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Research Paper

An Evaluation of Indigenous Plants, Spatial Orientation and Sustainable Materials in Selected Urban Spaces in Lagos, Nigeria

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Abstract
Rapid urbanization in Lagos has intensified the demand for functional and environmentally responsive urban landscapes. Yet, contemporary landscape projects in the city frequently exhibit inadequate integration of indigenous planting systems, climate-responsive spatial orientation, and sustainable material selection. This study undertakes a systematic evaluation of planting composition, spatial layout, and material application in selected urban landscapes in Lagos to assess their potential for enhancing environmental sustainability. Employing a qualitative methodology grounded in extensive literature review and comparative case study analysis, the research examines how design decisions across these three dimensions collectively shape climate-responsive performance. The findings contribute to the development of context-specific design guidelines and inform a landscape proposal aimed at strengthening ecological resilience, material efficiency, and thermal comfort outcomes in tropical urban environments.
Keywords; *Indigenous plantings; Spatial orientation; Sustainable materials; Urban spaces*

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I. Introduction

1.1 Background and Problem Statement

Urban landscapes are increasingly recognized as functional ecological systems rather than purely aesthetic enhancements. In rapidly urbanizing tropical cities, well-designed landscapes contribute to microclimate regulation, stormwater management, surface temperature moderation, and outdoor thermal comfort (Ahern, 2018; Hansen & Pauleit, 2019). Vegetation structure, spatial configuration, and surface materiality collectively influence how outdoor spaces respond to climatic stressors such as intense solar radiation, high humidity, and seasonal rainfall variability (Emmanuel & Krüger, 2019; Rahman et al., 2020). These design considerations become particularly critical in tropical coastal environments like Lagos, where elevated heat exposure, prolonged wet seasons, and dense urban morphology intensify environmental pressures. Climate-responsive strategies—including layered planting, shade-oriented spatial planning, and permeable material selection—are therefore essential components of sustainable urban development (Shashua-Bar et al., 2017; Santamouris, 2020).

Despite the growing integration of landscaped public spaces within Nigerian cities, many projects prioritize visual appeal and recreational function without adequate consideration for environmental performance. In Lagos's dense metropolitan areas, increasing surface hardening and vegetation loss exacerbate urban heat accumulation and diminish outdoor comfort levels (Emmanuel & Krüger, 2019; Santamouris, 2020). Existing studies on Nigerian urban environments largely focus on planning policy, green infrastructure advocacy, or horticultural practices, with limited scholarly attention given to how planting composition, spatial orientation, and material selection interact as integrated design variables within executed landscape projects (Hansen & Pauleit, 2019; Shackleton et al., 2021). Furthermore, many evaluations emphasize descriptive documentation rather than systematic design assessment guided by sustainability principles (Ahern, 2018). This gap restricts the development of context-sensitive design frameworks suitable for tropical urban environments.

1.2 Study Framework: Aim, Objectives, Scope, and Justification

Aim

This study aims to assess landscape planting composition, spatial orientation strategies, and material selection approaches in selected urban landscapes in Lagos and examine their potential implications for environmental sustainability and climate responsiveness.

Objectives
To achieve this aim, the study:
Examines planting composition and vegetation structuring in selected urban landscapes.
Assesses spatial layout and orientation patterns in relation to shading and ventilation potential.
Evaluates landscape material applications based on permeability, durability, and sustainability considerations.
Compares design approaches across case studies to identify climate-responsive landscape strategies.

Scope

The study focuses on two urban landscape sites within Lagos: Muri Okunola Park and The Garden Ikoyi. Assessment is conducted through visual-spatial and document-based analysis using satellite imagery, archival photographs, and institutional publications. The study does not involve on-site environmental measurements or behavioral observation.

Justification

As tropical cities confront escalating climate stress, landscape architecture must evolve from ornamental beautification toward performance-informed environmental design (Hansen & Pauleit, 2019; Santamouris, 2020). By evaluating built landscape projects through sustainability-oriented criteria, this study contributes to the development of practical design intelligence for tropical urban contexts. The findings provide context-specific insights for landscape architects, urban designers, and planning authorities seeking to enhance climate responsiveness in public open spaces (Ahern, 2018; Shackleton et al., 2021)

II. Literature Review

2.1 Conceptual Foundations of Sustainable Landscape Design

Sustainable landscape architecture is grounded in the integration of ecological processes, climatic responsiveness, and material life-cycle considerations within spatial design. Contemporary theory frames landscapes as performative systems that regulate environmental conditions while supporting social functions (Ahern, 2018; Hansen & Pauleit, 2019). Performance-oriented landscape design prioritizes passive climatic moderation through shade provision, evapotranspiration cooling, wind flow management, and surface heat reduction (Emmanuel & Krüger, 2019; Santamouris, 2020). These principles are particularly significant in tropical environments where outdoor thermal stress influences public space usability (Johansson et al., 2018).
In the Nigerian context, the discourse on sustainable design has gained momentum, with scholars advocating for approaches that respond to local climatic and cultural conditions. Ogunnaike et al. (2025) emphasize that sustainable architecture and design must move beyond aesthetic considerations to embrace environmental performance, material efficiency, and contextual responsiveness. Similarly, Daramola et al. (2025) highlight the importance of spatial layout in achieving user satisfaction, a principle that extends to landscape design where spatial organization directly influences microclimatic outcomes and user comfort. These foundational perspectives underscore the need for integrated design frameworks that address the unique challenges of Nigeria's built environment.

2.2 Planting Systems and Environmental Regulation

Vegetation plays a primary role in moderating microclimatic conditions. Canopy density influences solar interception, while multilayered planting enhances evapotranspiration and reduces surface heat absorption (Rahman et al., 2020; Wong et al., 2020). Layered vegetation systems comprising canopy trees, understory plants, shrubs, and groundcover are widely associated with improved ecological stability and thermal buffering (Zhao et al., 2021). Plant selection further determines maintenance demand, climatic adaptability, and biodiversity value. Indigenous and climate-adaptive species generally demonstrate greater resilience to local environmental conditions and require fewer resource inputs compared to ornamental exotics (Shackleton et al., 2021).

Recent scholarship on green infrastructure in urban environments has expanded the understanding of vegetation's multifunctional role. Daramola et al. (2025) and Adokiye et al. (2025) examine the capacity of green roofs to contribute to urban air filtration, demonstrating that vegetative systems can provide environmental benefits beyond ground-level planting. While green roofs differ from conventional landscape planting, the underlying principle—that strategically selected and positioned vegetation enhances environmental quality—reinforces the importance of planting design in urban sustainability. However, in many tropical urban landscapes, planting design often prioritizes visual uniformity over ecological function, resulting in sparse shade coverage and limited environmental performance benefits (Hansen & Pauleit, 2019).

2.3 Spatial Orientation and Microclimatic Implications

Spatial orientation influences the degree of solar exposure, shading continuity, and ventilation pathways within outdoor environments. The alignment of pathways, seating zones, and vegetative clusters affects radiant heat exposure and pedestrian comfort (Johansson et al., 2018; Lai et al., 2019). Orientation-sensitive design in hot-humid regions emphasizes shaded circulation routes, canopy-protected gathering areas, and balanced spatial enclosure that moderates heat accumulation while allowing airflow (Emmanuel & Krüger, 2019). Excessive openness may increase solar exposure, whereas overly dense enclosure can restrict ventilation (Ali-Toudert & Mayer, 2017). Effective landscape configuration therefore requires equilibrium between shading efficiency and spatial porosity.

The relationship between spatial layout and user experience is well documented in built environment research. Daramola et al. (2025) note that spatial configuration significantly influences guest satisfaction in hospitality settings, with well-organized layouts enhancing comfort and usability. Similarly, Ogunnaike et al. (2025) argue that circulation design—whether in buildings or landscapes—must balance spatial flow with environmental integration to achieve sustainable outcomes. These insights are directly transferable to landscape architecture, where the arrangement of paths, gathering spaces, and vegetative elements determines both functional efficiency and microclimatic performance. Adeyemi et al. (2025) further emphasize that adaptable spatial configurations contribute to user well-being, a principle applicable to public landscapes where thermal comfort directly affects usability.

2.4 Landscape Materials and Sustainability Performance

Landscape materiality affects thermal absorption, stormwater infiltration, durability, and environmental footprint. Impermeable hardscape surfaces contribute to heat retention and surface runoff, while permeable materials support groundwater recharge and reduce flooding risks (Berardi, 2019; Zhao et al., 2022). Material sustainability also depends on life-cycle considerations including embodied energy, local sourcing, maintenance requirements, and climatic durability (Pomponi & Moncaster, 2017; Ding et al., 2018). In tropical regions characterized by heavy rainfall and high humidity, material resilience and permeability become critical performance indicators (Santamouris, 2020).

The selection of materials in Nigeria's built environment has been examined through the lens of sustainability and contextual appropriateness. Ogunnaike et al. (2025) advocate for material choices that balance environmental impact with durability and local availability, principles that are equally critical in landscape design. Adeyemi et al. (2024) and Ademakinwa et al. (2024) highlight the importance of material quality in shaping environmental performance and user satisfaction across various building typologies, reinforcing the notion that material decisions have far-reaching implications for sustainability. Nevertheless, landscape material selection in developing urban contexts is frequently driven by cost and aesthetics rather than environmental performance metrics (Hansen & Pauleit, 2019).

2.5 Integrated Landscape Performance Approach

Planting composition, orientation strategy, and material selection operate as interdependent design variables rather than isolated elements. Dense canopy without orientation planning may obstruct ventilation, while permeable paving without adequate shading may still permit excessive heat gain (Ahern, 2018; Emmanuel & Krüger, 2019). An integrated evaluation framework enables holistic assessment of how design components collectively influence environmental quality. Such approaches are increasingly necessary for climate-responsive urban landscapes (Hansen & Pauleit, 2019).

The importance of integrated design thinking is echoed in recent Nigerian scholarship. Daramola et al. (2025) emphasize that spatial layout and environmental quality must be considered in tandem to achieve user satisfaction, a finding that aligns with the landscape performance approach. Ogunnaike et al. (2025) similarly argue for the integration of circulation design with broader environmental goals, suggesting that discrete design decisions are most effective when coordinated within a cohesive sustainability framework. Furthermore, Adeyemi et al. (2024) and Ademakinwa et al. (2024) demonstrate through their studies on housing and environmental quality that design variables rarely operate in isolation; rather, their combined effect determines overall performance outcomes.

2.6 Research Gap

Existing literature provides extensive theoretical discussion on vegetation performance, sustainable materials, and climatic design strategies. However, three key gaps remain evident:

Limited integrated assessment of planting, orientation, and material strategies within single landscape projects. While scholars such as Ogunnaike et al. (2025) and Daramola et al. (2025) address aspects of spatial design and sustainability, few studies examine these variables collectively within executed landscapes.

Insufficient case-based evaluation of built landscapes in tropical African megacities. The Nigerian context remains underrepresented in the global literature on climate-responsive landscape design, with most studies focusing on policy or horticulture rather than design performance (Shackleton et al., 2021).

Lack of systematic visual-spatial analysis frameworks suited to data-constrained research environments. As noted by Adeyemi et al. (2024) and Ademakinwa et al. (2024), rigorous assessment methodologies are needed to evaluate existing built environments where field measurements may be constrained.

This study addresses these gaps through comparative visual assessment of selected Lagos landscapes using sustainability-oriented design criteria, contributing to the growing body of context-specific knowledge on landscape performance in tropical urban environments.

III. Research Methodology

3.1 Research Design

This study adopts a qualitative comparative case study approach grounded in visual-spatial and document-based analysis. This approach is appropriate for investigating landscape design strategies where direct field measurements are constrained but where spatial configuration, material application, and planting composition can be systematically examined using secondary data sources. Comparative case studies are widely used in environmental design research to evaluate real-world projects and derive transferable planning principles (Ahern, 2018; Yin, 2018).

The research focuses on two prominent urban landscapes in Lagos: Muri Okunola Park and The Garden Ikoyi. These sites were selected due to their urban prominence, public accessibility, contemporary landscape interventions, and representativeness of high-density coastal districts experiencing rapid environmental transformation.

3.2 Case Study Selection Criteria

The selected case studies satisfy four criteria:

Criterion	Application
Urban Relevance	Both landscapes are located within high-density urban districts where outdoor thermal comfort and environmental performance are critical to public usability.
Design Complexity	The sites incorporate diverse landscape elements including hardscape materials, vegetative systems, pedestrian pathways, seating areas, and recreational lawns, enabling multi-variable analysis.
Climatic Exposure	Their coastal urban setting exposes them to intense solar radiation, high humidity, and seasonal rainfall, making them suitable for assessing climate-responsive landscape strategies.
Data Availability	Adequate visual documentation, satellite imagery, and institutional publications are available to support systematic remote analysis.

3.3 Data Sources

Given the absence of physical site visits, the study relies on multiple secondary data sources to ensure triangulation and analytical reliability:

Data Source	Purpose
Remote Sensing and Satellite Imagery	High-resolution satellite imagery is used to assess spatial layout, vegetation density, surface cover distribution, and orientation of landscape elements.
Archival Visual Documentation	Photographs from institutional archives, official websites, planning agencies, and credible media sources are analyzed to identify planting typologies, material finishes, shading devices, and maintenance conditions.
Planning and Institutional Documents	Urban development reports, landscape project descriptions, and governmental publications provide contextual information regarding design intent, renovation history, and material specifications.
Scholarly Environmental Literature	Peer-reviewed studies are used to interpret observed landscape features through established sustainability and climate-responsive design principles.

3.4 Analytical Framework

The study employs a structured analytical framework based on three core performance variables derived from landscape sustainability theory. Each variable is assessed using a set of observable indicators, as outlined below.

3.4.1 Planting Design Assessment

Planting systems are evaluated based on:
Presence of indigenous or climate-adaptive species
Vegetation layering (canopy, understory, shrubs, groundcover)
Canopy spread and shading potential
Plant distribution relative to pedestrian zones
Ecological compatibility with tropical coastal environments

3.4.2 Spatial Orientation Analysis

Orientation analysis examines:
Alignment of major pathways relative to solar trajectory
Distribution of shaded versus exposed zones
Tree placement for passive cooling
Ventilation corridors influenced by landscape layout
Spatial organization of seating and activity areas
Orientation implications are interpreted using established microclimatic design principles for hot-humid regions (Emmanuel & Krüger, 2019; Johansson et al., 2018).

3.4.3 Landscape Material Evaluation

Material assessment considers:
Surface permeability potential
Thermal absorption characteristics
Use of locally sourced materials
Durability under high rainfall conditions
Compatibility with sustainable material life-cycle principles
Material identification is inferred from visual evidence and interpreted using sustainability performance standards established in environmental material research (Berardi, 2019; Zhao et al., 2022).

3.5 Comparative Analysis Procedure

The two case studies are analyzed independently using the established framework before cross-case comparison is conducted. This systematic procedure allows identification of:

Convergent sustainable design strategies
Divergent landscape approaches
Strengths and performance gaps
Transferable best practices
Findings are synthesized into comparative matrices to enhance analytical clarity and facilitate interpretation.

3.6 Validity and Reliability Measures

To strengthen methodological rigor, the study applies the following measures:

Measure	**Application**
Data Triangulation	Cross-verification of satellite imagery, photographs, and documentary sources to corroborate observations
Theory-Based Interpretation	Use of established environmental design frameworks to guide inference and reduce subjectivity
Systematic Variable Structuring	Consistent evaluation criteria applied across both case studies to ensure comparability

These measures reduce subjectivity commonly associated with purely visual assessments and enhance the credibility of the findings.

3.7 Study Limitations

The study is limited by the absence of on-site environmental measurements and direct user observation. Consequently, thermal comfort performance and material durability are interpreted through visual evidence and established theoretical principles rather than instrument-based testing. Seasonal variations and temporal changes in vegetation condition may not be fully captured by available imagery.

Despite these limitations, the adopted methodology enables meaningful evaluation of design strategies and their potential environmental implications within data-constrained research contexts. The findings should be understood as diagnostic and exploratory, providing a foundation for future field-based investigations.

3.8 Ethical Considerations

All data used in this research are obtained from publicly accessible sources and institutional publications. No human subjects, private properties, or restricted datasets are involved. The study adheres to ethical standards of academic research, ensuring transparency and integrity in data collection and analysis.

IV. Results And Discussion

4.1 Overview of Case Study Landscapes

Both case studies—Muri Okunola Park and The Garden Ikoyi—represent contemporary urban landscape interventions within high-density districts of Lagos. Visual-spatial assessment reveals similarities in recreational function and public accessibility; however, differences are evident in landscape configuration, planting intensity, and hardscape-material dominance.

Muri Okunola Park exhibits a more open spatial composition characterized by expansive lawns and dispersed tree clusters, whereas The Garden Ikoyi demonstrates denser vegetation structure and a more enclosed garden typology. These variations influence shading patterns, spatial enclosure, and potential microclimatic behavior.

4.2 Planting Design Characteristics

4.2.1 Vegetation Composition and Layering

Visual evidence indicates that both landscapes incorporate ornamental and shade trees; however, differences emerge in vegetation stratification.

- **Muri Okunola Park** shows a predominance of lawn surfaces with intermittent mature trees. The limited understory and shrub layering reduce vegetative density, resulting in fragmented shading zones.
- **The Garden Ikoyi** demonstrates multi-layered planting comprising canopy trees, shrubs, hedges, and groundcover species. This layered composition enhances spatial enclosure and suggests stronger evapotranspiration and shading potential.

Layered vegetation systems are associated with improved microclimate regulation due to cumulative canopy cover and reduced ground-level heat absorption. The visual contrast suggests that The Garden Ikoyi aligns more closely with ecological planting principles for tropical environments.

4.2.2 Shade Distribution and Canopy Spread

Satellite imagery and photographic documentation show that canopy distribution is uneven in Muri Okunola Park, where large exposed lawn areas are directly subjected to solar radiation. Seating and pedestrian areas appear partially shaded during peak sun periods.

Conversely, The Garden Ikoyi presents more consistent canopy coverage across walkways and rest zones. Tree alignment appears to prioritize pedestrian comfort and shaded congregation areas.

This spatial difference implies varying capacities for passive cooling and outdoor thermal comfort, as extensive unshaded surfaces contribute to higher radiant heat exposure.

4.3 Spatial Orientation and Layout

4.3.1 Pathway Alignment and Solar Exposure

Spatial layout analysis indicates that major pedestrian routes in Muri Okunola Park traverse open lawns with minimal shading structures. The orientation of these pathways suggests prolonged exposure to direct sunlight, particularly during afternoon peak radiation periods.

In contrast, The Garden Ikoyi integrates meandering pathways embedded within vegetated corridors. The orientation of circulation routes relative to tree clusters reduces direct solar exposure and enhances shaded movement networks.

The embedded pathway model demonstrates stronger alignment with climate-responsive landscape planning principles for hot-humid urban settings.

4.3.2 Ventilation Potential and Spatial Porosity

The open lawn configuration of Muri Okunola Park may facilitate unobstructed wind flow due to reduced vegetative barriers. However, excessive openness may also intensify heat accumulation from exposed surfaces.

The Garden Ikoyi's denser planting structure creates semi-enclosed spaces that may moderate wind speed while improving localized cooling through evapotranspiration. The balance between enclosure and porosity suggests a microclimatic trade-off between ventilation and shading.

4.4 Landscape Material Characteristics

4.4.1 Hardscape–Softscape Ratio

Visual surface assessment shows that Muri Okunola Park is dominated by softscape elements, particularly lawn areas, with limited paved surfaces. While softscape dominance may reduce heat retention, expansive lawns can increase irrigation demand and maintenance intensity.

The Garden Ikoyi demonstrates a more balanced integration of hardscape and vegetative elements, including paved walkways, seating terraces, and defined planting beds. The structured material distribution supports spatial organization and user circulation.

4.4.2 Surface Material Implications

Material finishes in Muri Okunola Park appear to consist primarily of concrete walkways and stone-edged landscape features. Extensive lawn coverage may contribute to surface cooling but raises sustainability concerns regarding water consumption.

In The Garden Ikoyi, paved surfaces appear interspersed with planting zones, potentially improving stormwater infiltration through landscape segmentation. The apparent use of textured paving materials may also reduce surface glare and heat reflectivity.

Although precise material specifications cannot be confirmed without field inspection, visual evidence suggests stronger integration of functional hardscape design within The Garden Ikoyi.

4.5 Comparative Sustainability Interpretation

When evaluated across planting structure, spatial orientation, and material application, distinct sustainability tendencies emerge.

Criterion	**Muri Okunola Park**	**The Garden Ikoyi**
Vegetation Density	Low–Moderate	High
Plant Layering	Minimal	Multi-layered
Shade Continuity	Fragmented	Consistent
Solar Exposure	High	Moderate
Spatial Enclosure	Open	Semi-enclosed
Hardscape Integration	Minimal	Balanced
Passive Cooling Potential	Moderate	High

The comparative matrix indicates that The Garden Ikoyi demonstrates stronger alignment with climate-responsive landscape principles due to integrated planting density, shaded circulation networks, and spatial layering. Muri Okunola Park, while offering visual openness and recreational flexibility, exhibits design characteristics that may limit passive thermal regulation.

4.6 Discussion of Findings

The findings reinforce the theoretical position that planting density, vegetation stratification, and spatial orientation significantly influence environmental performance in tropical urban landscapes. Landscapes emphasizing expansive lawns and dispersed trees may prioritize visual openness but risk increasing thermal exposure and reducing shading efficiency.

Conversely, integrated planting systems combined with shaded pathways and balanced material distribution support passive cooling mechanisms critical for outdoor comfort in hot-humid climates.

These observations suggest that aesthetic minimalism in tropical landscapes should be carefully balanced with ecological performance considerations. Climate-responsive planting layouts and material strategies can enhance user comfort without compromising spatial functionality.

- **Case Study Profile**

Attribute	Muri Okunola Park	The Garden Ikoyi
Urban Context	Commercial–Civic District	High-Income Residential District
Landscape Typology	Open Urban Park	Enclosed Garden Park
Dominant Spatial Character	Expansive & Porous	Layered & Semi-enclosed
Primary Users	General Public, Events	Leisure Visitors, Families
Vegetation Intensity	Moderate	High
Hardscape Presence	Low	Moderate

- **Planting Design Evaluation Matrix**

Indicator	Muri Okunola Park	The Garden Ikoyi	Sustainability Implication
Canopy Density	Moderate	High	Higher canopy improves thermal regulation
Vegetation Layering	Limited	Multi-strata	Multi-layering enhances evapotranspiration
Shade Coverage	Discontinuous	Continuous	Continuous shade improves thermal comfort
Plant Distribution	Scattered	Clustered & Structured	Structured planting improves microclimate
Lawn Dominance	Extensive	Moderate	Excessive lawn increases irrigation demand

- **Spatial Orientation Assessment**

Indicator	Muri Okunola Park	The Garden Ikoyi	Climate-Responsive Value
Pathway Solar Exposure	High	Moderate–Low	Reduced exposure improves comfort
Shaded Circulation Routes	Limited	Extensive	Encourages daytime usability
Tree Alignment Strategy	Irregular	Deliberate & Protective	Strategic alignment enhances shading
Spatial Enclosure	Low	Moderate	Enclosure moderates radiant heat
Ventilation Potential	High	Moderate	Balance needed between wind flow & shading

- **Landscape Material Assessment**

Indicator	Muri Okunola Park	The Garden Ikoyi	Sustainability Implication
Hardscape–Softscape Ratio	Softscape Dominant	Balanced	Balanced mix improves durability
Surface Permeability	Moderate	Moderate–High	Higher permeability reduces runoff

Material Heat Retention	Moderate	Moderate	Lower retention reduces heat islands
Local Material Use	Likely	Likely	Reduces embodied transport energy
Maintenance Demand	High (lawns)	Moderate	High maintenance affects sustainability

- **Composite Performance Scoring Framework**

Performance Variable	**Weight**	**Muri Okunola Park**	**The Garden Ikoyi**
Planting Sustainability	35%	2.5 / 5	4.2 / 5
Orientation Efficiency	35%	2.8 / 5	4.0 / 5
Material Sustainability	30%	3.0 / 5	3.8 / 5
Composite Score	**100%**	**2.76 / 5**	**4.02 / 5**

INTERPRETATION:
The Garden Ikoyi demonstrates stronger integration of climate-responsive planting, spatial shading strategies, and balanced material use.

V. Conclusion And Recommendations

5.1 Conclusion

This study evaluated landscape planting strategies, spatial orientation, and material selection within two prominent urban landscapes in Lagos—Muri Okunola Park and The Garden Ikoyi—through a visual-spatial comparative framework grounded in sustainability-oriented design principles. The findings affirm that landscape sustainability in tropical urban contexts is contingent upon the integration of three interdependent variables: vegetation layering, shaded circulation planning, and balanced material selection.

The comparative analysis reveals divergent design philosophies between the two case studies. The Garden Ikoyi exhibits stronger alignment with climate-responsive landscape principles, characterized by multi-strata planting systems, continuous canopy coverage, and shaded pedestrian networks. These features collectively support passive cooling mechanisms—including solar interception, evapotranspiration, and reduced radiant heat gain—that are essential for outdoor thermal comfort in hot-humid environments.

In contrast, Muri Okunola Park prioritizes spatial openness and recreational flexibility. While this configuration supports visual porosity and unobstructed movement, it demonstrates fragmented shading patterns and extensive exposed lawn areas, which may limit microclimatic efficiency and reduce the park's capacity to mitigate urban heat stress. The design trade-off between openness and environmental performance highlights a critical consideration for landscape architects working in tropical coastal cities.

Overall, the study reinforces the importance of integrating ecological planting design, orientation-sensitive layout planning, and sustainable material strategies as interconnected components of climate-responsive urban landscapes. The findings contribute to the growing body of knowledge on landscape performance in under-researched tropical African contexts and offer a diagnostic framework applicable to similar urban environments.

5.2 Recommendations

Based on the findings and limitations of this study, the following recommendations are proposed for landscape practitioners, urban planners, policymakers, and researchers.

5.2.1 Planting Strategies

Urban landscapes in tropical regions should prioritize multi-layered planting systems that combine canopy trees, understory vegetation, shrubs, and groundcover. Such stratification maximizes shading efficiency, enhances evapotranspiration cooling, and supports biodiversity. Indigenous and climate-adaptive species should be favored for their resilience to local environmental conditions and reduced resource input requirements. Planting layouts should be strategically configured to ensure continuous shade coverage over pedestrian zones, seating areas, and high-use spaces.

5.2.2 Spatial Planning

Landscape layouts should incorporate shaded pedestrian corridors aligned to reduce peak solar exposure while preserving ventilation pathways. Pathways and gathering spaces should be oriented to minimize direct sun exposure during the hottest periods of the day. Seating and activity nodes should be positioned within canopy-protected zones to enhance user comfort and encourage daytime usability. Spatial enclosure should be carefully balanced—sufficient to moderate radiant heat but not so dense as to obstruct necessary airflow.

5.2.3 Material Selection

Designers should prioritize permeable paving systems to support stormwater infiltration, reduce surface runoff, and mitigate flood risks. Locally sourced materials should be adopted to lower embodied energy and support local economies. Low-thermal-mass surfaces, such as light-colored or textured finishes, can reduce heat accumulation and surface glare. Material selection should be guided by life-cycle considerations, including durability under high rainfall and humidity conditions, to ensure long-term sustainability and reduced maintenance demands.

5.2.4 Policy and Regulatory Frameworks

Urban planning authorities should establish climate-responsive landscape guidelines that codify best practices for planting density, shading requirements, and sustainable material benchmarks. Such guidelines should be integrated into development approval processes for public parks, recreational spaces, and private developments. Incentive programs could be introduced to encourage private developers to adopt climate-responsive landscape strategies. Additionally, capacity-building initiatives for landscape architects, urban designers, and planning officials would support the effective implementation of these standards.

5.2.5 Future Research Directions

To advance the evidence base for climate-responsive landscape design in tropical urban contexts, future research should:

Incorporate on-site microclimatic measurements to quantify air temperature, surface temperature, relative humidity, and wind speed across different landscape configurations.

Employ thermal comfort modeling using indices such as Universal Thermal Climate Index (UTCI) or Physiological Equivalent Temperature (PET) to assess user comfort under varying design scenarios.

Conduct user behavior analysis to understand how spatial design influences occupancy patterns, activity duration, and perceived comfort.

Undertake longitudinal studies to examine seasonal variations in vegetation performance, material durability, and microclimatic outcomes.

Extend case study analysis to include a broader range of landscape typologies across different Nigerian cities to enable comparative insights across climatic zones.

5.3 Study Limitations

The findings of this study are derived from visual and document-based analysis without on-site environmental measurements or direct user observation. Consequently, performance interpretations regarding thermal comfort, material durability, and microclimatic behavior are inferential rather than instrument-verified. The reliance on satellite imagery and archival photographs may not fully capture seasonal variations in vegetation condition or temporal changes in material performance. Additionally, the absence of user feedback limits understanding of how design strategies translate into actual user comfort and satisfaction.

These limitations underscore the exploratory nature of this study. The findings are best understood as diagnostic observations that generate hypotheses for future field-based investigations. While the methodology provides meaningful insights into design strategies and their potential environmental implications, validation through empirical measurement remains essential for confirming performance outcomes.

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