

## Assessing the Contribution of Recreational Facilities to Ecosystem Services in Abuja, Nigeria

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### Abstract

*This study evaluated the contribution of recreational facilities in Abuja, Nigeria, to the provision of ecosystem services. Twenty officially gazetted recreational facilities in the Federal Capital city, Abuja were stratified into three categories: Large Formal Parks, Commercial/Amusement Parks, and Neighbourhood Parks. Using a table of random numbers, two parks were selected from each category. A total of 462 questionnaires were administered to park users based on estimated visitation footfall, out of which 400 valid responses were retrieved, representing an 86.6% response rate. Data were analysed using descriptive statistical methods. The results revealed significant variation in visitation patterns across park categories. Weekly visitation was highest in Neighbourhood Parks (34.57%), while Large Formal Parks recorded their highest visits monthly (30.48%) and during festive periods (28.34%). Commercial/Amusement Parks were predominantly patronised during festive periods (32.58%). Nature appreciation emerged as a major motivation for park users in Neighbourhood Parks (64.20%), while exercise and fitness were most prominent in Large Formal Parks (51.34%). Leisure and relaxation were particularly dominant in Commercial/Amusement Parks (50.00%). Furthermore, the dominant services provided by the park in the study area were cultural services, which included sporting and leisure activities, among others. While other ecosystem services, such as regulating, provisioning, and supporting services, were significantly low and often unavailable in most of the recreational facilities. This was largely due to the non-integration of ecosystem infrastructure during the design and review of the recreational facilities. In view of this, the study recommends the integration of ecological infrastructure into the recreational facilities to enhance the provision of ecosystem services.*

**Key Words:** Recreational facility, Ecosystem services, Sampling, Urban Parks.

## INTRODUCTION

Recreational facilities, which include leisure pursuits such as tourism, sports, hiking, picnicking, and boating, have become an integral part of urban life, contributing to human well-being, economic growth and social cohesion (Souza, 2024; Yang, 2023; Khytra, 2021; Surujlal and David, 2019). It is commonly believed that recreation has a positive impact on nature; however, like all human activities, it has its negative consequences. As a result of recreational activities, anthropogenic transformation of the natural environment occurs (Ospan *et al.*, 2024).

Tourism and recreational activities have direct and indirect environmental impacts (Papiryan, 2000). Direct impacts encompass the extermination of flora and fauna through hunting and fishing, destruction of natural habitats due to economic activities, the spread of infections and diseases via human activity waste and disruption of natural processes of life activity in plants and animals through feeding, breeding in artificial conditions, observation, noise pollution and the destruction of nests and dens. Indirect impacts involve anthropogenic effects on geographical components such as soil and surface water pollution, deforestation, erosion, development, global climate change and atmospheric pollution. Ospan *et al.*, (2024) also include alterations of natural habitats and artificial breeding of animals and plants with specified properties (genetically modified organisms or mutants), whose impacts on the natural environment and humans remain inadequately studied.

Abuja, Nigeria's capital city, has numerous recreational areas, including parks, gardens, sports complexes, and leisure centres. Popular recreational sites such as Millennium Park, Jabi Lake and the National Children's Park and Zoo serve as major attractions for residents and visitors (Abuja City Guide,

2023). These activities are critical for the social and mental well-being of the urban population, offering an escape from the city's hustle and bustle (WHO, 2016). However, environmental sustainability has become a critical global concern in the 21st century, influencing policies, development projects, and day-to-day activities (Kumaresan *et al.*, 2023). By examining key recreational sites in Abuja, this study identifies the environmental challenges posed by these activities, including pollution, land degradation and ecosystem disruption. It also explores the role of stakeholders, such as government agencies, park managers, visitors and local communities, in promoting sustainable recreational practices. Understanding the impact of recreational activities on environmental sustainability is crucial for fostering responsible urban development in Abuja. As the city continues to grow, sustainable management of recreational spaces is essential to preserve its natural resources, protect biodiversity, and enhance the quality of life for present and future generations.

Recreational activities, while offering numerous social and economic benefits, pose significant environmental challenges that threaten ecosystem integrity and sustainability. One of the most pressing issues is habitat degradation, as excessive foot traffic, off-road vehicles and infrastructure development contribute to soil erosion, deforestation and the destruction of fragile ecosystems. Sensitive habitats such as wetlands, coastal dunes and alpine regions are particularly vulnerable to human disturbance, leading to biodiversity loss and the disruption of ecological balance (Ogunba, 2015).

Abuja currently has twenty gazetted parks that were approved as recreational facilities which provide leisure services as well as other ecosystem services such as provisioning, regulating and supporting services. However, there is a lack of data on whether these

recreational services sufficiently or otherwise render these ecosystem services in the study area. Though there is a general perception that leisure and culturally related activities are the dominant services provided by these facilities. Considering the significance of ecosystem services in the resilience of cities, especially with the ongoing climate change debate, this paper is to determine the adequacy or otherwise of ecological services provided by the recreational facilities in the study area.

## **METHODOLOGY**

### **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 km<sup>2</sup> out of the 8,000 km<sup>2</sup> 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 km<sup>2</sup>. 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).

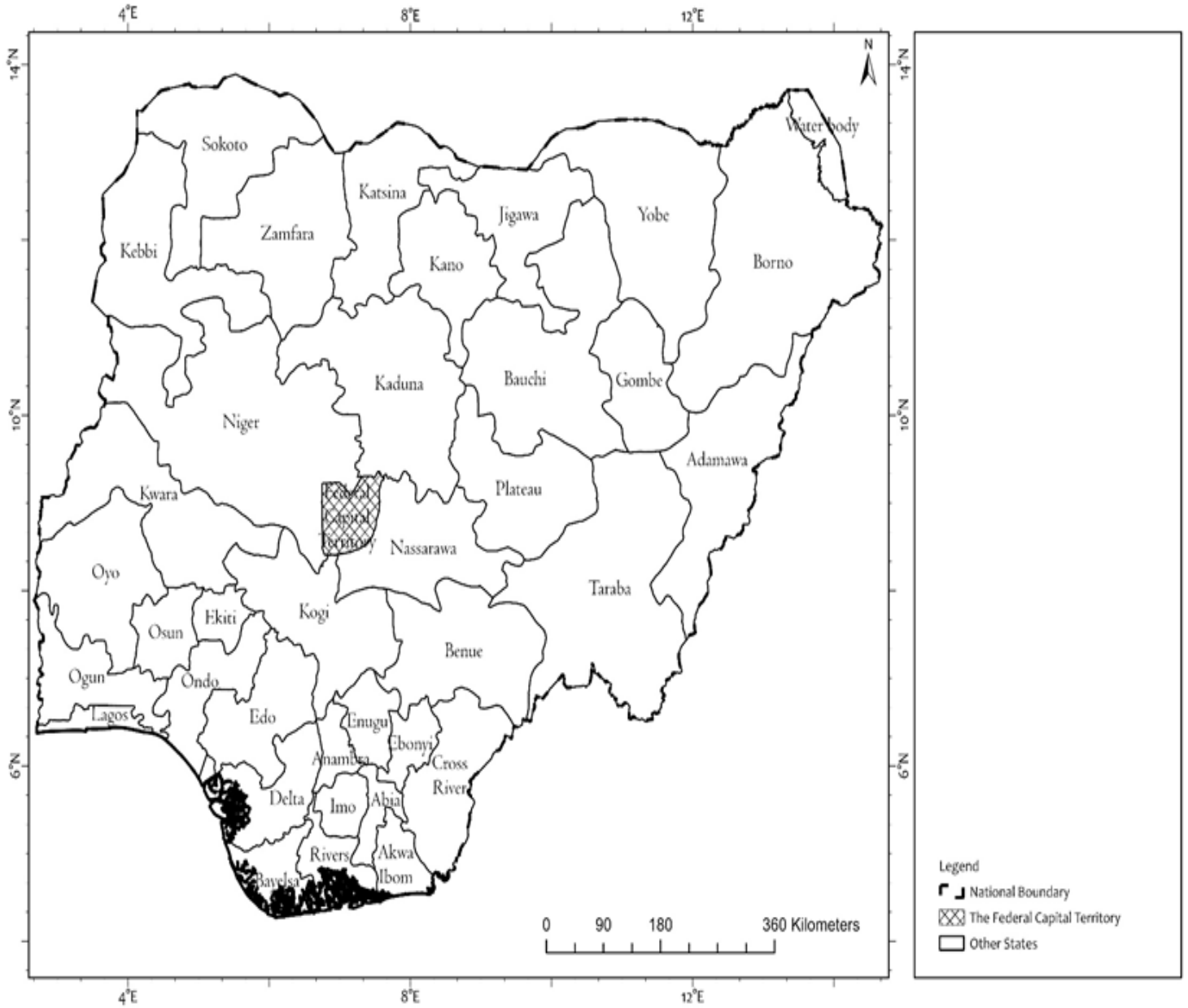


Figure 1: Nigeria Showing FCT

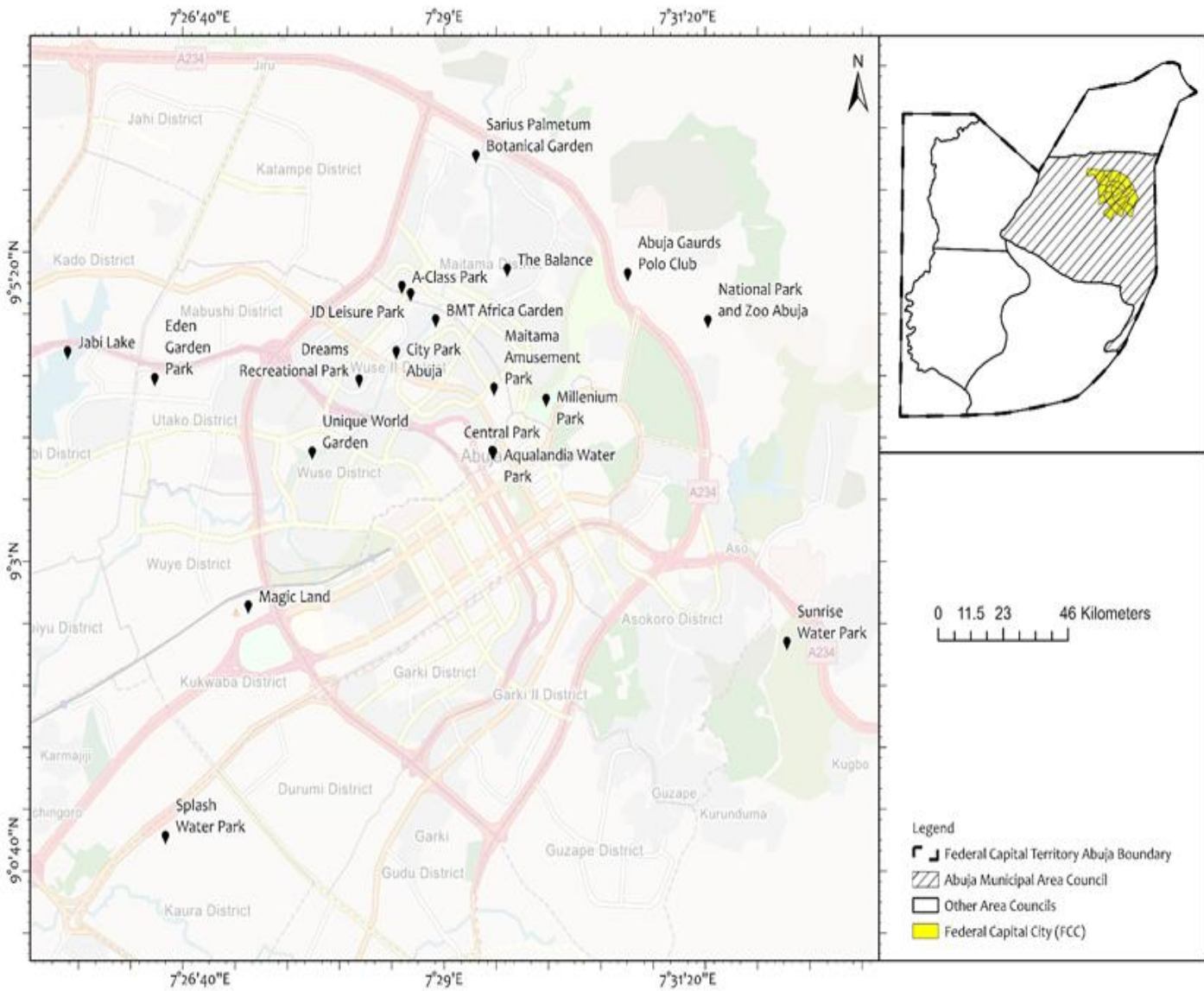


Figure 2: Location-Specific Recreational Parks in the FCC

The climate of Phase One of the FCC is the same as that of the Abuja Municipal Area Council, which experiences the tropical wet and dry seasons (Balogun, 2001). Temperatures are highest during the dry season, ranging from 30°C to 35°C and moderate during the rainy season, fluctuating between 25 °C and 30 °C (Logan, 2001). The rainy season extends from mid-March to mid-October, lasting for approximately 190 days with mean annual rainfall between 1,445mm and 1,631mm (Hassan, 2008).

The vegetation cover in Abuja City, particularly in Phase One of the Federal Capital City, has undergone significant changes over the past few decades due to rapid urban expansion (Enoguanbhor et al., 2019). Enoguanbhor et al. (2019) studied urban land cover change in relation to land use planning in the Abuja city-region from 1987 to 2017, integrating GIS and freely available RS data to examine these changes. Enoguanbhor et al. (2019) observed a significant reduction in vegetation cover due to rapid and uncontrolled urban expansion. Initially, built-up land coverage in 1987 was relatively low at 1.8%, as the region primarily comprised a few, isolated settlements. However, there was a large expansion of urban/built-up areas by 2002, increasing to 10% and further expanding to 19.3% by 2017. This rapid urban growth occurred at the expense of vegetation cover, as green areas were converted into urban spaces. Numerous plant species are found in the area which includes palm species, *Daniella Olliveri*, *Delonx regia*,

*Azadirachta indica*, *Terminalia catappa* and *Polyalthia longifolia* among others.

### Data management

Field observations were conducted in the twenty gazetted parks in Abuja. A stratified sampling procedure was employed and the twenty approved recreational parks were classified into three major parks, namely Large formal parks, Commercial/Amusement parks and Neighbourhood parks on the basis of their sizes and usage. The large formal parks category includes: Central Park, Jabi lake, Millenium park, Sarius, Palmetum Botanical Garden and National Park and Zoo Abuja. While the commercial/Amusement parks comprise Splash Water Park, Blake Resort, Magic Land, The Balance, Maitama Amusement Park. Aqualandia Water Park, Sunrise Water Park and Abuja Guards Polo Club. While the Neighbourhood consists of; City Park Abuja, A-Class Park, JD Leisure Park, Dreams Recreational Park, BMT Africa Garden, Eden Garden Park and Unique World Garden.

Using the table of random numbers, two parks were selected from each category. Therefore, for large formal parks, Jabi Lake and National Park and Zoo Abuja were selected; similarly, Magic Land and Sunrise Water Park were selected from commercial/Amusement parks. While City Park Abuja and Eden Garden park were selected in the Neighbourhood park category.

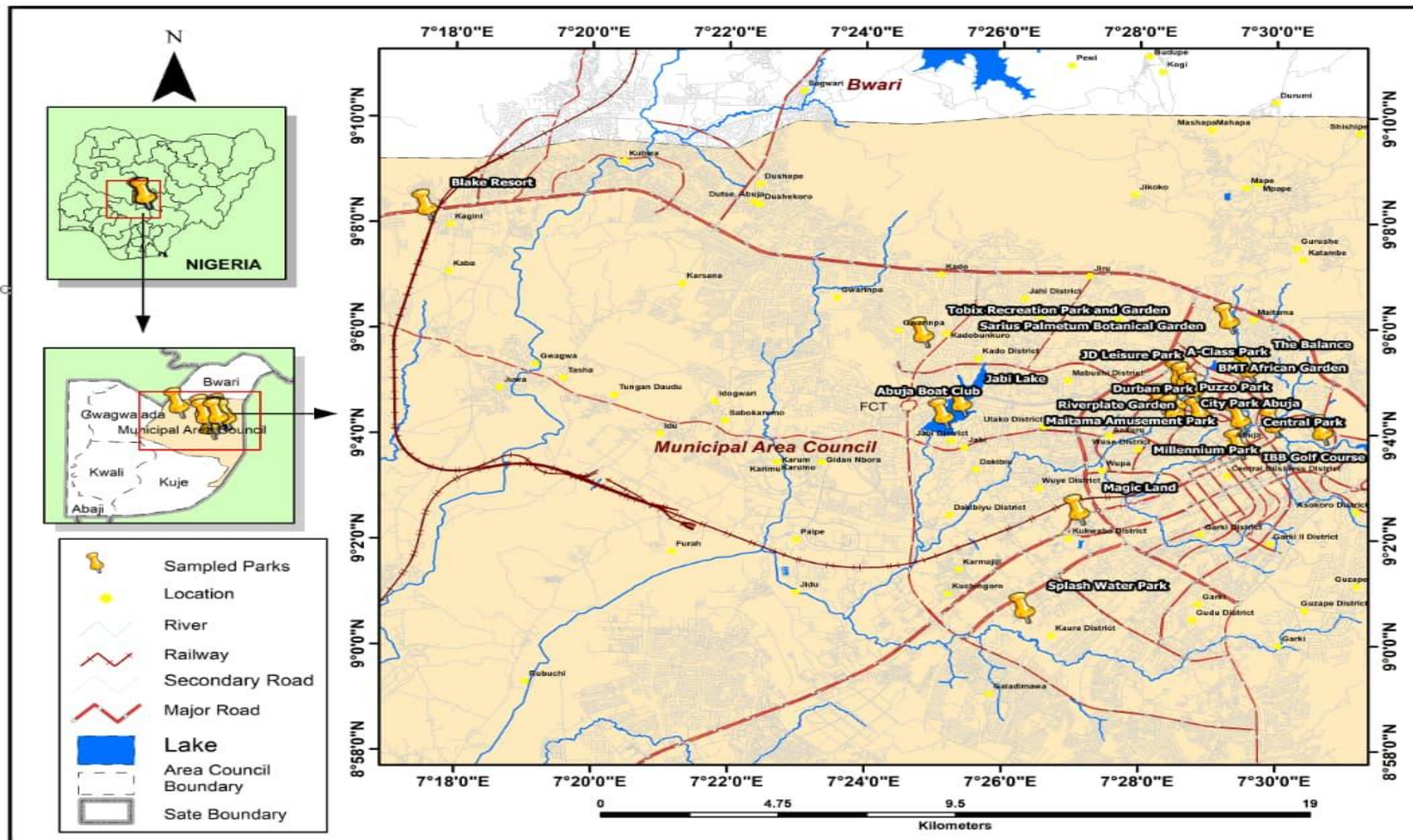


Figure 3: Identified Recreational Parks in the Study Area.

Using the 2006 population census data of the AMAC, the 2024 projected population is given as:

$$N_{2024}=776,298 \times e(0.043 \times 18)$$

$$N_{2024}=776,298 \times e(0.774)$$

$$N_{2024}=776,298 \times 2.168$$

$$N_{2024} \approx 1,683,000$$

Therefore, the estimated total resident population of AMAC in 2024 is 1.68 million. Based on the projected population, a sample size of 384.6 was obtained. In anticipation of no response and the mixing

of questionnaires, 20% of the original sample size was considered, which amounted to 462 questionnaires administered across all recreational facilities. Refer to Table 1 for the detailed distribution of the respondents in the study area.

The target sample size of 462 respondents was allocated proportionally to the six selected parks based on estimated relative visitor footfall. The estimates were derived from observational headcounts conducted during the reconnaissance survey's peak periods. The allocation, administration, and final valid sample are presented in the table below.

Table 1: Proportional Distribution of Samples Across Park Categories

Stratum	Selected Park	Estimated Daily Visitor Footfall (Peak)	Proportional Share (%)	Questionnaires Administered (n=462)	Valid, Completed Questionnaires (n=400)
Large Formal Parks	Jabi Lake	650	28%	128	111
	National Park & Zoo	450	19%	88	76
<b>Subtotal</b>		<b>1100</b>	<b>47%</b>	<b>216</b>	<b>187</b>
Commercial/Amusement	Magic Land	420	18%	83	72
	Sunrise Water Park	350	15%	69	60
<b>Subtotal</b>		<b>770</b>	<b>33%</b>	<b>152</b>	<b>132</b>
Neighborhood Parks	City Park Abuja	280	12%	55	48
	Eden Garden Park	200	8%	38	34
<b>Subtotal</b>		<b>480</b>	<b>20%</b>	<b>93</b>	<b>81</b>
<b>TOTAL</b>		<b>2350</b>	<b>100%</b>	<b>462</b>	<b>400</b>

Of the 462 questionnaires administered across the six parks, a total of 400 were returned fully completed and valid for analysis, resulting in a valid response rate of 86.6%. The data collected from the recreational park users in Abuja were analysed using descriptive statistical techniques.

## RESULTS AND DISCUSSION

### *Ecosystem Services Provided by Various Recreational Centres*

Figure 4 revealed that the respondents associated recreational centres with multiple ecosystem services. Recognition of ecosystem services is strong but varies by service type. Wildlife Habitat is the most recognized service across Commercial and Large Formal Parks (both 63.64%), though it is lower in Neighbourhood Parks (55.56%). Clean Air Provision and Mental

Health Support are highly valued across the board. Cultural Benefits are consistently acknowledged (~44% across all). Educational Opportunities are most recognized in Large Formal Parks (41.18%), while Water Regulation is notably less recognized in Commercial/Amusement Parks (31.06%) compared to others. This shows that regulating services (air, water, temperature) are not significantly acknowledged as cultural and supporting services.

Furthermore, Figure 5 revealed a strong association between recreational centres and well-being. The Impact on Wellbeing is affirmed most strongly by users of Neighbourhood Parks (81.48%), followed by Commercial/Amusement (78.79%), and Large Formal Parks (75.40%).

Similarly, the belief that parks contribute to a Good Environment is highest among Large Formal Park users (80.75%), as shown in Figure 6. Regarding the specific Ways Parks Contribute, "Improved Physical & Social Life" dominates for Commercial/Amusement users (56.82%). In contrast, Neighbourhood and Large Formal Park users place more emphasis on "Improved Aesthetic View" (35.80% and 34.76% respectively) and "Improved Air Quality" (27.16% for Neighbourhood Parks).

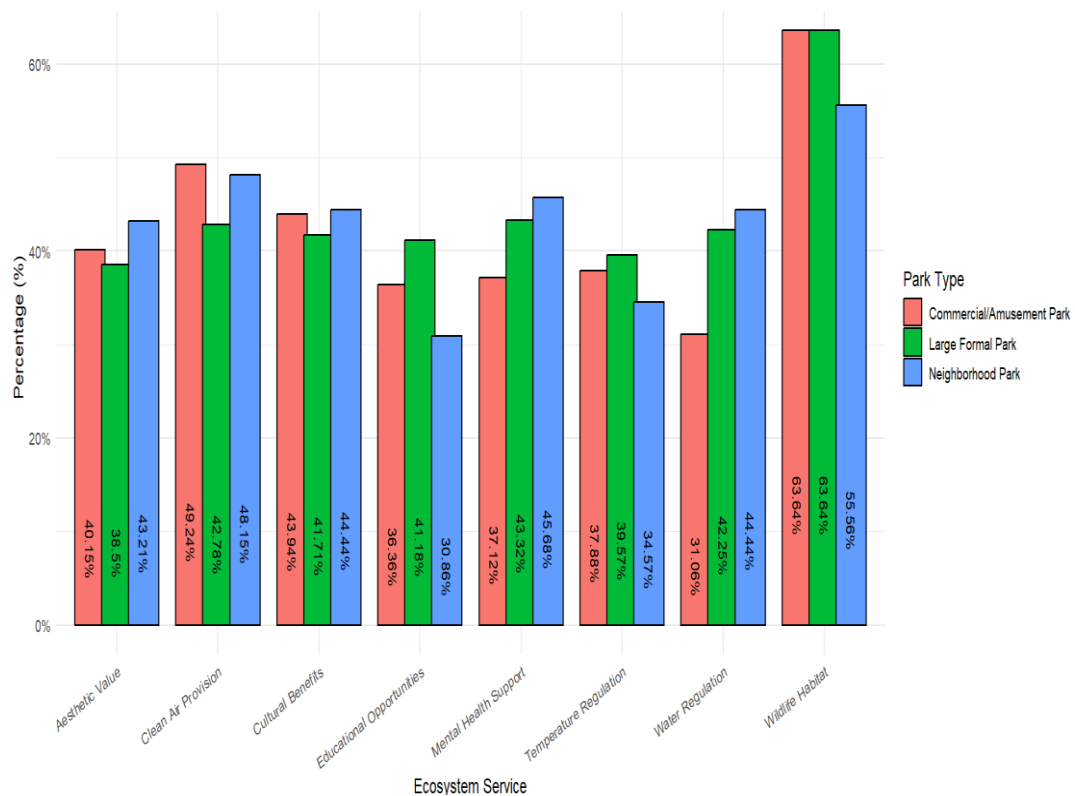


Figure 4: Ecosystem Services Provided by Recreational Parks

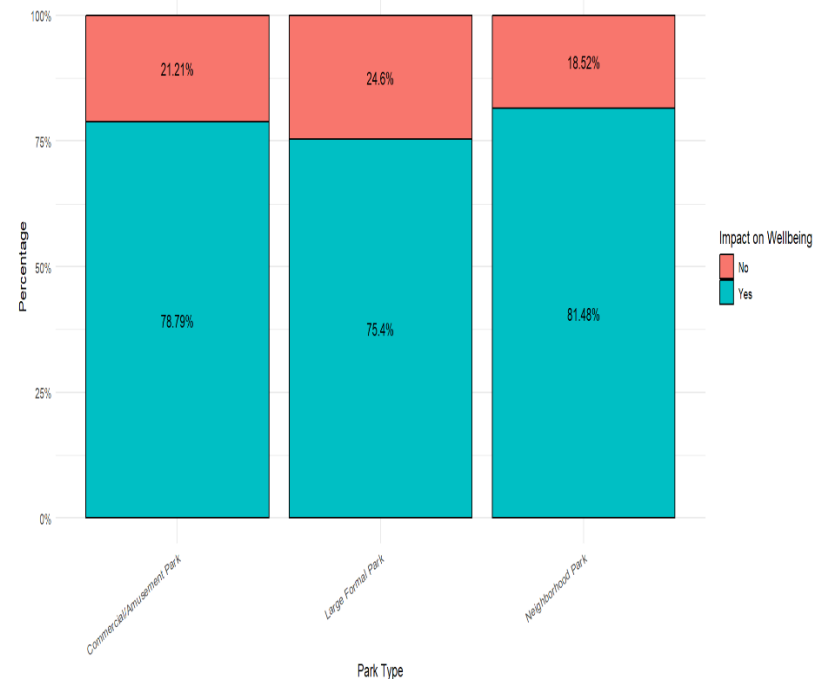


Figure 5: Impact of Recreational Parks on Wellbeing by Park Type

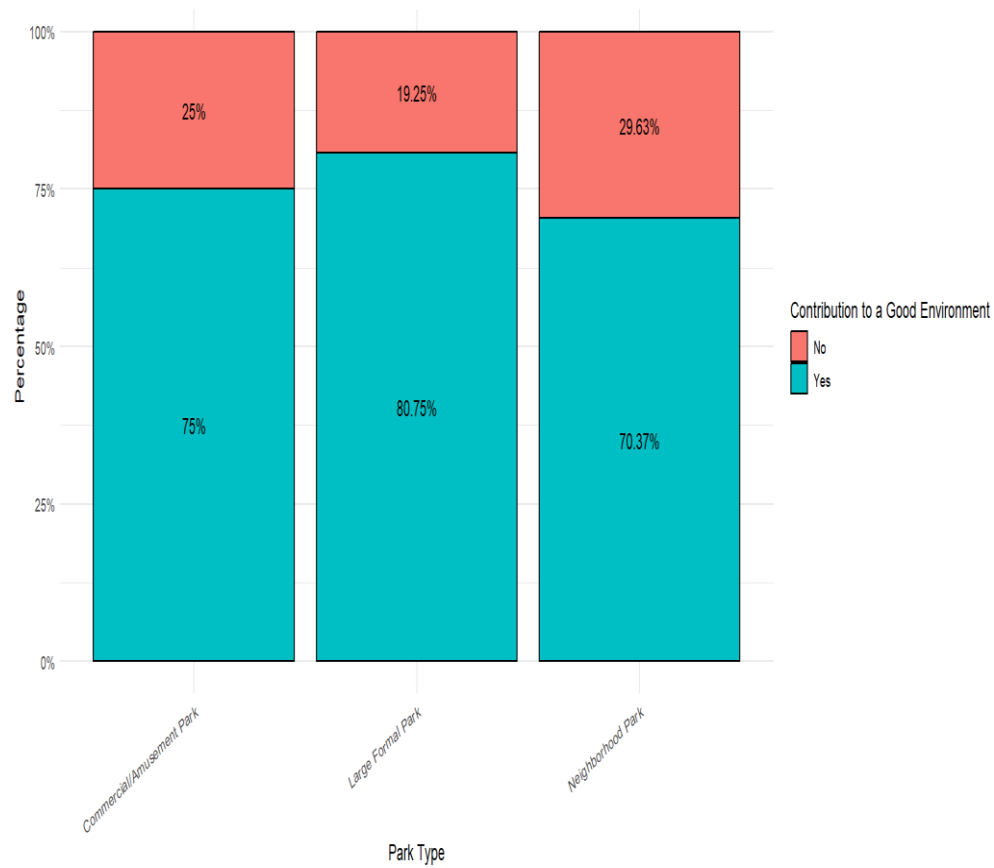


Figure 6: Contribution of Recreational Parks to a Good Environment by Park Type

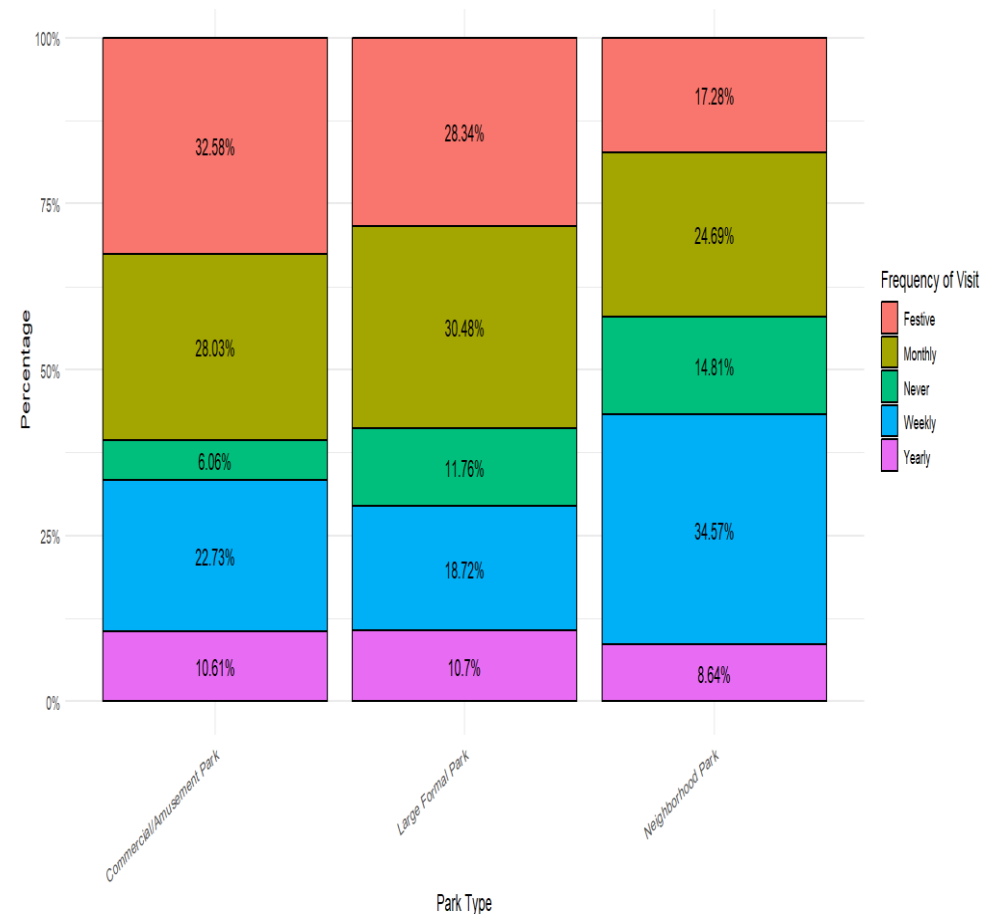


Figure 7: Distribution of Recreational Park Visit Frequency by Park Type

### ***Extent of Residents' Usage of Recreational Provisions/Facilities in the Study Area.***

The results from figure 7-10 reveal distinct patterns of park usage, across the three park types in Abuja, with significant variations in visitation frequency, primary benefits, and perceived quality.

Figure 7 revealed diverse visitation patterns in the study area. Neighborhood Parks showed the highest level of regular integration, with weekly visits being most common (34.57%), the highest proportion for this category across all parks. Large Formal Parks and Commercial/Amusement Parks showed different patterns. Large Formal Parks observe their highest visitation monthly (30.48%) and during festive periods (28.34%), suggesting planned outings. Commercial/Amusement Parks are distinctly event and festivity-oriented, with the single largest visitation reason being festive periods (32.58%). Notably, "Never" visiting is highest for Neighbourhood Parks (14.81%), which may indicate accessibility issues or a lack of relevance for a segment of the immediate community. Similar findings have been reported in Abuja, where studies identified weekends and festive periods as peak visitation times (Majebi & Agbebaku, 2024).

The motivations for park use show both shared values and distinct priorities as presented in figure 8. Nature Appreciation is a primary driver across all parks, peaking in Neighbourhood Parks (64.20%). Exercise and Fitness is also a major universal reason, highest in Large Formal Parks (51.34%). Relaxation and Leisure show the starkest variation: it is the second strongest reason for Commercial/Amusement Parks (50.00%) but ranks much lower for Neighbourhood Parks (29.63%). Cultural Activities find strong relevance across all, slightly highest in Neighbourhood Parks (44.44%). This indicates that while all parks serve multi-functional roles, Neighbourhood Parks are strongly valued for nature and culture, Commercial parks for

leisure and relaxation, and Large Formal Parks for structured exercise. Furthermore, the perceived Quality of Recreational Facilities is shown in Figure 9, which is rated as "Good" or "Excellent" is highest in Commercial/Amusement Parks (53.03%), followed by Large Formal Parks (52.40%), and lowest in Neighbourhood Parks (50.62%). Finally, Figure 10 depicted Accessibility of Facilities, and the results showed (a clear "Yes") is perceived best in Commercial/Amusement Parks (57.58%), with Large Formal (49.73%) and Neighbourhood Parks (50.62%) facing more significant access challenges. This suggests a potential gap where Neighbourhood Parks, despite being closest to users, are not seen as having the best quality or most accessible facilities.

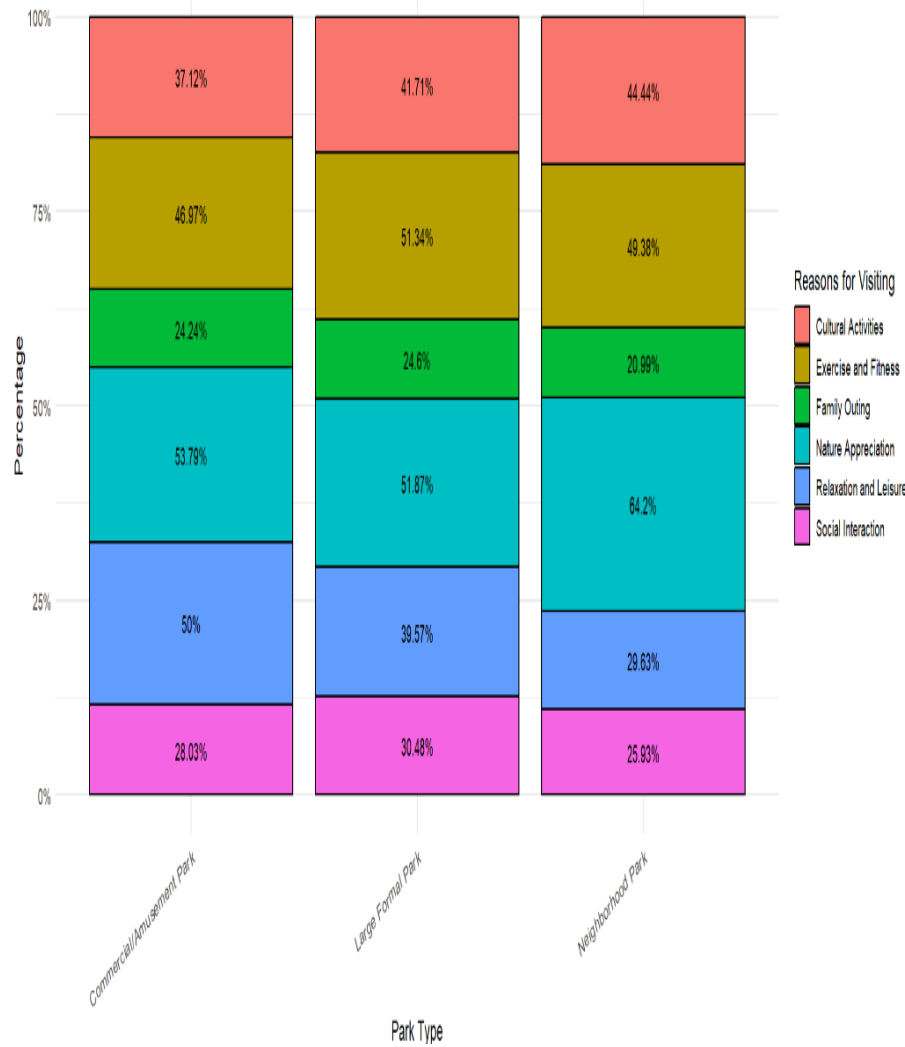


Figure 8: Motivation for Visiting Recreational Parks by Park Type

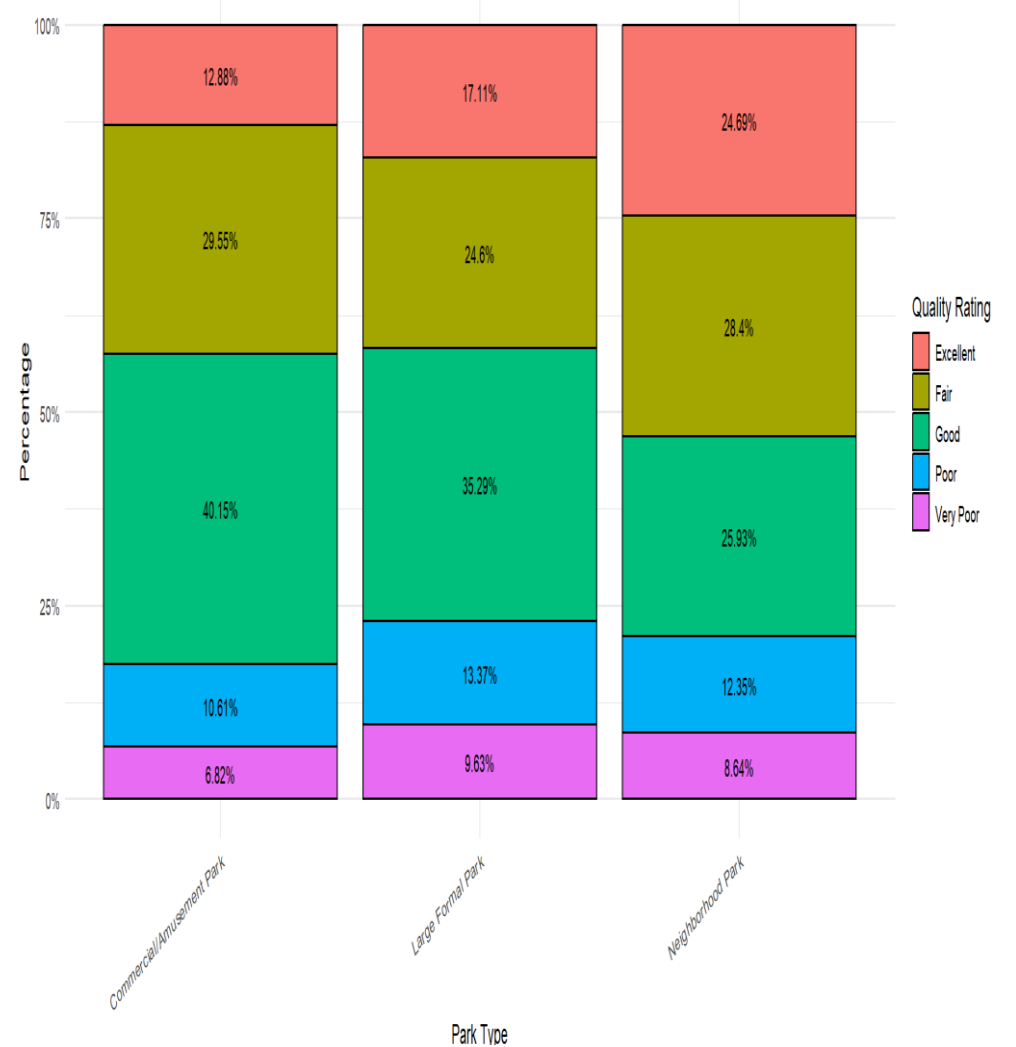


Figure 9: Perceived Quality of Recreational Facilities by Park Type

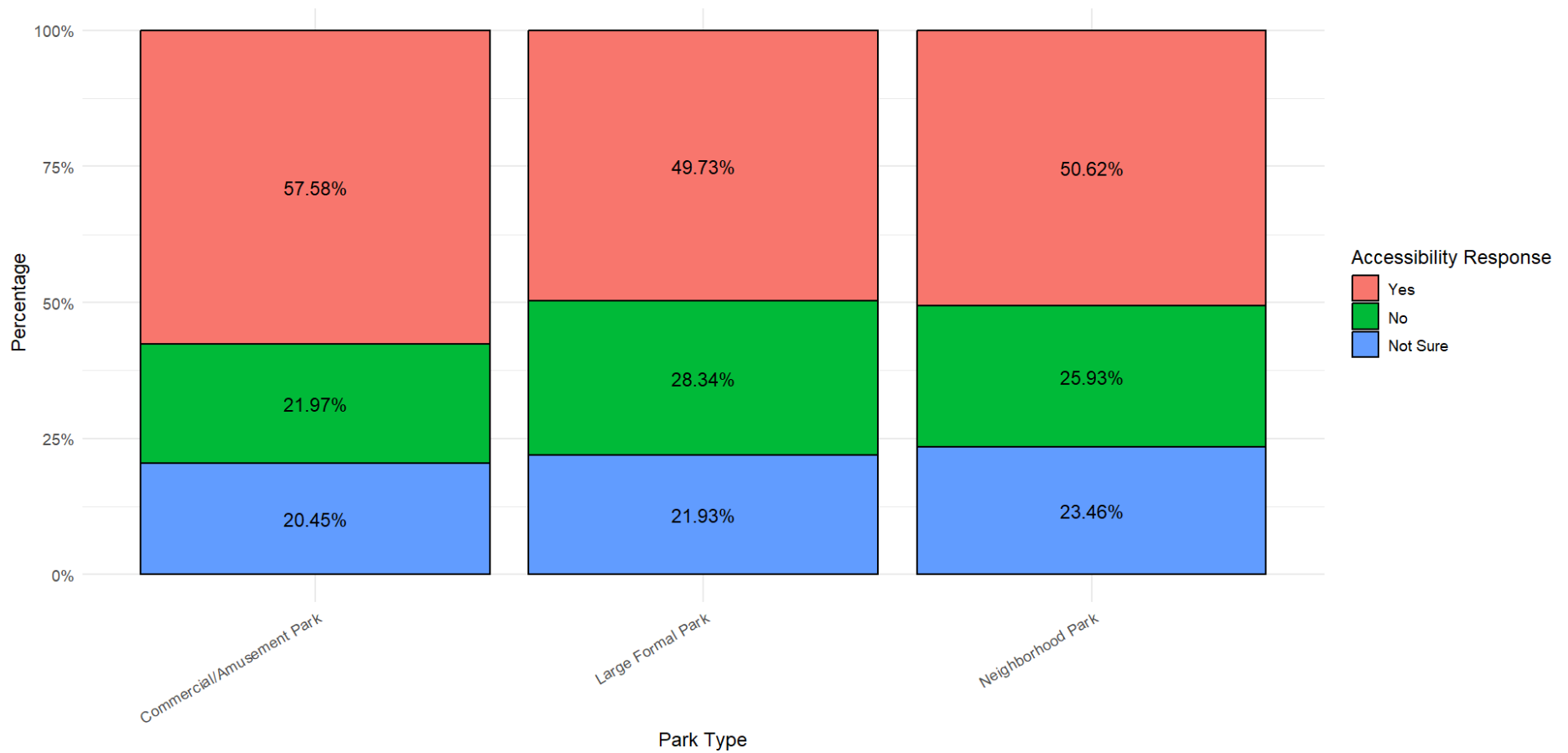


Figure 10: Accessibility of Recreational Facilities by Park Type

The findings imply that ecosystem services provided by the recreational facilities in the study area, which include provisioning services, regulating services, supporting services, and cultural services, are reflected in the recreational facilities studied; however, the rate of the services provided by the recreational facilities are very inadequate with respect to provisioning services, supporting services and regulating services. Most of the recreational facilities lack basic and important components that are essential to providing these ecosystem services. Furthermore, the survey also proves that leisure activities, which in other words are cultural services, are the dominant services that are significantly available in all the recreational facilities studied. Consequently, these recreational facilities may be impacted by human activities as a result of the dominance of the cultural services with its attendant consequences on environmental sustainability. This observation aligns with the conceptual framework of ecosystem services articulated by the Millennium Ecosystem Assessment (2005), which emphasizes that ecosystems contribute to human well-being through these interconnected service categories. When one or more categories are underperforming, the overall ecological integrity and sustainability of urban systems are compromised. Bolund and Hunhammar (1999) demonstrated that urban green areas play essential roles in moderating microclimates, reducing air pollution, and managing stormwater runoff. Similarly, Gómez-Baggethun and Barton (2013) argue that many cities underinvest in ecological infrastructure, thereby weakening regulating and supporting ecosystem functions. The dominance of cultural services, particularly leisure and recreational activities, across all facilities reflects a common trend in urban park development where social and aesthetic functions are

prioritized over ecological performance. According to Chan et al. (2012), cultural ecosystem services often receive greater public and political attention because they are more immediately visible and socially valued. However, overemphasis on cultural services especially when not balanced with ecological design can lead to habitat degradation, soil compaction, vegetation loss, and biodiversity decline due to excessive human pressure. Jim and Chen (2009) further note that intense recreational use without ecological safeguards can reduce the environmental quality of urban green spaces, undermining their long-term sustainability.

The implications for urban resilience are significant. Urban resilience depends heavily on the capacity of ecosystems to provide life-supporting services, including carbon sequestration, water regulation, nutrient cycling, and habitat provision. The Intergovernmental Panel on Climate Change (2022) underscores that nature-based solutions and green infrastructure are essential components of climate adaptation strategies in cities. When recreational facilities function primarily as leisure spaces without embedded ecosystem infrastructure, their contribution to resilience is minimal. Ahern (2011) argues that resilient cities require multifunctional landscapes capable of delivering ecological, social, and economic benefits simultaneously.

Flowing from these, the resilience of the city may be a daunting task in the near future because the ecological services that are necessary life-supporting system for urban growth are lacking. Therefore, the need for the urban administration to review and integrate ecosystem infrastructure in the existing recreational facilities cannot be overemphasized.

## CONCLUSION

Recreational facilities in Abuja are overwhelmed by cultural activities such as leisure, sports, Social Interaction & Community Events, Health & Psychological Restoration and spiritual & Symbolic Values. However, the ecological services provided by these facilities in terms of regulating services, supporting and provisioning services are inadequate, thus posing a strong challenge to urban ecology, and by implications the resilience of the city to climate change will be hampered. On the strength of this, the study recommends that the review and the design of the recreational facilities in the study area should be considered rapidly, taking into cognisance the burgeoning population of the study area.

## RECOMMENDATIONS

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

1. Integrate Green Infrastructure into Existing Recreational Facilities: Urban authorities should redesign and retrofit parks to function as multifunctional ecological landscapes, not just leisure grounds.
2. Balance Cultural Services with Ecological Carrying Capacity: Recreational facilities should adopt zoning strategies to reduce ecological degradation caused by excessive human pressure.
3. Strengthen Urban Biodiversity and Supporting Services: Since supporting services (soil formation, habitat provision, nutrient cycling) are weak, targeted ecological restoration is necessary.
4. Mainstream Ecosystem-Based Planning in Urban Policy: Urban planning authorities in Abuja should integrate ecosystem service assessment into park planning guidelines and also make green infrastructure mandatory in new recreational developments.

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