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Plant Species Composition and Community Perception Towards Landscaping Work Executed at Hawassa University-Main Campus, Ethiopia

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ABSTRACT

Landscaping is making visual improvements to academic institutions, urban and other private organizations with plants and attractive materials. People all over the world are attracted to green and beautiful landscapes which initiate them to be happy and creative. Especially students in higher educational institutions who spend much of their time focused on their studies need of clean, green and attractively well-designed landscape in their campus. So far data on plant species composition and perception of university towards landscape work is lacking. With this understanding, the study was conducted to investigate plant species composition and community perception towards landscaping work executed at Hawassa University's main campus using questionnaires, interviews, observation and group discussion methods. In addition, vegetation data were collected using systematic sampling method. In the study, 221 respondents were drawn from academic staff, administrative workers and students using random sampling method. Key informants were selected using purposive sampling method. In order to identify the plant species, systematic sampling along the transect line was employed. Twelve (12), 40m X 40 m (i.e. 1600 m^2) area quadrat plots were laid and all the plants species in the quadrats were collected and identified. The distance between each transects and quadrat was 200 m and 100m, respectively. 52 plant species with 44 genera and 29 families were recorded. The study showed that, the most dominant family was *Fabaceae* with 9 species followed by *Cupressaceae* as well as *Moraceae* with 4 species each respectively. The results revealed that, campus landscaping work was the most significantly important and made the campus more attractive by plantation (61.1%), landscaping (27.1%) and walkways (5.7%). Plantation could also modify the micro-climate of the campus environment (94.3%) due to the plants photosynthesis process which produces O_2 and takes in Co_2 from the atmosphere. In general educational institutions landscaping need to be encouraged to enhance the teaching-learning process, and to make the working environment attractive. A great educational environment is guided by the most powerful teacher of all, nature itself.

INTRODUCTION

The global physical landscape is changing due to the process of urbanization. According to the United Nations Department of Economic and Social Affairs (2014), about 54% of the world's populace resided in city/urban regions in 2014. Lands are modified to make useful for residential, commercial, public gatherings, industrial and institutional zones; encouraging population migration to gain access to these facilities. Gradually the shrinking of urban green spaces/areas results in the loss of

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biodiversity and disturbance to the natural ecosystem (Izyan *et al*., 2017). The ecologicalization of plant life landscape want to ensure the rich species and diverse shapes of campus flora, and the plant configuration is affordable, the usage of vegetation to decorate the campus environment to ensure the stability and balance of campus environment and reach the coordination of artificial environment and natural environment (Habib *et al*., 2016). The campus planning and panorama layout should fairly adopt circulate concept, ecological recuperation idea and occasional carbon idea to make college campus come to be harmonious ecological campus from macro views (Horhota *et al*., 2014). A development of green infrastructure (GI) on the University compound has been acknowledged as one of the foundations of Education for Sustainable Development (ESD), an initiative that could provide various benefits to the campus community. The students and the campus community are the primary beneficiaries in several aspects which contribute to the enhancement of knowledge, skills, as well as physical and mental replenishment from sustainable landscaping, greening, and beautification work (Izyan *et al*., 2017). Landscaping is the process of making visual improvements to academic institutions, urban and other private organizations with plants and attractive materials (Amy, 2009).

Landscaping, greening and beautification in better instructional establishments and faculties can be traced to the very starting of formal education, thinking about it very vital components of the total plan (Jellico, 1966; Boughman, 1992). Landscaping, beautification and greening are completed to create the high-quality aesthetic feature, appropriate environment and to supply a naturalized placing the usage of nicely matched herbal or man-made materials. The desired quality of beautification can be made via the affiliation of plant life, shrubs, timber, lawns, fences, houses, pavement, and water (Boughman, 1992; McConnell *et al*., 2003). Large bucks have been spent on landscaping to fulfill mankind’s preferred fine and beautiful environment. Plantation of wood, vegetation, shrubs and water offer residing quarters with non-violent and comfy surroundings that are pondered in houses, organizations, authorities places of work, church homes, and academic facilities (Boughman, 1992). An adorable bodily environment satisfies the student's emotional and cloth wishes and stimulates non secular increase. A scholar's capability to look and admire physical splendor is nurtured via the manner of his/her surroundings. Actual colleges have the potential for attracting beauty to high school community and then transmitting it to the related buddies (Brown, 1983).

A college campus made attractive by landscaping, greening and beautification is a concept to all of the university network and the parents. The purpose of landscaping at University and faculties are to beautify the surrounding physical surroundings, to offer shade, assist the coaching mastering strategies and to inspire students to love and admire the environment (Malone and Tranter, 2003; Dyment and Bell, 2007; Habib *et al*., 2016), because the campuses are social group, and that they play a giant position in converting peoples’ life-style. According to Wells (2000), panorama may also alter the micro-climate of the environment surrounding the campus due to the plants photosynthesis system which produces oxygen and absorbed carbon dioxide from the

atmosphere. Landscape and plants gives an appealing element through the way of aesthetic value (Rasidi *et al*., 2013). An attractive landscaping, greening and beautification plays a vast position in minimizing emotional stress, negative emotions, physical pressure, growth fine thoughts among college students and initiate the scholars' interest toward getting to know, due to the fact, flowers affect human psychology (Han, 2009). Maintainable landscaping and beautification practices can help to lessen pressure and improve the overall health of humans living in town, college, campus and other organization environments, and may be significantly less expensive to hold. Therefore, developing an advantageous dating between a man and the environment may want to have extensive benefit closer to mental balance, enhancing the behavior and improving health situations. Furthermore, interaction with none restrict with lovely outside environment may want to reduce mental strain in humans daily lifestyles (Harting *et al.*, 1991; Kaplan, 1995; Kaplan *et al*., 1998; Wells; 2000; Taylor *et al*., 2001).

A University campus is just like a small city with infrastructure (such as buildings, transportation, electricity, roads, beautiful and pleasant landscape and green compound) because of the complete function, the construction of campus panorama area have to create locations to carry all kinds of sports and make sure that campus space has attractive elements (ICADCE, 2015). The school grounds, with adequate care (clean, attractive, comfortable, and orderly surroundings) can make major contributions to student progress. Preserving a sustainable landscaped campus environment play a considerable position meets the requirements of diverse verbal exchange between teachers and college students under the assorted social historical past of more than one value. the distance spirit can well arouse the feel of identification of instructors and students to campus panorama cause them to experience pride to analyze, live, contact, leap forward in a campus landscape environment, be unconsciously encouraged through the edification of information and boom the experience of belonging of campus are (ICADCE, 2015). Greening is the process of planting trees, herbs and shrubs to transform the living environment into more health, beautiful and suitable place (Douglas, 2003; Ryrie, 2004). A beautiful and green campus in the end offers an institution the opportunity to take the lead in redefining its environmental way of life and growing new paradigms through developing sustainable answers for the environmental, social and economic needs of mankind. Therefore, the main purposes of the study were to assess the community perception towards landscaping work executed at Hawassa University main campus.

MATERIALS AND METHODS

Study Area

The study was conducted in the main campus of Hawassa University. Hawassa University (HU) was established at Hawassa on the 25th of April 2000. Hawassa University has seven functional campuses, namely; College of Agriculture (AC), College of Medicine and Health's Sciences Campus (CMHS), Institute of Technology (IOT) and the Main Campus (the seat for the top administration) are located in Hawassa City. The remaining three, namely Wondo Genet Campus (WCFNR), Awada Campus and Bensa Daye Campus are situated out of Hawassa city.

Hawassa University (HU) is a comprehensive university that is engaged in the provision of all-round education, research, training and community service through its diversified areas of the academic units. Hawassa University has recently established three Centers: "Center of Excellence for Teacher Education and Educational Leaders, Academic Center of Excellence in Human Nutrition, and Science, Technology, Engineering, and Mathematics (STEM) Center". It is located 275 km South of Addis Ababa, the capital city of Ethiopia in the Sidama region, Hawassa city. The main campus was established in 2000. Geographically
it lies at 07^0 05' north, $38^0$29' east and at 1697m above sea level. The rainfall pattern is characterized by bimodal distribution with spring/"belg" and summer (main) rainy seasons. However, the rainfall is continuously disbursed with one dry season. The mean annual temperature is 19.5^0c with the minimum average ranging from 9.3^0C at some point of December to 140 ^{0}C at some stage in July and maximum temperature varies from 24 °C throughout July to 29.2 °C at some stage in March. The land shape is obvious with reddish volcano soil which is right for construction. The present study was conducted at the main campus of Hawassa University.

Methods of Data Collection

The study was conducted in Hawassa University's main campus from 2017 - 2019 to study the perception of its community on the beautification, greening, and landscaping work that had been done. The data were collected by using both questionnaires and semi-structured interviews (Martin, 1995) and site observation. Systematic random sampling techniques were employed to select lecturers, third-year main campus students, administrative staffs, key-informants and campus cleaners as representative samples for data collection. A total of 221 informants were randomly selected and 10 key informants were included. Questionnaires were prepared and distributed for two hundred twenty-one (221) respondents to collect data on the perception of the community on landscaping and its contribution on education quality, job creation and beautification work in the campus. The amassed plant specimens were pressed, dried and recognized by experienced botanists using the vegetation of Ethiopian and Eretria extent one to eight (Azene *et al*., 1993; Edwards *et al*., 1995; Hedberg *et al*., 2003; Hedberg *et al*., 2004), then mounted on herbarium sheets and deposited in the lab. In order to collect the plant species, purposive sampling was used and a total of 12 quadrants, 40m X 40m (i.e. 1600 m^2 area) along transect line were used. The distance between, each transects and quadrants were 200m and 100m, respectively. From the total of 12 quadrants, all the plants species in the quadrants were collected and identified.

Data Analysis

The collected quantitative data were organized, summarized and subjected to descriptive statics.

RESULTS AND DISCUSSION

The study was conducted at Hawassa University's main campus to assess the perception of Hawassa University's community towards the landscaping work executed at its main campus carried out from 2017 to the present. Since its establishment in 2000, the main campus was bare land with hot and

intolerable climatic conditions, not sufficiently attractive for the teaching-learning process and for the administrative worker, academic staffs, and students to accomplish their regular work effectively (Figure 1). Thanks to landscaping and greening works done, currently, the seat, shade area and recreational area made a suitable environment for the service intended (Figure 1 and 3). The respondents were asked whether they have been ever observed landscape and beatification work in governmental institution in Ethiopia. The result indicates that 78.6% of the respondents' agreed as they are familiar with landscaping, greening and beautification works in governmental institution in Ethiopia while 21.4% of the respondents responded as not observed landscaping and beautification works elsewhere (Table 1). The respondents observed beautification work in a governmental institution such as university (52.2%), Federal office (18%), Schools (14.6%), region office (8.2%) and less in Zone office 7.0%). The majority of the University community (77.1%) agreed and was satisfied with the beautification, greening and landscaping work of the University whereas 22.9% of the respondents claim that as there are some issues that need more attention than beautification and landscaping work (Table 1).

Figure 1. Comparison between past (Top) and present (bottom) appearance of the main campus

The respondent agrees that campus beautification and landscaping work was the most important and made the campus more attractive by plantation (61.1%), landscaping (27.1%), walk ways (5.7%), seat and shades (4%), and small water pools compared to the previous situation (Figure 1, 3 and Table 1). Each tree helps to fight global warming via reducing the quantity of greenhouse gases within the environment. Vegetation in the campus environment provides color to break out the warmth of the sun and additionally they provide green areas for rest, relaxation and pastime or recreation (Behe *et al*., 2005). The respondents also rated the change in the main campus environment as there is drastic change (75.8%) while the rest claimed as beautification, greening and landscaping work doesn't include all the campus areas (Table 1).

Table 1: The Perception of respondents towards beautification and landscaping work done in the main campus

Information	Category	Percentage (%)
Have you ever observed land scape & beatification work in governmental institution in Ethiopia	Yes	78.6%
	No	21.4%
Types of institutions landscape and beatification carried out	Schools	14.6%
	Federal office	18.0%
	Zone office	7.0%
	Regional office	8.2%
	University	52.2%
Are you satisfied with the landscaping and beautification work in the campus	Yes	77.1%
	No	22.9%
Which landscaping and beautification work is most attractive?	Landscaping	27.1%
	Walk ways	5.7%
	Seat & shades	4.0%
	Small water pools	0.0%
	Plantation	61.1%
How do you rate the change on the campus environment?	Have change a lot	75.8%
	Not that much	17.1%
	No change at all	7.1%
Plants planted have significant role in micro-climate modification	Yes	94.3%
	No	5.7%
Landscaping work increases the beauty of the campus	Agree	97.7%
	Disagree	2.3%
Landscaping work has created suitable environment for teaching learning process	Agree	91.4%
	Disagree	8.6%
Landscaping work has positive contribution for education quality	Agree	74.5%
	Disagree	25.5%
Landscaping increases plantation and infrastructure of the campus	Agree	87.1%
	Disagree	12.9%
The seat, shade area and recreational area made a suitable environment for service intended	Agree	91.4%
	Disagree	8.6%
Landscaping work create job opportunity for citizens	Agree	96.2%
	Disagree	3.8%

Attractively designed and well-maintained physical environment of the campus can help to create a positive paramount impression, set up a peaceful mood, and increase assets value. The present study finding also agreed with this concept that, majority of respondents (94.3%) confirmed as plantation have a significance role for environmental micro-climate modification. Because, plants regulate the temperature, it is good for refreshment, provide clean air and also good for all image of the campus. Hence, almost all respondents (97.7%) agree with landscaping, greening and beautification work increases the beauty of the main campus (Table 1). Besides creating excellent working environment for the University community, the landscaping, greening and beautification work also contribute a lot for the teaching-learning process (91.4%) and education quality (74.5) through modifying micro-climate, providing shade, recreation areas and serving as reading area (Table 1).

With the improvement of socialization, integration and popularization of higher education, the substances of education so come to be more massive and they are not confined to books and school rooms. The campus surroundings that students stay in their everyday life are the materials of training as nicely (Hartig *et al.*, 1991; Tennessen and Cimprich, 1995; Habib *et al*., 2016). The modified physical environment surrounding the campus promotes efficiency in the teaching-learning process and contributes to education quality as well as contributes to their aesthetic development. Almost all respondents confirmed that, before the start of beautification and landscaping work, it was difficult to stay at the office, even students were traveling to Lake Hawassa side areas seeking shade and comfortable reading and seating area due to hot temperature. Nowadays, landscaping and beautification work increase plantation and infrastructure of the main campus (87.1%) and almost all respondents agreed (91.4%) with the opinion that the seat, shade, and recreation area made a suitable environment for the service intended (Figure 1, 3 and Table 1). On the other hand, beautification, greening and landscaping work create job opportunities for citizens (96.2%) (Figure 3, 4 and Table 1).

Trees for Landscaping and Beautification

The present study revealed that greening and plantation (94.3%) significantly modify the micro-climate of the environment in the study area (Figure 3 and Table 1). Plants are the “lung of urban areas’’ (McPherson, 2005) due to their ability to remove pollutants from the atmosphere that is breathed by acting as natural filters. Powe and Wills (2004) reported that plants generate health benefits by reducing the mortality rate and reducing visits to the hospital. Ornamental plants made a more pleasant environment for people (Akbari, 2002) and people walking around green areas showed reduced stress levels (Lohr *et al*., 2007; Ulrich, 1989). Higher education institutions’ students’ under exam stress had increased positive feelings and reduced fear and anger when they had view of plants (Frank, 2003).

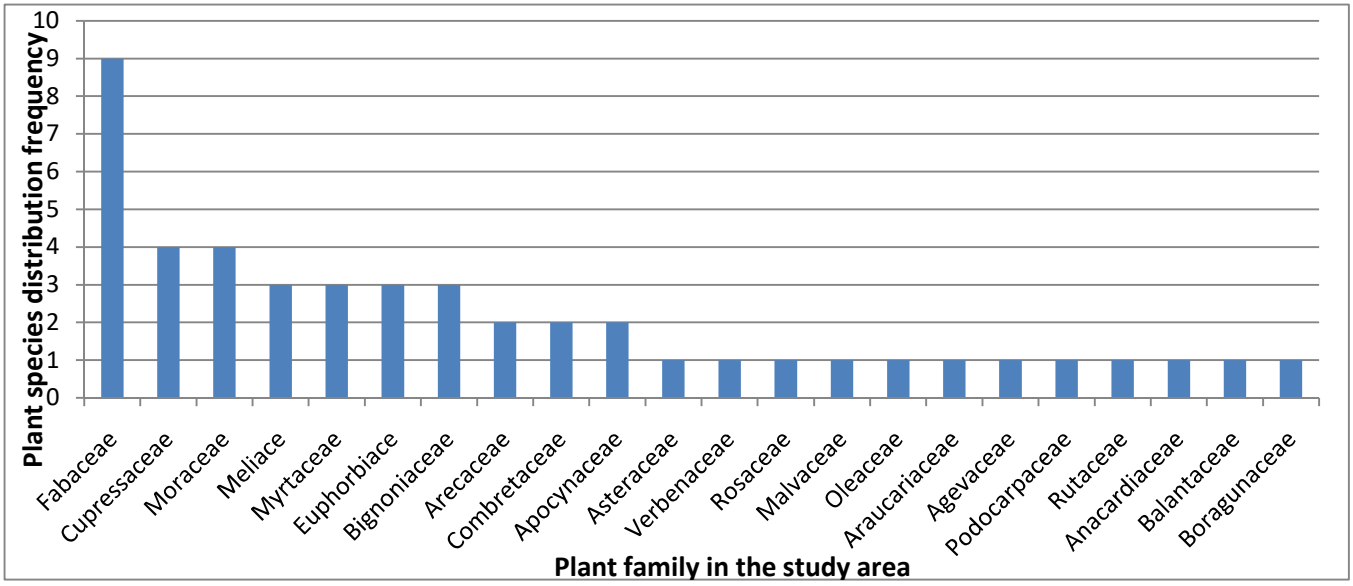

Figure 2. Plant Family and species distribution frequency from the study area (both exotic and indigenous plants, see Appendix)

In the present study area, both exotic and native plants were used (Appendix). Plantation trees used in the study area includes; *Junipers procera*, *Jacaranda mimosofolia*, *Ficus elastic*, *Phoenix reclenata*, *Borassus aethiopum*, *Acacia species*, *Nerium oleander*, *Hibiscus syriacus*, *Cupressus sempervirens pyramidalis*, *Graviellia robusta*, Araucaria species to mention a few (Appendix).

The majority of plants species used for plantation in the main campus belongs to twenty (29) families; dominated by the Fabaceae family with nine (9) species and Cupressaceae and Moraceae with four (4) species each (Figure 2 and Appendix). The main reason for choosing plants for landscaping such as providing the screen, blocking the unwanted view, modifying temperature, stabilizing soil, and aesthetic value(overall habit or shape of the plants and their foliage, flower, fruit, and bark).Thus, diversity of plant species and combination of plant forms, foliage, flowers, fruit and bark can result in creative, artistic display and beautiful landscape composition. Plant species indigenous to the country should be incorporated into the landscaping and beautification work. Compared to exotic plants, indigenous plant species carries a variety of environmental benefits ranging from reducing erosion, shade, micro-climate modification, and these plants would require less overall maintenance, less watering and less intensive management than exotic species currently used on campus landscaping. The plantation of indigenous trees is very important to conserve the plants species and their survival rate is higher compared to exotic plants. The present study finding indicates that the study area is dominated by exotic plants (Appendix). Therefore, the researchers recommend that planting indigenous plant is more important than exotic trees for sustainable and long-term usage of the landscaping. Because, having a larger proportion of native plants would be less expensive to upkeep in the long-run.

Effect of Landscaping and Beautification on Teaching-learning Processes

There is direct dating among the construction of verbal exchange space and the realization of the instructional feature of campus landscape, high-quality campus communication area offers a great location for various communique activities in the campus, makes it convenient for carrying out sports which include instructional alternate, extracurricular practice, extracurricular coaching, out of doors exercise, undertaking and sightseeing. The current university college students present range and randomness and numerous forms of conversation space with wealthy gradation meet the requirements of various varieties of customers. From this perspective, campus panorama surroundings, higher realizes the function for education carrier (ICADCE, 2015). Because college days are a vital duration to form the view of existence values, excessive great campus area environment has a lively effect on shaping the thoughts of university college students (Habib *et al*., 2016).The present study finding reveals that campus landscaping, beautification, and greening had a significant effect on supporting the teaching-learning process, job opportunity and recreation, 91.4%, 96.2%, and 91.4% respectively (Figure 3 and Table 1). Plantation and greening assist the teaching- learning process through providing shade, recreational place, increasing staff and students stay at the campus, reading space and modifying the temperature of the environment (Figure 3 and Table 1). Interplay with natural factors such as vegetation, water source or different appealing regions could lessen psychological pressure in humans each day lifestyles. Decreased psychological strain could permit advantageous attitudes to broaden and stimulate students learning interest towards studying (Kaplan *et al*., 1998; Han, 2009). Beautification components, especially flora have active psychological relationship with people, could assist in mental stability, improving the behavior and health conditions (Wells, 2000; Taylor *et al*., 2001)..

Figure 3. Landscape designing and walk ways in the main campus

Humans have better standard health and immunity to diseases while dwelling in an area with considerable inexperienced space, and patients recover faster when a view of a natural environment is available (Maas *et al*., 2006; Maller *et al*., 2002). Beautiful environment enhance the aesthetic value of the campus environment and reduce the surrounding temperature and help to get clean air (Malone and Tranter, 2003). Hence, almost all respondents (97.7%) of the present study appreciate the landscaping and beautification work done in the study area (Table 1).

Job opportunities

Before landscaping and plantation work started Hawassa University's main campus was bare lands, hot and inconvenient for teaching-learning process, academic staff, students and administrative workers to accomplish their daily activity properly. The majorities of main campus students especially prefer to seat and read at Lake Hawassa sides. Nowdays, the campus appears as one of the most beautiful and attractive campuses in the country (Figure 1 and 3).Even the campus is becoming preferable a film shot and another activity area. Beautification, greening and landscaping work in the campus started in 2012 G.C and continue to present with the support of the Germany Government that support around 74 million birr, and beatified by Flora Agricultural state PLC AA (personal communication with campus beatification officer). Since beautification started, different activities were carried out in the main campus such as planting trees, grasses and protecting them watering, mulching, weeds avoiding, shortening the grass with a sickle, scissors and machines. The study result confirmed that the campus beautification work has created a great job opportunity (96.2%) for more than 80 workers now (Figure4 and Table 1). However, different challenges interrupt the beautification and greening activities (Table 2). The price paid and works are not related and workers are disadvantageous. The study suggests that sustaining the landscaping, beautification, greening and encouraging the workers are crucial (Figure 3 and 4). Awareness raising activities should be given to the students and campus societies to protect and proud off the campus beautifying and greening.

Figure 4. Partial view of landscaping, beautification and greening workers in the main campus.

Landscaping and beautification requires significant hand work and the use of a system, relying on the nature of site grounds. However the use of educated labor and higher equipment may also lessen the fee. From 1% - 4% of the price range for the campus, the school invested on campus beautification. Therefore, setting up an endowment could create a higher financial supply to be available for campus beautification and up maintenance (Larry, 1992).

Seating Areas

The respondents' were asked to which facilities they would like to be incorporated to the site and indicated that incorporating seating regions need to be a design priority. Respondents were verified the maximum popular option benches (85%), as they would love to look benches brought to the area, indicating a preference to make the space greater interactive and welcoming. at some stage in the focal point group, participants emphasized seating areas as an amazing manner to get students to note and admire the ecological layout features of the site (Figure 5).

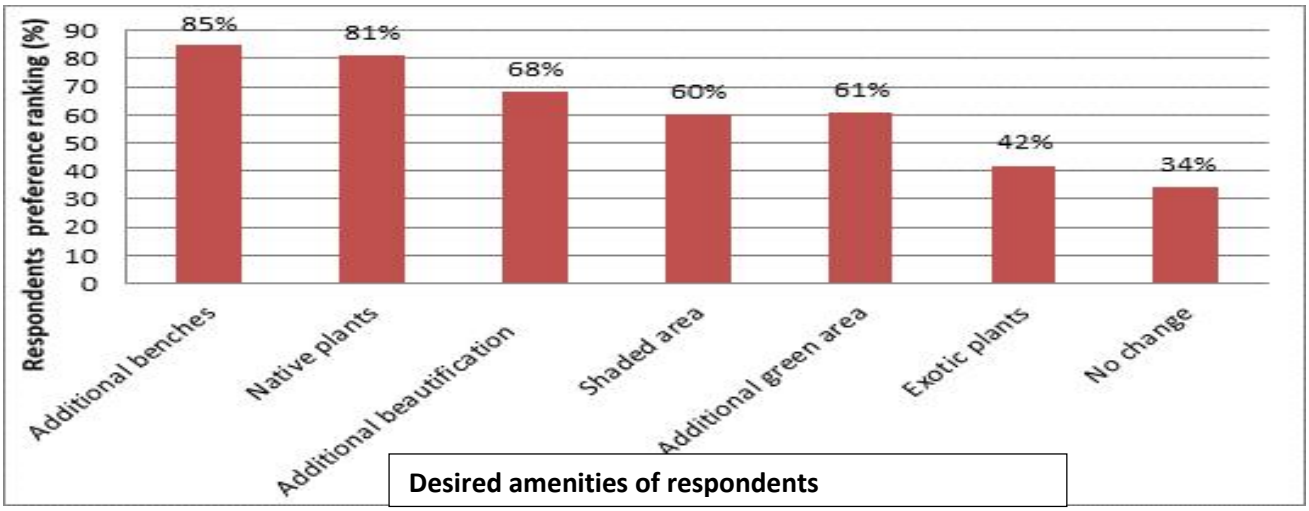

Figure 5. Desired amenities of respondents in the study area

The respondents point out that, comfortable areas where students and the community could seat and examine or do work are the seating regions ought to be as a minimum partly offset from the on foot paths and avenue facets so that they may be not be disturbed by high pedestrian site visitors. Figure 5 above also indicates that, green space and landscaping involving native plants species (81%) are more appreciated by respondents. The findings indicate thatthere is support for additional beautification, landscaping and greening with less exotic plant species (Figure 5 and Appendix).

Constraints of Landscaping, Beautification and Greening in Hawassa University Main Campus

Different challenges interrupt the beautification and greening activities (Table 2). Semi-structured interview and questionnaire reports indicate that, the main challenges of landscaping, greening and beautification work of the study area were lack of budget (77.66%), lack of beautification equipment's (76.10%), absence of nursery on the main campus (56.23%), lack of planting materials, lack of

awareness and lack of trained human power (54.73%), (53%)and (51.%) respectively (Table 2).

Table 2: Constraints of landscaping, beautification and greening work in the study area

Challenges	Frequency	Percent (%)	Rank
Knowledge gap in beautification	51	52.33	6th
Lack of training for workers	52	51.10	7th
Lack of water availability	37	41.20	9th
Destruction by animals	43	49.12	8th
Lack of budget	82	77.66	1st
Lack of awareness for University Community	45	53.00	5th
Lack of beautification equipment's	71	76.10	2nd
Knowledge gap in plant breeding	31	19.10	10th
Absence of nursery in main campus	55	56.23	3rd
Lack of planting materials	57	54.73	4th

CONCLUSIONS

A development of green infrastructure on University compound has been acknowledged as one of the foundations of Education for Sustainable Development, an initiative that could provide various benefits to the campus community. The investigation was carried out to assess plant species composition and the perception of Hawassa University community towards the landscaping work executed at its main campus since 2017 to present. Besides creating excellent working environment for the University community, the landscaping, greening and beautification work contribute a lot for teaching-learning process and education quality through modifying micro-climate, providing shade, recreation place, and serving as reading space. Nowadays, landscaping and beautification work increase plantation and infrastructure of the main campus and almost all respondents agreed with the opinion that the seat, shade, and recreation area made a suitable environment for the service intended. The finding of the study also indicates that, the majorities of respondents agree and appreciate that landscaping and beautification work creates enormous job opportunities for citizens. We recommend that sustainable landscaping works to enhance the teaching-learning process make the campus more attractive and refresh the mind of workers and students as it potentially contributes to the quality of education. Therefore, all University communities should protect/be proud of the greening and beautification work done. Protection and taking care of the plants should be given higher priority. Furthermore, the University should use this beautiful environment as an income source (place to shoot films and photos). Planting different plant species should continue in consultation with experts in the area (botanists, environmentalists, and horticulture).

Conflict of Interests

The authors declared that there is no any conflict of interests.

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Appendix. List of plants, their local name, family, frequency of occurrence

No	Scientific name	Family	Local name	Habit	Frequency	Origin
1	*Acacia abyssinica Hochst*	Fabaceae	Baziragirar	Tree	3	Indigenous
2	*Acacia seyal DC.*	Fabaceae		Tree	6	Indigenous
3	*Acacia tortilis Forssk.*	Fabaceae		Tree	1	Indigenous
4	*Afrocarpus falcatus (Thunb.) C.N.Page*	Podocarpaceae	Zigiba	Tree	45	Indigenous
5	*Agave Americana L.*	Agevaceae		Tree	10	Exotic
6	*Araucaria biramulata Buchh.*	Araucariaceae			11	Exotic
7	*Azadirachta indica A.Juss.*	Meliaceae	Neem	Tree	1	Exotic
8	*Balanitesa egyptiaca (L.) Delile*	Balanitaceae		Tree	2	Indigenous
9	*Bauhinia sp L*	Fabaceae		Tree	6	Exotic
10	*Borassus aethiopum Mart.*	Arecaceae	Zembaba	Tree	44	Indigenous
11	*Caesalpinia pulcherrima (L.) Sw.*	Fabaceae		Tree	6	Exotic
12	*Calforniaspps*	Geraniaceae		Tree	4	Exotic
13	*Callistemon citrinus (Curtis) Skeels*	Myrtaceae		Tree	30	Exotic
14	*Casimiroa edulis La Llave*	Rutaceae		Tree	1	Exotic

15	*Combretum molle R.Br. ex G.Don,*	Combretaceae		Tree	3	Indigenous
16	*Cordia africana Lam.*	Boraginaceae	Wanza	Tree	21	Indigenous
17	*Croton macrostachyus Hochst.*	Euphorbiaceae	Bisana	Tree	2	Indigenous
18	*Croton megalocarpus Hutch.*	Euphorbiaceae	Kenya bisana	Tree	1	Exotic
19	*Cupressus lusitanica Mill.*	Cupressaceae	Yefenjitid	Tree	15	Exotic
20	*Cupressus sempervirens pyramidalis*	Cupressaceae	Italian cypress	Tree	53	Exotic
21	*Delonix regia (Boj.ex Hook.)Ref.*	Fabaceae	Yedirezaf	Tree	12	Exotic
22	*Duranta erecta L*	Verbenaceae	-	Tree	>100	Exotic
23	*Ekebergia capensis Sparrm.*	Meliaceae	Lol	Tree	5	Indigenous
24	*Eriobotrya japonica Loquat*	Rosaceae		Shrub	4	Exotic
25	*Ficus elastic Roxb. ex Hornem*	Moraceae	Yegomazaf	Tree	1	Exotic
26	*Ficus sycomorus L*	Moraceae	Shola	Tree	5	Indigenous
27	*Ficus vasta Forssk*	Moraceae	Worka	Tree	4	Indigenous
28	*Grevillea robusta R.Br.*	Proteaceae	Abeba	Tree	45	Exotic
29	*Hibiscus rosa-sinensis L.*	Malvaceae		Shrub	16	Exotic
30	*Jacaranda mimosifolia D.Don.*	Bignoniaceae	Yetemenjazaf	Tree	70	Exotic
31	*Jatropha curcas L.*	Euphorbiaceae		Tree	5	Exotic
32	*Juniperus procera Hochst ex Engl*	Cupressaceae	Tid	Tree	16	Indigenous
33	*Leucaena leucocephala (Lam.) de Wit*	Fabaceae		Shrub	3	Exotic
34	*Mangifera indica L.*	Anacardiaceae	Mango	Tree	5	Exotic
35	*Melia azandrach L.*	Meliaceae		Tree	14	Exotic
36	*Moringa stenopetala (Baker f.) Cufod.*	Moringaceae	Shiferaw	Tree	1	Exotic
37	*Musa paradisiaca L.*	Musaceae	Banana/Muz	Tree	20	Exotic
38	*Nerium oleander L.*	Apocynaceae	-	shrub	80	Exotic
39	*Olea europaea ssp. cuspidata (Wall.exG.Don) Cif.*	Oleaceae	Woyra	Tree	15	Indigenous
40	*Phoenix reclinata Jacq.*	Arecaceae	Saticho	Tree	64	Indigenous
41	*Pinus patula L.*	Pinaceae		Tree	8	Exotic
42	*Plumeria alba L.*	Apocyanaceae	Yebereha rose	Shrub	3	Exotic
43	*Psidium guajava L.*	Myrtaceae	Zeyituna	Tree	2	Exotic
44	*Senna siamea (Lam.) Irwin et Barneby*	Fabaceae		Tree	24	Exotic
45	*Sesbania sesban (L.) merr.*	Fabaceae		Shrub	2	Indigenous
46	*Spathodea campanulata P.Beauv.*	Bignoniaceae		Tree	19+ 24	Exotic
47	*Syzygium jambos L*	Myrtaceae	Yeferenjigoya	Tree	9	Exotic
48	*Terminalia brownie Fresen*	Combretaceae		Tree	42	Indigenous
49	*Thevetia peruviana (Pers.) K.Schum.*	Apocynaceae			14	Exotic
50	*Thuja orientalis L.*	Cupressaceae	Yefenjitid	Tree	11	Exotic
51	*Trilepsum madagascare*	Moraceae		Tree	18	Indigenous
52	*Vernonia amygdalinaDelile*	Asteraceae	Grawa	Tree	5	Indigenous