

Environmental Threat Assessment and the Role of Urban Planning in Sustainable Recreational Centre Management in Federal Capital City of Abuja, Nigeria

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Publication Date: 2026/07/07

Abstract: Urban recreational centres constitute an important component of sustainable urban development by providing ecosystem services, leisure opportunities, social interaction, and environmental benefits. However, increasing urbanization and population growth have intensified environmental pressures on these facilities, particularly in rapidly expanding cities such as Abuja, Nigeria. This study assessed the environmental threats associated with the utilization of recreational centres and examined the role of urban planning in promoting sustainable recreational centre management in the Federal Capital City (FCC) of Abuja, Nigeria. A mixed-method research design was adopted, integrating quantitative and qualitative approaches. Primary data were collected through questionnaires administered to 462 recreational park users, semi-structured interviews with key stakeholders, and Focus Group Discussions (FGDs) involving urban planners, environmental experts, park managers, and community representatives. Descriptive statistics, Chi-square analysis, and the Kruskal-Wallis H test were employed to analyze the data. The findings revealed widespread public awareness of environmental degradation across recreational parks, with major threats including soil erosion, air pollution, noise pollution, improper waste disposal, vegetation loss, water pollution, and disturbances to biodiversity. Visitors attributed these threats primarily to poor facility management, inadequate environmental education, negligence by authorities, and insufficient waste management infrastructure. The Kruskal-Wallis H test showed no statistically significant differences in environmental threat perceptions across Commercial/Amusement Parks, Large Formal Parks, and Neighborhood Parks ($p > 0.05$), indicating that environmental degradation is perceived as a city-wide challenge rather than a site-specific issue. Furthermore, demographic variables such as age, gender, education, income, and marital status were found to have no significant influence on awareness of sustainable environmental practices, suggesting that sustainability awareness is broadly distributed across the population. However, occupation showed a significant association with awareness levels in Commercial/Amusement Parks ($\chi^2 = 16.036$; $p = 0.042$). The study concludes that while sustainability awareness among park users is relatively high, environmental degradation persists due to weak governance structures, inadequate policy implementation, poor maintenance culture, and limited stakeholder participation. The study recommends the adoption of an integrated city-wide recreational sustainability framework, strengthened institutional coordination among relevant agencies, enhanced environmental monitoring, and a shift from awareness-focused interventions to action-oriented policies that facilitate sustainable environmental behaviour. These measures are essential for ensuring the long-term sustainability of recreational centres and their contribution to urban environmental quality in Abuja.

Keywords: Recreational Centres, Environmental Threats, Urban Planning, Sustainability, Green Infrastructure, Environmental Management, Abuja, Nigeria.

How to Cite: Maigida S. Abba; Oludele J. Ayoola (2026) Environmental Threat Assessment and the Role of Urban Planning in Sustainable Recreational Centre Management in Federal Capital City of Abuja, Nigeria. *International Journal of Innovative Science and Research Technology*, 11(6), 2812-2824.
<https://doi.org/10.38124/ijisrt/26jun1568>

I. INTRODUCTION

Urban recreational centres are essential components of sustainable urban development, providing spaces for leisure, physical exercise, tourism, and social interaction while contributing to the physical and mental well-being of urban residents (Chiesura, 2004). In rapidly growing cities, the demand for recreational spaces continues to increase, often resulting in intensified use and associated environmental pressures. In the Federal Capital City (FCC) of Abuja, Nigeria, recreational centres such as parks, gardens, and open spaces are increasingly under pressure due to urban expansion, population growth, and rising recreational demand. Globally, recreational centres are known to face a range of environmental challenges including solid waste accumulation, soil compaction, vegetation degradation, air and noise pollution, and water contamination (Jim & Chen, 2009). These impacts are often exacerbated in developing countries where environmental governance, infrastructure provision, and maintenance systems are weak. In such contexts, recreational spaces tend to deteriorate rapidly, losing their ecological integrity and aesthetic value, thereby reducing their contribution to urban sustainability.

Abuja, designed as Nigeria's capital with a well-structured master plan, was intended to function as a model of modern urban planning with clearly defined land use zones, including recreational and green areas (Federal Capital Development Authority, FCDA, 2018). However, increasing urbanization, informal land use practices, and inadequate enforcement of planning regulations have led to significant environmental stress on recreational centres. These pressures manifest in overcrowding, improper waste disposal, encroachment, and degradation of green infrastructure. Urban planning plays a crucial role in ensuring the sustainability of recreational centres through land use regulation, environmental management policies, infrastructure provision, and green space conservation strategies. According to Ahern (2011), effective urban planning enhances urban resilience by integrating ecological principles into land use decisions. However, in many rapidly growing cities, including Abuja, there is often a gap between planning policies and actual implementation outcomes, leading to environmental inefficiencies and unsustainable recreational space management.

Sustainable management of recreational centres requires a holistic approach that integrates environmental protection, social inclusiveness, and institutional effectiveness. This includes proper environmental monitoring, enforcement of planning regulations, stakeholder engagement, and the incorporation of green infrastructure principles into urban development strategies. Despite the importance of recreational

centres in promoting urban livability, environmental quality, and public health in cities, these facilities in the Federal Capital City (FCC) of Abuja are increasingly experiencing environmental degradation associated with intensive human use and weak environmental control measures. Urban recreational centres are expected to provide ecological, social, and aesthetic benefits; however, in rapidly growing urban environments, they often become vulnerable to environmental stressors such as waste accumulation, vegetation loss, and pollution (Chiesura, 2004; Jim & Chen, 2009).

In Abuja, uncontrolled human activities within recreational spaces, coupled with increasing population pressure and urban expansion, have resulted in visible environmental challenges including improper waste disposal, soil compaction, noise pollution, and degradation of green infrastructure. These conditions reflect broader patterns of urban environmental decline commonly observed in developing cities where infrastructure provision and environmental governance are often insufficient (Adebayo & Jegede, 2010; UN-Habitat, 2020). Similarly, rapid urbanization without adequate environmental safeguards has been identified as a major driver of urban ecosystem deterioration in Nigeria (Mabogunje, 2012). Although the Federal Capital Territory (FCT) was originally designed with a structured master plan to ensure sustainable land use and environmental balance, including designated recreational and green areas, increasing deviations from planning standards have raised concerns about environmental sustainability. The FCDA (2018) notes that urban development control mechanisms exist; however, challenges in enforcement and compliance have limited their effectiveness in protecting urban recreational environments.

Furthermore, studies have shown that poor integration of environmental management principles into urban planning systems contributes significantly to the degradation of urban green spaces (Ahern, 2011). In many cases, recreational centres in urban areas suffer from weak maintenance culture, inadequate monitoring, and insufficient stakeholder engagement, resulting in declining environmental quality and reduced functionality of these spaces (Jim & Chen, 2009). Despite these concerns, there is still limited empirical evidence specifically focusing on the environmental threats associated with recreational centre utilization in the Federal Capital City of Abuja and the extent to which urban planning contributes to mitigating these challenges. Existing literature tends to focus broadly on urban growth, land use planning, and general environmental management, with little attention to recreational centre-specific environmental assessment and sustainability outcomes (Abubakar & Dano, 2020).

This gap in knowledge limits the ability of urban planners and policymakers to develop targeted interventions that address the specific environmental challenges facing recreational centres in Abuja. Without a clear understanding of these environmental threats and the effectiveness of urban planning strategies, sustainable management of recreational facilities in the city may remain inadequate, thereby undermining their ecological, social, and recreational functions (World Bank, 2017). Therefore, this study seeks to assess the environmental threats associated with recreational centre utilization and evaluate the role of urban planning in promoting sustainable recreational centre management in the Federal Capital City of Abuja, Nigeria.

II. MATERIALS AND METHODS

➤ Study Area

The first development phase (often referred to as Phase One) of the Federal Capital City, Abuja, constitutes the location for this study. The FCC is located at 8°25" and 9°25" North of the Equator and 6° 45" and 7° 45" east of Greenwich as shown in Figure 3.1. The Abuja Master Plan was designed to have four

phases of development, each of which would consist of a specific number of districts (Ezeamaka & Oluwole, 2016). The Federal Capital City (FCC) is in the FCT's Northeast corner (Fanan et al., 2011), and according to (Mabogunje, 1976), this area is regarded as the most suitable and favourable for human habitation and settlement development in the FCT.

The city serves as the capital and the location of the government's administrative headquarters, including all extra-ministerial agencies and government parastatals. Administratively, the FCC is located within the Abuja Municipal Area Council (AMAC), one of the six (6) area councils in the Federal Capital Territory (FCT). The AMAC is located on the eastern wing of the Federal Capital Territory. It covers an area that spans 1,769 km² out of the 8,000 km² land mass of the FCT. The estimated 2018 population of AMAC was 2,440,200. Phase One of the FCC is made up of ten (10) districts that jointly occupy an area that measures about 69.9 km². The constituent districts of Phase One of the FCC include Central Business District (A00), Garki I (A02), Wuse I (A02), Garki II (A03), Asokoro (A04), Maitama I (A05), Maitama II (A06), Wuse IIA (A07), Wuse IIB (A08), Guzape (A09).

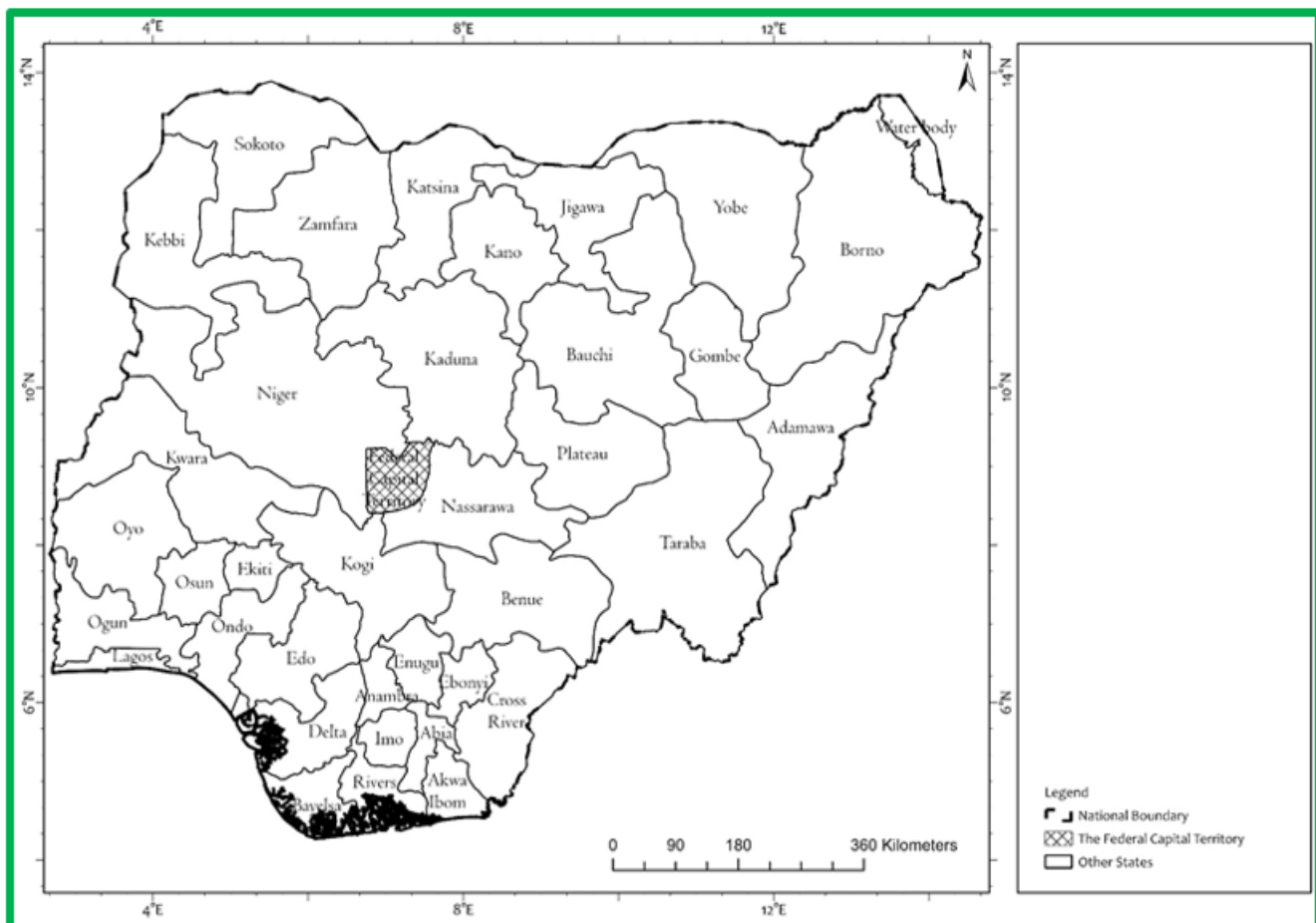


Fig 1: Map of Nigeria Showing FCT
Source: FCDA, Cartography Department.

➤ Sampling Procedure

This study employed a mixed-method approach, integrating qualitative and quantitative research techniques in analyzing recreational activities and environmental sustainability in the Federal Capital City (FCC) of Abuja, Nigeria. The purpose is to explore the link between recreational activities and environmental sustainability in the FCC, Abuja, Nigeria. The study used primary data; collected through questionnaire administration, interviews, field observations and Focus Group Discussion (FGD).

Questionnaires were administered to recreational facilities users to generate data types on recreational activities that they engage in and their awareness on sustainable environmental usage. The content of the questionnaire is on issues related to the ecosystem services provided by the various recreational centres, extent of resident's usage of the recreational provisions/facilities in the study area, public perception of sustainable environmental practices in the study area, determine the existing or otherwise sustainable recreational policies in the identified recreational centres in the study area, environmental threats associated with the utilization of these recreational centres in the study area and data on significance of urban planning in sustainable recreational activities in Abuja City.

Apart from utilizing questionnaire in extracting primary data, semi-structured interviews were carried out with prominent stakeholders, development control officials,

environmental experts, and recreational facilities managers. This helped unveil policies and initiatives related sustainability.

Purposive sampling was employed in sampling interviewees. Those to be interviewed are;

- Prominent stakeholders in charge of parks
- Development control officials,
- Environmental experts, and
- Recreational facilities managers.

Interviewing them provides out in-depth information relating to policies and initiatives relating sustainable utilization of parks.

FGD were carried out to enhance the quality of data obtained using questionnaires on the recreational activities and environmental sustainability in the green parks in the Federal Capital City (FCC) of Abuja, Nigeria. In carrying out FGD, sample size of between 10-15 informants were used in carrying out the FGDs which is considered sufficient for a qualitative assessment. Participants in the FGDs includes the;

- Urban planners,
- Area council representative,
- Environmental NGOs,
- Managers or Operators of parks,
- Private enterprise involved in development, operation of recreational spaces
- Users of the parks

Table 1: The Sampling Frame

S/N	NAME	ADDRESS	LOCATION	LONGITUDE	LATITUDE
1.	Central Park	No. 70 Kur Mohammed Avenue.	Central Area District.	9.0637° N	7.4910° E
2.	Splash Water Park	Plot 1164 Cadastral Zone B1.	Beside Games Village, Kaura	9.0119° N	7.4389° E
3.	Blake Resort	Ahmadu Bello Way.	Garki District.	9.1386° N	7.2928° E
4.	Jabi Lake	Alex Ekwueme Way.	Jabi District	9.0771° N	7.4233° E
5.	Magic Land	1 Kukwaba Hills Constitution Avenue.	Wuye, Kukwaba District.	9.0429° N	7.4521° E
6.	The Balance	Shehu Shagari Way.	Maitama District.	9.0882° N	7.4934° E
7.	Maitama Amusement Park	Ibrahim Babangida Boulevard.	Maitama District.	9.0722° N	7.4913° E
8.	Millennium Park	No. 5 Usuma Street.	Three Arms Zone Abuja	9.0707° N	7.4996° E
9.	Sarius Palmetum Botanical Garden	4, Salween Close. IBB Way.	Maitama District.	9.1035° N	7.4884° E
10.	City Park Abuja	Ahmadu Bello Way.	Wuse II District.	9.0771° N	7.4757° E
11.	A-Class Park	Kashim Ibrahim Way.	Wuse II District.	9.0859° N	7.4766° E
12.	JD Leisure Park	Kashim Ibrahim Way.	Wuse II District.	9.0849° N	7.4780° E
13.	Dreams Recreational Park	Aminu Kano Crescent	Wuse II	9.0733° N	7.4698° E
14.	Aqualandia Water Park	174 Kur Mohammed Avenue.	Wuse II	9.0636° N	7.4912° E
15.	BMT Africa Garden	Aminu Kano Crescent	Wuse II	9.0814° N	7.4820° E
16.	Unique World Garden	No. 5 Accra Street	Wuse Zone 5.	9.0636° N	7.4623° E

17.	Eden Garden Park	Augustus Aikhomo Way Utako.	Utako District.	9.0735° N	7.4372° E
18.	Sunrise Water Park	Sunrise Hills Estate, RI.	Sunrise Boulevard Asokoro	9.0380° N	7.5380° E
19.	Abuja Guards Polo Club	Murtal Muhamed Express Road	Asokoro District.	9.0876° N	7.5126° E
20.	National Park and Zoo Abuja	Off Murtal Muhamed Express Road	Asokoro District.	9.0813°N	7.5254°E

Source: Field Researcher's Work, 2025.

The sample size for the survey component of this study was determined using the standard sample size formula for a large, finite population (Cochran, 1977). The calculation aimed to determine the minimum number of respondents required to achieve findings that are statistically representative of the study population with a known level of precision.

The formula applied was:

$$n = \frac{Z^2 * P * (1 - p)}{e^2}$$

Where:

n = required sample size

Z = Z-score corresponding to the desired confidence level (1.96 for 95% confidence)

p = estimated proportion of the population possessing the characteristic (set at 0.5 for maximum variability)

e = desired margin of error (0.05 or 5%); the sample size was set at 462 respondents.

The data collected from the recreational park users in Abuja were analysed using both descriptive and inferential statistical techniques

III. RESULTS AND DISCUSSION

➤ *Environmental Threats Associated with the Utilization of Recreational Centers*

The results from the table 1, reveal a clear and concerning public perception of environmental degradation across Abuja's recreational parks, coupled with identified causes and actionable solutions. The data indicates that visitors are acutely aware of multiple, concurrent threats and are critical of current management efforts. A majority of visitors across all park types have noticed environmental problems, with the highest awareness in Commercial/Amusement Parks (64.39%), followed by Large Formal (58.82%) and Neighborhood Parks (58.02%). The specific threats observed are widespread and severe. Soil Erosion or Degradation is the top-cited threat in Commercial/Amusement Parks (54.55%), while Air Pollution is most observed in Large Formal (52.94%) and Neighborhood Parks (53.09%). Noise Pollution is also highly prevalent, particularly in Commercial/Amusement Parks (53.79%). Essentially, these are not isolated issues; visitors report presence of threats, including tree loss, improper waste disposal, water pollution, and wildlife disturbance, each affecting between 27% and 55% of respondents depending on the park. This explains the degradation of the ecosystem in the various parks and its attendant consequences on the ecosystem services.

Table 2: Environmental Threats Associated with the Utilization of the Recreational Centres

Perceived Environmental Threats in Recreational Parks						
Column-wise Frequencies and Percentages (Within Park Type)						
Item	Commercial/Amusement Park (Frequency)	Large Formal Park (Frequency)	Neighborhood Park (Frequency)	Commercial/Amusement Park (Percentage)	Large Formal Park (Percentage)	Neighborhood Park (Percentage)
Noticed Environmental Problems						
Yes	85	110	47	64.39	58.82	58.02
No	25	46	18	18.94	24.60	22.22
Not Sure	22	31	16	16.67	16.58	19.75
TOTAL	132	187	81	100.00	100.00	100.00
Observed Environmental Threats						
Air Pollution	67	99	43	50.76	52.94	53.09

Deforestation or Loss of Green Areas	59	74	34	44.70	39.57	41.98
Soil Erosion or Degradation	72	87	40	54.55	46.52	49.38
Noise Pollution	71	92	41	53.79	49.20	50.62
Improper Waste Disposal	36	72	27	27.27	38.50	33.33
Water Pollution	48	66	31	36.36	35.29	38.27
Disturbance of Wildlife or Biodiversity	47	64	34	35.61	34.22	41.98
Perceived Causes of Environmental Threats						
Construction or Development	48	68	23	36.36	36.36	28.40
Negligence by Authorities	53	84	42	40.15	44.92	51.85
Inadequate Waste Disposal Facilities	48	77	24	36.36	41.18	29.63
Lack of Environmental Education	71	79	40	53.79	42.25	49.38
Overuse by Visitors	61	81	34	46.21	43.32	41.98
Poor Facility Management	57	102	41	43.18	54.55	50.62
Efforts to Address Environmental Threats						
Yes	53	79	32	40.15	42.25	39.51
No	51	62	32	38.64	33.16	39.51
Not Sure	28	46	17	21.21	24.60	20.99
TOTAL	132	187	81	100.00	100.00	100.00
Sufficiency of Management Efforts						
Yes	35	67	17	26.52	35.83	20.99
No	60	78	44	45.45	41.71	54.32
Not Sure	37	42	20	28.03	22.46	24.69
TOTAL	132	187	81	100.00	100.00	100.00
Perceived Environmental Degradation						
Yes	77	113	49	58.33	60.43	60.49
No	55	74	32	41.67	39.57	39.51
TOTAL	132	187	81	100.00	100.00	100.00
Cleanliness and Environmental Maintenance						
Excellent	18	24	18	13.64	12.83	22.22
Good	45	64	22	34.09	34.22	27.16
Fair	37	54	21	28.03	28.88	25.93
Poor	26	28	14	19.70	14.97	17.28

Very Poor	6	17	6	4.55	9.09	7.41
TOTAL	132	187	81	100.00	100.00	100.00
Participation in Environmental Cleanup Activities						
Yes	56	80	30	42.42	42.78	37.04
No	45	73	34	34.09	39.04	41.98
Not Aware	31	34	17	23.48	18.18	20.99
TOTAL	132	187	81	100.00	100.00	100.00
Suggested Strategies to Reduce Environmental Threats						
Provide More Waste Bins	80	113	55	60.61	60.43	67.90
Promote Eco-friendly Recreational Activities	80	119	45	60.61	63.64	55.56
Increase Public Environmental Education	53	81	30	40.15	43.32	37.04
Enforce Environmental Laws	52	68	36	39.39	36.36	44.44
Limit Visitor Numbers	40	48	22	30.30	25.67	27.16
Regular Maintenance & Landscaping	84	120	51	63.64	64.17	62.96
Source: Field Survey (2025)						

This study findings aligns with the FGD findings, where respondents consistently emphasized that environmental degradation particularly waste, vegetation loss and unregulated commercial activities poses a growing threat.

Similar findings have been documented in Abuja's urban green spaces (Majebi & Agbebaku, 2024).

Furthermore, FGD also reveal the existence littering, inadequate toilet facilities and unregulated vending as daily challenges. Accordingly, Key informant interview reinforced this by highlighting plastic waste and negative public attitudes toward littering as major sustainability threats.

This finding agrees with the work of Ihuma et al., 2016 who argued that biodiversity and ecosystem services receive little public attention compared to more visible environmental issues.

With regards the cause of threats, the respondents attribute these threats primarily to systemic and managerial failures rather than natural causes. Lack of Environmental Education is seen as the leading cause in Commercial/Amusement Parks (53.79%). Poor Facility Management is identified as the primary cause in Large Formal Parks (54.55%) and is a major

factor in Neighborhood Parks (50.62%). Negligence by Authorities is cited as the top cause in Neighborhood Parks (51.85%) and is highly significant in Large Formal Parks (44.92%). Overuse by Visitors and Inadequate Waste Disposal Facilities are also consistently mentioned. This indicates a public perception that the threats are anthropogenic and, importantly, manageable with better governance and education. These aligned with FGD narratives which admitted that staffing and budget constraints hindered maintenance, while KII pointed to weak oversight and exclusion from broader urban planning processes. KII further emphasized the lack of environmental education and awareness as a root cause of unsustainable behaviour. Structural factors such as inadequate facilities and government negligence were also mentioned in the FGDs, particularly by respondents who attributed underfunding and policy neglect as critical factors.

This governance challenge has been widely recognized in studies of Abuja's green space management, where poor institutional support undermines sustainability initiatives (Ezeamaka & Oluwole, 2017).

When evaluating interventions, there is a pronounced deficit of public confidence in current management. While 39.51% to 42.25% acknowledge some Efforts to address

Environmental threats, a majority find these efforts insufficient. This is most observable in Neighborhood Parks, where 54.32% of users say management efforts are Not Sufficient, and only 20.99% considered them sufficient. Consequently, a majority of visitors in all parks perceive ongoing Environmental Degradation (Yes: 58.33% to 60.49%). Ratings for Cleanliness and Environmental Maintenance are middling at best, with "Good" or "Excellent" ratings not exceeding 36% in any park type, and "Poor" or "Very Poor" ratings significant (e.g., 24.25% in Commercial, 24.06% in Large Formal).

However, FGD participants provided a more insight. They argued that sustainability frameworks is outdated and weakly enforced, while KII observed the lack of grassroots engagement and poor accountability. Park managers similarly noted that while ad-hoc clean-ups and landscaping occur, they are not backed by systemic policy or technical support.

This divergence assessment highlights a recurring pattern in Abuja where visible, short-term interventions are perceived as progress by the public, but viewed as superficial by stakeholders with deeper institutional knowledge (Majebi, Agbebaku, & Orimaye, 2024).

Table 3: Kruskal–Wallis H Test for Perceived Environmental Threats

Kruskal–Wallis H Test for Perceived Environmental Threats				
Comparison Across Recreational Park Strata				
Environmental Threat Indicator	Kruskal–Wallis H	Degrees of Freedom	p-value	Decision ($\alpha = 0.05$)
Solid Waste Pollution	4.3613	2	0.1130	Not Significant
Deforestation	0.8357	2	0.6585	Not Significant
Soil Erosion	1.9921	2	0.3693	Not Significant
Water Pollution	0.2174	2	0.8970	Not Significant
Noise Pollution	0.6567	2	0.7201	Not Significant
Air Pollution	0.1759	2	0.9158	Not Significant
Threats to Wildlife	1.5008	2	0.4722	Not Significant
Total Environmental Threat Count	0.5646	2	0.7540	Not Significant
Park Cleanliness Level	0.6562	2	0.7203	Not Significant
Overall Environmental Degradation	0.1641	2	0.9212	Not Significant

Source: Field Survey Data (2025)

The Kruskal-Wallis H test was performed to compare the median perceptions of environmental threat severity and related evaluations across the three independent park strata. The results indicate that for all 10 composite threat indicators tested, the p-value exceeds the alpha level of 0.05. P-values range from 0.1130 (for Solid Waste Pollution) to 0.9212 (for Overall Environmental Degradation). Crucially, the test for the aggregated *Total Environmental Threat Count* yields a p-value of 0.7540, and the perception of *Overall Environmental Degradation* yields 0.9212.

Based on these results, the null hypothesis (H_0) is accepted. There is no statistically significant difference in the median perceptions of: The severity of specific environmental threats (solid waste, deforestation, soil erosion, water/noise/air pollution, threats to wildlife), The aggregated count of threats observed, The evaluated level of park cleanliness and the overarching perception of environmental degradation among users of Commercial/Amusement Parks, Large Formal Parks, and Neighborhood Parks in Abuja. Although *Solid Waste Pollution* shows a relatively lower p-value (0.1130), it does not attain statistical significance.

This finding presents a critical and unified diagnostic for urban environmental management in Abuja. It reveals that the perception of environmental risk and degradation is not confined to, nor significantly different between, specific types

of recreational spaces. Instead, it is a shared urban experience. Whether in a commercially managed amusement park, a large formal city park, or a local neighborhood green space, users are observing a similar spectrum and severity of environmental problems from pollution to ecosystem degradation and arriving at similarly critical judgments about cleanliness and overall decline.

This uniformity in threat perception has several key implications:

- **City-Wide, Not Site-Specific, Challenges:** The environmental threats are likely driven by overarching urban pressures (e.g., regional air quality, widespread waste management issues, common construction practices) rather than unique, localized factors inherent to each park's design or primary use.
- **Unified Mandate for Action:** The lack of significant difference means that calls for environmental intervention and investment cannot be justifiably prioritized for one park stratum over another based on user concern. Public demand for improvement is equally strong across the entire park system, creating a powerful, unified mandate for a city-wide green space remediation and protection strategy.

- **Consistency in Communication:** Messaging regarding environmental stewardship and the urgency of conservation can be standardized across the park network, as the baseline perception of problem severity is common to all users.
- **Validation of Systemic Issues:** The result corroborates the earlier findings from the descriptive analysis that identified multiple concurrent threats. It statistically confirms that these are not anecdotal or isolated complaints but represent a coherent, widely held perception of systemic environmental stress on Abuja's recreational infrastructure.

The finding of uniform environmental threat perception across diverse urban park types aligns with literature on the "urban syndrome" and the shared experience of anthropogenic environmental stress in cities, which often transcends specific locales within the urban fabric.

First, the non-significant differences in perceiving pollution-based threats (Air, Water, Noise, Solid Waste) support the concept of urban ecosystems as integrated exposure landscapes. Research shows that pollutants, particularly airborne particulates and noise, diffuse across neighborhood boundaries, creating a generalized background level of exposure that residents recognize uniformly (Grimm et al., 2008). The perception of Solid Waste Pollution approaching significance ($p=0.1130$) may reflect its more visible and site-managed nature, a nuance noted in studies linking waste visibility to heightened local concern (Ojedokun, 2011).

Second, the uniform perception of ecological degradation threats like Deforestation, Soil Erosion, and Threats to Wildlife resonates with the theory of "shifting baseline syndrome" and landscape-scale change. As cities expand, the loss of green cover and habitat fragmentation are regional phenomena. Park

users, regardless of which park they frequent, are witnessing and reacting to the same broader landscape transformation, leading to convergent perceptions of loss (Pauli & Juhola, 2021).

Third, the lack of difference in the perception of Overall Environmental Degradation ($p=0.9212$) and the Total Threat Count ($p=0.7540$) strongly aligns with the "neighborhood effect" and socio-ecological models of environmental perception. Studies indicate that individuals' overall assessment of environmental quality is shaped less by the micro-features of a single site and more by their general experiences and narratives about the city's development and governance (Hurley & Walker, 2004). Our results suggest that Abuja's park users share a common narrative of environmental decline.

Finally, the uniformity in evaluating Park Cleanliness and underlying causes like Poor Facility Management points toward a common critique of institutional performance. This aligns with environmental justice and governance literature, which finds that when public services are perceived to fail, the resulting dissatisfaction is often widespread across different community types, reflecting a systemic governance issue rather than isolated lapses (Agyeman & Evans, 2004). The shared perception points to a need for improved, transparent, and accountable park management institutions city-wide.

➤ *Demographic Characteristics and Awareness Level on Sustainable Environmental Practices Across the Park Categories.*

The overarching finding is one of widespread non-significance. For the vast majority of demographic variables across all three park types, the p-value is greater than the alpha level of 0.05. This indicates that the distribution of awareness levels (Aware, Not Aware, Not Sure) is independent of the demographic category. The null hypothesis of no association is therefore not rejected for these variables.

Table 4: Demographic Factors and Awareness of Sustainable Environmental Practices

Demographic Factors and Awareness of Sustainable Environmental Practices										
Cross-tabulation and Chi-square Test Across Recreational Park Strata										
Category	Aware (Yes)	Not Aware (No)	Not Sure	Total	% Aware	χ^2	df	p-value	Demographic Variable	Inference ($\alpha = 0.05$)
Commercial/Amusement Park										
Male	45	9	14	68	66.180	0.189	2	0.910	Sex	Not Significant
Female	42	10	12	64	65.620	0.189	2	0.910	Sex	Not Significant
15–19	6	0	1	7	85.710	6.281	10	0.791	Age Group	Not Significant
20–24	29	6	5	40	72.500	6.281	10	0.791	Age Group	Not Significant
25–29	17	4	9	30	56.670	6.281	10	0.791	Age Group	Not Significant
30–34	18	5	4	27	66.670	6.281	10	0.791	Age Group	Not Significant
35–39	9	2	3	14	64.290	6.281	10	0.791	Age Group	Not Significant
>40	8	2	4	14	57.140	6.281	10	0.791	Age Group	Not Significant
Single	38	10	10	58	65.520	6.988	8	0.538	Marital Status	Not Significant
Married	28	7	8	43	65.120	6.988	8	0.538	Marital Status	Not Significant
Divorced	6	1	2	9	66.670	6.988	8	0.538	Marital Status	Not Significant

Widowed	4	0	4	8	50.000	6.988	8	0.538	Marital Status	Not Significant
Separated	11	1	2	14	78.570	6.988	8	0.538	Marital Status	Not Significant
Primary	9	1	5	15	60.000	7.261	8	0.509	Education Level	Not Significant
Secondary	23	4	3	30	76.670	7.261	8	0.509	Education Level	Not Significant
Tertiary	36	10	14	60	60.000	7.261	8	0.509	Education Level	Not Significant
Qur'anic	11	3	1	15	73.330	7.261	8	0.509	Education Level	Not Significant
Others	8	1	3	12	66.670	7.261	8	0.509	Education Level	Not Significant
Farming	11	0	4	15	73.330	16.036	8	0.042	Occupation	Significant
Civil Service	26	9	4	39	66.670	16.036	8	0.042	Occupation	Significant
Trading	15	1	9	25	60.000	16.036	8	0.042	Occupation	Significant
Artisan	20	8	5	33	60.610	16.036	8	0.042	Occupation	Significant
Unemployed	15	1	4	20	75.000	16.036	8	0.042	Occupation	Significant
<₹10k	17	4	3	24	70.830	4.776	10	0.906	Income Level	Not Significant
₹10k–20k	18	4	3	25	72.000	4.776	10	0.906	Income Level	Not Significant
₹20k–50k	23	6	9	38	60.530	4.776	10	0.906	Income Level	Not Significant
₹50k–100k	14	1	4	19	73.680	4.776	10	0.906	Income Level	Not Significant
₹100k–500k	12	3	5	20	60.000	4.776	10	0.906	Income Level	Not Significant
>₹500k	3	1	2	6	50.000	4.776	10	0.906	Income Level	Not Significant
Large Formal Park										
Male	72	21	18	111	64.860	0.499	2	0.779	Sex	Not Significant
Female	53	12	11	76	69.740	0.499	2	0.779	Sex	Not Significant
15–19	7	5	4	16	43.750	13.541	10	0.195	Age Group	Not Significant
20–24	20	4	3	27	74.070	13.541	10	0.195	Age Group	Not Significant
25–29	27	7	4	38	71.050	13.541	10	0.195	Age Group	Not Significant
30–34	29	4	5	38	76.320	13.541	10	0.195	Age Group	Not Significant
35–39	14	9	5	28	50.000	13.541	10	0.195	Age Group	Not Significant
>40	28	4	8	40	70.000	13.541	10	0.195	Age Group	Not Significant
Single	63	18	13	94	67.020	9.867	8	0.274	Marital Status	Not Significant
Married	42	14	10	66	63.640	9.867	8	0.274	Marital Status	Not Significant
Divorced	8	0	0	8	100.000	9.867	8	0.274	Marital Status	Not Significant
Widowed	8	1	4	13	61.540	9.867	8	0.274	Marital Status	Not Significant
Separated	4	0	2	6	66.670	9.867	8	0.274	Marital Status	Not Significant
Primary	11	5	5	21	52.380	9.036	8	0.339	Education Level	Not Significant
Secondary	32	12	5	49	65.310	9.036	8	0.339	Education Level	Not Significant
Tertiary	62	9	12	83	74.700	9.036	8	0.339	Education Level	Not Significant
Qur'anic	11	4	5	20	55.000	9.036	8	0.339	Education Level	Not Significant
Others	9	3	2	14	64.290	9.036	8	0.339	Education Level	Not Significant
Farming	15	4	4	23	65.220	1.153	8	0.997	Occupation	Not Significant
Civil Service	34	10	10	54	62.960	1.153	8	0.997	Occupation	Not Significant
Trading	29	8	6	43	67.440	1.153	8	0.997	Occupation	Not Significant
Artisan	23	5	5	33	69.700	1.153	8	0.997	Occupation	Not Significant
Unemployed	24	6	4	34	70.590	1.153	8	0.997	Occupation	Not Significant
<₹10k	20	8	5	33	60.610	6.395	10	0.781	Income Level	Not Significant
₹10k–20k	23	7	5	35	65.710	6.395	10	0.781	Income Level	Not Significant
₹20k–50k	28	8	7	43	65.120	6.395	10	0.781	Income Level	Not Significant
₹50k–100k	28	3	4	35	80.000	6.395	10	0.781	Income Level	Not Significant
₹100k–500k	21	6	5	32	65.620	6.395	10	0.781	Income Level	Not Significant
>₹500k	5	1	3	9	55.560	6.395	10	0.781	Income Level	Not Significant
Neighborhood Park										
Male	24	11	9	44	54.550	2.987	2	0.225	Sex	Not Significant

Female	27	5	5	37	72.970	2.987	2	0.225	Sex	Not Significant
15–19	2	0	1	3	66.670	9.220	10	0.511	Age Group	Not Significant
20–24	9	6	2	17	52.940	9.220	10	0.511	Age Group	Not Significant
25–29	8	4	2	14	57.140	9.220	10	0.511	Age Group	Not Significant
30–34	9	3	5	17	52.940	9.220	10	0.511	Age Group	Not Significant
35–39	13	2	3	18	72.220	9.220	10	0.511	Age Group	Not Significant
>40	10	1	1	12	83.330	9.220	10	0.511	Age Group	Not Significant
Single	17	5	5	27	62.960	3.465	8	0.902	Marital Status	Not Significant
Married	23	8	5	36	63.890	3.465	8	0.902	Marital Status	Not Significant
Divorced	7	1	1	9	77.780	3.465	8	0.902	Marital Status	Not Significant
Widowed	2	1	1	4	50.000	3.465	8	0.902	Marital Status	Not Significant
Separated	2	1	2	5	40.000	3.465	8	0.902	Marital Status	Not Significant
Primary	5	1	1	7	71.430	4.311	8	0.828	Education Level	Not Significant
Secondary	13	7	4	24	54.170	4.311	8	0.828	Education Level	Not Significant
Tertiary	24	4	7	35	68.570	4.311	8	0.828	Education Level	Not Significant
Qur'anic	5	3	1	9	55.560	4.311	8	0.828	Education Level	Not Significant
Others	4	1	1	6	66.670	4.311	8	0.828	Education Level	Not Significant
Farming	7	5	0	12	58.330	11.953	8	0.153	Occupation	Not Significant
Civil Service	15	2	3	20	75.000	11.953	8	0.153	Occupation	Not Significant
Trading	11	6	6	23	47.830	11.953	8	0.153	Occupation	Not Significant
Artisan	13	2	2	17	76.470	11.953	8	0.153	Occupation	Not Significant
Unemployed	5	1	3	9	55.560	11.953	8	0.153	Occupation	Not Significant
<₹10k	11	2	5	18	61.110	5.528	10	0.853	Income Level	Not Significant
₹10k–20k	7	4	2	13	53.850	5.528	10	0.853	Income Level	Not Significant
₹20k–50k	12	4	3	19	63.160	5.528	10	0.853	Income Level	Not Significant
₹50k–100k	11	5	2	18	61.110	5.528	10	0.853	Income Level	Not Significant
₹100k–500k	9	1	2	12	75.000	5.528	10	0.853	Income Level	Not Significant
>₹500k	1	0	0	1	100.000	5.528	10	0.853	Income Level	Not Significant
Source: Field Survey Data (2025)										

Key Inferences by Demographic Variable and Park Type reveals that:

- Sex: No significant association was found in any park type (Commercial: $p=0.910$; Large Formal: $p=0.779$; Neighborhood: $p=0.225$). Awareness levels between males and females are statistically similar.
- Age Group: No significant association was found in any park type (Commercial: $p=0.791$; Large Formal: $p=0.195$; Neighborhood: $p=0.511$). Awareness is not concentrated in any specific age cohort.
- Marital Status: No significant association was found in any park type (Commercial: $p=0.538$; Large Formal: $p=0.274$; Neighborhood: $p=0.902$). Single, married, or other statuses do not predict awareness.
- Education Level: No significant association was found in any park type (Commercial: $p=0.509$; Large Formal: $p=0.339$; Neighborhood: $p=0.828$). Crucially, this includes no significant difference between those with Tertiary education and other levels.

- Income Level: No significant association was found in any park type (Commercial: $p=0.906$; Large Formal: $p=0.781$; Neighborhood: $p=0.853$). Awareness is not linked to economic stratum.

Although, A significant association was found for Occupation within the Commercial/Amusement Park stratum only ($\chi^2=16.036$, $df=8$, $p=0.042$). This indicates that in Commercial/Amusement Parks, the level of awareness of sustainable practices is dependent on a visitor's occupation. Examining the "% Aware" column reveals notable variations: Unemployed (75.0%), Farming (73.3%), Civil Service (66.7%), Artisan (60.6%), and Trading (60.0%). This association was not replicated in Large Formal Parks ($p=0.997$) or Neighborhood Parks ($p=0.153$).

For the majority of tests (17 out of 18 demographic variable-park type combinations), we the null hypothesis (H_0) was accepted. There is no statistically significant association between demographic characteristics (Sex, Age, Marital Status, Education, Income) and awareness levels of sustainable practices across all park categories. The single, isolated

exception is the association with Occupation in Commercial/Amusement Parks.

The findings strongly suggests that awareness of sustainability is not the exclusive domain of any particular demographic group it is not limited to the more educated, the higher-income, the younger, or a specific gender. Instead, awareness appears to be a widely distributed social phenomenon that cuts across traditional socio-economic lines. This reinforces the earlier Kruskal-Wallis finding that awareness levels themselves do not differ between park types; now we see they also do not differ meaningfully within park types based on who people are.

For policymakers, the primary implication is that broad, inclusive public awareness campaigns are justified and likely to be effective. There is no evidence to suggest targeting only "elite" or "educated" demographics. Sustainability messaging can and should be designed for mass appeal, as the potential for understanding is broadly based. The study must now turn its focus from who is aware to what motivates the transition from this widespread awareness to widespread action, as this appears to be the more pressing barrier.

The widespread lack of demographic association with environmental awareness, particularly the non-significance of education and income, challenges simplistic "information-deficit" models and aligns with more complex, social diffusion models of environmental consciousness.

First, the non-significant results for Education and Income in all parks directly contest the common assumption that socio-economic status is a primary driver of environmental knowledge. This aligns with research in various contexts showing that once environmental issues reach a certain level of salience in the public sphere through media, popular culture, and shared public experiences awareness becomes decoupled from formal education and wealth (Dunlap & York, 2008). It suggests sustainability has become a mainstream social norm in Abuja.

Second, the lack of association with Age and Marital Status supports theories of generational and life-cycle convergence on environmental values. While early research often found stronger pro-environmental views among the young, more recent studies in the context of palpable climate impacts and ubiquitous digital media show concerns broadening across all adult age groups (Lee, Markowitz, Howe, Ko, & Leiserowitz, 2015). Similarly, family status does not appear to be a key differentiator of basic awareness.

Finally, the overall pattern of non-association strongly supports the Cognitive-Affective-Norm (CAN) model and Social Diffusion Theory. These posit that widespread awareness arises less from individual demographic attributes and more from social networks, affective experiences in shared spaces (like parks), and the internalization of prevailing social

norms (Bamberg & Möser, 2007; Stern, 2000). Abuja's parks appear to be functioning as such a normative space, where a baseline of sustainability awareness is part of the shared cultural fabric, accessible to all users regardless of background.

IV. CONCLUSION AND RECOMMENDATION

This study demonstrates that recreational parks in the Federal Capital City of Abuja constitute an essential component of the city's social and ecological infrastructure, providing widely recognized ecosystem services that enhance environmental quality, mental wellbeing, and social interaction. Although recreational activities and usage intensity vary across park strata, users perceive ecosystem services, sustainability practices, and environmental threats in remarkably similar ways across all park types. In essence, Abuja's recreational parks represent both a significant opportunity for advancing urban environmental sustainability and a clear illustration of the limits of awareness-driven approaches when not supported by strong governance structures. Sustainable outcomes will depend on shifting policy focus from narrowly targeted awareness campaigns to integrated planning, institutional accountability, and participatory management frameworks that enable collective action.

Based on the findings and conclusion of this study, the following recommendations were made;

- Shift Policy Focus from Awareness Creation to Action Enablement: Given the widespread and demographically inclusive nature of sustainability awareness, policy interventions should prioritize mechanisms that enable action such as infrastructure provision, enforcement, and incentives should be encouraged.
- Adopt an Integrated City-Wide Recreational Sustainability Framework: Recreational parks should be planned and managed as a unified green infrastructure network, with standardized sustainability guidelines covering waste management, ecosystem protection, visitor carrying capacity, and maintenance across all park categories.
- The Abuja Environmental Protection Board (AEPB), Federal Capital Development Authority (FCDA) and other relevant agencies should develop a coordinated governance framework that ensures regular monitoring, supervision and enforcement of environmental standards within recreational centres.

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