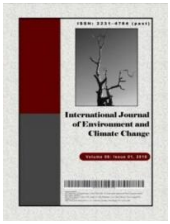

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Undergraduate Students Willingness to Pay for Social Services of Trees at the Federal University of Agriculture Makurdi, Benue State, Nigeria

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Authors' contributions

This work was carried out in collaboration among all authors. The authors collectively designed the study. Author TTN collected field data, wrote the protocol and the first draft of the manuscript. Author PUA performed the statistical analysis and managed the analyses of the study. All authors read and approved the final manuscript.

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ABSTRACT

The study was conducted to provide information on students Willingness to Pay (WTP) for social services provided by tree species on the campus of the Federal University of Agriculture Makurdi (FUAM), Benue State, Nigeria. Random sampling technique was used to select 200 students from 10 Departments of the University. The semi-structured questionnaire was used to obtain data from the students. Vegetation survey was conducted to indentified tree species present in the selected colleges. The result of the study shows that *Albizia zygia* was the dominant tree species on the campus. Majority of the students (86.5%) were willing to pay (WTP) for social services of the tree species while (23.5%) were not WTP. Provision of shade (WMS= 4.19>3.00) and beautification (WMS=3.64>3.00) were the most social services provided by tree species. The mean amount the students were WTP for social tree services was ₦46 per month. Sex of the students differed significantly (P<0.05) from their WTP for the trees social services. Also, there was a significant difference (P<0.10) between the students level of study and their willingness to pay for the trees social services. The major reasons responsible for the insufficiency of trees on the campus as

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stated by the students were clearance for construction purposes (WMS4.15>3.00) and bush burning (WMS=3.62>3.00). It was recommended that harnessing of human, financial and material resources to address issues of sustainability of forest goods and services on the campus of FUAM should be prioritized. School administration, Departmental Staff and students should promote tree planting on campus.

Keywords: Students; willingness to pay; social services; trees; University.

1. INTRODUCTION

Forests are renewable natural resources which provide essential goods and services that are useful to human being [1]. Agbogidi and Eshegbeyi [2] maintained that forests play an important role in contributing to carbon sequestration and other global ecological services such as provision of wood, food, fresh water, fiber, genetic resources and medicines, climate regulation, natural hazard regulation, water purification and waste management amongst others. Forests have been central to human survival for as long as humans inhabited the earth. According to [3], how people use and value forests at a particular place and time, however, depends in large part on their scarcity or abundance relative to changing human needs. Most research related to household use of forest resources in developing countries is concerned with forest depletion and sustainable use of natural resources. The diversity of forest products has attracted renewed attention in recent years. Emery [4] noted that the commercial potential of these products is growing, and their production can improve forest management. Certain products can be economically harvested from the forest while maintaining biodiversity, wildlife habitat, clean air, and clean water as well as social and cultural values. Many non-timber forest benefits, on the other hand, cannot easily be bought and sold such as biodiversity, watershed protection, carbon storage among others. Others generate little or no revenue for the land owner, although they may have significant value to the general public such as aesthetic values. Where non-timber forest benefits are also non-marketed, private land owners will have little motivation to produce them unless compelled to do so. Similarly, public forest agencies may under-estimate the importance of such benefits, which are often less visible than the revenue, taxes and jobs generated by the timber and agriculture industries [3]. [5] noted that the true value of the forest must include not only its productive value as a commodity timber, but also its non-timber use values; which include the indirect use of the forests' environmental service functions and relevant existence values.

In order to formulate and implement management approaches that support the supply of multiple services, quantitative insight into the complete bundle of services and values supplied by protected areas is therefore required [6]. Willingness to pay (WTP) is a concept used by environmental economist to elicit values placed on natural resources by people. UNEP [7] defines willingness to pay (WTP) as the amount an individual is "willing to pay" to acquire some good or service. This amount may be elicited from stated or revealed preference approaches. Israel and Levinson [8] noted that WTP can be used to improve economic growth and environmental quality by analyzing different trends in the population to generate a reversal in conservation projects. Tsi et al. [9] remarked that the WTP for conservation of species often leaves people who must decide in a social dilemma. Carson et al. [10] describes the choice as mechanism that asks each respondent how they would vote if faced with a particular program and the prospect of paying for the program through some means, such as higher taxes. Tsi et al. [9] also noted that the choice is between one's self-interests and those of the community or group. In either case the problem of choice is often affected by attitudes, motivation, perceptions, and culture.

Several studies have been carried out in different localities of the world on peoples WTP for environmental resources. For example, [11] estimated Jordanians WTP for improvement of the national park. Nielsen et al. [12] used a choice experiment to assess the willingness to pay for species composition, height structure, and standing and fallen dead trees in Danish forests. Rambonilaza and Brahic [13] used a choice experiment to estimate the willingness to pay for forest attributes in publicly owned forests representing 15% of all the forests in France. Tilahun et al. [14] valued rural households' willingness to pay for frankincense forest conservation. Kamri [15] assessed Willingness to

Pay for Conservation of Natural Resources in the Gunning Gading National Park, Sarawak. Tisdell and Wilson (2004) [16] noted the knowledge and WTP for the conservation of wildlife species in Australian.

In Africa, studies on WTP for forest resources include [17] who reported on the WTP for the control of water hyacinth in an urban environment of South Africa. [9] documented the willingness to pay (WTP) for the conservation of Derby Eland (*Taurotragus derbianus gigas*) and the African wild dog (*Lycaonpictus*) in North Cameroon. [18] assessed soil degradation, poverty, and farmers' willingness to invest in soil conservation in highland of Southern Ethiopia. In Nigeria, [19] worked on monetization of forest service functions for sustainable management. [20] reported on WTP for rehabilitation of Ibadan urban environment through reforestation projects. [21] conducted economic valuation of forest plants used in traditional treatment of guinea worm (*Dracunculus medinesis* Linn) infections in Ogun State, Nigeria. [22] assessed cooperate organizations WTP for environmental service of forest trees in Abeokuta. Also, [1] used the Contingent Valuation Methods (CVM) to value urban forest in the University of Agriculture in Abeokuta. [23] documented public WTP for ecosystem service functions of a peri-urban forest in Abeokuta. [24] reported residents of neighborhoods WTP for Park development in Makurdi metropolis, Benue State, Nigeria. Studies on the social benefits of forest tree species in the Federal University of Agriculture Makurdi is lacking. Thus, this study was conducted with the aim of investigating the students WTP for social services of tree species in the University for decision and policy making.

2. METHODOLOGY

2.1 Study Area

The study was conducted on the campus of the Federal University of Agriculture Makurdi. The University is one the three Federal Universities of Agriculture established by the Nigerian Government in 1988. The University lies within the coordinates of Latitude 7 47` and 10 00` East and Longitude 6º21` and 8º8` North (Fig. 1). The University occupies an arable land area of 8,040 hectares thus making the University the largest holder of agricultural land area among other institution of its kind. The University is located in the southern guinea savanna. Continuous clearance of the vegetation has led to the development of re-grown vegetation at various stages. Some of trees species found on the University campus includes; *Parkia biglobosa, Khaya senegalensis, Prosopis africana,Vitelleria paradoxa, Danieelli oliveri, Terminalia mentalis,* among others which produce valuable seeds, wood and fruits which are used in industries.

The climate of the University area is of the tropical sub humid with two distinct seasons via: rainy (wet) season which last for about seven (7) months beginning from April down to October and the dry season lasting for about a period of five (5) months cutting across November to March. The annual rainfall range is between 1200-2000 mm.

The Temperature is generally high in the day with a maximum and minimum temperature of 35 and 21 respectively.

2.2 Population, Sampling Procedure and Sample size

The study population consisted of the undergraduate students of University. The University was stratified into the existing ten (10) Colleges. Five (5) Colleges were randomly selected. In each of the selected college, two Departments were randomly selected and in each Department, ten students were randomly selected, giving a total of forty (20) students in each college.

The colleges sampled included: College of Agronomy, College of Engineering, College of Science, College of Agricultural and Science Education and College of Animal Science. Thus, the sample size for the study was 200 students.

2.3 Data Collection

Primary data was used for the study. The Data were generated with aid of semi-structured questionnaire. The data were collected within a period of two months. The questionnaire was divided in the following eight thematic areas:

1. Socio economic characteristic of the students. The closed and open ended questions were used to obtain responses from the students.
2. Social Services provided by trees on campus. Five points Likert scale rating format as used by [25] was adapted to measure the extent of benefits provided by trees social services on the campus. The

weighting scale was derived from the following values with respect to the social services of trees provided on the campus; Very High (VH) = 5, High (H) = 4, Moderate (M) = 3, Low (L) = 2, very Low (VL) =1.

3. Willingness to Pay for trees Social Services and the continued existence of trees on Campus. The closed and open ended questions were used to get the students WTP for the trees social services.
4. Amount Willing to Pay for social tree services for the conservation of tree species. The elicited monetary values of social services of tree species were obtained through the Payment Card System (CPS) of Contingent Valuation Method (CVM) as used by [21] and [26]. The students were asked to indicate the maximum amount they will be WTP per month for social services provided by the tree species from their allowances.
5. Reasons for Students not WTP for conservation of tree species. The multi-choices question format was used to get the students responses on the reasons were not WTP for social services of the tree species.
6. Distribution of tree species on the campus. The "Yes or No" question type was used to get the students response on the distribution of tree species on the campus.
7. Students reasons for trees been insufficient on campus. Five points Likert weighted scale rating format as used by [25] was adapted to measure the reasons for the insufficiency of trees on campus. The weighting scale was derived from the following values with respect to the insufficiency of tree species on the campus; Strongly Agree (SA) = 5, Agree (A) = 4, Undecided (M) = 3, Disagree (D) = 2, Strongly Disagree (SD) =1.

Two hundred (200) questionnaires were distributed to students in the selected colleges in the University out of which one hundred and sixty-three questionnaires were returned which amounted to 81.5% of questionnaires collected for analysis.

The questionnaire administration was carried out concurrently with vegetation survey to indentify tree species present in the selected Colleges. The tree species were identified with the assistance of a Taxonomist in the Department of Forest Production and Products of the University Agriculture Makurdi. In each of the colleges, the different tree species were counted and recorded accordingly.

2.4 Data Analysis

Descriptive statistics such as frequency mean and percentage were used to present result for socioeconomic characteristic of the students, tree species on campus, WTP for, or not on tree species and distribution of the tree species on campus.

Following [21], the mean WTP for social services of trees on campus was expressed as:

$$WTP = \frac{\sum fx}{n}$$

where:

WTP= mean willingness to pay value
∑= Summation sign
f = frequencies of mention of tree species
x = Species value in Naira (N) and
n = Number of respondents

The Likert rating Mean Score (MS) of the student was expressed as:

$$MS = \frac{\sum f}{n}$$

where:

f = Sumation of the five point rating scale and
n = Number of points

Therefore, for a five point Likert scale, MS is expressed as:

$$MS = \frac{1 + 2 + 3 + 4 + 5}{5}$$

$$MS = 3.0$$

The Likert Weighted Mean Score (WMS) is expressed as:

$$WMS = \frac{\sum_{i=1}^{n} f_i x_i}{N}$$

Where:

f = frequency of respondent
x = Likert scale point
N= Total Number of respondents

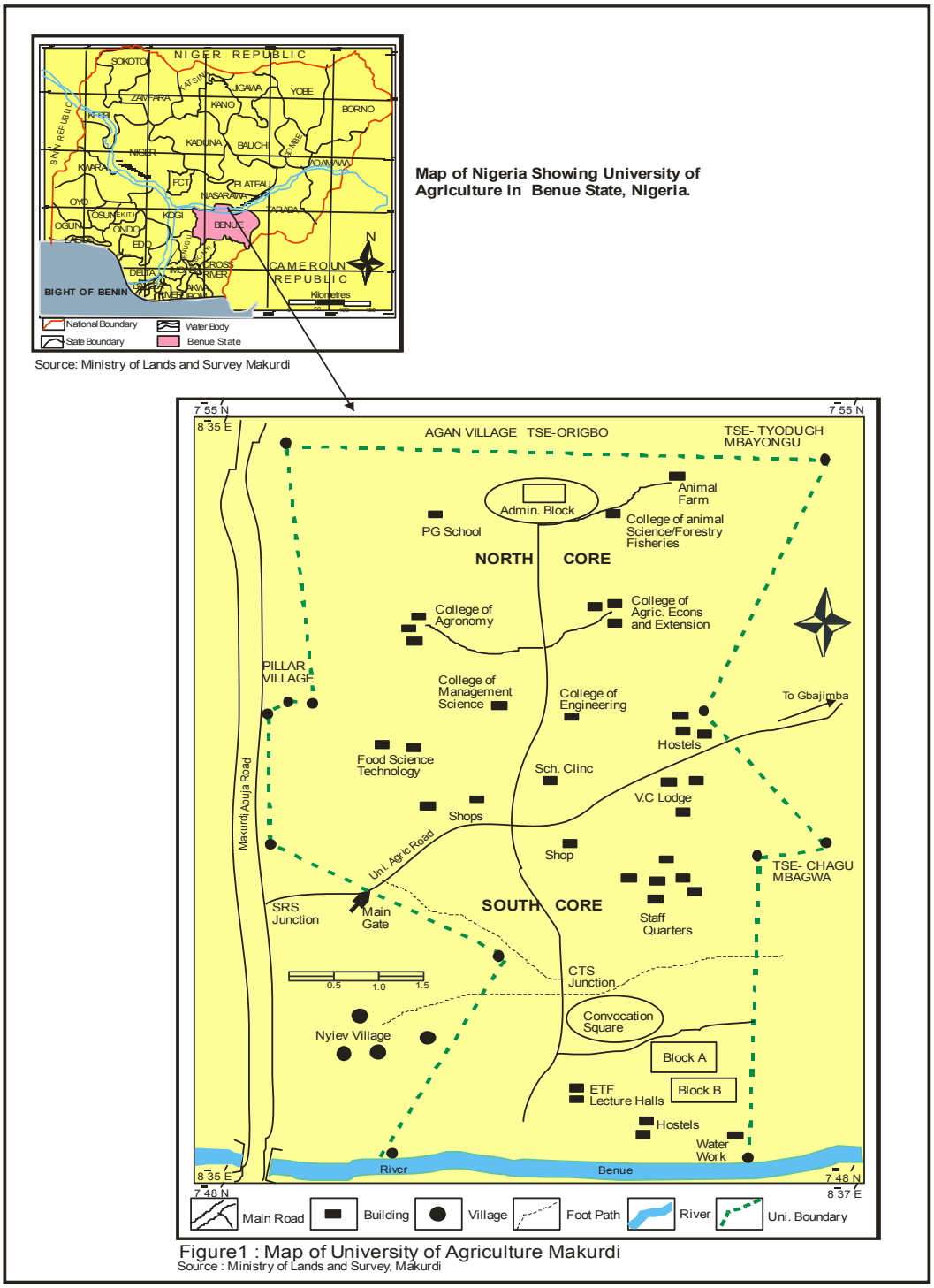

Fig. 1. Map of the study area

Source: Benue State ministry of land and survey

Using the interval scale of 0.05, the Upper Limit (UL) cut-off is MS+0.05 (3.0+0.05 = 3.05). The Lower Limit (LL) cut-off is MS - 0.05 (3.0-0.05 = 2.95). Based on these two extreme limits any variable with WMS below 2.95 (WMS<2.95) was considered 'Low'. Variable with MWS between

2.95 and 3.05, 'Moderate' any variable MWS greater than 3.05 (MWS>3.05), 'High'.

The Mann-Whitney U test (U) as used by [27] was used to test for the significant difference between Gender and willingness to pay for trees social services on the campus.

The Mann-Whitney U test (U) is expressed as:

$$U = n_1 n_2 + \frac{n_2(n_2+1)}{2} - \sum_{i=n_{11}+1}^{n_2} R_i$$

where:

U=Mann-Whitney U test
N_1 = sample size one
N2= Sample size two
R_i = Rank of the sample size

Kruskal-Walis H test was used to test for significant relationship between Departments, level of study of the students and their willingness to pay for trees social services.

$$H = (N-1)\frac{\sum_{i=1}^{g} n_i(\bar{r_i} - \bar{r})^2}{\sum_{i=1}^{g}\sum_{j=1}^{n_i}(r_{ij} - \bar{r})^2}$$

where:

H = Kruskal-Walis
n_i = Number of observations in group *i*
r_{ij} = the rank of obsrvations j from group *i*
N = Total number of observations across all groups

3. RESULTS

3.1 Socio-economic Characteristics of the Students

The socio economic characteristics of students of the University are shown in Table 1. Female (52.76%) interviewed were more than the male students (47.24%). The age category of 21-25 years was highest (57.1%) while the age category of 30 and above was the lowest age group (3.1%). The mean age of the students was 23 years. Majority of the students were single (93.3%) while 6.7% were married. Based on the monthly allowance of the students, 52.8% of the students receive allowance in the category of ₦1000-5000 monthly and 19.6% of students receive allowance of ₦10,100 and above monthly making them the highest and lowest respectively. In terms of the level of students, 25.77% of the students that provided information were at 100 levels while 9.82% were at 400 levels.

3.2 Tree Species from the Selected Colleges

A total of 28 different tree species were identified on the campus of the University with *Albizia zygia having* the highest percentage occurrence of (19.30%) and was followed by *Terminalia mentalis* (13.29%) and *Delonix regia* (8.86%).

Table 1. Socio-economic characteristics of the students

Characteristics	Category	Frequency (n=163)	Percentage (%)
Sex	Male	77	47.24
	Female	86	52.76
Age (Yrs)	15-20	33	20.2
	21-25	93	57.1
	26-30	32	19.6
	30 and above	5	3.1
Mean age (Yrs)	23		
Marital status	Single	152	93.3
	Married	11	6.7
Monthly allowance (N)	1000-5000	86	52.8
	5100-10000	45	27.6
	10100 and above	32	19.6
Level of study	100	42	25.77
	200	39	23.93
	300	36	22.09
	400	16	9.82
	500	30	18.40

Other tree species found in the University which were among the top ten tree species were *Polylathia longifera (*8.86%), *Azadirachta indica (*7.91%), *Moringa oleifera (*5.70%), *Daniella oliveri (*5.38%), *Gmelina arborea, (*4.75%), *Ficus sycomorus (*4.75%) and *Hura cripitens (*3.48%). The least five tree species found in the University were *Pilistigma thornigii (*0.32*%), Khaya senegalensis (*0.32*%), Detarium microcapum (*0.32*%), Stereospermum kunthianum (*0.32*%),* and *Anogiosus leoicarpa (*0.32*%).*

3.3 Social Services Provided by Trees on Campus

The social services provided by trees on campus are shown in Table 3. Provision of shade was the highest social service provided by tree species on the campus (WMS= 4.19>3.00) followed by beautification of the environment (WMS= 3.64>3.00). Other very high social services provided by tree species were landscaping / viewing (WMS=3.45>3.00), health benefit (WMS=3.32>3.00), recreation (WMS=3.30> 3.00), enhance social cohesion (WMS=3.17> 3.00) and improving academic performance (WMS=3.12>3.00).

3.4 Willingness to Pay for Trees Social Services and the Continued Existence of Trees on Campus

Table 4 shows the students willingness to pay for social benefits of trees on the campus. The students who were willing to pay for the social services of the trees were (86.50%) while 13.50% of the students were not willing to pay for tree services.

3.5 Amount Willing to Pay for Social Tree Services for the Conservation of Tree Species

The amount willing to pay for social tree services for the conservation of tree species is shown in Table 5. Majority of the students (73.76%) were willing to pay between ₦100-500 per month.

Table 2. Tree species on campus from selected colleges

Tree specie	F*	%	Ranking
Albizia zygia	61	19.30	1
Terminalia mentalis	42	13.29	2
Delonix regia	28	8.86	3
Polylathia longifera	28	8.86	4
Azadirachta indica	25	7.91	5
Moringa oleifera	18	5.70	6
Daniella oliveri	17	5.38	7
Gmelina arborea	15	4.75	8
Ficus sycomorus	13	4.11	9
Hura cripitens	11	3.48	10
Prosopis Africana	10	3.16	11
Cascia spectabilis	8	2.53	12
Vitex doniana	7	2.22	13
Mangifera indica	6	1.90	14
Sarcocephalus latfolius	4	1.27	15
Anacardium occidentale	3	0.95	16
Cocos nucifera	3	0.95	17
Ficus exaspirata	2	0.63	18
Vitellaria paradoxa	2	0.63	19
Citrus sinensis	2	0.63	20
Strychnos spinosa	2	0.63	21
Elaese guinensis	2	0.63	22
Eucalyptus camaldulensis	2	0.63	23
Pilistigma thornigii	1	0.32	24
Khaya senegalensis	1	0.32	25
Detarium microcapum	1	0.32	26
Stereospermum kunthianum	1	0.32	27
Anogiosus leoicarpa	1	0.32	28
Total	316	100	-

Others were willing to pay between N600-1000 (17.02%), ₦1100-1500 (2.84%), ₦1600-2000 (3.55%) and ₦2000 and above (2.84%). The mean amount per month the students were willing to pay was ₦46.

3.6 Amount Willing to Pay by Male and Female Students for Social Tree Services in the University

Table 6 presents the results of the amount of money in naira the male and female students were willing to pay for the social services of trees. The male students (44%) were WTP ₦18,160 yearly giving a mean yearly amount of ₦293 and mean monthly amount WTP of ₦24. The female students (56%) were WTP ₦20,520 with mean yearly amount WTP of ₦260 and mean monthly amount WTP of ₦22. On yearly basis, the mean amount WTP by the students was ₦553 and while the monthly mean WTP ₦46.

3.7 Reasons for Students not Willing to Paying for Conservation of Tree Species

Table 7 shows the reasons the students were not willing to pay for conservation of the tree services on the campus. Twenty six students were not WTP for the conservation of tree species on the campus. The reasons put forward by the students were financial constraints (34.62%), responsibility of the school administration (34.62%), trees were free gift of nature (15.38%), responsibility of the ₣Federal Government (7.69%) and trees are sources of nuisance (7.69%).

Table 3. Social services provided by trees in the study area

Services	VL	L	M	H	VH	N	MS	WMS	D
Provision of shade	O(0)	7(14)	37(11)	37(148)	82(410)	163	683	4.19	VH
Beautification	3(3)	17(34)	58(174)	43(172)	42(210)	163	593	3.64	VH
Landscaping / viewing	6(6)	20(40)	68(204)	33(132)	36(180)	163	562	3.45	VH
Health benefit	10(10)	26(52)	59(177)	38(152)	30(150)	163	541	3.32	VH
Recreation	3(3)	34(68)	64(192)	35(140)	27(135)	163	538	3.30	VH
Enhance social cohesion	9(9)	29(58)	71(213)	33(132)	21(105)	163	517	3.17	VH
Improving academic performance	25(25)	20(40)	54(162)	39(156)	25(125)	163	508	3.12	VH

Number of students (N) = 163, Mean score (MS) = 3.0, Upper Limit (UL) = 3.05, Lower Limit (LL) = 2.95.
Note: Values in the brackets are products of Likert scale values and values outside the brackets are frequency of the students
VL= very low, L= low, M= moderate, H= high, VH= very high, N= total number of frequency, WMS=weighted mean score, D= decision

Table 4. Willingness to pay for trees social services and distribution of trees in the study area

Willingness to pay	Frequency	Percentage
Yes	141	86.5
No	22	13.5
Total	163	100

Table 5. Amount willing to pay social tree services for the conservation of tree species in the study area

Amount (₦)	Frequency	Percentage
100-500	104	73.76
600-1000	24	17.02
1100-1500	4	2.84
1600-2000	5	3.55
2000 and above	4	2.84
Total	141	100

Mean WTP= N46

Table 6. Amount willing to pay by male and female students for social tree services for the conservation of tree species

Gender	F	%	Total yearly amount WTP(N)	Mean yearly amount WTP(N)	Mean monthly WTP(N)
Male	62	44	18160	293	24
Female	79	56	20520	260	22
Total	141	100	38680	553	46

Table 7. Reasons for students not paying for tree species conservation

Reasons for not Paying	F*	%	Ranking
Financial constraint	36	34.62	1
Responsibility of the school administration	36	34.62	2
Free gifts of nature	16	15.38	3
Responsibility of the federal government	8	7.69	4
Source of nuisance	8	7.69	5
Total	104	100	

**Multi-choice response*

3.8 Distribution of Tree Species on the Campus

Table 8 shows the students responses on the distribution of tree species on the campus. Majority of students (62%) reported that tree species were insufficient on campus while 38% of the students were of the opinion that trees were sufficient on the campus.

Table 8. Distribution of trees on campus

Enough tree distribution	F	%
Yes	62	38
No	101	62
Total	163	100

3.9 Students Agreement on Reasons for Trees Been Insufficient on Campus

The students' agreements on reasons for insufficiency of trees on campus are presented in Table 9. The students seriously agreed on all the reasons put forward to them that could be responsible for the insufficiency of tree species on the campus. The reason the students mostly agreed on as been responsible for the insufficiency of trees on the campus is Clearance for construction purpose (WMS4.15>3.00) followed by Bush burning (WMS=3.62>3.00). Other reasons put forward by the students were farming activities (WMS=3.48>3.00), illegal felling (WMS=3.48>3.00), Animal grazing (WMS=3.42>3.00) and Wind (WMS=3.25>3.00).

3.10 Relationship between Sex of the Students and Willingness to Pay for Trees Social Services

The Mann-Whitney U test used to test for significant~~ce~~ difference between sex of the students and their willingness to pay for the trees social services is presented in Table 10. There was a significant difference ($P<0.05$) between sex of the students and their willingness to pay for the trees social services.

Table 9. Reasons for trees been insufficient on campus

Reasons	SD	D	UD	A	SA	N	MS	WMS	D
Clearance for construction purpose	1(1)	10(20)	16(48)	41(164)	95(475)	163	676	4.15	SA
Bush burning	8(8)	26(52)	34(102)	47(188)	48(240)	163	590	3.62	SA
Farming activities	10(10)	34(68)	35(105)	35(140)	49(245)	163	568	3.48	SA
illegal felling	8(8)	34(68)	32(96)	50(200)	39(195)	163	567	3.48	SA
Animal grazing	4(4)	35(70)	41(123)	54(216)	29(145)	163	558	3.42	SA
Wind	10(10)	37(74)	42(126)	50(200)	24(120)	163	530	3.25	SA

Number of students (N) = 163, Mean score (MS) = 3.0, Upper Limit (UL) = 3.05, Lower Limit (LL) = 2.95.
Note: Values in the brackets are products of Likert scale values and values outside the brackets are frequency of the students.
SD= Strongly Disagree, D= Disagree, UD= Undecided, A= Agree, SA= Strongly Agree, N= total number of frequency, WMS=weighted mean score, D= decision

Table 10. Mann-Whitney test of relationship between sex of the students and willingness to pay for trees social services

Test Variable	U. Value	P. value	Decision
Sex of Students Vs WTP	1089	0.05	Significant

Significant Level= 0.05

Table 11. Kruskal-Wallis test of relationship between departments, level of study of the students and willingness to pay for trees social services

Test Variables	H. Value	P. value	Decision
Departments Vs WTP	1103.5	0.10	Significant
Levels of Study Vs WTP	1098.5	0.09	Significant

3.11 Relationship between Departments, Level of Study of the Students and Willingness to Pay for Trees Social Services

The Kruskal-Wallis H test used to test for significant~~ce~~ difference between the Departments, level of study and their willingness to pay for the trees social services is shown in Table 11. There was a significant difference (P=0.10) between the departments of the students and their willingness to pay for the trees social services. Also, there was a significant difference (P<0.10) between the students level of study and their willingness to pay for the trees social services.

4. DISCUSSION

High numbers of the students were willing to pay some amounts for social services of tree species on the campus. Their willingness to pay indicates the importance they place on tree species. This finding corroborates the assertion by [9] that high level of WTP for the conservation of species in Northern Cameroon shows that conservation has been seen by respondents as important. This finding also agrees with [24] that many persons were WTP for park development in Makurdi metropolis, Benue State, Nigeria. This is also similar to the works of [20] and [21] in which 77% the respondents were WTP for the environmental service functions of the forest. It also agrees with [28] that 87.3% of their respondents were willing to pay in cash and kind for church forest conservation in Ethiopia.

However, the finding of this study contradicts the results obtained by [1] that the people not WTP for environmental service functions of forest trees in University of Agriculture Abeokuta were more than the people WTP. Similarly, [29] reported that (78.3%) of their respondents were not WTP for environmental service function of mangrove forest in Uzere, Delta State, Nigeria. [23] also observed that 54% of their respondents were not willing to pay for ecosystem service functions of a peri-urban forest in Abeokuta, Nigeria.

There was a variation between male and female in the elicited amounts they were willing to pay for social services of the trees. Whereas the males were willing to pay a mean amount of ~~₦~~24, females were willing to pay a mean amount N22 per month. This is an indication that sex play a role in the determination of amount a person may be willing to pay for services provided by trees. This finding agrees with [1] who submitted that males were willing to pay higher amount for tree services than the females at the University of Agriculture Abeokuta.

The mean yearly and monthly students WTP of ~~₦~~553 and ~~₦~~46 respectively compares well with the WTP figures of ~~₦~~444.50 obtained by [24] in Makurdi metropolis. It is also similar to [9] where the people were WTP from 50-500 FCFA (10¢ to US $1) for wildlife conservation in North Cameroon and some individuals were willing to accept a deduction at source of 50 FCFA (10¢) from their monthly salaries. Their findings also revealed that international visitors were willing to pay RM16.14 for conservation fee compared to local visitors at only RM 7.38. The finding is also supported by [30] who estimated the value of ~~the~~ social and environmental benefits of forestry to the people of Britain at around £1 billion per year. [31] ascertained annual value of the ecosystem services provided by one hectare of German forests at about 319 Pounds.

This study found that male and female students differ significantly in their willingness to pay for the trees social services in the University. This finding could be attributed to the differences in which male and females view and appreciated

natural resources. This finding agrees with [15] that gender significantly influence peoples willingness to pay for conservation of natural resources in the Gunung Gading National Park, Sarawak, Malaysia. The result is also in line with [32] that gender influences WTP for nature conservation policies in state-owned forests in Austrian. However, the finding contradicts [33] who found no significant difference between gender and willingness to pay for conservation of selected Zoos in Southwest Nigeria. In same vein [34] found that gender have no influence on the student's environmental conservation awareness among secondary school students in Makurdi local government area of Benue State, Nigeria.

There was a significant difference between the Departments (course of study) of the students and their willingness to pay for the trees social services. This may be due to level of exposure of the students to environmental services of trees. This finding is in line with the submission by [35] that when students are actively involved in environmental issues, they demonstrate interest to learn about environmental topics. Also, there was a significant difference between the students' level of study and their willingness to pay for the trees social services. This finding agrees with [15] that education is a significant variable in influencing peoples WTP for conservation of natural resources. Also, [36] agrees that education significantly influence WTP for forest resources in India. [34] agrees that the class of students has a significant role in determining the student's level of environmental awareness. The higher the class the higher the level of environmental awareness as student in the higher class tends to be more aware of environmental conservation than the students in the lower classes. [16] asserted that the degree of knowledge that individuals have of different wildlife species influences their economic valuation of the different species and their willingness to pay for their conservation. Also, [1] noted that the higher the income and educational level of an individual the more the willingness to pay for forest service function especially in a campus environment. However, [33] reported that education do not significantly influence peoples willingness to pay for conservation of selected Zoos in Southwest Nigeria.

The highest social service provided by the tree species on campus was provision of shade. Other services provided by the trees were beautification of the environment, landscaping / viewing, health benefit, recreation, enhanced social cohesion and improving academic performance. This finding agrees with [22] and [1] that provision of shade was the highest service provided by trees in the campus of University of Agriculture, Abeokuta, Ogun State, Nigeria. Other services provided by trees in that University were Climatic amelioration, Air pollution reduction and Ornamental, aesthetics food medicinal services.

The reason the students mostly agreed on as been responsible for the insufficiency of trees on the campus is clearance for construction purpose. Other reasons put forward by the students were bush burning, farming activities, illegal felling, animal grazing and Wind. This finding is in consonance with [37] that forest is been lost as a result of fragmentation and this represents a global threat to the forest land. [38] estimated that over 350,000 ha of forest and natural vegetation are lost annually due to farming. [39] also supported the finding that farming activities such as slash, clear cutting and burning play a major role in influencing the plant community composition and structure in Agoi-Ekpo, Cross River State Nigeria. These farming activities bring about rapid change in vegetation characteristics and the continuous cultivation of land results in the alteration of the forest vegetation. The burning of forest after clearing may hinder rapid vegetation regeneration, because the propagules that would have facilitated vegetation re-growth are killed or destroyed by the fire [40]. Agriculture, basically farming among other human activities has left distinctive imprints on plant communities by altering their richness and density [41]. Thus, [42] and [43] noted that small trees are much more vulnerable to destruction as they suffer severe injury and check back than larger ones.

5. CONCLUSION

The study has established that students of FUAM were aware of the social services provided by tree species in the University. Majority of the students were WTP for social services of the tree species to ensure conservation and continuous existence of these trees on campus. The most reason advanced by the students for their unwillingness to pay for social tree services were financial constraints. The highest social service provided by the tree species on the campus is provision of shad. Other services provided by the trees wee beautification of the environment, landscaping / viewing, health benefit, recreation, enhance social cohesion and improving

academic performance. The study also documented variation in the elicited amounts the male and female students were WTP for social services of the trees on campus. The students significantly differed in their willingness to pay for the trees social services in the University. Also, there was a significant difference between the students' level of study and their willingness to pay for the trees social services indicating that level of studies influences students WTP for natural resources. Clearance of the tree species on campus for construction purpose was the major reason responsible for the insufficiency of trees on the campus. Other reasons put forward by the students were bush burning, farming activities, illegal felling, animal grazing and Wind. There is need to pool human materials and financial resources together to address issues relating to sustainability of forest goods and services. Therefore, awareness rallies should be conducted to intimate the students and the general populace on the importance of trees on the campus especially during remarkable days. Individuals, private firms and the government should invest in this sector through plantation establishment, reforestation, and recreational centers to ensure continual provision of the services to the people.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

REFERENCES

1. Adekunle MF, Momoh S, Agbaje BM. Valuing urban forests: The application of contingent valuation methods. Ethiopian Journal of Environmental Studies and Management. 2008;1(2):61-67.
2. Agbogidi OM, Eshegbeyi OF. Forestry development for a safe environment. In: Onykwelu JC, Adekunle VAJ, Oke DO. (eds.). Research for development in forestry, forest products and natural resources management. Proceedings of the 1st national conference of the forests and forest products society of Nigerian (FFPN) held at the Federal University of Technology, Akure, Ondo State. 2008;95-98.
3. Bishop JT. (ed). Valuing forest: A review of methods and application in developing countries International Institute for Environment and Development, London (LLED); 1998.
4. Emery MR. Invisible livelihoods: Non-timber forest products in Michigan's Upper Peninsula. Ph.D. Dissertation, Rutgers University, New Brunswick; 1998.
5. Ajewole OI. Economic valuation of environmental service functions of forest in Ibadan metropolis. Department of Forest Resources Management, University of Ibadan, Nigeria. 2001;1(2):2-16.
6. Hein L. Economics benefits generated by protected areas: the case of Hoge Veluwe forest, the Netherlands: Ecology and Society. International day for biological diversity, 2011. Forest Biodiversity: Earth's living Treasure. Published by the Secretariat of the Convention on Biological Diversity. 2011;16.
   Available:http://www.ecologyandsociety.org/vol16/iss2/art13
7. United Nations Environmental Programme (UNEP). Global biological diversity assessment. Annex 6, Convention of Biodiversity; 1995.
8. Israel and Levinson. Willingness to pay for environmental quality: Testable empirical implications of the growth and environment literature. Contributions to Economic Analysis and Policy, the Berkeley Electronic Press; 2004.
   Available:http://www.bepress.com/bejeap
9. Tsi EA, Ajaga N, Wiegleb G, Mühlenberg M. The willingness to pay (WTP) for the conservation of wild animals: Case of the derby eland (*Taurotragus derbianus* gigas) and the African wild dog (Lycaon pictus) in North Cameroon. African Journal of Environmental Science and Technology. 2008;2(3):051-058.
   Available:http://www.academicjournals.org/AJest
10. Carson RT, Wright JL, Carson NJ, Alberini A, Flores NE. A bibliography of contingent valuation studies and papers. La Jolla, CA: NRDA, Inc; 1995.
11. Jabarin AS, Damhoureyeh SA. Estimating the recreational benefits of Dibeen National Park in Jordan using contingent valuation and travel cost methods. Pakistan Journal of Biological Sciences. 2006;9(12):2198-2206.
12. Nielsen AB, Olsen SB, Lundhede T. An economic valuation of the recreational benefits associated with nature-based forest management practices. Landsc. Urban Plan. 2007;80:63-71.
13. Rambonilaza T, Brahic E. Non-market values of forest biodiversity and the impact

of informing on the general public: Insights from generalized multinomial logit estimations. Environ. Sci. Policy. 2016;64:93-100.

14. Tilahun M, Mathijs E, Muys B, Vranken L, Deckers J, Gebregziabher K, Gebrehiwot K, Bauer H. Contingent valuation analysis of rural households' willingness to pay for frankincense forest conservation. EAAE 2011 Congress Change and Uncertainty Challenges for Agriculture, Food and Natural Resources August 30 to September 2, 2011 ETH Zurich, Zurich, Switzerland; 2011.
15. Kamri T. Willingness to pay for conservation of natural resources in the Gunung Gading National Park, Sarawak. Social and Behavioral Sciences. 2013;101:506-515.
16. Tisdell C, Wilson C. Knowledge and willingness to pay for the conservation of wildlife species: Experimental results evaluating Australian tropical species. Working Paper; 2004.
Available:https://www.researchgate.net/publication/37621717
17. Law MC. Willingness to pay for the control of water hyacinth in an urban environment of South Africa', Master's thesis, Rhodes University; 2008.
18. Tessema W, Holden S. Soil degradation, poverty, and farmers willingness to invest in soil conservation: A case from a Highland in Southern Ethiopia. Proceedings of the Third International Conference on the Ethiopian Economy, 2:147-164. Addis Ababa, Ethiopia: Ethiopian Economic Association; 2006.
19. Ajewole OI, Popoola L. Monetization of forest service functions for sustainable forest management. Journal of Environmental Extension, University of Ibadan. 2001;1(1):7-21.
20. Popoola L, Ajewole O. Willingness to pay for rehabilitation of Ibadan urban environment through reforestation projects. International Journal of Sustainable Development. 2002;9(2):5-23.
21. Adekunle MF. Economic valuation of forest plants used in traditional treatment of guinea worm (*Dracunculus medinesis* Linn) infections in Ogun State, Nigeria. Ph.D. Thesis, Department of Forestry and Wildlife Management, University of Agriculture Abeokuta. 2005;199.
22. Adekunle MF, Adedokun MO, Adedoja AA. Willingness to pay for environmental service of forest trees by cooperate organizations. Paper presented at the Farm Management Association of Nigerian Conference, Jos, Nigeria; 2006.
23. Adekunle MF, Agbaje BM. Public willingness to pay for ecosystem service functions of a Peri-urban forest in Abeokuta. Proceedings of the Environmental Management Conference, Held at the Department of Forestry and Wildlife Management, College of Environmental Resources Management. Federal University of Agriculture, Abeokuta, Nigeria; 2011.
24. Samuel CO, Tee NT, Ancha PU. Residents of neighborhoods willingness to pay for park development in Makurdi metropolis, Benue State, Nigeria. International Journal of Innovative Research and Development, 2019;8(3):12-18.
Available:www.ijird.com
25. Dagba BI, Azeez IO, Ancha PU. Assessment of community based forest management practices in Benue State, Nigeria. Journal of Environmental Science, Toxicology and Food Technology. 2017; 11(2):1-13.
26. Nikodinoska N, Foxcroft LC, Rouget M, Paletto A, Notaro S. Tourists' perceptions and willingness to pay for the control of *Opuntia stricta* invasion in protected areas: A case study from South Africa', Koedoe. 2014;56(1):1-8.
Available:http://dx.doi.org/10.4102/koedoe.v56i1.1214
27. Mustapha A. Application of Mann-Whitney U test non-parametric statistical tool to temperature variation in Kano metropolitan, Nigeria. International Journal of Innovative Environmental Studies Research. 2013;1(3):69-76.
Available:www.seahipub.org
28. Endalew B, Wondimagegnhu BS. Determinants of households' willingness to pay for the conservation of church forests in Northwestern Ethiopia: A contingent valuation study. Cogent Environmental Science. 2019;5:1-14.
Available:https://doi.org/10.1080/23311843.2019.1570659
29. Kesiena TO, Saka OJ, Opeyemi IA. Willingness to pay for environmental service function of mangrove forest in Uzere, Delta State, Nigeria. Journal of Resources Development and Management. 2014;16:1-7.
Available:www.iiste.org

30. Kenneth GW, Guy G, Riccardo S, Neil P, Andrew L, Ian JB, Nick H, Douglas CM. The social and environmental benefits of forests In Great Britain, Phase 2. Centre for Research in Environmental Appraisal and Management University of Newcastle; 2004.
Available:www.forestry.uk.gov/sustainableforestry
31. Bösch M, Elsasser P, Franz K, Lorenz M, Moning C, Olschewski R, Rödl A, Schneider H, Schröppel B, Weller P. Forest ecosystem services in rural areas of Germany: Insights from the national TEEB study. Ecosystem Service. 2018;31:77–83.
32. Getzner M, Meyerhoff J, Schläpfer F. Willingness to pay for nature conservation policies in state-owned forests: An Austrian case study. Forests Forests. 2018;9:537.
Available:www.mdpi.com/journal/forests
33. Adetola BO, Adedire OP. Visitors' motivation and willingness to pay for conservation in selected Zoos in Southwest Nigeria. Journal of Applied Science and Environmental. Management. 2018;22(4): 531-537.
Available:https://www.ajol.info/index.php/jasem
34. Ikyaagba ET, Ancha PU, Ojebade JW, Gbande S, Adia JE. Environmental conservation awareness among secondary school students in Makurdi local government area of Benue State, Nigeria. 2018; 6(1):8-17.
Available:https://www.academicresearchjournals.org/ARJB/Index.htm
35. Trumper R. How do learners in developed and developing countries relate to environmental issues? Science Education International. 2010;21(4):217–240.
36. Jaina A, Chandrab G, Nautiyalb R. Valuating intangible benefits from afforested areas: A case study in India. Economía Agraria y Recursos Naturales. 2017;17(1):89-100.
37. Millennium Ecosystem Assessment (MEA). Ecosystem and human well-being synthesis island press. Washington D. C. USA; 2005.
38. Nigerian Environmental Study/Action Team (NEST), The challenge of Sustainable Development in Nigeria, T. Nest Ibadan; 1991.
39. Iwara AI, Deekor TN, Njar GN. Effect of farming activities on tree diversity, density and community structure in Agoi-Ekpo, Cross River State, Nigeria. Nova Journal of Engineering and Applied Sciences. 2014;2(2):1-7.
40. Aweto AO. Trees in shifting and continuous cultivation farms in Ibadan area, Southwestern Nigeria. Landscape and Urban Planning. 2001;53(3):22-30.
41. Makana JR, Thomas SC. Impacts of selective logging and agricultural clearing on forest structure, floristic composition and diversity, and timber tree regeneration in the Ituri forest, Democratic Republic of Congo. Biodiversity and Conservation. 2006;15:1375-1397.
42. Jonkers WBJ. Vegetation structure, logging damage and silviculture in tropical rainforests in Suriname. The Netherlands Agricultural University, Wageningen; 1988.
43. Kasenene JM, Murphy PG. Post-logging mortality and major branch losses in Kibale forest, Uganda. Forest Ecology and Management. 1991;46:295-307.

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