved by conducting a contingent valuation study which gives individual or community values of the resource; hence, a cost–benefit analysis (CBA) [81–83].

WTP helps to provide the cost–benefit analysis when considering important decisions, especially with natural resource development. Policy decisions are based on the WTP or WTA to decide on given developments of the given resource [8,20–27,63–76,81–83], for example, if the government of Uganda, based on our findings, would consider using our research findings for decision making soon, considering that a majority of respondents of 90% preferred forest existence values and were willing to pay 10 USD. This means that the government would have to put into place policies such as re-afforestation, intensive protection of forest ecosystems, and subsidization of energy alternatives, such as gas and electricity, to minimize deforestation.

5. Conclusions

Forest existence value varies from one individual to the other. Forest non-use value can be measured using a choice and/or stated preference in order to obtain people's willingness to pay to conserve the forest and other ecosystems, even though they may never use them directly. It can be concluded that forest existence value exceeds the costs of all projects concerning the forest resource if a valuation is done.

A cross-tabulation analysis for willingness to pay for forest existence value and preference for forest non-use demonstrates that over 80% of the participants were willing to pay for forest existence. In total, over 90% of the respondents were willing to pay for forest existence.

We had hypothesized that the preference for non-use of forests influences people's willingness to pay for forest existence. Referring to the Pearson chi-square findings, we concluded that willingness to pay for forest existence depends on or is influenced by the preference for non-use of forest services and their benefits. Other results indicate that sex has a statistically smaller, though statistically significant, impact on the respondents' willingness to pay for forest existence. The SP results showed that the mean willingness to pay was 15 USD and that over 60% were willing to pay for forests' existence. Over 80% were willing to pay at least 10 USD to conserve the forests in the country, and this was not influenced by household incomes or levels of education.

We conclude that research participants in Uganda appreciate the forest existence/non-use values. This is illustrated by their willingness to pay in a bid to conserve forests with the preference for forest non-use. We cannot generalize our study's findings to the entire population of Uganda because of the limitations of using such a small sample. Future studies should use larger and regionally distributed sample sizes of at least 1000 or more respondents to increase the representativeness of the findings. The results of the topic of study are paramount for sensitive decision and policy making regarding development within forest areas.

It is worth mentioning that forest existence, referred to as non-use, has and will always play a multi-dimensional role in humans' wellbeing, and this calls for government leaders, foresters, the private sector, and other stakeholders to work together to save the already threatened forests.

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