

Perception study of Trees and Greens in Open Spaces for Environmental Quality; A Case Study of Federal University of Technology, Akure.

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Abstract

Trees have an important positive effect on people's lives. One of such positive effects is the amelioration of microclimate. The study therefore assessed perceived influences of trees and greens in open spaces for environmental quality in the Federal University of Technology, Akure. Specifically, the study examined the influence of trees, greens in open spaces for environmental quality, perception about the university landscape and effects of landscape and weather on the inhabitant of the location. Multistage techniques were used to select 90 respondents including staff and students from which data was collected with the use of well structured interview schedule. Data collected was analyzed using descriptive statistics. The study indicated that majority (59.1%) of the respondents were male, while (47.7%) of the respondents were between the ages of 21-30 years. Respondents asserted that good landscaping contributes to the serenity of the environment (80.2%), 61.7% agreed that landscape contributes to environmental quality while (47.6%) asserted that landscape provides comfort to life, in all (48.9%) asserted that the university is beautifully landscaped to ameliorate microclimate. Therefore, the development or introduction of a built environment within the campus should be well maintained without jeopardizing the quality of campus environment and green spaces.

Key words: Landscape, Green Space, Microclimate, thermal variable .

1. Introduction

The use of open spaces is influenced by the microclimatic conditions provided, whereas microclimate and thermal perception definitely depend on urban design and show a high temporal and spatial variation. The outdoor thermal environment, is impacted by the built environment, through anthropogenic heat, ground surface covering (Lin et al., 2010), evaporation and evapo-transpiration of plants (Robitu et al., 2006), and shading by trees or constructed objects (Lin et al., 2010). There is a strong public interest in the quality of open urban spaces that can contribute to the quality of life within cities. However, there is a significant lack of information on comfort conditions in outdoor spaces (Dimoudi and Nikolopoulou, 2003). In times of excessive heat, it is important to maximize the cooling potential for people. Trees are important as they can be used effectively to improve radiant conditions. Vegetation has a low heat capacity and uses a large proportion of the received radiation resulting to the surface below the leaves being cooler. However, as tree canopies are elevated, they not only cool the surface in shade, but allow people shelter from the sun. This shelter creates cool oases where a person feeling heat stress can shelter from the direct short-wave radiation of the sun and improve their thermal comfort (Georgi and Dimitriou, 2010).

2. Materials and Methodology

The study was conducted within the university campus of the Federal University of Technology (F.U.T), Akure, Ondo State, specifically the Obanla area of the university campus which harbours administrative blocks, departments, student hostels and the staff quarters, and lies between longitudes 70E and 70451E, and latitudes 60N and 70N of the equator in Nigeria. The Federal University of Technology, Akure has a population of over 10,000 students and staff. Snow balling technique was used to select 90 respondents across the University including staff and students. A well structured interview schedule was used to collect data from selected respondents. Data obtained from the study was analyzed using descriptive statistics such as mean (μ) and percentages.

3. Results and Discussion

In table 1, majority (59.1%) of the respondents' were male, while 47.7% of the respondents were between age brackets of 21 and 30 years of age. This implies that both post graduates students and members of academics staff were young adults that take time out to enjoy and appreciate the benefit of greening. The study further showed that a higher proportion of respondents (about 36.4%) were academic staff.

Table 1: socio economic characteristics of respondents

| | Frequency | Percent(%) |
|---------------------|-----------|------------|
| Sex | | |
| Male | 52 | 59.1 |
| Female | 36 | 40.9 |
| Age | | |
| Below 20 | 2 | 2.3 |
| 21-30 | 42 | 47.7 |
| 31-40 | 27 | 30.7 |
| 41-50 | 16 | 15.4 |
| 51-60 | 1 | 1.1 |
| Status | | |
| Undergraduate | 15 | 17.0 |
| Post-graduate | 25 | 28.4 |
| Non academics Staff | 16 | 18.2 |
| Academics Staff | 32 | 36.4 |

The result in figure 1 shows that 90.9% of total respondents love to relax and prefers to take out time to relax under trees with green. This is in agreement with Toccolini (2006) that green areas are network of greening and interconnected open spaces formed by tree-streets, waterways and drainage ways around and between urban areas, at all spatial scales where people can use to reach places of work or study. Campus green area is composed of tree-street, walkways (Benedine and Adamu, 2007). Green area allows campus residents to undergo their daily activities such as walking, jogging, experiencing nature, watching people, meeting friends, displaying artworks and many more.

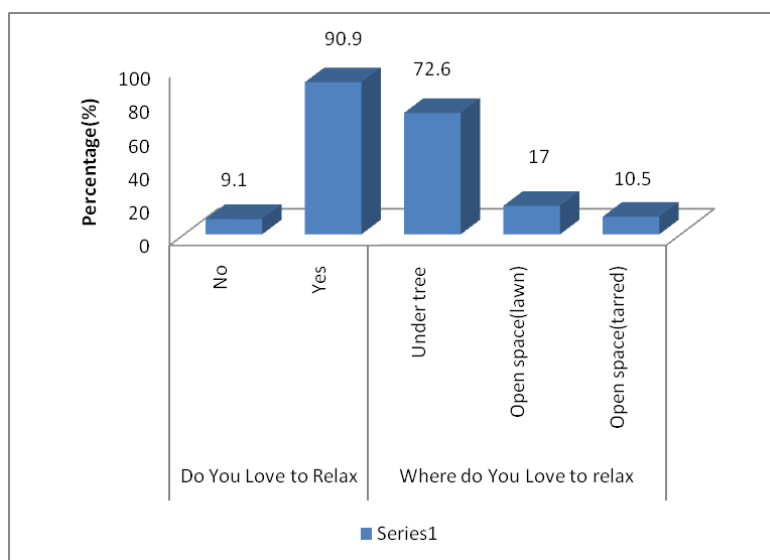


Fig. 1: Statistics of respondents preference for relaxation

About 23% and 20% of respondents' are relieved of stressed and fatigue respectively as shown in figure 2. This explains that the level of stress decreases rapidly for those who were exposed to natural environment as compared to people who were exposed to urban environment. This is a clear indication that urban green spaces can increase the physical and psychological well-being its dwellers. Certainly, improvements in air quality due to vegetation have a positive impact on physical health with such obvious benefits as seen in the decrease of illness. The connection between people and nature is important for everyday enjoyment, work productivity and general mental health (Grahn and Stigsodotter 2003). At the level of organization, in agreement to Westphal (2003), workers report greater productivity when they have a view of green space from their place of work, and their supervisors also feel that these workers are more productive.

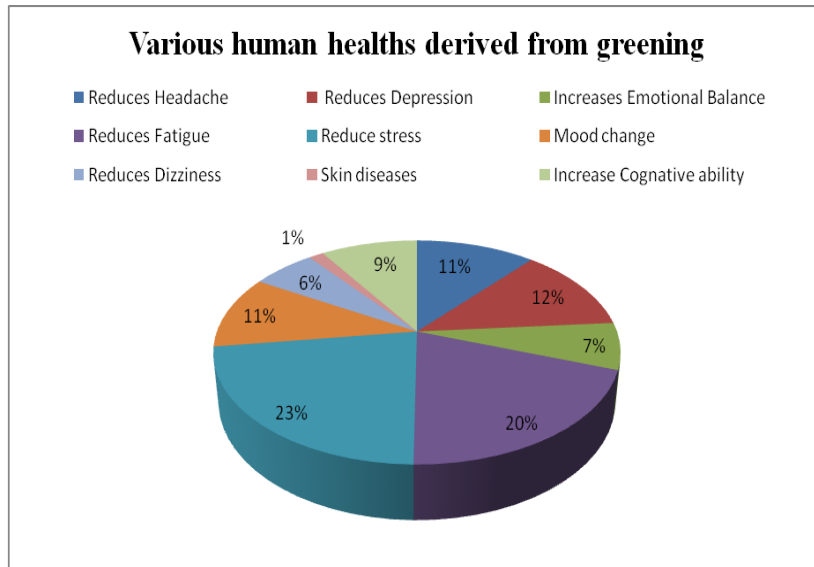


Fig 2: Effects of greening on health

Figure 3 presents the respondents preference to different seasons of the year. This actually vary on the basis of how the respondents viewed it. Probably from a bio-aspect, agro-aspect, aviation-aspect e.t.c. The two seasons in Nigeria are the rainy season popularly known summer season(which is dominated by 'warm and moist' south-west monsoon flow from the Atlantic ocean) and dry season known as winter season (dominated by 'cold and dry' north-east trade wind from the Sahara desert) (Nymphas *et al.*, 2004). Having a good idea of weather helps to have a better understanding of the physiological aspect of thermal sensation, generally recognized that heat gained or lost by the body to its environment is directly related to the temperature of the surroundings, humidity, wind velocity, amount of radiation within that environment and type of activity been carried out.

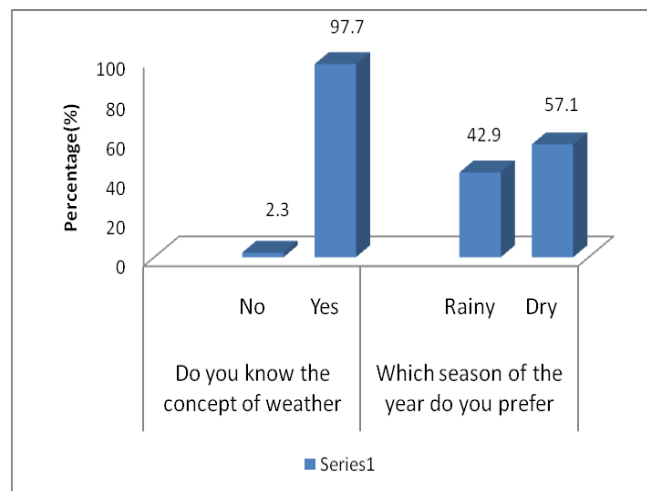


Fig 3: Respondents understanding and preference of seasonality of weather.

Table 2 shows that 52.3% of the respondent moderately enjoys the comfort of green spaces which could be compare to the comfort derived from sitting or standing under a tree to when not sitting or standing under a tree. 40.7% asserted that green spaces can act as a place of comfort while 48.8 % asserted that green space contributes to good health. This can be attributed to the fact that the radiant energy reduction made by a tree will vary depending on the tree canopy size and density, but as a result of tree shade, a person radiates more energy away than he receives resulting in feeling cooler (Georgi and Dimitriou, 2010). In addition to the reduced solar energy, the built surfaces in shade will have lower temperatures and further energy can be lost to these surfaces, furthering the cooling value.

Shading from trees can act to cool the atmosphere below by simply intercepting solar radiation. Water in the leaf is vaporized and released through the stomata. This release of vapour is known as evapotranspiration and this not only uses the received energy, but also the water vapour released "warms the air less" resulting in cooler air temperatures around the area of vegetation (Dimoudi and Nikolopoulou, 2003).The low heat capacity results in very little energy being stored for re-radiation or heating through convection (sensible heat) and much of the received solar energy is used for transpiration (latent heat), cooling the surrounding air temperature. The ratio of sensible heat and latent heat varies as a result of many factors, not least air temperature and water availability, and is quantified by the Bowen ratio (Monteith and Unsworth, 1990).

Table 2: Respondents' perception of open spaces

| Statement | Not at all(%) | Moderately (%) | Highly (%) |
|---|---------------|----------------|------------|
| Green space offer same comfort as normal spaces | 19(20.9) | 46(52.3) | 23(26.7) |
| Effective force of tree as a place of comfort | 21(24.4) | 31(34.9) | 35(40.7) |
| Green space contributes to good health | 20(23.3) | 25(27.9) | 43(48.8) |

Table 3 shows respondents' perception of the University landscape. 48.9% of the respondents' agrees that the university is beautifully landscaped which in conclusion showed that ($\mu=4.14$) of the respondent agrees to the statement while 80.2% of respondent strongly asserted that, good landscaping contributes to the serenity of the environment ($\mu= 4.78$). This is in agreement with Habib and Ismaila, (2008) assertion that provision of quality living and learning sets is crucial for staff and student in the University campuses.

Other respondents' perception about the university landscape include; 50% of the respondents agrees that there are adequate green spaces within the university environment ($\mu=3.88$), open spaces serve as reading location for students ($\mu=3.80$) and that there are adequate trees to provide shade within the university. The quality of an environment is dependent on its landscaping, this can be attributed to the unity and harmony of landscape principle incorporated into the element of landscape whereby leading to a healthy and organized social and cultural lives of both staff and students, this according to respondent perception, 61.7 % agrees that the university landscaping contributes to the environment quality which can be concluded that the total mean ($\mu=4.54$). This is in agreement to Tzoulas (2007) which states that in campus, greenery promotes healthy society. This means greenery and open spaces are not just amenities but also an interconnected network of ecological systems that conserve air, water, microclimate, energy resources and enriches human quality of life. Also students' perception weren't left out where 40.9 % strongly agrees that open spaces serves as reading location. This is n agreement to Tolley (1996) that, University with a vast green area is a conducive place of study.

| STATEMENT | SA | A | U | D | SD | MEAN(μ) |
|---|----------|----------|----------|----------|----------|---------------|
| The university is beautifully landscaped | 33(37.5) | 43(48.9) | 5(5.7) | 5(5.7) | 2(2.3) | 4.14 |
| There are no adequate green spaces within the university environment | 9(12.7) | 9(12.7) | 16(22.5) | 20(28.2) | 17(23.9) | 2.62 |
| There are adequate trees to provide shade within the university community | 13(15.1) | 43(50.0) | 17(19.8) | 10(11.6) | 3(3.5) | 3.62 |
| FUTA has a better landscape compared to other universities | 9(11.5) | 14(17.9) | 33(42.3) | 9(11.5) | 13(16.7) | 2.96 |
| Open space serve as reading location for students. | 36(40.9) | 22(25.0) | 15(17.0) | 6(6.8) | 9(10.2) | 3.80 |
| The trees used for landscaping are the right ones. | 13(14.8) | 49(55.7) | 22(25.0) | 2(2.3) | 2(2.3) | 3.78 |
| Good landscaping contributes to serenity of the environment. | 65(80.2) | 14(17.3) | 2(2.5) | - | - | 4.80 |
| Landscaping doesn't contribute to serenity of the environment. | 2(2.8) | 4(5.6) | 20(28.2) | 17(23.9) | 28(39.4) | 1.42 |
| The university landscape contributes to environmental quality. | 50(61.7) | 25(30.9) | 6(7.4) | - | - | 4.54 |
| Does the university landscape provide comfort to life? | 39(47.6) | 34(41.5) | 7(8.5) | - | 2(2.4) | 4.32 |

4. Conclusion

The study has established that green spaces are tools in networking between both students and staff and means for community integration for comfortable and pleasant settings. Green area in campus also offers an opportunity to preserve the disappearing green spaces from campus due to the physical developmental pressure. Campus is growing each year with the enrolment of new students; more space will be needed to accommodate hostels, road signage for managing traffic flows, new schools for new courses as well as parking space (Lim, 2006). In other words, the green network connects one cluster of buildings and spaces to another that facilitates users' interaction with ease and safety under shaded and pleasant conditions. There is a clear indication that greening plays an important role in keeping campus microclimate comfortable and gives more benefits for outdoor activity users.

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