An Assessment of the Implementation of Sustainable Landscape Strategies in Selected Pentecostal Churches in Lagos-Ogun Megacity State.

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Abstract:

This study evaluates the implementation of sustainable landscape strategies in selected Pentecostal churches located in Lagos-Ogun megacity, with an emphasis on their capacity to minimize environmental impacts. Although the role of religious institutions in promoting sustainability is becoming more recognized, there is a significant lack of research on how these techniques are implemented in quickly expanding metropolitan areas. This study aims to assess the extent to which churches have incorporated sustainable practices into their surroundings. The study used a qualitative methodology that combines literature review and field observations to examine the implementation of diverse sustainable landscaping strategies in these churches. The findings reveal significant disparity in the commitment to and effectiveness of these practices among the churches studied. The results suggest that while some institutions are taking meaningful steps toward sustainability, others exhibit substantial gaps that could be addressed with more targeted efforts. The discussion highlights the broader implications of these findings, emphasizing the need for increased awareness, investment in sustainable infrastructure, and more comprehensive adoption of environmentally friendly practices. The study concludes that while progress has been made, there is considerable room for improvement, and these churches have the potential to play a more active role in environmental stewardship within their communities. This research contributes to the existing body of knowledge by providing insights into the current state of sustainability efforts in religious institutions and offering recommendations for enhancing these practices.

Keywords: **Sustainable landscape strategies, Pentecostal churches, Religious Institutions, Environmental impact, Sustainability, Environmental stewardship, Lagos-Ogun megacity**

1. Introduction

The sustainability of landscapes and landscape development has drawn more attention in more modern times, particularly following the endorsement of the concept of sustainable development by the Brundtland Commission in October 1987. This historic report laid the foundation for a global shift towards environmentally conscious practices and the integration of sustainability principles into various sectors, including landscape design and development [1]. [2] raised critical questions regarding the coexistence of sustainability and landscapes. The concept of sustainable landscapes was initially viewed as idealistic, given the inherent dynamism of landscapes over time and the unique imprint each generation of humans leaves on the environment. The historical evolution of the concept of landscape, originating as an artistic representation in the sixteenth century and transitioning into a means of observing and engaging with nature in the seventeenth century, prompted inquiries into the compatibility of sustainability with the dynamic nature of landscapes [3]. The arrangement of basic materials within landscapes plays a pivotal role in shaping not only the physical environment but also influencing how individuals interact with and perceive their surroundings [4].

Implementing sustainable landscapes in churches can significantly enhance these sacred spaces' environmental, social, and spiritual aspects by fostering environmental stewardship, creating a welcoming and inclusive environment, and promoting health and well-being [4]. However, incorporating sustainable landscape strategies into the design of a church must be carefully balanced with other design factors to ensure harmony and functionality. This balance ensures that sustainability complements architectural style, cultural values,

and functional requirements while considering budgetary constraints and local site conditions.

While research exists on sustainable architectural practices and landscape practices broadly [4], [5], [6], there has been limited specific investigation into implementing sustainable landscape design in the complex, specialized content of church architecture. This is particularly evident in places with different climatic and cultural characteristics, such as Lagos, Nigeria. Lagos offers a unique context for combining cultural preservation with ecological design in churches since it has the highest number of churches in Nigeria [7]. Nigerian churches have a significant potential to spearhead sustainable architecture by implementing sustainable landscape design, which can serve as a model for environmental stewardship, enhance the worship experience, and promote community well-being but the integration of sustainable landscape design has contextual challenges associated with technical feasibility, costs, limitations in knowledge, and the need to strike a balance between preservation and innovation [5]. Adopting tailored strategies for sustainable landscape design in Nigerian churches may serve as prototypes for the country to foster environmental stewardship, community well-being, and ecological resilience through its architecture [8].

Therefore, this study aims to assess the implementation of sustainable landscape strategies in selected Pentecostal churches in Lagos, Nigeria, to inform sustainable and environmentally responsible design practices in religious architecture in the Nigerian context. Lagos, being Nigeria's most populous city hosts many Pentecostal churches which will be relevant to the study. To address the aim of the study, the following research objectives were formulated:

- To identify suitable sustainable landscape design strategies for Pentecostal churches in the study area.
- To evaluate the current adoption of sustainable landscape design strategies amongst the selected Pentecostal churches in the study area.

This study is meticulously justified on multiple grounds. Firstly, it aligns seamlessly with the Sustainable Development Goals (SDGs), acting as a catalyst for global commitments. It promotes SDG 7 by pushing for the use of renewable energy sources and energy-efficient practices, therefore lessening dependence on non-renewable energy and reducing greenhouse gas emissions. It supports SDG 11 by improving public spaces to become more resilient, inclusive, and pleasant for communities, thereby promoting sustainable cities. The study also promotes SDG 12 via the use of locally sourced, eco-friendly materials, supporting responsible consumption and production. Finally, it addresses SDG 13 by employing strategies that reduce the effects of climate change, promote biodiversity, and improve water management, hence fostering climate resilience and adaptation. By examining and advocating for these practices, the study helps to a more sustainable and ecologically conscious society. Furthermore, adopting sustainable landscape strategies can serve as a model for environmental stewardship within the community, inspiring other institutions and individuals to pursue greener practices. Lastly, the study emphasizes local contextualization, designing sustainable landscape solutions to meet the specific needs of Pentecostal churches within Lagos State's unique climatic and cultural setting. In summary, this study incorporates a comprehensive strategy that intertwines global sustainability goals with the development of religious spaces, envisioning a transformative impact on church architecture and community engagement.

2. Literature Review

2.1 Concepts of Sustainability in Landscapes

According to the renowned landscape architect Ian McHarg, it is crucial for us to acknowledge that nature possesses exceptional intelligence, power, and beauty, while humans are merely a constituent of this vibrant and dynamic environment [9]. This perspective forms the foundation of sustainability in landscape design, which involves creating outdoor spaces that are ecologically responsible, economically viable, and socially beneficial. These seek to achieve a natural balance between the needs of human beings and the conservation of natural ecosystems, so guaranteeing that landscapes will maintain their ability to withstand and function effectively for the benefit of future generations. Sustainable landscape design encompasses more than just visual appeal; it necessitates meticulous strategizing and oversight to preserve environmental health while creating settings that promote human welfare. Conservation of resources is a fundamental principle in sustainable landscape design. This encompasses the effective utilization of water, energy, and materials [10]. Implementing strategies like as rainwater harvesting, utilizing indigenous plants that demand minimal watering, and opting for materials with a low carbon footprint are essential for attaining sustainability. In addition, sustainable landscapes promote biodiversity by integrating a diverse range of plant and animal species, especially indigenous flora that are well-suited to the local environment [11]. This not only promotes ecological equilibrium but also boosts the landscape's ability to withstand pests and illnesses.

Soil health is a fundamental aspect of sustainable landscapes. Practices like composting, mulching, and avoiding chemical-based fertilizers help maintain soil fertility and structure, which in turn supports plant health and water retention [10]. Efficient water management is also vital, with technologies like site drainage, permeable pavements, and rain gardens helping to control stormwater, minimize runoff, and replenish groundwater [12]. These measures minimize the impact on local water supplies and lessen the likelihood of flooding.

Energy efficiency is integral to sustainable landscape design. Incorporating energy-efficient lighting, such as solar-powered fixtures and LED lights, minimizes energy usage [12]. Additionally, the judicious placement of trees and plants can naturally minimize the demand for artificial heating and cooling by providing shade and functioning as windbreaks. Waste reduction is another significant component, with actions like recycling, composting, and the reuse of materials lowering the environmental impact and supporting the responsible use of resources [10].

Sustainable landscapes are also planned with human well-

being and social interaction in mind. By offering spaces for entertainment, relaxation, and community interaction, these landscapes increase quality of life [13]. Features like outdoor dining areas, walking routes, and community gardens inspire people to connect with nature and each other, establishing a sense of community. Moreover, as climate change impacts grow more evident, sustainable landscapes are planned to be robust, with plants and features that can resist extreme weather conditions and adapt to changing surroundings [13].

The benefits of sustainable landscape design are wide-ranging. Environmentally, these landscapes help maintain and restore ecosystems, reduce greenhouse gas emissions, and conserve water and other resources [12]. Economically, they can cut long-term maintenance costs, enhance property prices, and attract investment by enhancing the visual and functional attractiveness of a site. Socially, sustainable landscapes increase quality of life by offering spaces that encourage physical and mental health, recreation, and social cohesion [13].

2.2. Dynamics of Spiritual Landscape- Church Architecture

Ethnographic studies have shown a universal belief in the interconnectedness of the human world with supernatural or spiritual realms, leading to the emergence of the concept of spiritual landscapes or sacred geography [14]. These spiritual landscapes encompass various significant places such as powerful sites, water bodies, and mountains, emphasizing the profound connection between spirituality and specific locations within the natural landscape [15]. It is important to note that spiritual landscapes are not limited to religious sites but can also include places like burial grounds that hold deep spiritual significance [14]. The engagement with spiritual landscapes can occur through ritual practices or as part of everyday life, reflecting the deep-rooted connection between individuals, communities, and the spiritual dimensions present in ancient and tribal environments [4].

Christianity's understanding of sacred places and ancestor worship further underscores the recognition of spiritual elements within various landscapes, highlighting the role of spirituality in shaping individual and communal experiences [15]. These spiritual environments act as vital links between the physical world and the spiritual realm, influencing perceptions, practices, and interactions within the landscape [14].

In conclusion, the effects of spiritual environments on the natural landscape are profound, shaping not only the physical surroundings but also individual beliefs, practices, and communal experiences. The concept of spiritual landscapes bridges the gap between the tangible world and the intangible spiritual dimensions, emphasizing the significance of specific locations within the natural environment in various cultural and religious contexts.

2.3. Sustainable Landscape Design Strategies

As the world deals with the increasing challenges posed by climate change and environmental degradation, the requirement for sustainable practices across all sectors of society has become more apparent [16]. As integral community institutions, Pentecostal churches carry a responsibility in this regard and must implement sustainable landscape techniques to lessen their environmental imprint and develop ecological stewardship among their members [17]. By implementing measures such as water conservation, energy efficiency, and the utilization of native plants, Pentecostal churches can not only reduce their environmental impact but also serve as role models of environmental responsibility [18].

In the context of Pentecostal churches, fostering stewardship not only entails individual activities but also necessitates communal efforts within the community. Engaging in stewardship networks and developing cooperation among many stakeholders may significantly increase the impact of environmental responsibility initiatives [17]. Additionally, understanding the unintended consequences of stewardship actions, beyond their immediate environmental impact, and ensuring equitable distribution of costs and benefits among different groups are essential considerations for effective environmental stewardship within Pentecostal churches [19].

The application of sustainable landscape strategies in Pentecostal churches is crucial for lowering their environmental impact and creating a culture of ecological care among congregants. By embracing environmental stewardship principles, collaborating with diverse stakeholders, and considering the broader implications of their actions [20], Pentecostal churches can contribute meaningfully to ecological sustainability and set an example for responsible environmental practices within their communities. The following are various sustainable landscape strategies that can be incorporated into Pentecostal Churches to mitigate their effect on the natural landscape.

2.3.1. The use of native plants in outdoor landscaping

Native plants are species that have naturally evolved in a particular region, making them well-suited to the local climate, soil, and ecological conditions. Using native plants in outdoor landscaping offers several benefits, including reduced water demand, lower maintenance needs, and increased support for local wildlife. Because these plants are adapted to the local environment, they require fewer chemical inputs such as fertilizers and pesticides, which can harm the surrounding ecosystem. Additionally, native plants can enhance the aesthetic and spiritual appeal of church grounds, creating a space that feels naturally connected to the environment.

2.3.2. Water conservation measures

Water conservation is critical in sustainable landscape management, especially in regions facing water scarcity. Efficient irrigation systems, such as drip irrigation, soaker hoses, or smart irrigation controllers, deliver water directly to the root zones of plants, minimizing waste and evaporation [21]. These systems can be programmed to water during cooler parts of the day or in response to soil moisture levels, ensuring that plants receive only the water they need. Implementing these measures in Pentecostal churches helps conserve water, reduces utility costs, and demonstrates a commitment to responsible resource management.

2.3.3. The Use of Hardscape Permeable Materials

Hardscape features such as walkways, parking lots, and patios are integral to church landscapes, but traditional materials like concrete can contribute to runoff and flooding [22]. Permeable

materials, such as permeable pavers, gravel, or porous concrete, allow water to infiltrate through the surface, reducing runoff and promoting groundwater recharge [23]. This approach helps manage stormwater, prevents erosion, and reduces the strain on municipal drainage systems. Incorporating permeable hardscapes into church grounds not only addresses environmental concerns but also enhances the usability and aesthetic appeal of outdoor spaces.

2.3.4. The Presence of Outdoor Seating Areas

Creating outdoor seating areas or recreational zones provides spaces for congregation members to gather, reflect, and engage in fellowship outside the church building. These areas can be designed to blend harmoniously with the surrounding landscape, offering shaded spots under trees, views of gardens, or spaces for quiet meditation. By incorporating sustainable materials and designs, these zones can become vibrant extensions of the church's mission, fostering a sense of community and providing opportunities for outdoor worship, events, or casual interaction. Moreover, well-designed outdoor spaces can enhance the overall spiritual experience, offering a serene environment that encourages contemplation and connection with nature.

2.3.5. Energy-Efficient Lighting

Lighting is a crucial aspect of church environments, both for safety and ambience. However, traditional lighting systems can consume significant amounts of energy, contributing to higher utility costs and environmental impact [24]. Energy-efficient lighting, such as LED bulbs, solar-powered lights, or motion-sensor lighting, provides a sustainable alternative. These options use less energy, have longer lifespans, and reduce greenhouse gas emissions. Implementing energy-efficient lighting within and outside the church not only lowers energy costs but also aligns with the church's broader mission of stewardship and care for creation. Additionally, thoughtful lighting design can enhance the visual appeal of church buildings and landscapes, creating a welcoming atmosphere for evening services and events.

2.3.6. Sense of Responsibility Towards Maintenance

Landscapes require ongoing care to maintain their effectiveness and aesthetic value. A sense of responsibility towards maintenance involves regular upkeep of gardens, irrigation systems, lighting, and hardscapes to ensure they continue to function efficiently and sustainably. This responsibility can be shared among church members, fostering a sense of ownership and community involvement. By engaging the congregation in maintenance efforts, the church not only sustains its green initiatives but also educates its members on the importance of environmental stewardship. Regular maintenance also prevents issues such as overgrowth, system failures, or deterioration, ensuring that the church grounds remain beautiful, functional, and welcoming for all who visit.

3. MATERIALS AND METHODS

This study focused on the assessment of the use of sustainable landscape design strategies in order to explore how these religious institutions are integrating environmentally sustainable practices into their landscape designs, therefore, the qualitative research method was adopted for this study. An observation guide was used to assess the extent to which the sustainable landscape design strategies were used in the selected Pentecostal churches.

The study area for the research is the Lagos-Ogun megacity. This is one of the largest and fastest-growing urban areas in Nigeria. The Lagos-Ogun megacity is one of the fastest-growing urban areas in Africa, with significant population growth and rapid urbanization. This rapid expansion has led to increased pressure on natural resources, higher levels of pollution, and the degradation of green spaces. As a result, there is an urgent need for sustainable landscape practices to mitigate these environmental impacts, making it a relevant and pressing area of study. The Lagos-Ogun megacity region comprises parts of Lagos State and Ogun State, two of Nigeria's southwestern states. This megacity is a sprawling urban and peri-urban area that has emerged due to the rapid expansion and confluence of metropolitan Lagos and adjoining parts of Ogun State. The study area was chosen based on the sheer number of prominent mega-churches situated there. The study selection criteria employed purposive sampling. First and foremost, the church must have a capacity exceeding 7000. Furthermore, the construction of the building must be specifically designed to serve as a church. The timeliness of the construction of the church building was also taken into account. Examining the most recent construction methods and technology utilized by the designers will reveal the extent to which they adhere to sustainable practices.

The observation guide focused on the sustainable landscape strategies obtained from literature to keep the study focused on the key strategies, to correctly identify the existence of those specific methods. The findings were evaluated using descriptive analysis and conclusions were drawn to assess the extent to which the selected Pentecostal churches used the sustainable landscape strategies mentioned in literature. Afterwards, the church building with the most adapted sustainable landscape strategies was picked for more in-depth examination. The in-depth investigation is confined to the actual observations and physical assessments feasible on-site. A digital camera was used to capture images of existing characteristics in the selected Pentecostal churches. The data were presented utilizing words, tables and plates for clarity and easy interpretation.

TABLE I
THE SAMPLING FRAME OF PENTECOSTAL CHURCHES ABOVE 7000 SEATING CAPACITY IN LAGOS AND OGUN STATE, NIGERIA

SN	Church	Capacity	Location
1.	Faith Tabernacle	50,000	10, Idiroko Road, Ota Ogun State, Nigeria.
2.	Deeper Christian Life Ministry	30,000	2 – 10 Ayodele Oke-Owo Street, Gbagada, Lagos, Nigeria.
3.	Christ Embassy Believer's Love	20,000	8 Billings Way, Oregun, Ikeja 101233, Lagos, Nigeria
4.	The Synagogue Church of all nations	15,000	1 Prophet T.B Joshua St, Egbe Rd, Alimosho, Lagos, Nigeria

5.	House on the Rock HQ	10,000	Ikate-Elegushi, Lekki, Lagos Lagos
6.	The Redeemed Evangelical Mission	10,000	Gbagada Express Way, Gbagada, Lagos, Nigeria.
7.	National Temple, Apostolic church	10,000	Olorunda, Ketu, Lagos.
8.	Fountain of Life Church	8,0000	12 Industrial Estate Road, off Town Planning Way, Ilupeju, Lagos.

TABLE 2
THE SAMPLING FRAME OF ALL SELECTED CULTURAL CENTRES IN LAGOS, NIGERIA

SN	Church	Capacity	Location
1.	Faith Tabernacle	50,000	10, Idiroko Road, Ota Ogun State, Nigeria.
2.	House on the Rock HQ	10,000	Ikate-Elegushi, Lekki, Lagos.
3.	Fountain of Life Church	8,0000	12 Industrial Estate Road, off Town Planning Way, Ilupeju, Lagos.
4.	Deeper Christian Life Ministry	30,000	2 – 10 Ayodele Oke-Owo Street, Gbagada, Lagos, Nigeria.

4. RESULTS AND DISCUSSION

This study examined the sustainable landscape strategies utilized in the selected Pentecostal churches, and the findings are delineated in the subsequent subsections.

4.1. Description and Building Characteristics of the Selected Pentecostal Churches

4.1.1. Faith Tabernacle, Canaan Land, Ogun State

Faith Tabernacle, the headquarters of the Living Faith Church Worldwide, is a massive Pentecostal church located in Canaanland, at kilometer 10 on Idiroko Road, Ota, Ogun State. Covering an area of approximately 23,000 square meters, the church can accommodate more than 50,000 worshippers. The building is designed with three wings, each connected at a central point, and includes a gallery level. This unique architectural layout, with its three-armed spread, enhances the building's ability to efficiently utilize natural energy resources. Figure 1 provides an aerial view of Faith Tabernacle.

Figure 1. Aerial shot of the Faith Tabernacle (Source: Google)

4.1.2. House on the Rock (The Rock Cathedral)

The Rock Cathedral is a versatile church complex that serves as the headquarters for The Rock Foundation and is also home to House on the Rock. The pentagon-shaped building covers a 7,000-square-meter area and includes spaces for worship, education, healthcare, and various other community initiatives. The main auditorium is designed to hold up to 10,000 people across its five floors. Plate 1 provides a view of the cathedral's front façade.

Plate 1. Exterior view of the House on the Rock

4.1.3. Fountain of Life Church

The construction of The Fountain of Life Church's 8,000-seat auditorium began in 2004 and was completed in June 2014. The building covers approximately 4,500 square meters and includes various supporting facilities for worship, education, healthcare, and community development. The structure is rectangular and extends across six floors. The auditorium relies almost entirely on artificial lighting and cooling, with minimal use of natural resources. Plate 2 shows a view of the façade of the Fountain of Life church.

Plate 2. Image showing the façade of the Fountain of life church.

4.1.4. Deeper Christian Life Ministry

Deeper Life Bible Church, a Pentecostal Christian denomination, has its global headquarters, Deeper Christian Life Ministry HQ, situated in Gbagada, Lagos. The building is uniquely designed in a semi-circular form, with varying depths across its sectors. The main auditorium has a seating capacity of 30,000, while the basement accommodates a children's church for 7,500. The structure stands at a height of approximately 16 to 20 meters, covering three gallery levels with a total area of around 7,500 square meters. Figure 2 presents an aerial view of the church.

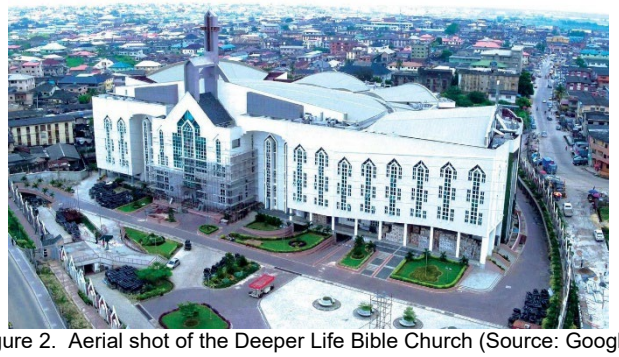
Figure 2. Aerial shot of the Deeper Life Bible Church (Source: Google)

Table 3, 4, 5 and 6 show the selected Pentecostal churches and their building characteristics.

TABLE 3
FAITH TABERNACLE AND ITS BUILDING CHARACTERISTICS

SN	Building Characteristics	Faith Tabernacle
1.	Building Orientation	The building has a non-linear shape, featuring three wings oriented in different directions.
2.	Building Shape	A central hexagonal structure with three extending wings.
3.	Capacity	50,000
4.	Number of Floors	2 floors
5.	Year built	1999
6.	External Wall Finishing	Stone cladding / Ceramic wall tiles
7.	Floor Construction materials	Reinforced concrete floor with Terrazzo finish
8.	Wall Construction materials	Hollow Sand-Crete blocks and reinforced concrete floor

TABLE 4
THE ROCK CATHEDRAL AND ITS BUILDING CHARACTERISTICS

SN	Building Characteristics	The Rock Cathedral
1.	Building Orientation	The non-linear shape prevents any dominant alignment.
2.	Building Shape	A square shape with one corner cut off, forming a pentagon.
3.	Capacity	10,000
4.	Number of Floors	5 floors
5.	Year built	2013
6.	External Wall Finishing	Paint in a light shade combined with stone cladding
7.	Floor Construction materials	Reinforced concrete floor with marble tiles
8.	Wall Construction materials	Hollow Sand-Crete blocks and reinforced concrete floor

TABLE 5
FOUNTAIN OF LIFE CHURCH AND ITS BUILDING CHARACTERISTICS

SN	Building Characteristics	Fountain of Life church
1.	Building Orientation	Orientation with the longer sides positioned toward the east and west.
2.	Building Shape	Rectilinear form
3.	Capacity	8,000
4.	Number of Floors	5 floors
5.	Year built	2014
6.	External Wall Finishing	Paint in a light shade combined with aluco board cladding
7.	Floor Construction materials	Reinforced concrete floor with marble tiles
8.	Wall Construction materials	Hollow Sand-Crete blocks and reinforced concrete floor

TABLE 6
DEEPER LIFE BIBLE CHURCH AND ITS BUILDING CHARACTERISTICS

SN	Building Characteristics	Fountain of Life church
1.	Building Orientation	Orientation with the longer sides positioned toward the east and west.
2.	Building Shape	Dome-shaped structure featuring multiple protruding sections.
3.	Capacity	30,000
4.	Number of Floors	6 floors
5.	Year built	2018
6.	External Wall Finishing	Paint in a light shade combined with aluco board cladding
7.	Floor Construction materials	Reinforced concrete floor with marble tiles
8.	Wall Construction materials	Hollow Sand-Crete blocks and reinforced concrete floor

4.2. Appraisal Of Sustainable Landscape Strategies

Table 7. presents a detailed comparative evaluation of the implementation of sustainable landscape strategies across four prominent Pentecostal churches: Faith Tabernacle, The Rock Cathedral, Fountain of Life Church, and Deeper Life Bible Church. These churches, each serving large congregations within the Lagos-Ogun megacity, have been assessed based on their adherence to seven critical sustainable landscape strategies, which are essential in mitigating the environmental impacts associated with large religious institutions. The strategies evaluated include the use of native plants in outdoor landscaping, which is vital for promoting local biodiversity and reducing the need for excessive irrigation; water conservation measures, such as efficient irrigation systems that minimize water wastage and optimize the use of this crucial resource; the use of hardscape permeable materials, which facilitate natural water infiltration and reduce surface runoff, thereby mitigating the risk of flooding and erosion; the presence of outdoor seating areas or recreational zones, which enhance community engagement while also providing green spaces that contribute to environmental health; the presence of energy-efficient lighting within and outside the church, a key factor in reducing the overall energy consumption and carbon footprint of these institutions; a demonstrated sense of responsibility towards maintenance, which ensures the longevity and effectiveness of these sustainable practices; and the presence of green roofs, a strategy that, while highly beneficial, is often underutilized in many architectural designs.

Plate 3. Image showing the exterior façade, the pavements and green areas of the Deeper Christian Life church.

Plate 4. Image showing the permeable paved walkway around the Faith Tabernacle

Plate 5. Image showing the green area serving as a buffer zone between the hardscape area and the building

Each church was scored on a scale from 1 to 4 for each of these strategies, where a score of 1 indicates that the strategy is not available, 2 denotes inadequate implementation, 3 represents moderate implementation, and 4 signifies adequate implementation

TABLE 7
UTILIZATION OF SUSTAINABLE LANDSCAPE STRATEGIES IN SELECTED PENTECOSTAL CHURCHES

Sustainable Landscape Strategies	Faith Tabernacle	The Rock Cathedral	Fountain Of Life Church	Deeper Life Bible Church
The use of native plants	4	3	2	3
Water conservation measures	3	3	2	3
The use of hardscape permeable materials	3	3	3	3
The presence of outdoor seating areas or recreational zones	4	2	2	3
Presence of energy-efficient lighting	4	3	3	3
Sense of responsibility towards maintenance	4	4	3	3
Presence of Green roofs	1	1	1	1
TOTAL	23	19	16	19

Faith Tabernacle emerges as the leader in this evaluation, achieving the highest overall score of 23 out of a possible 28. This score reflects the church's strong commitment to sustainability across most of the assessed strategies. Faith Tabernacle's high ratings, particularly in the use of native plants, outdoor seating, and energy-efficient lighting, indicate a comprehensive approach to integrating sustainability into both the landscape and operational aspects of the church. This suggests that Faith Tabernacle has not only recognized the importance of these strategies but has also taken significant steps to ensure their effective implementation, making it a model for other religious institutions in the region. The Rock Cathedral and Deeper Life Bible Church both achieved a total score of 19, indicating a moderate level of implementation across the board. These scores suggest that while both churches have made efforts to incorporate sustainable practices, there are still areas where improvements could be made. For instance, their moderate scores in areas like water conservation and the use of native plants indicate that these churches have adopted some sustainable practices but have not yet fully optimized their potential. The consistent scores across these two churches also suggest a shared approach or similar challenges in implementing these strategies, possibly due to factors such as financial constraints, site limitations, or varying levels of awareness and prioritization of sustainability within their leadership. Fountain of Life Church, with the lowest total score of 16, reflects significant gaps in its implementation of sustainable landscape strategies. The church's scores reveal inadequacies in several key areas, particularly in the use of native plants and water conservation measures, which are fundamental to any sustainable landscape design. The lower scores may indicate either a lack of resources dedicated to sustainability or a need for greater awareness and education on the importance and benefits of these strategies. The church's minimal provision of outdoor seating and recreational zones also suggests that there may be missed opportunities for enhancing community engagement through the creation of environmentally friendly and socially inclusive spaces. impact and demonstrate leadership in sustainability.

4.3. Discussion

The assessment reveals that while there is a general awareness of the importance of sustainable landscape strategies among these churches, the extent of their implementation varies considerably. Faith Tabernacle emerges as the leader in this regard, with the highest overall score, reflecting a strong commitment to sustainability across multiple dimensions. This church's high scores in the use of native plants, outdoor seating areas, and energy-efficient lighting indicate a comprehensive approach to integrating sustainability into the church's landscape and operational aspects. Faith Tabernacle's efforts demonstrate that large religious institutions can prioritize environmental stewardship without compromising on their spaces' functionality or aesthetic appeal. This serves as a model for other churches, highlighting the potential benefits of adopting a holistic approach to sustainability.

In contrast, The Rock Cathedral and Deeper Life Bible Church both display a moderate implementation level, scoring 19 out of 28. Their balanced but moderate scores across most categories suggest that these churches have made initial strides towards sustainability but have yet to fully optimize their potential. This may be due to a variety of factors, including financial constraints, limited resources, or perhaps a more gradual approach to integrating sustainable practices. However, their moderate implementation of strategies like water conservation and the use of native plants indicates room for improvement. These churches could benefit from increased investment in sustainable infrastructure and a more deliberate focus on expanding their green initiatives. By building on their current efforts, The Rock Cathedral and Deeper Life Bible Church have the opportunity to elevate their sustainability practices and further reduce their environmental footprint.

Fountain of Life Church's lower overall score of 16 highlights significant gaps in its sustainable landscape strategies, particularly in areas crucial for environmental sustainability such as water conservation, the use of native plants, and the provision of outdoor seating and recreational zones. The inadequacies in these areas suggest that sustainability may not be a top priority for the church, or that it faces significant challenges in implementing these strategies. These challenges could stem from a lack of resources, insufficient knowledge or expertise in sustainable practices, or competing priorities that divert attention away from environmental initiatives. However, addressing these gaps presents a significant opportunity for improvement. By focusing on enhancing water conservation efforts, increasing the use of native plants, and developing outdoor spaces that foster community engagement and environmental stewardship, Fountain of Life Church could make substantial progress in aligning its operations with sustainable principles.

A particularly notable finding from the assessment is the uniformly low score for the presence of green roofs across all four churches. Despite the well-documented environmental benefits of green roofs—such as reducing urban heat islands, improving air quality, enhancing stormwater management, and providing additional green space—this strategy has not been adopted by any of the evaluated churches. The absence of green roofs points to a broader trend of underutilization of innovative sustainable strategies in these institutions. This may be due to a variety of factors, including perceived high costs, structural limitations, or a lack of awareness about the benefits and feasibility of green roofs. The consistent lack of green roofs suggests a significant missed opportunity for these churches to further enhance their sustainability efforts. Encouraging the adoption of green roofs, possibly through education, subsidies, or demonstration projects, could be a key area for future development in sustainable church design.

The findings from this assessment also highlight the broader role that Pentecostal churches can play in promoting sustainability within their communities. As large, influential institutions with significant social and cultural impact, these churches have the potential to lead by example, demonstrating the importance and feasibility of integrating sustainability into all aspects of life, including religious practices. By adopting and promoting sustainable landscape strategies, these churches can not only reduce their own environmental impact but also inspire their congregations and the wider community to embrace sustainable practices.

5. CONCLUSION AND RECOMMENDATIONS

The findings reveal a significant disparity in the commitment to and application of these strategies among the churches studied. While some churches have made commendable strides toward sustainability, integrating various practices into their landscapes, others demonstrate substantial gaps that hinder their potential to contribute meaningfully to environmental stewardship. The research highlights the broader implications of these findings, particularly the role of religious institutions in promoting sustainability within rapidly urbanizing areas. Despite the growing recognition of the importance of sustainable practices, there remains a notable gap in how these strategies are applied in religious contexts, especially in fast-expanding metropolitan regions. The study underscores the need for a more consistent and comprehensive approach to sustainability across all churches to ensure that their operations align with broader environmental goals.

Based on these findings, the key recommendations are as follows:

1. Broaden the Geographical Focus: Going forward, studies should expand beyond the Lagos-Ogun megacity to include other urbanizing regions, both within Nigeria and across West Africa. This broader geographical focus will help identify regional differences in sustainability practices, allowing for tailored strategies that address specific environmental challenges in various areas. Expanding the network of churches committed to sustainability can drive more widespread adoption of these practices.
2. Execute Comprehensive Long-Term Sustainability Assessment: Future research should prioritize comprehensive long-term assessments of sustainable landscape strategies in churches. These assessments should

include regular monitoring and evaluation to track progress, identify areas for improvement, and ensure that sustainability efforts are maintained and enhanced over time. Setting measurable goals will help churches achieve lasting environmental benefits and demonstrate a sustained commitment to sustainability.

3. Encourage Collaboration with Environmental Experts: To effectively implement sustainable practices, churches should collaborate more closely with environmental experts, government agencies, and non-profits. These partnerships will provide the necessary technical support, resources, and expertise to develop and maintain effective sustainability strategies. By working with experts, churches can tailor their approaches to better meet their specific needs and contexts, fostering more innovative and impactful solutions.

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