

Article

Students' Willingness to Plant Trees and Pay for Their Maintenance on Campuses in the Democratic Republic of Congo

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Abstract: There is a growing interest in greening schools, campuses, and workplaces due to the perceived ecosystem services provided by trees. However, students' willingness to participate in and financially support the greening process is less examined. Using a questionnaire survey based on the contingent valuation method (CVM) and Likert scale, 1278 students from 13 universities were interviewed on their willingness to participate in tree planting and pay for their maintenance to promote green and clean campuses in the Democratic Republic of Congo (DRC). Most of the students interviewed were male (61%) and enrolled as undergraduates (60%). While 65% of the respondents agreed with the idea of planting trees, this agreement was significantly associated with students' awareness of climate change, the university attended, and the sources of information on the roles of trees in the community. The binary logit results showed that university courses (environment-related) and television broadcasts significantly affected students' willingness to participate in tree planting. Overall, students (70%) agreed to pay for tree maintenance, and their willingness to pay (WTP) was estimated mainly at less than USD 5 per year. The price to pay was a significant factor in determining students' willingness to pay for tree maintenance. Findings suggest that students' willingness to support tree planting and maintenance is a crucial factor for academic authorities and planners to consider in order to successfully implement green infrastructures to improve the campus environment and make educational and work spaces sustainably attractive.

Keywords: university students; environmental challenges; tree planting; ecosystem services; willingness to pay

1. Introduction

Urbanization has emerged as one of the 21st century's most transformative trends with multifarious (positive as well as negative) impacts on the well-being of humans and the environment [1]. Although many experts argue that urbanization is generally linked to economic growth [2,3], it has simultaneously resulted in a number of ecological problems, mostly associated with the loss or degradation of green spaces [4,5]. Recently, Nguyen and colleagues [6] have indicated that the spatial expansion of cities has led to the removal of the original vegetation cover and its replacement by a diversity of anthropogenic land uses, e.g., housing construction—which has caused profound impacts on urban forest ecosystems.

In tropical areas, land use/cover changes have resulted in losses of 89% in the estimated value of eight ecosystem services, including climate regulation, water flow regulation, erosion control, and moderation of disturbance and nutrient cycling [7]. Further, the concentration of higher education institutions in cities and the need to expand university facilities often lead to the removal of trees from campuses. For example, in Nigeria, at the University of Ibadan Campus, 323 trees of different species were removed from the Faculty of Education area due to the construction going on and the perceived threats of old trees to the buildings [8]. Places where trees are removed often experience rapid loss of tree cover, leading to reduced provision of environmental services, such as shade, moderation of heat, and carbon capture [9,10].

To date, there is a growing interest in greening university campuses and workplaces due to the perceived positive effects of trees on people's well-being [11–13]. Tree planting provides various goods and services [14] and has been perceived as a panacea to a variety of problems, including climate change, biodiversity loss, and resilience of ecosystem loss [15,16]. Turner-Skoff and Cavender [17] argue that the presence of trees cools buildings, adds value to properties in a neighborhood, and improves students' attention and test scores. Recently, Kuo and coworkers [18] have found significant and positive relationships between school greenness and achievement in 450 public schools in Washington State among sixth-graders. These authors concluded that tree canopy within 250 m of a school predicted better performance in both reading and mathematics test scores. Additionally, Wang and collaborators [19] explain how trees on university campuses provide more energy-saving and aesthetic benefits.

In northern cities where the presence of trees on campuses has been largely studied and is therefore considered an integral part of campus landscapes [13,18,20], the barriers to extending tree planting, and the willingness to pay for their preservation and maintenance, have also been assessed [21–23]. Interviews conducted with government policymakers, planning practitioners, and urban residents showed that the main obstacles to green infrastructure implementation are living experience and funding issues [21], a low level of understanding of the roles trees play, and negative perceptions of them among city residents [24].

Additionally, in many cities, decision-makers and planners are also short of data likely to maximize the environmental benefits provided by trees [5]. Studies by [22,25] argue that the willingness to participate in green infrastructure implementation and preservation is variably associated with socioeconomic factors (income, gender, price cost, people's perception, and education level). In the study country, it has been reported that people with a social science education background perceive more ecosystem services of green spaces than people with applied science and technical profiles do [26]. Further, the perception of environmental threats can lead people to plant trees [15,27,28].

In the DRC, where the spatial expansion of cities has profoundly led to the loss of trees and green spaces [5–29], assessing the participation of students in tree planting today is essential, as it can stimulate and support projects and policies oriented toward the establishment and the preservation of urban forestry. In the study area, many university campuses are established on large lots, where trees, lawns, and flowers can still be planted to make campuses greener, cleaner, and more attractive, and allow the recycling of abundant

biodegradable waste [30], as well as air purification [31]. Therefore, understanding the factors that shape people's willingness to participate in tree planting and pay for their maintenance can be the main driving force of green infrastructure implementation within a community; in this case, on campuses [22,23,25].

The present study was designed to assess students' willingness to participate in tree planting and pay for their maintenance to promote green and clean campuses in the DRC. We hypothesized that (i) male students enrolled at license-level in the faculties of social sciences and life sciences were more likely to participate in tree planting due to the knowledge acquired throughout their schooling and their exposure to environmental projects, (ii) university courses and media could reinforce students' understanding of the roles of trees and significantly affect their willingness to participate in tree planting, (iii) students' sociodemographic and institutional characteristics could be significant predictors of students' WTP for tree maintenance on campuses in DRC. In this study, the WTP for maintenance should be understood as the maximum cost or price that a student can bear or pay for taking care of the land and trees on campuses. The results of this study are crucial for providing suggestions on how academic authorities and university planners can make better strategies regarding the implementation of green infrastructures on campuses and their maintenance.

2. Materials and Methods

2.1. Localization of the Study Area

This study was conducted in the DRC (Figure 1), located in central Africa, between the parallels of 5° N to 13° S and the meridians of 12° to 32° E. The country has a surface area of 2,345,410 km², and shares borders with the Republic of Congo to the northwest, the Central African Republic to the north, South Sudan to the northeast, Uganda, Rwanda, Burundi, and Tanzania to the east, Zambia to the southeast and Angola to the west [32]. The universities surveyed are located in the southeastern and western DRC.

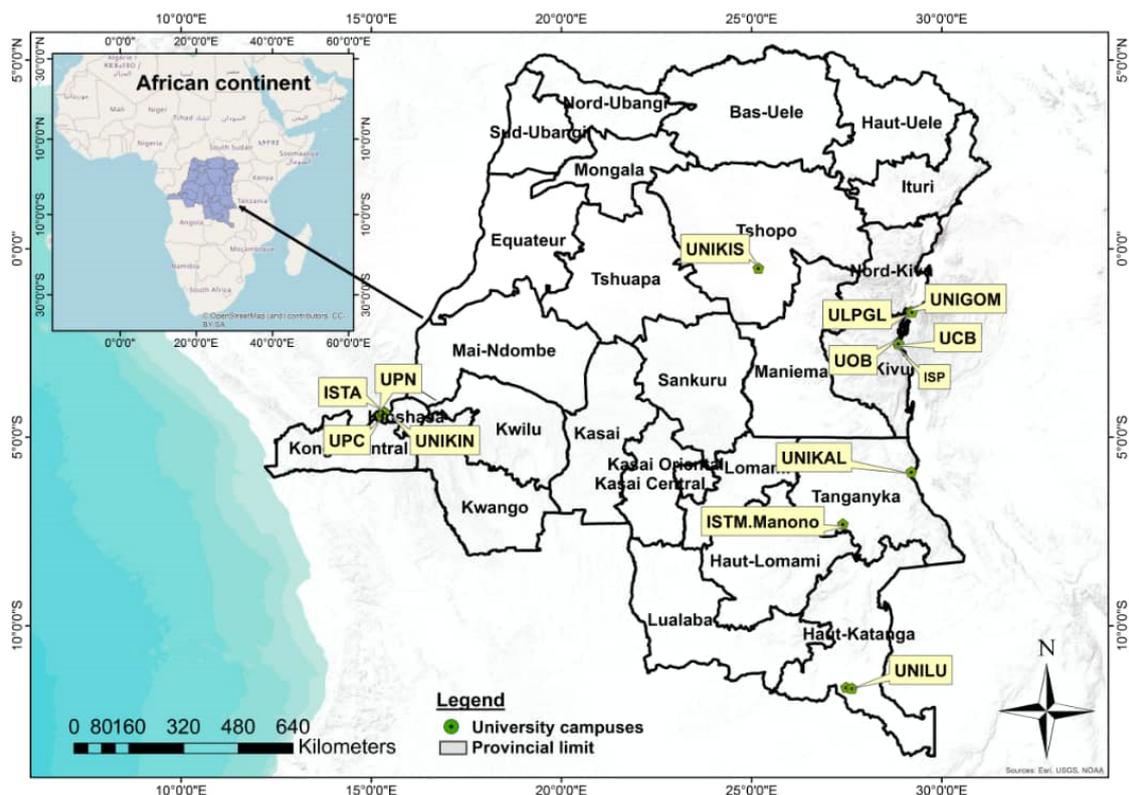


Figure 1. Geographic location of university campuses (highlighted in yellow) in seven provinces of the Democratic Republic of the Congo.

2.2. Climate, Soil and Vegetation

The DRC has a largely equatorial climate with annual average rainfall values of up to 2300 mm/year; however, this significantly varies across the country's extensive land area [33]. Generally, the country is hot and humid in the north and west, and generally cooler and drier in the southern, central, and eastern areas. The soils are mainly sandy and clayey and are dominated by Orthic ferrosols: Xanthic ferrosols, Arenosols, Dystric Nitosols, and Rhodic ferrosols, respectively. However, the soils vary depending on whether you are on the plateaus or in the valleys [33]. The country is home to an exceptionally high degree of diversity biomes, ecosystems, and habitats; notably, dry rainforests (Muhulu), woodland (Miombo), and savannahs, as well as cloud and gallery forests [34].

2.3. Socioeconomic Situation and Challenges

The DRC is historically portrayed as a country very rich in natural resources, e.g., diverse minerals, the largest rain forests in the world after the Amazon, and vast arable land [34,35]. Despite these resources, the majority of the population (71%) is affected by poverty and food insecurity [35]. After reaching 5.8% in 2018, economic growth has slowed to 4.4% in 2019, owing to COVID-19 impacts and the drop in prices of minerals (cobalt and copper), which account for over 80% of the country's exports [36]. In 2020, the DRC's population was estimated at approximately 90 million and is projected to hit 120 million by 2030 [37]. The increase in population in the DRC poses socio-economic and environmental challenges in terms of the need for food, social infrastructure, and waste management. As only 19% of the population has access to electricity [38], there is high pressure on forests for energy resources.

In 2015, the literacy rate was 68.8%. A recent report by the Congolese ministry of higher education [39] reveals that, between the academic years 2019–2020, 971 universities and higher education colleges were identified across the 26 provinces of the DRC, with a total of 564,421 students. Most of the higher education institutions are concentrated in urban areas where 40 million Congolese are expected to live by 2025 [35]. Ten universities and three higher education institutions selected to participate in this study are located in the main cities of the DRC, whose main characteristics are presented in Table 1.

Table 1. Sampled students in each educational institution and the main characteristics of studied areas.

Universities	N Students Interviewed	Provinces. Cities	Key Characteristics of Studied Areas
Institut supérieur pédagogique de Bukavu (ISP Bkv)	100	South Kivu. Bukavu	High rural exodus and poverty rate (80%) due to insecurity. The city has more women (52%) than men; 56.1% of the population is <18 years old. There is a high population density. Uncontrolled urbanization exacerbates erosion, flooding, and landslides [40].
Catholic University of Bukavu (UCB)	102		
Université Officielle de Bukavu (UOB)	72		
Institut Supérieur des techniques appliquées (ISTA)-Kin	29	Kinshasa. Kinshasa	The capital of the country, Kinshasa, is one of the most populated cities in Africa, expected to host 21 million inhabitants by 2030 [41]. Landscape is increasingly degraded due to unplanned urbanization [29]. Heat waves affect dwellers. Each rainy season, floods induce substantial economic costs estimated at USD 1.2 million daily [42]. The city has 16 public and 56 private higher education institutions [39].
Université Protestante du Congo (UPC)	33		
Université Pédagogique Nationale (UPN)	51		
University of Kinshasa (UNIKIN)	127		

Table 1. Cont.

Universities	N Students Interviewed	Provinces. Cities	Key Characteristics of Studied Areas
Université Libre de pays de Grands Lacs (ULPGL)	119	North Kivu. Goma	Armed conflicts forced the rural population to move to Goma. This situation has a negative impact on local food production. Land conflicts between communities are frequently reported [43]. The highly dense population is permanently exposed to natural hazards from the Nyiragongo volcano, which erupted in 2002, and recently, in May 2020 [44]. North Kivu alone is home to 16% of the higher education institutions in the DRC [39].
University of Goma (UNIGOM)	90		
University of Kalemie (UNIKAL)	90	Tanganyika. Kalemie and Manono	The city of Kalemie is on the shores of Lake Tanganyika, one of the most fish-rich lakes in the world. Fishing and other informal economic activities are important. Manono is located 480 km from Kalemie, with 265,000 inhabitants. Its economic activity is centered on mining activities, which attract people from other provinces [45]. Wood is used as a source of energy and construction material, which leads to pressure on the local forest. From 2001 to 2021, Manono lost 936 ha of vegetation cover.
ISTM Manono	100		
University of Kisangani (UNIKIS)	100	Tshopo. Kisangani	Kisangani still bears the scars of different wars that have destroyed infrastructure, derailing the urbanization process [46]. Urban farming and other informal economic activities are developed there to stimulate the local economy. Charcoal and firewood are the main energy source for around 1.8 million inhabitants. Destruction of the forest around the city is documented [47]. In whole Tshopo, there are 32 higher education institutions [39].
University of Lubumbashi (UNILU)	265	Upper-Katanga. Lubumbashi	Rapidly growing mining town with planned and unplanned neighborhoods. Street trees exist and are managed by owners [48]. Increasing mining activities and demand for charcoal have resulted in pressure on Miombo, a surrounding forest [49]. The strong presence of informal economic activities, e.g., urban agriculture, is a source of income for many residents, including students [50]. Mining extractive industries are a source of deforestation and air pollution and pose serious public health problems [51,52].

2.4. Methodology

This study applies a Likert scale and a CVM to elicit the students' willingness to participate in tree planting and pay for their maintenance. While the Likert scale allows respondents to indicate their positive-to-negative strength of agreement and assess their attitude about a particular topic, in this case, tree planting [53], the CVM is a survey-based method frequently used for placing monetary values on environmental goods and services not bought and sold in the marketplace [54]. It is based on an assessment of the willingness of the people being asked to pay (WTP) for the continued existence or improvement of an environmental good they consume, or their willingness to accept compensation for the loss of an environmental good they consume [25,55]. The CVM has been used in the assessment of ecosystem services of urban green spaces in Western countries and China [25,55,56], and helps to determine people's interest and participation in the preservation of public goods [55].

Using a survey questionnaire, a convenience sample of 1278 students across the DRC was selected (see Table 1). To reduce the bias inherent in the convenience sampling method,

students were selected based on their sociodemographic and institutional characteristics (gender, consent to participate in the survey, being regularly enrolled in the universities surveyed, and being enrolled as undergraduate and postgraduate students).

Data were collected through direct individual interviews with students from 25 February 2021 to 18 October 2021. The questionnaire was designed in French, an official language in the DRC (see Appendix A). It had four sections. Section I described the profile of the respondents (gender, age, level of education, faculty, and university), Section II assessed students' awareness of climate change, Section III presented the sources of information about tree planting and students' willingness to participate in tree planting on campuses. Section IV assessed students' WTP for tree maintenance on campuses.

The following are the context and the main questions of the CVM:

Suppose a plan is proposed by an independent expert to the university authorities, with all the necessary actions for maintaining trees on campus to improve the environment. If the maintenance plan is approved, there will be a financial cost. If the total cost of the plan cannot be financed by the university or the state, would you be willing to contribute if the university calls for donation? Respondents who agreed to pay also answered the following question: What maximum amount in dollars (USD) would you be willing to pay per year?

The choice of the variables examined in this investigation is explained by their direct influence on the public's perception of environmental challenges and consent to participate in the promotion of green infrastructures [23]. The higher education and university institutions that participated in this study were selected because most of them own large land properties where trees and other ornamental plants can be installed. Second, universities are vital in educating citizens and promoting pro-environment behavior [57]. Many of these educational institutions are public and among the most prominent universities in the country. For example, the University of Kinshasa, the University of Kisangani, and the University of Lubumbashi host many students attending different faculties. In addition, most of these universities are located in the country's major cities, where each student has a personal and contextual experience of environmental challenges. Students interviewed were from the life sciences, social sciences, and applied sciences. While some students were met on campus during break time (12–2 p.m.) or after class (4–5 p.m.), other students preferred completing the questionnaire at home and returning it the next day. Our interest is in interviewing students because they are primarily young, skilled people, who are expected to play an essential role in providing the DRC's solutions to socioeconomic and environmental challenges.

2.5. Data Analysis

Excel Microsoft Office 2010 and SPSS 21.0 were used to record and analyze the data. First, data analysis was performed using descriptive statistics (frequencies and percentages) presented in figures and tables. The frequencies and percentages were calculated in terms of (i) the students' sociodemographic characteristic information (gender, age, level of education, and awareness level of climate change), and (ii) whether or not the students were willing to participate in tree planting. To investigate whether social and institutional factors (gender, sources of information, university and faculty attended) and climate change awareness were associated or not with the students' willingness to participate in tree planting, a bivariate analysis, using a chi-square test (χ^2), was performed. To describe and figure out the relationship between the universities, awareness of climate change, gender, and willingness to plant trees on campuses, we performed a Multiple Correspondence Analysis (MCA).

Additionally, a binary logistic model was applied to the data to identify the potential sources of information that influenced students' intention to participate in tree planting and determine factors influencing their WTP for tree maintenance (Table 2). The decision of respondents regarding whether they could participate in tree planting or not took the form of dichotomous variables. The students' willingness to plant trees and their WTP were

set in a binary form (1 = agree, 0 if disagree). Neutral answers were eliminated from this specific analysis. Students' age, gender, faculty, university, climate change awareness, and level of education were set as predictors of WTP for tree maintenance. Although income is an important factor in the analysis of willingness to pay [23–56], it was not taken into account in this study because most of the students interviewed did not work to make income and said they were financially dependent on their parents.

Table 2. Predictors used in binary logistic regression to identify the potential sources of information affecting students' willingness to plant trees.

Variables	Predictors	Description of the Explanatory Variables	Signs Expected
Sources of information about tree planting (independent)	University courses	1 = Yes, No = 0	+
	Television	1 = Yes, No = 0	+
	Radio	1 = Yes, No = 0	-
	Social media	1 = Yes, No = 0	+
	Friends clubs	1 = Yes, No = 0	-

Lastly, a multinomial logistic regression was used to analyze the influencing factors for the amount respondents were willing to pay. The amount that students were willing to pay was set at 4 levels (\leq USD 5, USD 6–10, > USD 10, Not pay) as a dependent variable. For this analysis, the level Not pay was set as a reference category. The variables used as independent variables were age, gender, faculty, university, climate change awareness, and education level. The data were analyzed with a 95% confidence interval. The choice of both binary logit and multinomial regression models is due to their capacity to identify and determine among studied factors that can significantly predict individuals' decision to pay for tree maintenance and help to make future projections [23].

3. Results

3.1. Students' Social Characteristics and Awareness of Climate Change

The characteristics of students interviewed within universities in the DRC are shown in Table 3. A large proportion of the students who participated in this study were males (61%), while females constituted 39%. The age of the majority of the respondents (80%) ranged between 18 and 25 years old, and 60% were enrolled as undergraduate students. These students attended different schools, but a high number of the respondents were enrolled in social sciences (55.8%), applied sciences (22.4%), and the school of life sciences (21.7%). Most of the students (92%) admitted being aware of climate change.

Table 3. Students' sociodemographic characteristics and awareness of climate change.

Variables	Category	Frequency	Percentage
Gender	Female	495	39
	Male	783	61
Age (years)	18–25	1021	80
	26–33	195	15
	34–41	38	3
	>42	24	2
	Life sciences	277	21.6
School (faculties)	Applied sciences	287	22.4
	Social sciences	714	55.8
	Undergraduate	767	60
Level of education	Post graduate (licence)	511	40
Students' awareness of climate change	Yes	1182	93

3.2. Students' Willingness to Participate in Tree Planting on Campuses

A majority of these students (65%) agreed with the idea to plant trees on university campuses and communities (Figure 2). Students' willingness to plant trees was significantly associated with gender ($\chi^2 = 7.2828$, $df = 2$, $p = 0.0262$). About 20% of the students interviewed responded that they would not participate in tree planting and 15% remained neutral.

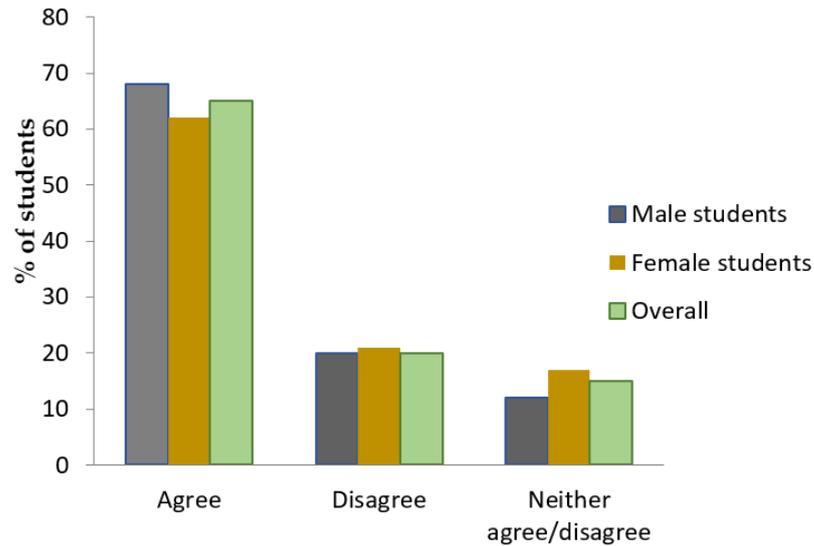


Figure 2. Students' willingness to participate in tree planting on campuses.

Figure 3 groups factors that affect students' willingness to plant trees. The chi-squared test showed that both student awareness of climate change ($\chi^2 = 13.4$, $p = 0.001$) and university attended ($\chi^2 = 153.63$, $p = 0.000$) were associated with students' willingness to plant trees on campuses and community. Students of ISTM Manono (63%), ULPGL, UNIGom (71%), UPN (100%), and UNIKIN (91%) expressed more interest in planting trees compared to the rest of the universities where low interest was recorded, for instance, the universities Kalemie (41%), UCB (50%), and UNILU (51%). However, the position of the students at the University of Kisangani was ambiguous, since many students of this university remained neutral to the idea of tree planting.

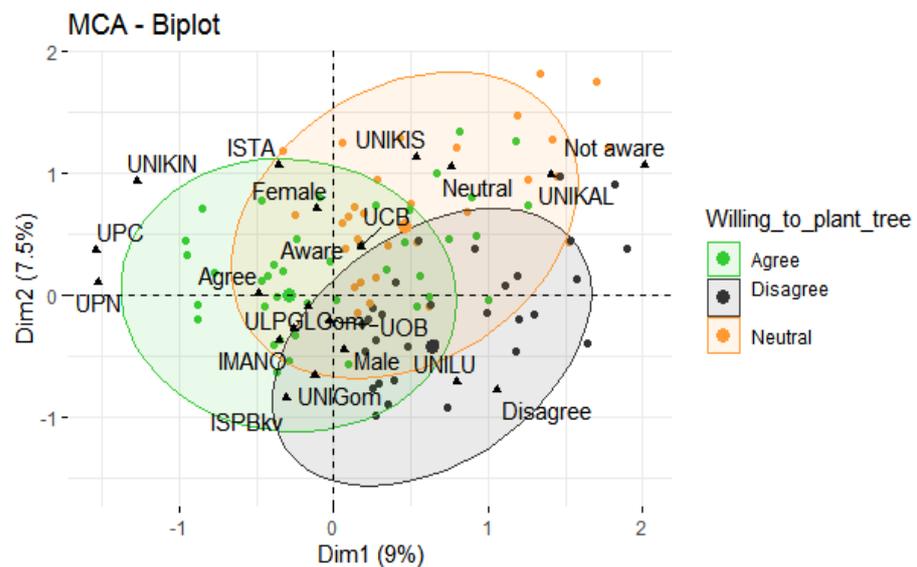


Figure 3. Results from a multiple correspondence analysis showing the relationship pattern between the universities, awareness of climate change, gender, and willingness to plant trees on campuses.

The association between the level of education, faculties attended, and students' willingness to plant trees is presented in Table 4. Although there was no significant association between the two parameters and students' willingness to plant trees ($p > 0.05$), the data tendency indicates that the majority of respondents who agreed to plant trees were license-level students.

Table 4. Association between schools attended by the students and willingness to plant trees.

Parameters	Modalities	Agree (%)	Disagree (%)	Neutral (%)	χ^2	α
Schools	Overall	842(65.9)	257(20.1)	179(14.0)	1.187	0.880
	Life sciences	184(66.4)	51(18.4)	42(15.2)		
	Applied sciences	185(64.5)	62(21.6)	40(14.0)		
	Social sciences	473(66.2)	144(20.2)	97(13.6)		
Level	Licence	354(69.2)	87(17.0)	70(13.7)	5.57	0.062
	Undergraduate	488(63.62)	170(22.16)	109(14.21)		

3.3. Sources of Information Affecting Students' Willingness to Participate in Tree Planting

About two-thirds of students enrolled in license claimed to obtain information about climate change issues and the roles of trees from radio and university environment-related courses (Figure 4). Overall, television (80%), social media (77%), and university courses (65%) were the major sources of information used by students to learn about climate change issues and the roles of trees in the community. The sources of information affecting students' willingness to participate in tree planting are shown in Table 5.

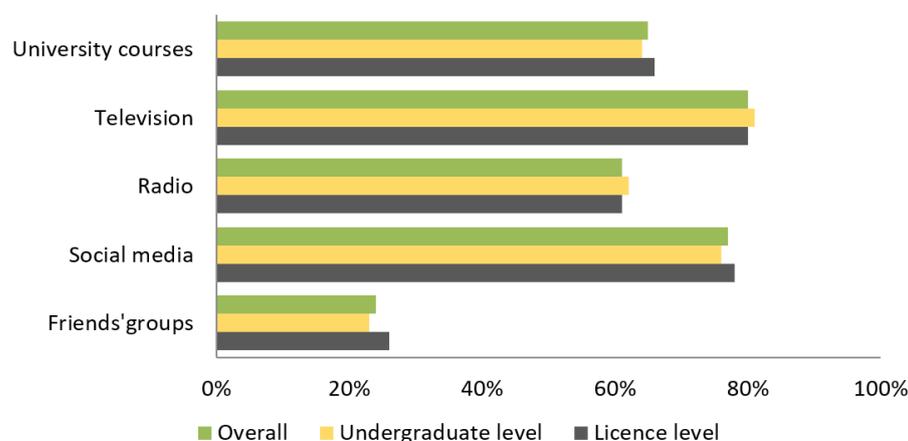


Figure 4. Students' sources of information about climate change and roles of trees in the community.

Table 5. Sources of information affecting students' willingness to participate in tree planting.

Variables	B	Std. Error	Wald	p-Value	Exp(B)	95% C.I. for EXP(B)	
						Lower	Upper
University courses	0.415	0.154	7.245	0.007 **	1.515	1.120	2.050
Radio	0.103	0.154	0.447	0.504	1.108	0.820	1.499
Television	0.298	0.178	2.809	0.094	1.347	0.951	1.908
Social media	-0.018	0.174	0.010	0.920	0.983	0.698	1.383
Friends clubs	0.094	0.175	0.289	0.591	1.099	0.780	1.547
Constant	-1.512	0.169	79.555	0.000 ***	0.221	-	-

B represents partial regression coefficients; EXP (B) represents odds ratio, $-2 \log$ likelihood = 1165.870, ** indicates highly significant test at 5%, *** indicates very highly significant at 1%, CI = confidence interval; overall percentage predicted = 76.4%.

The sign of the coefficients, as well as the odds ratios labeled by Exp(B), indicate the direction of the relationship between variables in the equation. The Wald statistics highlight the contribution of each factor to the improvement of the model. The results in Table 5 show that four out of five of the sources of information used by students about tree planting were positively correlated (in the equation) with students' willingness to participate in tree planting on campuses in the DRC. These factors are university environment-related courses, radio, television, and friends clubs. Among these factors, university courses and television were found to be the significant factors that affected students' willingness to plant trees. Despite the increase in the use of social media among Congolese students (see Figure 4), we found surprisingly that it was negatively correlated with the students' intention to participate in tree planting.

3.4. Students' Willingness to Pay for Tree Maintenance

The results of the descriptive statistics that show the distribution of students within universities and faculties attended according to respondents' willingness to pay for tree maintenance are shown in Supplementary Materials Figures S1 and S2. Descriptive statistics revealed that a large majority of the students interviewed (70%) agreed to pay for tree maintenance and one-third of students disagreed (30%).

Many students who disagreed to pay lamented, "already we are facing challenges to pay our school fees. Adding extra money to take care of vegetation on the campus will result in displeasure among students". Of the seven variables examined by the binary logit model, only the level of price to pay, i.e., amount of money requested, was a significant determinant of students' willingness to pay for tree maintenance on campuses (Table 6). Although gender, age, level of education, university, and faculty attended were not significant, they were still positively correlated with students' willingness to pay for tree maintenance. The male students were 1.141 times more likely to pay for tree maintenance than the female respondents. However, despite students' awareness of climate change, this factor was surprisingly negatively correlated with students' willingness to pay for tree maintenance. Results showed that the power of the logit model was suitable because it correctly classified 73.4% of the known factors.

Table 6. Determinants of students' willingness to pay for tree maintenance on campuses in DRC.

Predictors	B	Std. Error	Wald	p-Value	Exp(B)
Gender	0.132	0.149	0.783	0.376	1.141
Age	0.140	0.140	0.998	0.318	1.150
University attended	0.013	0.022	0.369	0.543	1.013
Amount of money requested	0.569	0.053	113.457	0.000 ***	1.767
Education level	0.264	0.149	3.117	0.077	1.302
Climate change awareness	−0.452	0.276	2.687	0.101	0.636
Faculty attended	0.038	0.091	0.177	0.674	1.039
Constant	−1.172	0.652	3.228	0.072	0.310

B represents partial regression coefficients; EXP (B) represents odds ratio, *** indicates very highly significant at 1%, $-2 \log \text{likelihood} = 1162.838$, overall percentage predicted = 73.4%.

Since the amount of money to pay was the key predictor of students' willingness to pay, we used multinomial logistic regression to identify the factors influencing the amount respondents were willing to pay (Table 7), and a chi-square test to investigate in detail the association between university, faculties, and students' WTP for tree maintenance (see Supplementary Materials Table S1). Multinomial logistic regression results revealed that university, faculty attended, and gender influenced significantly the level of price students were willing to pay. However, the variables in terms of age, climate change awareness, and education level did not influence at all the probability of the amount respondents were willing to pay. These results were also confirmed by the chi-square test, which highlighted a significant association between universities, faculties, and the level of price to pay (Supplementary Materials Table S1).

Table 7. Results of factors influencing the amount respondents are willing to pay.

WTP Amount/Year ^a	Predictors	B	Std. Error	Wald	p-Value	Exp(B)
USD 6–10	Gender	0.205	0.241	0.725	0.395	1.228
	Age	−0.377	0.207	3.307	0.069	0.686
	Faculty	0.343	0.144	5.673	0.017 *	1.409
	Climate change awareness	−0.156	0.506	0.096	0.757	0.855
	Education level	−0.434	0.248	3.055	0.081	0.648
	University	0.116	0.036	10.438	0.001 **	1.123
>USD 10	Gender	−0.771	0.320	5.787	0.016 *	0.463
	Faculty	0.322	0.164	3.860	0.049 *	1.379
	Climate change awareness	−0.006	0.509	0.000	0.991	0.994
	Education level	0.048	0.272	0.031	0.860	1.049
	Age	0.180	0.289	0.388	0.533	1.197
	University	−0.001	0.041	0.001	0.974	0.999
≤USD 5	Gender	0.299	0.141	4.482	0.034 *	1.348
	Faculty	0.046	0.089	0.264	0.608	1.047
	Climate change awareness	−0.488	0.277	3.103	0.078	0.614
	Education level	−0.011	0.142	0.006	0.940	0.989
	Age	−0.265	0.140	3.570	0.059	0.767
	University	−0.093	0.021	19.428	0.000 ***	0.911

^a The reference category is: Not pay, i.e., students who were not willing to pay anything at all; B represents partial regression coefficients; EXP (B) represents odds ratio, * indicates the significant test at 5%, ** = indicates highly significant test at 5%, *** indicates very highly significant at 1%.

4. Discussion

4.1. Students' Awareness of Climate Change and Willingness to Plant Trees

Most of the students surveyed had a high concern about climate change and a majority of these students showed much interest in tree planting as a possible strategy for mitigating climate change and making campuses green, clean, and sustainable. This awareness of students is important because climate change impacts are expected to be severe in Africa [58]. Additionally, scholars argue that the knowledge and awareness of climate change among students is of paramount importance, as it equips them with skills to deal with its future impacts [59,60]. However, results highlighting gender differences in tree planting were observed. These differences can be explained by distinct men's and women's knowledge and roles in relation to the management of forests and the use of tree resources [60].

People's willingness to participate in tree planting can also depend on various factors including the ecosystem services expected. From this point of view, the vision behind tree planting can result in differences among social groups. For example, in the Philippines, students engaged in tree planting to combat and slow down the effect of global warming [28], while smallholder farmers in Nigeria and Burkina Faso planted trees out of economic interest to sustain their livelihoods and support local afforestation projects [27–61]. In this study, we found that a large proportion of students from universities located in the cities of Kinshasa (UPN, UNIKIN) and Goma (UNI Gom) were likely more willing to plant trees compared to the rest of the universities in other cities (e.g., Kalemie). This is probably because many students from these areas have been exposed to reforestation and agroforestry projects; for instance, the green campus project at the University of Kinshasa [62].

However, in the city of Lubumbashi, where air pollution due to intense mining activity significantly affects human health [51,52,63], 51% of students at the University of Lubumbashi were willing to plant trees. Tree planting in a city like Lubumbashi can reduce air pollution [31].

4.2. Students' Source of Information on the Roles of Trees within Community

The binary logit results showed that university courses and television were significant determinants of the probability of willingness to participate in tree planting. This is because these sources of information increased students' understanding of the roles of trees in the community. Also, these combined sources are important in increasing students' awareness

of current environmental challenges and promoting pro-environmental behavior, such as reforestation. Reforestation can mitigate climate change and improve environmental quality within communities [64]. In Nigeria, radio was an essential communication tool in promoting tree planting in rural areas and supporting local afforestation projects [64]. With a positive relationship observed between university courses and students' intention to participate in tree planting, we believe that the recent introduction of the environment course in the school curriculum in the DRC reinforces students' knowledge of the roles of trees in the community. Additionally, many scholars strongly believe in university and school teachings as a credible source of information about sustainability and solutions to overcome environmental issues [65].

4.3. Factors Influencing Students' WTP

Contrary to the results of [23], which suggest that variables such as age and education level influence residents' WTP for green infrastructure maintenance, our findings showed that the level of the price to pay (amount requested) was the only significant determinant of students' willingness to pay for tree maintenance on campuses in the DRC. These results are also supported by descriptive statistics showing that most of the students were favorable to a lower amount. This is explained by the economic difficulties that the DRC is going through, which do not allow students to bet larger amounts.

Still, our results are in agreement with those of [66], which highlighted a significant correlation between the price to be paid and gender in Louisiana (United States), in a study looking at the preservation of the community urban forest, where most of the students were willing to support tree planting because they expected to maintain and enjoy more of the services that these trees would provide on their campuses. For example, students perceived spaces with trees on campus as places to relax, meet friends, play, and pass through [20–67], and also as attractive spaces that inspire, heal, and increase students' focus and connection with nature [13,18].

4.4. Factors Influencing the Amount Students Are Willing to Pay

To support tree maintenance on campuses, students' WTP was less than USD 5 per year. Students' WTP was 20 times lower compared to the amount that community members and students were respectively willing to pay for the preservation of urban green areas in Finland and Italy [22–56]. Although this amount of money may seem small, it remains significant in the DRC, where many students even struggle to pay their school fees and live on less than USD 1.90 per day [34]. Used well, students' contributions can drive significant changes on campuses where universities have limited funds allocated to landscape and environmental management. Specifically, such a contribution can help to perform landscape maintenance tasks that include trimming, pruning, mowing, weeding, fertilizing, and waste management.

4.4.1. Gender

Many studies argue that gender is an influencing factor for public perceptions, the driver of the adoption of sustainable practices to preserve forests, and WTP for the maximization of ecosystem services [22,55,66]. Our study showed that male students were more likely to pay a larger amount for tree maintenance than females. A similar observation was reported by [66] in Louisiana, showing that more males (25%) than females (18%) were willing to pay more than USD 12 per year. It was also reported that male respondents aged around 40 were more likely to pay than their female counterparts for the sustainable development of the Germia forest and recreational parks in Kosovo [68].

Additionally, a study assessing men's and women's participation in the protection of the environment found that women were found to express greater concern for the environment than men, regardless of their age and education [69]. Also, many contingent valuation studies about the WTP for the implementation and preservation of recreational parks and green areas showed no significant difference in terms of respondents' genders [23–56].

4.4.2. University and Faculty

The amount that students were willing to pay for tree maintenance differed from one university to another, and the same tendency was observed within faculties (see Supplementary Materials Table S1). The university and faculty attended by the students were also found to have a significant influence on the respondents' WTP. This makes sense because higher education is vital in educating citizens about environmental challenges and promoting pro-environmental behavior [58,59]. Meanwhile, a large proportion of students that agreed to pay for tree maintenance attended life sciences and social sciences. For students enrolled in life sciences, such interest is possibly due to their understanding of the role of trees in reducing air pollution-related diseases and in environmental sanitation for the welfare of the student community. This is in line with the results of [70,71], which argue that, as deforestation, urbanization, and climate change result in the emergence of new pathogens and diseases, medical students should take interest in environmental issues. However, a study [26] shows that people with a social science background are often motivated by the recreational and aesthetic services that trees provide in the community.

4.5. Reasons for Not Paying for Tree Maintenance

Our findings also revealed that 30% of the students were not willing to pay for tree maintenance, simply because they considered university campuses as public domains where environmental management should be entirely the responsibility of public and academic authorities. A similar attitude (unwillingness to pay) was also observed in Italy, where exactly the same proportion of students was not willing to pay for the urban green areas, due to a lack of money and the perception of natural areas as public goods whose protection and management should not be a private concern [56]. Two major reasons can explain the attitude of resistance among students from the University of Lubumbashi, University of Kalemie, ISP Bukavu, and UCB to financially support the greening project of the campuses. On one hand, in addition to the official tuition, students reported paying multiple fees within their faculties, affecting their budget planning. Additionally, in the context of serious socio-economic difficulties due to poverty, students would not consider campus greening an urgent priority.

4.6. Implication for the Community Urban Forestry Management

Our results offer a first indication that Congolese students are aware of current environmental issues and are willing to participate in tree planting and financially support their maintenance. Implementing and preserving urban forestry can be a huge contribution to the global vision of building green and climate-resilient cities. This is one of the ways to help urban areas prepare and adapt to absorb and recover from external and internal disturbances and reduce urban vulnerabilities [29,48,70]. Since such a great vision and achievement requires resources, the knowledge of residents' WTP for environmental quality is crucial to detect the community's needs and, as a consequence, to implement the most suitable policy interventions and management strategies [22,23,56]. At the level of the universities studied, students' participation and contribution will allow them to take ownership of the infrastructures implemented, because the success of policies in maintaining urban green areas depends on an adequate level of public participation [25]. In addition, the commitment of cities and universities towards green infrastructure will require the development of a master plan and possibly the consultation of experts, for example, in landscape architecture and horticulture.

5. Conclusions

In this study, we assessed students' willingness to participate in tree planting and pay for their maintenance to improve environment quality on university campuses. Most of the respondents were males enrolled as undergraduate students in different disciplines. Overall, our findings confirm that social and institutional factors (gender, sources of information, university attended) and awareness of climate change affected students' willingness to

participate in tree planting. University courses and television were significant sources of information in predicting students' probability of participating in tree planting.

Of the respondents, 70% were willing to pay, and the amount accepted by the large majority of the students was estimated at 5 USD per year. This contribution is important and can drive significant changes on campuses in the DRC, where universities do not have specific funds allocated to implement green infrastructures and manage environmental issues. The findings indicate that the socio-demographic factors (gender, age, level of education) did not significantly affect students' WTP for tree maintenance. However, the set amount to pay per year was the determinant factor. Students' willingness to participate in tree planting and maintenance initiatives can support public policy promoting campus green infrastructures.

Further investigation is needed to characterize the perceived tree ecosystem services to understand the real value students place on campus green infrastructures. Still, both financial support and knowledge of ecosystem services can support the management of green infrastructures and the adoption of relevant policies.

Supplementary Materials: The following supporting information can be downloaded at: <https://www.mdpi.com/article/10.3390/su142215148/s1>.

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Appendix A

Questionnaire d'enquête

I. Profil sociodémographique de l'enquêté

L'enquêté est du sexe

1. Masculin
2. Féminin

L'âge de l'enquêté est compris entre:

1. 18–25 ans
2. 26–32 ans
3. 34–40 ans
4. >41 ans

Quelle faculté fréquentez –vous?.....université.....

Promotion et cycle de formation (niveau)
.....

II. Perception du changement climatique

Le changement climatique constitue-t-il une préoccupation pour vous?

1. Oui
2. Non
3. Ne sait pas

Quel est le changement majeur observé qui vous convint que le climat est en cours de changement ?

1. Irrégularité des pluies
2. Montée des températures
3. Changement dans la durée des saisons
4. Prolifération des ravageurs
5. Autres

III. Sources d'information sur les rôles des arbres

Considérez-vous les cours appris à l'Université comme une source d'inspiration pour participer à la plantation d'arbres?

1. Je suis tout à fait d'accord
2. Je ne suis pas du tout d'accord
3. Je ne suis ni d'accord ni en désaccord

Considérez-vous la radio comme une source d'inspiration pour participer à la plantation d'arbres?

1. Je suis tout à fait d'accord
2. Je ne suis pas du tout d'accord
3. Je ne suis ni d'accord ni en désaccord

Considérez-vous la télévision comme une source d'information pour participer à la plantation d'arbres?

1. Je suis tout à fait d'accord
2. Je ne suis pas du tout d'accord
3. Je ne suis ni d'accord ni en désaccord

Considérez-vous les réseaux sociaux comme une source d'information pour participer à la plantation d'arbres?

1. Je suis tout à fait d'accord
2. Je ne suis pas du tout d'accord
3. Je ne suis ni d'accord ni en désaccord

Si vous êtes membre d'un club d'amis ou d'étudiants, ce type de clubs vous –inspirent-ils de participer à une activité de plantation d'arbres?

1. D'accord
2. Pas d'accord
3. Neutre

Dans l'objectif d'améliorer l'environnement au campus, accepteriez-vous de participer dans une activité de plantation d'arbres au campus?

1. Je suis tout à fait d'accord
2. Je ne suis pas du tout d'accord
3. Je ne suis ni d'accord ni en désaccord

Si cela est utile, expliquez les raisons

.....

Si cela est utile, expliquez les raisons

.....

IV. Volonté des étudiants à payer pour le maintien des arbres aux campus

Si un plan d'amélioration de l'environnement au campus était approuvé, accepteriez-vous de payer de votre argent pour contribuer à l'entretien des arbres plantés au campus, si l'Université lançait un appel à contribution ?

1. Je suis d'accord
2. Je ne suis pas d'accord
3. Ni d'accord ni en désaccord

En acceptant une telle idée d'appuyer un projet d'entretien des arbres au campus, combien (\$) seriez-vous disposé à payer par an?

1. ≤5 dollars US
2. 6–10 dollars US
3. ≥10 dollars US
4. Autres à préciser

Il y a-t-il des raisons qui feraient à ce que vous ne payez pas pour appuyer les activités d'entretien d'arbres au campus?

.....

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