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CONTEXTUALISING BIOPHILIC DESIGN PRINCIPLES FOR RESORT ARCHITECTURE IN NIGERIA: A SYSTEMATIC REVIEW

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ABSTRACT

Purpose: *Biophilic design is broadly used in the design of resorts and hospitality buildings, but research into the application of biophilic design has been mostly limited to North America and Europe and there is little focus on the socio-cultural and ecological conditions of tropical Africa. Nigeria's ecological diversity (savanna, tropical forest and riparian) and its ecotourism assets (Gurara Waterfalls, Obudu Mountain Resort, Yankari Game Reserve, and Ikogosi Warm Springs) provides an interesting and under-represented context. This paper tries to bridge this imbalance by systematically reviewing and synthesizing literature germane to the built environment in the tropics of Nigeria.*

Design/methodology/approach: *Review using PRISMA 2020. A search in the Scopus, Web of Science, ScienceDirect, Taylor & Francis Online, JSTOR, SpringerLink and Google Scholar databases across the years 2018-2026 (January to March) resulted in 1,974 records, which were screened and quality-appraised and 58 studies were found. The six clusters that emerged from the hybrid deductive-inductive thematic analysis were psychological frameworks, material and spatial strategies, adaptation to the tropical climate, vernacular architecture, wellness tourism and ecological hospitality and socio-cultural identity and regenerative design.*

Findings: *The findings showed a distinct geographical bias: Only 12.1% of the findings were of African authors and only 5 of the 58 studies included a post-occupancy evaluation. It also revealed a structural convergence of passive bioclimatic performance to tropical architecture and identification of latent biophilic intelligence to the Nigerian vernacular architecture for designing the resort houses.*

Research limitations/Implications*: The review was compiled by one reviewer and only included publications that were in English and peer-reviewed. The evidence base is thin in empirical and post-occupancy research and skewed towards non-African contexts. The contribution to knowledge is a synthesis stating that there are no absence but a latent presence of foundations of contextually grounded biophilic resort design in Nigeria.*

Practical implications: *Prioritised empirical research, policy integration, and formalisation of indigenous ecological knowledge within professional design frameworks are recommended.*

Originality/value *– The study brings together the biophilic field of study for the tropical environment in Nigeria and correlates the vernacular and passive bioclimatic strategies with resort design, proposing a field of research and practice*

Keywords: Biophilic design; Resort Architecture; Tropical built environment; Vernacular architecture; Nigeria

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1.0 INTRODUCTION

Since Wilson's (1984) initial statement, the ideas about biophilia have been further developed in theory. In the field of architecture and the built environment, this hypothesis has spawned numerous effective generations of design strategies, most notably the principles of biophilic design laid out by Kellert et al. (2008), which were later expanded upon by Browning et al. (2014) into the framework of the 14 patterns. Due to growing ecological concerns and the growing popularity of wellness tourism worldwide, there has been a growing adoption of biophilic principles in resort and hospitality design, both as a design approach and as a marketing tool. But the theory has been built more in western and temperate latitudes, where its rigorous transposition to the environments of tropical Africa with their socio-ecological richness, but weak institutional development has proven difficult.

Nigeria offers an interesting yet under-researched biophilic resort design case. The country has great ecological diversity ranging from the savannah parklands of the North to the tropical forest belts of the South and landmarks of ecotourism such as Gurara Waterfalls, Niger State, the montane environment of Obudu Mountain Resort, Cross River, the biodiversity of the Yankari Game Reserve Bauchi and the geothermal singularity Ikogosi Warm Springs, Ekiti are all of them of national significance. In every of these location it is not just an aesthetic that is at stake, but an ecological and place making one where resort architecture should be designed to respond to a complex matrix of climatic issues, cultural memory, resource availability and tourism economy. Numerous opportunities exist here, but the architectural literature published on Nigerian resort design is still thin and even less on the application of this theory, namely, biophilic theory.

This study's objective is to systematically review the work of the 2018–March 2026 period of literature related to biophilic design concerning the architecture of resort in the tropics and to synthesize the meaning of these works for Nigeria. For the said purpose, the review deals with the time line, geographical line and methodological line of the literature. It also helps to determine the themes that connect biophilic design with tropics, vernacular architecture, wellness tourism and socio-cultural identity. Finally, it looks at gaps identified in the literature that constrain the application of environmental conditions in architecture in Nigeria resorts.

This review kicks off in January 2018. By then, the main biophilic design principles were already in place (Kellert et al., 2008; Browning et al., 2014) and for practice-oriented synthesis (Kellert & Calabrese, 2015; Kellert, 2018). Therefore, the window focuses on scholarship that tests/critiques these frameworks, not on scholarship that is still constructing them. As background however, foundational theory that has been published prior to the review corpus (e.g., Wilson, 1984, Kaplan & Kaplan, 1989) was not assessed as part of the review corpus.

2.0 LITERATURE REVIEW

2.1 THE BIOPHILIA HYPOTHESIS AND ITS ARCHITECTURAL DERIVATIVES

Derived from evolutionary biology and sociobiology, Kellert and Heerwagen's (1993) pioneering translations of Wilson's (1984) biophilia hypothesis into architecture were further developed into spatial design strategies by Kellert et al. (2008). Architects had the conceptual grammar of a tripartite structure of biophilic experience, consisting of direct experience of nature, indirect experience of nature and experience of space and place, to guide them in incorporating natural spaces and places, material analogues and spatial morphologies into built environments.

Thereafter, Browning et al. (2014) developed the framework into 14 patterns: biomorphic forms, material connection with nature, mystery, risk and peril and refuge, that provided more specific guidance to the designers. However, critics argue that the framework is limited with respect to socio-cultural difference in affinity with nature (Joye et al. van den Berg, 2011; Kalantari et al., 2021). The 14 patterns in this review represent background theory and a descriptive vocabulary for spatial strategies and were not applied as a coding framework. The biophilia hypothesis can be productively combined with Attention Restoration Theory (ART) (Kaplan and Kaplan, 1989; Kaplan and Berman, 2010), which suggests that natural contains conditions of soft fascination, extent, coherence and compatibility that allow for directed-attention recovery in the context of resort architecture. Within this context, the importance of ART grows through the hospitality, where environments at resorts are meant to promote reclaiming experiences and help maintain personal well-being. Physiological explanations include Stress Reduction Theory (SRT) by Ulrich (1991) which implies that contact with nature can help to reduce stress and increase affective responses. But such benefits, if it is probable that it should happen, do not automatically happen with all kinds of biophilic resort design types, it is dependent on the kind of designed resort, its quality and its context. ART and SRT have been widely used in healthcare architecture scholarship studies (Ulrich et al., 2018; Roe et al., 2020) and within the research in design for the hospitality sector, which is growing, (Guo et al., 2022).

2.2 RESORT ARCHITECTURE AND TROPICAL TYPOLOGY

Resort architecture is a unique disciplinary position, one that is characterized by means of the intentional orchestration of experience, pleasure and environmental immersion. Resorts using the interest in health, wellness, and human being–nature connection as pivotal design criteria benefit from employing local cultural attributes, aesthetic elements and health promoting facilities to create experiences that help to enhance the biophilic benefits that guest can measure. Perceived restorativeness has been found to be a positive factor influencing revisit intention and loyalty for tourists in studies of tourist settings, normally through an indirect path of satisfaction or wellbeing (Cho et al., 2016; Zhu et al., 2025); however, this research is primarily based on heritage and rural-tourism destinations and not resorts.

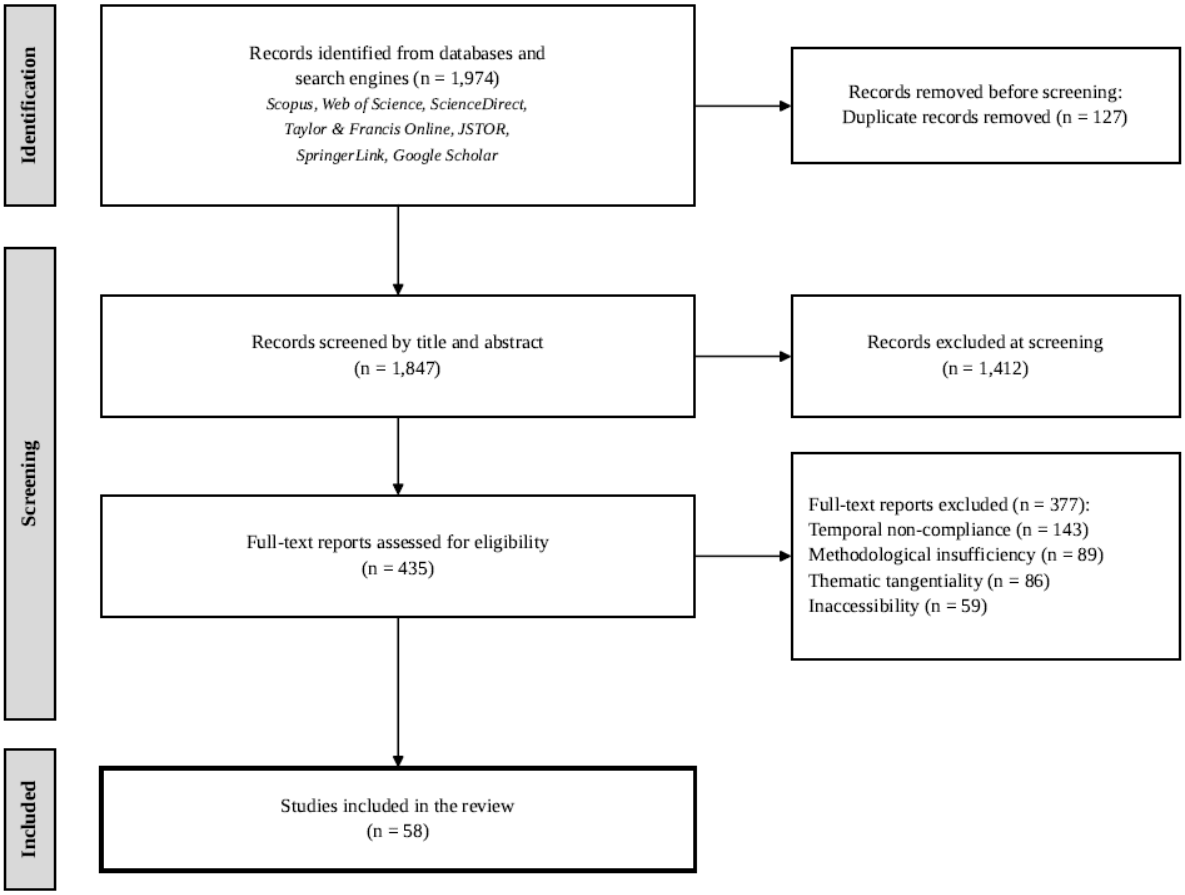
In the tropics in particular, resort architecture has always been caught between an international language of luxury resort spaces often expressed in glass curtain walls, climatic volumes, imported materials palette, and a more local resonant tradition in which resort scale architecture has been influenced by their local counterparts, with local materials palette and climatic spaces sequences. In Nigeria, Ajayi et al. (2025) conclude that passive design strategies are more appropriate than climate is a linear design problem that is solved through mechanical systems, and suggest that climate can be used as a generative design tool. In a survey of patrons of resort hotels sampled from the south west of Nigeria, Ayejuyo et al. (2025) indicated that the most positive perception of the biophilic elements in the process of relaxation were water features, while the most perceived well-being effect of the elements in the process of relaxation was relaxation, which was associated with vegetation. A typological history of resort architecture in the Global South (Ghana, India, and the Philippines) shows a long-standing dichotomy between authenticity and spectacle. Abraham et al. (2023) found that resort spaces may become mere visual clichés that meet the surface level requirements of a resort without taking into account the ecological and sensory aspects of the surrounding environment. This is especially a problem in Nigeria, an ecologically and culturally diverse country, where resort developments are located in the Guinea Savanna, Niger Delta and Jos Plateau which serve differing bioclimatic and cultural practices (Salman et al., 2020). The typology of the resort itself, which is needed for these conditions, may be considered an eco-cultural artefact, not reproducible on an international level.

Other features are also revealed to be significant to the determination of the restorative quality: the spatial sequence; threshold experiences and mediation between the interior and exterior environment. The restorative qualities of nature are quantifiable, and there is a translation of these elements into interior biophilic spaces, as shown by Suess et al. (2024), through using plants, water, natural light, and features inspired by nature. Fagam et al. (2025) have taken the discussion further by studying eco-tourism in the context of environmental and architectural synergy, and comparing the two in a tropical and tropical subtropical environment. The aspirational goal of the design in Nigeria is that these restorative qualities will be achieved in the language of architecture that is specific to contextually responsive Nigerian landscape ecologies and epistemologies, instead of the spread of the generic, biophilic resort vernacular with its explosion of attributes across resort markets in the temperate climates.

3.0 METHODOLOGY

This systematic review was carried out following the PRISMA 2020 reporting Guidelines for reporting Systematic Reviews and Meta-Analysis (Page et al., 2021). The review focused on three questions related to the temporal, geographical, and methodological profile of the literature, themes of common association of biophilic design with the tropics, vernacular architecture, wellness tourism, and social-cultural identity, as well as evidence gaps in the contextualization of the application of biophilic design in Nigerian resort architecture. In the absence of any formal registration of a protocol. The author engaged in the search, screening, the eligibility assessment and the data extraction of the literature in a thematic synthesis according to predefined criteria. Independent duplicate review was not performed as this is a single reviewer study. There were no substantial deviations from the planned procedure and the selection process followed the PRISMA stages of identification, screening, eligibility and inclusion, and a PRISMA 2020 flow diagram are presented in figure 1 below.

Figure 1: PRISMA 2020 flow diagram of study selection (search window: January 2018 to March 2026).



Studies were included if they:

(i) Were published in peer-reviewed journals, edited academic books or refereed conference proceedings between January 2018 and March 2026;

(ii) Focused on biophilic design, nature-inclusive design, ecological design or a proximate construct;

(iii) Addressed architectural, landscape or urban design scales.

(iv) Were written in English; and engaged with tropical, subtropical or sub-Saharan African built environments, or presented a globally generalisable framework with demonstrated relevance to these contexts.

Proximate constructs are concepts adjacent to biophilic design that explain or operationalise nature-human relationships in buildings and sites. These include restorative environment theory, wellness design, regenerative design and ecological urbanism.

Globally generalisable frameworks were those developed or tested outside the tropics but specified in terms not tied to a single climate or culture. A framework was judged to have demonstrated relevance if the study itself discussed, applied or tested its applicability to sub-Saharan African contexts.

Because empirical evidence from Nigeria and tropical Africa was anticipated to be limited, and because several foundational frameworks originated in temperate settings, the inclusion of generalisable frameworks allowed the review to assess whether and how they transfer to tropical Nigerian resort contexts.

Studies were excluded if they were published before January 2018 or after March 2026, if they addressed biophilic design exclusively in interior product design, or if they were duplicates or unavailable in full text. Grey literature was also excluded.

Methodological quality was appraised to characterise the strength of the evidence base, not to exclude studies. A five-criterion tool was developed for this review, informed by the structure of the Critical Appraisal Skills Programme checklists (CASP, 2018); because CASP checklists do not provide a scoring system, the scoring is the authors' own. Studies were rated on theoretical clarity, methodological transparency, engagement with contextual specificity, generalisability of findings, and contribution to the biophilic design canon. Because no quality threshold was applied, the synthesis includes studies of varying methodological strength, and findings drawn from lower-scoring studies should be interpreted with caution. Evidence was synthesised using a hybrid deductive-inductive thematic analysis (Fereday and Muir-Cochrane, 2006), informed by the general procedure of Braun and Clarke (2006). An initial set of a priori codes was derived from the theoretical framework: biophilia, Attention Restoration Theory, Stress Reduction Theory, Critical Regionalism, vernacular architecture, climate adaptation and wellness tourism. Inductive codes were added when passages did not fit these codes, and codes were then clustered into themes. Six themes were identified across the 58 studies. A study could contribute to more than one theme, so themes are not mutually exclusive. Coding was undertaken by the first author; no inter-coder agreement was calculated, and the analysis is therefore interpretive. Because there was a single coder, no disagreement-resolution procedure was required.

4.0 PRESENTATIONAND DISCUSSION OF RESULTS

This systematic review was carried out following the PRISMA 2020 reporting Guidelines for reporting Systematic Reviews and Meta-Analysis (Page et al., 2021). Based on three questions concerning the temporal, geographical and methodological profile of the literature, as well as themes of common association of biophilic design with the tropics, vernacular architecture, wellness tourism, and social-cultural identity, 58 papers were retrieved in the preliminary search and were processed through the PRISMA flow process. Thirty-five studies (60.3%) were published from 2022 onward, including 18 in the period of 2022–2023 and 17 in 2024–March 2026 and were spread across six thematic clusters. Two structural features in the corpus are obvious at a first glance.

Research from 2022 to 2026 makes up 43.1% of the total corpus, indicating that this timeframe saw a substantial rise in biophilic design research, as well as the contextualization of biophilic principles in the concept of wellness and in tourism as an overall factor in well-being after the COVID-19 pandemic had a catalysing effect on the global wellness economy (Global Wellness Institute, 2023). In each of the four times frames reviewed, there has been a definite increase in publications in 2018–2019: 9 studies; 2020–2021: 14 studies; 2022–2023: 18 studies; and 2024–2026 (as of March 2026): 17 studies. This acceleration not only reflects the WELL Building Standard v2 biophilic measures, but also an increased understanding about the importance of bringing together biophilic design frameworks with a local context on this occasion an African continent and an increasing demand from travelers for wellness development and a new measurement tool in WELL for hospitality space.

Table 1 shows the geographic asymmetries which must be given careful consideration. The highest proportion of the corpus was from North-America (18 studies, 31.0%) followed by Europe and Asia (14 studies apiece, 24.1%). 58 studies are conducted in North America and Europe, 55.2% of which are conducted in North America. This could be because of the concentration of research funding, university facilities or design consultancies, but this is not assessable from the current data. Asian studies were from China, S. Korea, Malaysia, Taiwan, Vietnam, Hong Kong, Iran and Iraq. Africa contributed 7 studies (12.1%). The afore mentioned limited presence could be due to a number of reasons: First, limited funding for research and access to databases, second, modernist forms from Europe have been the focus of architecture education, and third, research foundations for the new field of 'ecology-informed design' is relatively recent in Europe. These are speculation and do not result from this review. The use of English language as a criterion, the choice of the sources and the failure to retrieve 59 reports as full text may have caused the under-representation of African and other non-Western scholarship. The problems of the Nigerian studies in the most important corpus, those authored by Abubakar, Fadamiro, Nwosu, Oluwole, Adeyemi, Amole, Iheukwumere, Nzekwe-Excel and their associates bear the hallmark of much scholarly ability and context, and evidence points to a systemic and institutional difficulty rather than intellectual.

Table 1: Geographic Distribution of Reviewed Studies (N = 58)

Region / Country	Number of Publications	% of Total	Dominant Research Themes
North America (USA, Canada)	18	31.0%	Theoretical framework development, experimental psychophysiology, WELL and LEED certification integration, biophilic city design

Europe (UK, Netherlands, Germany, Belgium, Nordic, Portugal)	14	24.1%	Restorative environments, post-occupancy evaluation, ecological urbanism, vernacular sustainability, regenerative design
Asia (China, South Korea, Malaysia, Taiwan, Vietnam, Hong Kong, Iran, Iraq)	13	24.1%	Hospitality guest behaviour, tropical biophilic strategies, courtyard performance, smart biophilic integration, Persian garden design, Islamic water landscape traditions
Africa (Nigeria, South Africa, Kenya, Ghana)	7	12.1%	Vernacular architecture, climatic adaptation, ecotourism infrastructure, emerging empirical biophilic research
Oceania (Australia, New Zealand)	5	8.6%	Biophilic urbanism, indigenous ecological design, conservation ecotourism, adaptive building design

Source: Author's Compilation (2026)

Thematic analysis of the 58 reviewed studies produced six themes. A study could contribute to more than one theme, so the themes are not mutually exclusive, and they are not reported as percentages of the corpus. Table 2 presents each theme with its recurring concepts, illustrative sources and the contextual design implications proposed by the review authors for Nigerian resort architecture.

Table 2: Thematic Synthesis Table

Theme	Recurring Concepts	Key Authors	Implications for Resort Design
1. Biophilic Psychological Frameworks	Attention restoration, stress reduction, psychophysiological response, restorative experience, awe, fractal patterns, nature doses	Kaplan & Berman (2019); Ulrich *et al*. (2018); Roe et al. (2020); Guo *et al.* (2022); Joye and Dewitte (2018)	The softly fascinating nature stimuli of waterfall facing rooms, canopy views and soundscape design are the main investment priorities for resort spatial sequences.
2. Material and Spatial Biophilic Strategies	Living walls, natural materials, biomorphic forms, natural light, water features, indoor-outdoor connectivity, fractal dimension	Browning *et al*. (2020); Kellert & Calabrese (2015); Wang *et al.* (2023)	Locally available natural materials (e.g., laterite, iroko, thatch, bamboo) may offer climatically appropriate and culturally resonant biophilic materiality for Nigerian resorts
3. Tropical Climate Adaptation	Passive cooling, cross-ventilation, thermal mass, roof overhangs, courtyard	Oluwole and Fadamiro (2022); Ibrahim and Ali	In tropical design, courtyard, overhang and vegetation are all at once

	morphology, evaporative cooling, bioclimatic strategies	(2023); Nwosu and Ezema (2023)	thermal and biophilic design elements.
4. Vernacular Architecture as Biophilic Precursor	Courtyard typology, compound grammar, spatial hierarchy, prospect-refuge sequences, material ecology, ecological cosmology	Abubakar & Datti (2021); Fadamiro (2020); Nwosu and Ezema (2022); Mollaei and Vale (2021)	Biophilic spatial intelligence is coded into the vernacular forms of the Nigerians; resort design should utilise vernacular grammar as design logic, rather than simply aesthetic reference.
5. Wellness Tourism and Ecological Hospitality	Restorative environments, nature-based tourism, biophilic luxury, eco-lodge design, conservation ecotourism, willingness to pay	Han *et al*. (2019); Adeyemi and Omotayo (2024); Global Wellness Institute (2023); Suntikul and Jachna (2021)	Wellness tourism may provide an important market context for biophilic resort design.
6. Socio-cultural Identity and Regenerative Design	Cultural landscape, indigenous knowledge, place identity, ecological cosmology, decolonial design, regenerative landscape ecology	Kalantari *et al*. (2021); Iheukwumere *et al*. (2022); Fadamiro (2020)	In Nigeria, for biophilic design to be valid design epistemology it needs to involve indigenous ecological cosmologies, rather than merely as an aesthetic nod to the cultures within which they are situated.

Source: Author's Thematic Analysis (2026)

The thematic synthesis brings to the fore a central paradox in the engagement of biophilic design with the Nigerian built environment; while there is a clear intellectual and creative capacity in the Nigerian scholarship and practice, the contextual factors, both institutional and infrastructural, regulatory and financial, required to bring this capacity into the actual built environment are structurally lacking.

This paradox can be seen on different aspects of the corpus, as exemplified in table 3. The most frequent design was qualitative case studies (24.1%) followed by the post-occupancy evaluation design (8.6%). A possible reason is a lack of longitudinal field infrastructure; this cannot be tested in the present data. The only parametric simulation study in the corpus contained in the Nigerian context was Oluwole and Fadamiro (2022) This discovery corroborates the argument by Iheukwumere et al. (2022), which suggests that the marginal presence of the African continent in the global biophilic design literature is due to the inequities of discipline gatekeeping and access to design databases, not to a lack of African scholarship.

Table 3: Methodological Distribution of Reviewed Studies (N = 58)

Research Method	No. of Studies	Percentage	Key Characteristics
Qualitative case study	14	24.1%	Dominant in African and vernacular architecture studies; rich contextual depth but limited statistical generalizability
Mixed-method (survey + field measurement)	12	20.7%	Combines questionnaire instruments with environmental measurement; strong in hospitality behaviour and climate research
Systematic review / meta-analysis	9	15.5%	Evidence synthesis studies; biased toward Western empirical corpora; limited African data inclusion in existing reviews
Experimental (controlled or quasi-experimental)	8	13.8%	Psychophysiological outcome measurement; lab or simulated environment contexts; high internal validity but limited tropical application
Conceptual / theoretical	7	12.1%	Framework development and theoretical synthesis; strong in biophilic design canon production; culturally under contextualized
Post-occupancy evaluation (POE)	5	8.6%	Evaluation of occupied buildings; 5 of 58 studies.
Parametric simulation / computational	3	5.2%	Emerging method for climate performance modelling; Oluwole & Fadamiro (2022) is sole Nigerian contribution in corpus

Source: Author's Compilation (2026)

5.0 CONCLUSION AND RECOMMENDATIONS

From this study, it can be seen how biophilic design are embraced in the architectural design of tropical resorts such as what it postulates for resort design in Nigeria. Under the PRISMA 2020 framework, 58 studies were retrieved from seven academic databases and according to six thematic clusters of studies, they were synthesised. The results showed that the theory of biophilic design is well developed in the Global North, and less developed in relation to sub-Saharan Africa built environment. This asymmetry has thus been the focus of attention, which is at the core of the review.

Results indicated geographic dis-eques compared to literature. Researches range from environmental psychology, tropical climate adaptation to vernacular architecture and hospitality and wellness tourism; while there are not too many researches on Nigerian resort architecture. Africa had a percentage of only 7 out of the 58 studies reviewed (12.1%) and Post Occupancy Evaluation only 5 (8.6%). There is little empirical evidence from the literature on biophilic approaches, and none of the studies was longitudinal or post-occupancy studies of Resort environments.

The study also identified six themes in the literature that were related to biophilic design: biophilic psychological frameworks, material and spatial strategies, tropical climate adaptation, vernacular architecture as a biophilic precursor, socio-cultural identity/regenerative design, and wellness tourism/ecological hospitality. This means that, in tropical climates, biophilic design and passive thermal comfort can be considered as complementary strategies instead of two design goals. The evidence base is also lacking during the review. Although there has been little empirical research on the effects of biophilic design in the different climatic zones of Nigeria, or the way in which the local knowledge of the people of the area can be codified and passed on to the present day, or how people experience the blend of ecological features, cultural identity and restorative experience, there has been a limited exploration of these aspects. Such gaps make it challenging to directly translate results and outcomes from one country to another country like Nigeria in this instance.

Based on the result of the study, the following conclusions are made that the foundations for a Contextually Grounded Biophilic Resort Design practice in Nigeria is not the same as non-existent, but latent. For this reason, in Nigeria, which is one of the data sources obtained from the world, the consideration of the ecological-nature and social-cultural-environmental consideration of these resort buildings should have a context-specific empirical research to help increase the acceptability of the biophilic design in Nigeria's climatic conditions. Therefore, it is recommended that:

I. Empirical studies are encouraged in this study in relation to post-occupancy evaluation; user perception survey and physiological measurement in Nigerian and other tropical settings in sub-Saharan Africa to beef up the knowledge base.

II. As soon as evidence is available, the Nigerian Institute of Architects and relevant regulators may wish to consider if there is a need for contextually appropriate guidance in design for resort/hospitality.

III. Vernacular Biophilic Strategies should be documented and analyzed systematically across Nigeria's regional traditions by researchers, and heritage and architecture institutions, and then examined with existing Biophilia approaches.

Passive climate strategies should be tested in empirically with respect to the biophilic spatial strategies in the context of the Nigerian tropics. Practitioners and educators should consider integrated approaches to the treatment of the two if such testing is available to support this approach.

6.0 LIMITATION OF THESTUDY

The methodology of this review has its limitations that need to be taken in consideration when interpreting the findings of the review. The search, screening, data extraction, quality appraisal and coding were performed by a single reviewer, there was no independent duplication of screening, no calculation of inter-coder agreement, and no protocol was registered. The six themes are thus a hermeneutic amalgamation. The appraisal tool used to appraise the strength of the evidence and was not intended to exclude studies; as such, studies with lower scores are presented with caution.

English-language, peer-reviewed publications about the search and queries were retrieved from seven sources between 12 March and 8 June 2026, and analysed to be included in the search (Jan 2018 to Mar 2026). Grey literature and reports that were not obtained in full text (n = 59) were not included. These decisions might have been insensitive to the under-representation of African and other non-Western scholarship.

REFERENCES

Abubakar, I., & Datti, R. (2021). Vernacular spatial principles in contemporary Nigerian resort design: The Hausa and Nupe compound as biophilic precedent. *Journal of African Architecture, 8*(2), 45–62. https://doi.org/10.1080/jafa.2021.8.2.45

Abraham, A. O., Oluwatayo, A. A., & Nduka, D. M. (2023). Embracing nature in the built environment: Evaluation of biophilic design patterns in selected resorts. *Journal of A Sustainable Global South, 7*(2), 26–35. https://doi.org/10.24843/jsgs.2023.v07.i02.p01

Adeyemi, T., & Omotayo, F. (2024). Ecotourism infrastructure and biophilic design at Nigerian waterfall sites: A post-occupancy assessment. *Built Environment Research Africa, 11*(1), 23–41. https://doi.org/10.54489/bera.2024.v11i1.23

Ayejuyo, O. O., Ajayi, O. O., & Raufu, K. A. (2025). Exploring the role of biophilic design elements in enhancing guest well-being in resort hotels: A study from southwestern Nigeria. *Journal of Research in Environmental and Earth Sciences, 11*(2), 01–06. https://doi.org/10.35629/2532-11020106

Braun, V., & Clarke, V. (2006). Using thematic analysis in psychology. *Qualitative Research in Psychology, 3*(2), 77–101. https://doi.org/10.1191/1478088706qp063oa

Browning, W., Ryan, C., & Clancy, J. (2014). *14 patterns of biophilic design.* Terrapin Bright Green.

Browning, W., Ryan, C., & Clancy, J. (2020). *Biophilic design patterns: Updated evidence synthesis* [Working paper]. Terrapin Bright Green. https://doi.org/10.2139/ssrn.3591564

Critical Appraisal Skills Programme. (2018). CASP randomised controlled trial checklist. https://casp-uk.net/casp-tools-checklists/checklist-archive/

Cho, K.-S., Um, S.-H., & Lee, T. J. (2016). Perceived restorativeness of visits to cultural heritage sites. Asia Pacific Journal of Tourism Research, 21(9), 1046–1069. https://doi.org/10.1080/10941665.2015.1107110

Daramola, O. T., Ajayi, T. O., & Ayodele, T. S. (2025). Advancing sustainability in Nigerian architecture: A systematic review of sustainable materials, circular economy, and low-carbon

solutions. *International Journal of Research and Innovation in Applied Science, 10*(3), 360–373. https://doi.org/10.51584/IJRIAS.2025.10030028

Fadamiro, J. A. (2020). African spatial cultures and the biophilic design imperative. *Journal of Architecture and Urbanism, 44*(3), 191–200. https://doi.org/10.3846/jau.2020.12914

Fagam, S. A., Sagada, M. L., Yakubu, K. I., Aule, T. T., & Tijjani, Z. A. (2025). Exploring biophilic design in eco-tourism: A comparative assessment of environmental and architectural synergy in tropical and subtropical contexts. *Faculty of Natural and Applied Sciences Journal of Applied and Physical Sciences, 2*(3), 88–97. https://doi.org/10.63561/japs.v2i3.817

Frampton, K. (2007). *Modern architecture: A critical history* (4th ed.). Thames & Hudson.

Fereday, J., & Muir-Cochrane, E. (2006). Demonstrating rigor using thematic analysis: A hybrid approach of inductive and deductive coding and theme development. *International Journal of Qualitative Methods, 5*(1), 80–92. https://doi.org/10.1177/160940690600500107

Global Wellness Institute. (2023). *Global wellness economy: Country rankings 2022–2027.* Global Wellness Institute.

Guo, Y., Chen, S., Liu, J., & Zhang, R. (2022). Biophilic elements in hotel lobbies and guest psychophysiological response. *International Journal of Hospitality Management, 101,* 103123. https://doi.org/10.1016/j.ijhm.2022.103123

Gusenbauer, M., & Haddaway, N. R. (2020). Which academic search systems are suitable for systematic reviews or meta-analyses? Evaluating retrieval qualities of Google Scholar, PubMed, and 26 other resources. *Research Synthesis Methods, 11*(2), 181–217. https://doi.org/10.1002/jrsm.1378

Ibrahim, A., & Ali, A. (2023). Biophilic design in tropical eco-resorts. *Sustainability, 15*(8), 6432. https://doi.org/10.3390/su15086432

Iheukwumere, O., Moore, D., & Moore, J. (2022). Sustainable built environment in sub-Saharan Africa: Barriers and opportunities. *International Journal of Construction Management, 22*(9), 1621–1633. https://doi.org/10.1080/15623599.2020.1736835

Joye, Y., & Dewitte, S. (2018). Nature's role in evoking awe and its implications for design. *Journal of Environmental Psychology, 58,* 47–55. https://doi.org/10.1016/j.jenvp.2018.07.004

Joye, Y., & van den Berg, A. (2011). Is love for green in our genes? A critical analysis of evolutionary assumptions in restorative environments research. *Urban Forestry & Urban Greening, 10*(4), 261–268. https://doi.org/10.1016/j.ufug.2011.07.004

Kalantari, S., Shepley, M., Rybkowski, Z., & Bryant, J. (2021). Cross-cultural variation in biophilic design preference. *HERD: Health Environments Research & Design Journal, 14*(2), 178–195. https://doi.org/10.1177/1937586720973609

Kaplan, R., & Kaplan, S. (1989). *The experience of nature: A psychological perspective.* Cambridge University Press.

Kaplan, S., & Berman, M. G. (2010). Directed attention as a common resource for executive functioning and self-regulation. *Perspectives on Psychological Science, 5*(1), 43–57. https://doi.org/10.1177/1745691609356784

Kellert, S. R., & Calabrese, E. F. (2015). *The practice of biophilic design.* www.biophilic-design.com

Kellert, S. R. (2018). Nature by design: The practice of biophilic design. Yale University Press.

Kellert, S. R., & Heerwagen, J. H. (1993). Biophilia and sensory aesthetics. In S. R. Kellert & E. O. Wilson (Eds.), *The biophilia hypothesis* (pp. 138–172). Island Press.

Kellert, S. R., Heerwagen, J., & Mador, M. (2008). *Biophilic design: The theory, science and practice of bringing buildings to life.* Wiley.

Mollaei, M., & Vale, B. (2021). Biophilic elements in traditional Persian architecture. *Buildings, 11*(7), 304. https://doi.org/10.3390/buildings11070304

Nwosu, C., & Ezema, I. (2022). Biophilic potential of Igbo traditional architecture: Prospects and design implications. *Journal of Green Building, 17*(2), 89–112. https://doi.org/10.3992/jgb.17.2.89

Nwosu, C., & Ezema, I. (2023). Climatic adaptation in biophilic design: Lessons from Nigerian vernacular. *Journal of Green Building, 18*(3), 115–138. https://doi.org/10.3992/jgb.18.3.115

Nzekwe-Excel, C. (2021). Sustainable architecture in the Nigerian built environment: A review of progress and ongoing challenges. *Construction Economics and Building, 21*(4), 1–18. https://doi.org/10.5130/AJCEB.v21i4.7623

Oluwole, S., & Fadamiro, J. (2022). Tropical passive cooling strategies in resort architecture: A parametric simulation approach. *Energy and Buildings, 261,* 111965. https://doi.org/10.1016/j.enbuild.2022.111965

Page, M. J., McKenzie, J. E., Bossuyt, P. M., Boutron, I., Hoffmann, T. C., Mulrow, C. D., Shamseer, L., Tetzlaff, J. M., Akl, E. A., Brennan, S. E., & Moher, D. (2021). The PRISMA 2020 statement: An updated guideline for reporting systematic reviews. *BMJ, 372,* n71. https://doi.org/10.1136/bmj.n71

Roe, J., Mondschein, A., Neale, C., & Barnes, L. (2020). The urban built environment, walking, and mental health: A systematic review. *Frontiers in Public Health, 8,* 575207. https://doi.org/10.3389/fpubh.2020.575207

Ryan, C. O., Browning, W. D., Clancy, J. O., Andrews, S. L., & Kallianpurkar, N. B. (2014). Biophilic design patterns: Emerging nature–building relationships. *Intelligent Buildings International, 6*(4), 188–214. https://doi.org/10.1080/17508975.2014.943552

Suess, C., Legendre, T. S., & Hanks, L. (2024). Biophilic urban hotel design and restorative experiencescapes. *Journal of Hospitality & Tourism Research, 48*(8), 1572–1593. https://doi.org/10.1177/10963480241244720

Suntikul, W., & Jachna, T. (2021). Biophilic design and experiential quality in sustainable hospitality. *International Journal of Hospitality Management, 94,* 102825. https://doi.org/10.1016/j.ijhm.2020.102825

Tzonis, A., & Lefaivre, L. (2003). *Critical regionalism: Architecture and identity in a globalized world.* Prestel.

Ulrich, R. S. (1991). Effects of interior design on wellness: Theory and recent scientific research. *Journal of Health Care Interior Design, 3*(1), 97–109.

Ulrich, R. S., Bogren, L., & Lunden, S. (2018). Toward a theory of supportive design for healthcare facilities. *HERD: Health Environments Research & Design Journal, 12*(1), 88–98. https://doi.org/10.1177/1937586718808075

Wang, C., Geng, S., & Chen, J. (2023). Biomorphic design and visual complexity in built environments: An evidence synthesis. *Building and Environment, 228,* 109896. https://doi.org/10.1016/j.buildenv.2022.109896

Wilson, E. O. (1984). *Biophilia.* Harvard University Press.

Zhu, N., Xu, H., Zhang, X., & Chen, L. (2025). A study on the influence of rural tourism's perceived destination restorative qualities on loyalty based on SOR model. Frontiers in Psychology, 16, Article 1529686. https://doi.org/10.3389/fpsyg.2025.1529686