



Attributes of Urban Greenspaces and their Influence on Visitors' Preferences in Nairobi City County, Kenya

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Abstract

Urban green spaces refer to land covered with vegetation such as forests, street trees, parks, gardens, and water bodies in an urban setup. In this study, we sought to investigate the attributes of urban green spaces in Nairobi County and their relationships to visitor preferences. The Garden City Model advanced by Howard (1898) guided the study. Quantitative and qualitative methods were used to collect data while a cross-sectional survey designs and stratified random sampling of the green spaces was employed, based on the location within the urban core and peri-urban of Nairobi County. Four green spaces (Karura Forest, Ngong Road Forest, Nairobi Arboretum, and City Park) with diverse characteristics and attributes was selected. A sample population of 384 visitors to the green spaces were surveyed for their perceptions of the functions, use, and benefits of the green spaces. Our findings showed that attributes of green spaces including location, accessibility, security, hygiene, and infrastructure could explain the interaction between green space provision factors and the frequency of visits, time spent in the green spaces and overall satisfaction of the visitors. Green space provision should be equitable in regard to distance to residents, quality of spaces, facilities and services and should be designed to meet the needs of diverse residents. Further, they should provide services and benefits such as shade, recreation, and health which are the main attractions to the green spaces. To achieve maximum benefits for visitors, green spaces need to be safe and physically accessible to all.

Introduction

Urban Green Spaces (UGS) refer to land covered with vegetation in a landscape, such as forests, street trees, parks, gardens and water bodies in an urban set-up (Hunter and Luck, 2015). Quantity in green spaces alludes to the total land area used as green spaces compared to the total population of the urban area they are in (m²/inhabitant) (Halecki et al., 2023). In developing countries, low-income urban areas tend to have few smaller green spaces, which differ in their properties (De la Barrera et al., 2016). The total green space in Nairobi City County is 9.86% (Okech & Nyadera, 2021), equivalent to 69.41 km² of the 703.9 km².

The quality of green space is attributed to species richness, greenness (the lush green of healthy vegetation), vegetation or tree cover and naturalness, safety, and spaciousness (Reyes-Riveros et al., 2021). Through transpiration and shading, green spaces cool and humidify the environment, thus improving outdoor thermal comfort (Ye et al., 2022). In a study in Nigeria, outdoor air temperature



was reduced by up to 3.38 °C when 45 per cent of the canopy was covered with trees and mean radiant temperature by up to 24.24 °C (Zheng et al., 2024).

The UN Sustainable Development Goal 11 is intended to make cities and human settlements inclusive, safe, resilient and sustainable. To achieve this, UGS is considered the nature-based solution for sustainable urbanisation (UN-Habitat, 2020; Okech & Nyadera, 2021).

Green spaces provide ecosystem services, including air and water purification, wind and noise reduction, carbon sequestration, microclimate regulation, wildlife habitat, and social and psychological well-being. They are also linked to mental and physical health (Zhukov et al., 2022; Wolf et al., 2020).

The State of Green Spaces in Nairobi

Land use within Nairobi is divided into urban use, agriculture, rangeland, and remnants of evergreen tropical forests. Population densities vary widely within the city, with high-income locations having, on average, densities as low as 500 people/km². In comparison, low-income locations such as those in the slums have densities as high as 63,000 people/km² (Ren et al., 2020).

The rapid population growth has contributed to the decline of the remnants of evergreen tropical forests. Population densities vary widely within the city, with high-income locations in Nairobi putting pressure on the available UGS. Residents' perceptions of UGS's value, vulnerability, and management may vary from conservative to liberal (Basu & Nagendra, 2021). Population pressure in Nairobi has bulged into Kiambu County and converted the cash crop-rich land into commercial and residential zones. As a result, Kiambu County has lost significant agricultural land due to land use change (Musa & Odera, 2015). This study investigated the attributes of UGS in Nairobi City County and visitors' preference for green spaces.

Theoretical Framework

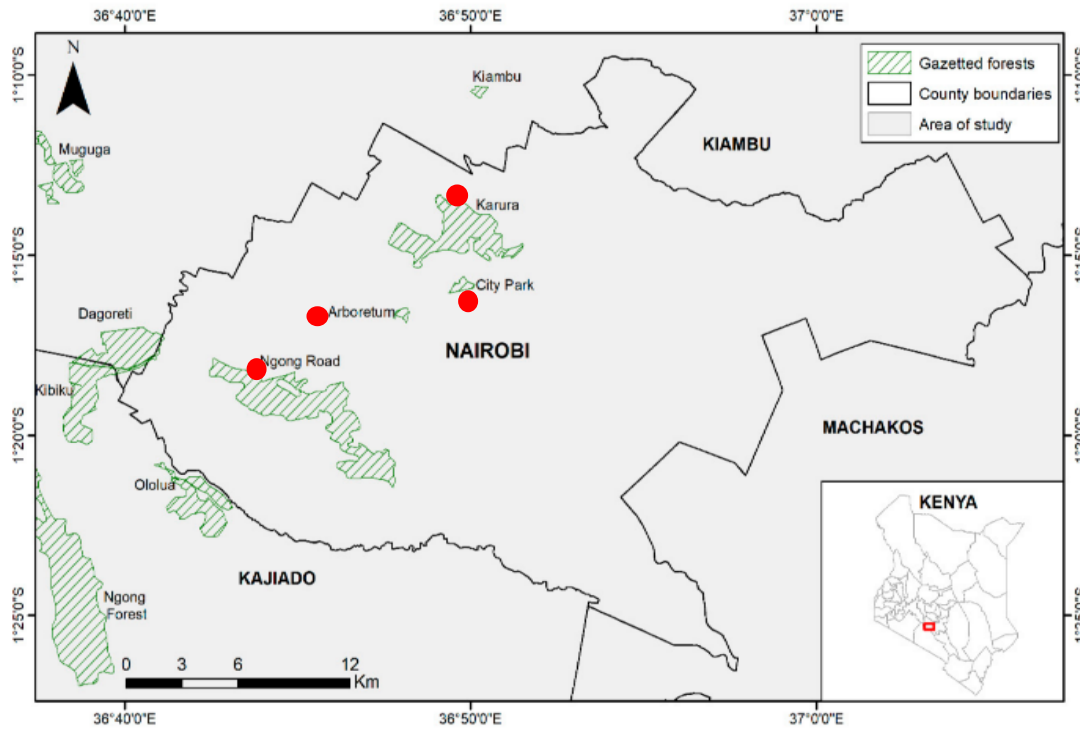
This study relied on the Garden City Model (GCM) advanced by Ebenezer Howard in 1898. The model proposed the conservation of the natural environment. It emphasised the preservation of UGS and combined the benefits of rural and urban life. The GCM advocates for a city with the economic and cultural advantages of urban life and the ecological benefits of a rural silverdure. It proposed the construction of green cities that would enable their spatial-urban planning to create environmentally friendly urban areas. The UGS were borrowed from the rural environment and tucked in urban spaces to break the general face of a concrete jungle. The construction of the first garden cities was in Letchworth and Welwyn. Planners Raymond Unwin and Barry Parker redefined the model's success, resulting in modern green-looking cities wherever it was applied (Gatarić et al., 2019; Mwanza et al., 2023).

Research Design

This study adopted a mixed research design to evaluate the attributes of UGS and visitors' preference in the UGS in Nairobi County. A cross-section survey coupled with stratification and random sampling were applied in this study. The study used the triangulation method, which adopted qualitative and quantitative techniques to collect data. Structured questionnaires were administered to park users, Focus Group Discussions (FGDs) and in-depth interviews were administered to key informants. The researcher applied visual observations of UGS attributes to validate the primary data collected. Historical data, including the park's age, usage and functions, were acquired from the County offices and Kenya Forest Services for the gazetted forests.

A multi-stage cluster sampling was applied, and the study area was stratified into different clusters. The stratification was based on relevant variables for evaluating characteristics such as total area, vegetation cover, age (number in years since opening to the public), dominant function, space characteristics and proximity to urban dwelling.

Figure 1: Location of the Nairobi City County and target urban green spaces



(Source with modifications: Environmental Sciences Proceedings, 2020)

Target Population

To determine the sample size when the target population is more than 10,000, we applied the formula by (Mugenda and Mugenda, 2019).

$$n = \frac{Z^2 pq}{d^2}$$

$$d^2$$

Where: n = the desired sample size

z = standard normal deviation at the required confidence level (1.96)

p = proportion in the target population (0.5)

q = 1-p

d = level of statistical significance set (0.05)



$$\begin{aligned} \text{Hence: } n &= (1.96)^2 (0.5) (1-0.5) / (0.05)^2 \\ &= 3.8416 \times 0.25 / 0.0025 \\ &= 0.9604 / 0.0025 \\ &= 384.16 \end{aligned}$$

Thus, a sample size of 384 respondents was obtained from a population of 4,397,073 persons.

Sampling Design

Purposive sampling was used to choose the key informants in each stratum, who included county officials in charge of the environment and Kenya Forest Service (KFS) conservators, foresters and rangers. The 51 KFS officers interviewed included Karura Forest (3), Ngong Road Forest (29), City Park (5) and Arboretum Nature Reserve (14). Forty-seven rangers filled out questionnaires, while four forest managers, two county forest conservators and seven Community Forest Association (CFA) staff were interviewed. Three hundred and thirty (330) park users responded to the questionnaires, out of which 40 were not filled well, so 290 were used in the analysis. According to Mugenda and Mugenda (2019), 30% of the population is enough for sampling. However, all 51 KFS officers were subjected to either an interview or a questionnaire.

Data Analysis

This study collected data through interviews, observations, and documentary data review. Since Nairobi has over 700 UGS (UN-HABITAT, 2020), concise stratification was done to enhance the statistical validity of the data collected and subsequent analysis (Farinha-Marques et al., 2016). Descriptive analysis was used in quantitative data, resulting in tables and graphs, while inferential analysis involving ANOVA and regression was used to relate variables. Data quality was ensured by the first piloting of questionnaires and interview schedules before administering them.

Characteristics and dominant functions of urban green space in the study area

Urban green spaces provide relatively low-cost opportunities for citizens to connect with nature daily. However, their characteristics and functions influence visitation. Table 1 shows the characteristics and dominant functions of the studied green spaces.



Table 1: Characteristics and dominant functions of the studied green spaces in Nairobi City County

Green space	Total area (in hectares)	Classification	Proximity to urban	Main environmental setting	Distance from city center (Km)	Dominant Functions	Current status of surrounding land type
Nairobi Arboretum	30	Nature reserve	Urban	Wooded landscape, Botanic garden, lawns	3	Recreational park, nature conservation,	Commercial land, Residential area
Ngong road forest	1224	Forest	Peri-urban	wooded landscape	29	Trekking trails, nature walks, biking trails, nature conservation	Farmland, Residential area, urban forest
Karura forest	1041	Forest	Urban	Urban forest	7	Trekking trails, lawns, nature walks, nature conservation, Botanic garden, historical site	Residential area, urban forest
City park	60	Nature reserve	Urban	Lawns, resting benches,	5	Recreational park, Historical site, National monument, Botanic garden	Commercial land, Residential area

Source: Author, 2024

Attributes of the selected Green spaces

As shown in Table 1, location, accessibility, security, hygiene, and infrastructure were highly considered determinants of recreational and ecosystem benefits and services of UGS in this study.

Distance to the selected Green spaces

The study sought to establish whether distance to the green spaces was a factor visitors considered. The results are shown in Table 2.

Table 2: Distance to the Selected Green spaces

Distance	Frequency	Percentage
< 0.5 km	8	2.7
0.5-5 km	77	26.6
5-10 km	150	51.7
>10 km	55	19.0
Total	290	100

Source: Author, 2024



From the results in Table 2, the study noted that 51.7% (150 out of 290) of respondents covered between 5-10 km to access their preferred green space. Twenty-six-point six per cent of interviewed travelled 0.5-5 km, 19% (55 out of 290) covered more than 10 km, while 2.7% (8 out of 290) of those interviewed travelled less than 5 km to reach the green spaces.

Analysis of green space accessibility in the study area

From Table 3, the findings reveal that 58.2% and 53.6% of respondents of Karura Forest and City Park commuted to access the green spaces. 55% drove to Ngong Forest, located further from the city centre. The majority (three out of four) of the studied UGS have tarmacked or concrete roads, which make accessibility easier irrespective of the climatic conditions.

Table 3: An analysis of accessibility attributes of the selected green spaces

Attribute	Variable	Responses	Karura forest	City Park	Ngong Road	Nairobi Arboretum
Accessibility	Which means of mobility do you use to access the green space?	1=walking	3 (3.8)	34 (30.9)	12 (21.4)	4 (8.9)
		2=motorbike	7 (8.9)	10 (9.1)	11 (19.6)	11 (24.4)
		3=commute	46 (58.2)	59 (53.6)	2 (3.6)	1 (2.2)
		4=drive	23 (29.1)	7 (6.4)	31 (55.4)	29 (64.4)
		Total	79 (100)	110 (100)	56 (100)	45 (100)
	What is the nature of access road to the green space?	1=Loose surface	0 (0)	0 (0)	0 (0)	0 (0)
		2=Murrum	4 (5.1)	7 (6.4)	0 (0)	0 (0)
		3=Tarmac	24 (30.4)	100 (90.9)	51 (91.1)	41 (91.1)
		4=Concrete	51 (64.6)	3 (2.7)	5 (8.9)	4 (8.9)
		Total	79 (100)	110 (100)	56 (100)	45 (100)

The number in parenthesis represent the frequency

Source: Author, 2024

Security level of the Selected green space in Nairobi City County

In the findings presented in Table 4, security measures are an attribute that attracts visitors to specific green spaces. For example, 66 out of 79 respondents visiting Karura forest (83.5%) reported that excellent security measures had been established. There was a similar overwhelming response from 38 out of 45 respondents visiting Nairobi Arboretum (84.4%) who felt that security measures in that space were adequate.

Table 4: An analysis of security attribute of the selected green spaces

Attribute	Variable	Responses	Karura forest	City Park	Ngong Road	Nairobi Arboretum
Security	What is the security level in the green space?	1=Excellent	66 (83.5)	0 (0)	9 (16.1)	38 (84.4)
		2=Very good	13 (16.5)	3 (2.7)	43 (76.8)	7 (15.6)
		3=Good	0 (0)	6 (5.5)	4 (7.1)	0 (0)
		4=Poor	0 (0)	101 (91.8)	0 (0)	0 (0)
		Total	79 (100)	110 (100)	56 (100)	45 (100)

The number in parenthesis represents the frequency

Source: Author, 2024



Physical Infrastructure Attribute of the Selected Green Spaces

The findings in Table 5 indicate that the investigation focused on the availability of physical infrastructure in the selected green spaces. It was observed that 71% (56 out of 79) of respondents in Karura Forest and 73% (33 out of 45) in Nairobi Arboretum felt that the green spaces had excellent physical infrastructure. In comparison, 7% (8 out of 110) said City Park had poor physical infrastructure

Table 5: An analysis of physical infrastructure attribute of the selected green spaces

Attribute	Variable	Responses	Karura forest	City Park	Ngong Road	Nairobi Arboretum
Physical Infrastructure	How would you rate the state of physical infrastructure available in the green space?	1=Excellent	56 (71)	41 (37.3)	31 (55.4)	33 (73.3)
		2=Good	19 (24)	34 (30.1)	22 (39.3)	12 (26.7)
		3=Average	4 (5,1)	27 (24.5)	3 (5.4)	0 (0)
		4=Poor	0 (0)	8 (7.3)	0 (0)	0 (0)
		Total	79 (100)	110 (100)	56 (100)	45 (100)

The number in parenthesis represents the frequency

Source: Author, 2024

Hygiene Facilities in the Selected Green Spaces

In Table 6 above, this study sought to establish whether a hygienic environment with litter collection service determines the frequency of visitors to the selected green spaces. From the findings, 62 out of 79 (78.5%) of those interviewed in Karura forest, 43 out of 56 (76.8%) in Ngong Road forest, and 35 out of 45 (77.8%) in Arboretum viewed it as excellent, while 61 out of 110 (55.5%) at City Part felt it was average.

Table 6: An analysis of hygiene attributes of the selected green spaces

Attribute	Variable	Responses	Karura forest	City Park	Ngong Road	Nairobi Arboretum
Hygiene	How would you rate hygiene/litter collection?	1=Excellent	62 (78.5)	26 (23.6)	43 (76.8)	35 (77.8)
		2=Good	17 (21.5)	19 (17.3)	10 (17.9)	10 (22.2)
		3=Average	0 (0)	61 (55.5)	3 (5.4)	0 (0)
		4=Poor	0 (0)	4 (3.6)	0 (0)	0 (0)
		Total	79 (100)	110 (100)	56 (100)	45 (100)

The number in parenthesis represent the frequency

Source: Author, 2024

Challenges Likely to be Encountered in the Selected Green Spaces

Table 7 sought to establish challenges likely to be encountered in the selected green spaces. It was observed that 60% (48 out of 79) of respondents in Karura Forest, 55% (31 out of 56 and 25 out of 45) in Ngong Road Forest and Nairobi Arboretum, respectively, felt distance was the main challenge of accessing the green spaces. On what makes park users uncomfortable in the green spaces, class.



Table 7: An analysis of challenges likely to be encountered in the selected green spaces

Attribute	Variable	Responses	Karura forest	City Park	Ngong Road	Nairobi Arboretum
Challenges	Which problems do you face when accessing the green space?	1=Distance	48 (60.8)	44 (40)	31 (55.4)	25 (55.6)
		2=Charges	22 (27.8)	0 (0)	12 (21.4)	8 (17.8)
		3=Insecurity	0 (0)	59 (53.6)	2 (3.6)	0 (0)
		4=Restriction	9 (11.4)	7 (6.4)	11 (19.6)	12 (26.7)
		Total	79 (100)	110 (100)	56 (100)	45 (100)
	What makes you most uncomfortable on each visit?	1=Class segregation	66 (83.5)	9 (8.2)	28 (50)	27 (60)
		2=Insecurity	6 (7.6)	62 (56.4)	11 (19.6)	5 (11.1)
		3=Congestion	7 (8.8)	8 (7.3)	17 (30.4)	13 (28.9)
		4=Hawkers	0 (0)	31 (28.2)	0 (0)	0 (0)
		Total	79 (100)	110 (100)	56 (100)	45 (100)

The number in parenthesis represents the frequency

Source: Author, 2024

segregation and insecurity were the highest at 83% (66 out of 79) and 56% (62 out of 110) in Karura Forest and City Park, respectively.

Perceived Values of the Selected Green Spaces

Table 8 sought to establish the values of the selected green spaces. All (79 out of 79) respondents in Karura forest said it served the health of its users satisfactorily, and one felt it served no health purpose. Regarding satisfaction, 89% (71 out of 79) of respondents and 88% (40 out of 45) of Karura forest and the Arboretum, respectively, were very satisfied, while 13% (15 out of 110) of respondents felt City Park was not satisfying. More than 70% of the park users interviewed in each of the selected green spaces spent between one and two hours in the green space; 71% (57 out of 79) in Karura forest, 82% (91 out of 110) City Park, 78% (44 out of 56) in Ngong forest and 80% (36 out of 45) respondents in Arboretum.



Table 8: An analysis of perceived values of the selected green spaces

Attribute	Variable	Responses	Karura forest	City Park	Ngong Road	Nairobi Arboretum
Perceived value of the green space	How well do you think the green space serves the health of the users?	1=Satisfactory	79 (100)	75 (68.2)	50 (89.3)	44 (97.8)
		2=Unsatisfactory	0 (0)	25 (22.7)	6 (10.7)	1 (2.2)
		3=Partially	0 (0)	10 (9.1)	0 (0)	0 (0)
		4=Does not	0 (0)	0 (0)	0 (0)	0 (0)
		<i>Total</i>	<i>79 (100)</i>	<i>110 (100)</i>	<i>56 (100)</i>	<i>45 (100)</i>
	How satisfied are you in visiting the urban green space?	1=Very satisfied	71 (89.9)	45 (40.1)	28 (50)	40 (88.9)
		2=Quite satisfied,	8 (10.1)	50 (45.5)	22 (39.3)	5 (11.1)
		3=Not satisfied	0 (0)	15 (13.6)	6 (10.7)	0 (0)
		<i>Total</i>	<i>79 (100)</i>	<i>110 (100)</i>	<i>56 (100)</i>	<i>45 (100)</i>
	How long do you spend in the green space during a visit?	1=1-2 hrs,	57 (71.2)	91 (82.7)	44 (78.6)	36 (80)
2=3-4 hrs,		12 (15.2)	17 (15.5)	8 (14.3)	7 (15.6)	
3=5-6 hrs,		8 (10.1)	2 (1.8)	3 (5.4)	2 (4.4)	
4=over 6 hours		2 (2.5)	0 (0)	1 (1.8)	0 (0)	
<i>Total</i>		<i>79 (100)</i>	<i>110 (100)</i>	<i>56 (100)</i>	<i>45 (100)</i>	

The number in parenthesis represent the frequency

Source: Author, 2024

Functions and Services of the Studied Green Spaces

In terms of functionality, the study sought to establish the reasons that inspired visitors to prefer certain green spaces over others. These included recreation, sports, health, and socialisation. From the findings in Table 9, 60.7% of 79 of those interviewed who visited Karura forest went there for recreation, 26.6% said sports attracted them, and 12.6% visited the forest for social activities.

Table 9: Uses of the Green Spaces in the Study Area

Use of the green space	Karura F(%)	City Park F(%)	Ngong Road forest F(%)	Arboretum F(%)
Recreation	48 (60.7)	86 (78.2)	9 (16.1)	12 (26.7)
Sports	21(26.6)	10 (9.1)	41 (73.2)	21 (46.7)
Health	-	-	-	1 (2.2)
Socialization	10 (12.6)	14 (12.7)	6 (10.7)	11 (24.4)
<i>Total</i>	<i>79 (100)</i>	<i>110 (100)</i>	<i>56 (100)</i>	<i>45 (100)</i>

The number in parenthesis represents the frequency

Source: Author, 2024

Findings on the use of City Park show that 78.2% (86 out of 110) park users interviewed go there for recreation purposes, 9.1% (10 out of 110) of those interviewed are attracted to the park for sporting activities, while 12.7% (14 out of 110) visited for social activities. In Ngong Road Forest, 9 out of 56 interviewees (82.1%) were drawn to the green space by recreational activities, 41 out of 56 (73.2%) were attracted by sporting facilities, and 6 out of 56 (10.7%) went there for socialisation. In the Arboretum, 26.7% (12 out of 45) of those interviewed went there for recreation, 46.7% (21 out of 45) were attracted by sporting, 1 out of 45 (2.2%) of those interviewed used the green space for health purposes while 24.4% (11 out of 45) were there for social activities.



Frequency of Visiting Green Spaces

This study sought to establish the frequency of respondents' visits to determine how users prefer some green spaces. The findings are shown in Table 10.

Table 10: Frequency of Visiting Green Spaces

Frequency of Visiting Green spaces	Karura F (%)	City Park F (%)	Ngong Road F (%)	Arboretum F (%)
Rarely (once in a month)	51 (64.6)	34 (31.0)	29 (51.8)	22 (49.0)
Regularly (2-6 times in a month)	23 (29.1)	48 (43.6)	18 (32.1)	15 (33.3)
Frequently (8 or more times in a month)	5 (6.3)	22 (20.0)	5 (9.0)	6 (13.3)
Daily	0 (0)	6 (5.4)	4 (7.1)	2 (4.4)
Total	79 (100)	110 (100)	56 (100)	45 (100)

The number in parenthesis represents the frequency

Source: Author, 2024

From the findings, 64.6% (51 out of 79) of the interviewed park users of Karura forest rarely visited (once a month), and no one interviewed visited the green space daily. At City Park, 43.6% (48 out of 110) visited 2 to 6 times a month, while 6 out of 110 (5.4%) visited daily. At Ngong Road forest, 51.8% (29 out of 56) respondents visited rarely, while 7.1% (4 out of 56) of those interviewed visited daily. In the Arboretum, those who visited rarely were 49% (22 out of 45) of those interviewed, while 4.4% (2 of 45) of the same visited daily.

Length of Stay During a Visit to a Green Space

This study sought to establish how long park users opted to remain in a green space, illustrating their preference for it. The findings are shown in Table 11.

Table 11: Length of Stay During a Visit to a Green Space

Attribute	Specific variable	Karura forest	City Park	Ngong Road	Arboretum
How long do you spend in the green space during a visit?	1 = 1-2 hours,	57 (71.2)	91 (82.7)	44 (78.6)	36 (80)
	2 = 3-4 hours,	12 (15.2)	17 (15.5)	8 (14.3)	7 (15.6)
	3 = 5-6 hours,	8 (10.1)	2 (1.8)	3 (5.4)	2 (4.4)
	4 = over 6 hrs	2 (2.5)	0 (0)	1 (1.8)	0 (0)
Total		79 (100)	110 (100)	56 (100)	45 (100)

The number in parenthesis represents the frequency

Source: Author, 2024

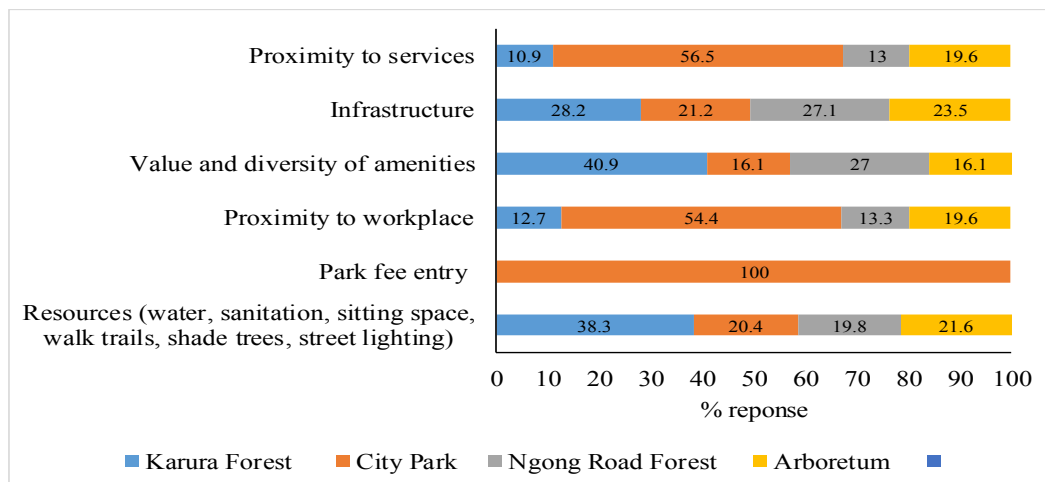
From the findings, 71.2% (57 out of 79) of park users interviewed at Karura Forest spend one to two hours during a visit, with 2.5% (2 out of 79) remaining for more than six hours. At City Park, 82.7% (91 out of 110) of interviewees spend 1-2 hours, and no one uses the park for more than 6 hours. In Ngong Road Forest, 78.6% (44 out of 56) use the park for 1-2 hours, and one out of 56 interviewed users (1.8%) use the green space for more than six hours. At the Arboretum, 80% 36 out of 45) of those interviewed use it for 1-2 hours, while no one uses it for more than six hours.

Social and Ecological Value of the Green Space

In Figure 2 below, this study sought to observe green spaces' social and ecological value to determine why some green spaces are preferred over others. From the data collected, it was noted that 38.3% of the interviewed visitors to Karura Forest, 21.6% of those who visited the Arboretum, 20.4% of the interviewed visitors to City Park, and 19.8% of interviewees visiting Ngong Road forest were attracted by resources like water and sanitation, sitting space, walk trails, shade trees, and street lighting.



Figure 2: What makes green spaces attractive to people



Source: Author, 2024

From the findings all 110 interviewed visitors (100%) at City Park cited free entry as their main reason for choosing the green space. Fifty six percent (62 out of 110) also asserted that proximity to the green space services attracts them, while at the same time, 54.4% (60 out of 110) of the interviewed park users at City Park said proximity to their workplaces attracted them to the green spaces. Forty one percent (32 out of 79) of those interviewed at Karura forest reported that they were attracted by the park's value and diversity of amenities. In contrast, resources like water, sanitation, walk trails, shade trees and street lighting attracted 38.3%.

Classification and Characterization of Urban Green Spaces

Most UGS users were mainly from other locations, and only a few lived in close proximity to the UGS. Three of the four UGS have mandatory entrance fees, ranging between 50 and 300 Kenya shillings. The UGS is used for various purposes, which include nature walks/runs, relaxing, bird-watching, meetings, sports, photo shoots, and recreational and social activities. The number of visitors to the UGS is consistent, and most visit at least once a month. The number of visitors to UGS has additionally increased. The main attractions to the UGS include infrastructure and security, comfortable sitting space, well-manicured walk trails, tree shade, value and diversity of amenities, and suitable water and sanitation facilities. Distance is the key challenge facing UGS in Nairobi, followed by lack of variety of activities, dilapidated infrastructure, small space, and insecurity. According to Veitch et al. (2015), park users prefer a variety of park infrastructure.

Findings on the distances to green spaces agree with Ikawa's (2015) assertion that, on average, Nairobi County residents take between 22 minutes and 90 minutes to access UGS. Mwangi (2019), also found that over 50% of green space visitors in Nairobi County are from other estates in Nairobi County. This could be attributed to the county's uneven distribution of green spaces (Chen et al., 2021).

Findings on the functions agree with Zhao (2010), that UGS are used mainly for recreation and health-related therapies, including relaxation and keeping fit (Bielinis, 2019). Jeptum (2021), reported that 55.9% of visitors used the parks for recreation, 15.5% for sports, 4.5% for health, and 24.1% for social activities.



The findings on the frequency of visits to green spaces imply that the majority (3 out of 4 parks) have their highest percentage of interviewed users rarely visiting (once a month). Proximity to the UGS is a key determinant of the frequency of visiting the UGS. This was due to 51.7% of the visitors having to cover 5-10km to access a UGS, while 58.2% of Karura visitors had to commute to access the UGS.

The larger UGS are located away from the Central Business District (CBD), which prompts visitors to use various means of transport to conveniently access the UGS, especially for those who do not drive. Only one of the four UGS (City Park) has free entry. The UGS offers many benefits to visitors, including opportunities for recreation, sports, wildlife viewing, environmental conservation, social gatherings, and health breaks.

Social and ecological value observations imply that Karura forest and the Arboretum have adequate water. Sanitation facilities are also essential for visitors' well-being. Diversity of amenities was considered a factor by the visitors, with 40.9% of Karura forest visitors and 27% of those visiting Ngong Road considering it important to have diverse amenities.

The fact that these resources attract visitors means that Karura Forest has safe drinking water, the sanitation facilities are clean and in good condition for use, there is enough walking space, and the trails are adequate; hence, people can walk/run in groups, there are enough tree shades, and the lighting is enough. Karura Forest is, however, not near the visitors' workplace, which implies that the visitors commute to the UGS. Security in Karura forest is also good, as it guarantees personal safety and that of their properties. Many walking trails, biking options, benches to rest on, picnic areas, and even a quaint café exist.

The resources in City Park are not impressive. Security is, however, a major concern for the visitors. This is due to everyone's free entry and accessibility. Thugs take advantage of this to steal from the visitors. Onyango (2021) showed that public spaces in Nairobi, including the Arboretum, are substandard. Most of the respondents' workplaces are not near Ngong Road Forest, which also explains why they visit the green space on weekends. However, the green space offers valuable services and diverse amenities.

Nairobi Arboretum is close to the workplace of most visitors interviewed; hence, it is convenient for them to check in during work breaks. The Arboretum also has various amenities that the visitors can explore. The green space's infrastructure is also very attractive to visitors, as the well-manicured lawns and walkways indicate. The Arboretum is close to the city centre. The security at the green space is also attractive, implying that the management has taken measures to enhance the security of the UGS. The findings corroborate with Binyanya et al. (2022), who found out that the Arboretum is home to over 350 tree species and over 100 resident and migrant birds, among other animal species. As one of the few well-preserved and maintained urban forests, it provides an ideal space for picnics, jogging, walking and unwinding.

Conclusions

The available UGS serve part of the population of Nairobi, even though they are not evenly distributed. Notable functions and uses of greenspaces included recreation, sporting, health, and social activities, where all the greenspaces served functions at different levels. The preference for UGS is attributed to security, accessibility, physical infrastructure, hygiene and value. Karura was the most preferred due to its security, proximity to the population, physical infrastructure, high hygiene and ability to serve and satisfy visitors. The city parks were the least preferred due to insecurity, irrespective of their proximity to settlement.



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