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The Application of Cultural Ecology Principles to the Conservation Strategy for the Jakarta Cathedral Church Area as a Cultural Heritage Site

Dominikus Demon Tereng *, Prisca Bicawasti Budi Sutanty

Department of Architecture, Faculty of Design and Technology, Universitas Pembangunan Jaya, Indonesia.

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Abstract
This study aimed to identify and analyze the preservation strategies of the Jakarta Cathedral Church area as a cultural heritage site in adapting to a tropical climate, using a cultural ecology approach. a neo-Gothic architectural landmark that is over a century old and faces preservation challenges due to tropical climatic conditions as well as increasing urban pressures. This research employed a descriptive qualitative method, utilizing field observations, semi-structured interviews with site managers and restoration practitioners, documentation, and literature review. The findings indicate that the applied preservation strategies have integrated the principles of cultural ecology with the regulatory framework of Law No. 11 of 2010 through spatial organization, material selection, construction techniques, and zoning systems. However, implementation is still limited, especially in addressing tropical climate conditions, as reflected in the imbalance between material authenticity, construction methods, and environmental performance. The findings demonstrate that cultural heritage preservation should be understood as an adaptive and integrated system encompassing physical, cultural, and environmental dimensions, rather than just technical interventions. The study strengthens the role of the cultural ecology as an analytical framework in architectural conservation studies, particularly within the context of historical sites in tropical regions facing simultaneous environmental pressures and urban development.

Keywords: area conservation, cultural ecology, cultural heritage, Jakarta Cathedral Church, Neo-Gothic

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Penerapan Prinsip-Prinsip Cultural Ecology *dalam Strategi Konservasi Kawasan Gereja Katedral Jakarta sebagai Situs Cagar Budaya*

Abstrak
Penelitian ini bertujuan untuk mengidentifikasi dan menganalisis strategi pelestarian kawasan Gereja Katedral Jakarta sebagai cagar budaya dalam beradaptasi dengan iklim tropis, dengan menggunakan pendekatan cultural ecology. *Kawasan ini merupakan contoh bangunan berarsitektur Neo-Gotik yang telah berusia lebih dari satu abad dan menghadapi tantangan pelestarian akibat kondisi iklim tropis serta tekanan lingkungan perkotaan. Penelitian menggunakan pendekatan kualitatif deskriptif melalui observasi lapangan, wawancara semi-terstruktur dengan pengelola dan pelaksana pemugaran, dokumentasi, serta studi literatur. Hasil penelitian menunjukkan bahwa strategi pelestarian yang diterapkan telah mengintegrasikan prinsip* cultural ecology *dan Undang-Undang Nomor 11 Tahun 2010 melalui pengaturan ruang, pemilihan material, teknik konstruksi, serta sistem zonasi kawasan. Namun, penerapannya masih terbatas, terutama dalam penyesuaian terhadap iklim tropis, yang terlihat dari ketidakseimbangan antara keaslian material, metode konstruksi, dan kinerja lingkungan. Temuan ini menunjukkan bahwa pelestarian cagar budaya perlu dipahami sebagai sistem yang adaptif dan terintegrasi antara aspek fisik, budaya, dan lingkungan, bukan sekadar tindakan teknis. Studi ini memperkuat peran* cultural ecology *sebagai kerangka analisis dalam studi konservasi arsitektur, khususnya dalam konteks kawasan bersejarah di wilayah tropis yang menghadapi tekanan lingkungan dan perkembangan kota secara simultan*.

***Kata-kunci**: cagar budaya, ekologi kultural*, Gereja Katedral Jakarta, *Neo-Gotik, pelestarian kawasan*

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* **Corresponding Author**
E-mail: dominikus.demontereng@student.upj.ac.id

Introduction

Cultural heritage areas are tangible cultural assets that include objects, buildings, structures, sites, and areas located both on land and in water, and that possess significant value in terms of history, science, education, religion, and culture [1]. In this context, the term *preservation* is used as an umbrella concept encompassing various actions such as protection, development, utilization, and restoration, which aim to maintain the continuity of cultural heritage values and existence, both physically and non-physically, in accordance with Law No. 11 of 2010 [2].

As the capital city and a city with a long historical trajectory, Jakarta possesses a wealth of historical areas that reflect evolving social, cultural, and political dynamics over time. The existence of cultural heritage buildings and areas in Jakarta not only serves as a historical archive but also as urban assets with economic potential through tourism and educational sectors [3]–[6]. However, rapid urban development has created significant challenges to the sustainability of these heritage areas, particularly in terms of their physical condition, function, and environmental context.

Law No. 11 of 2010 on Cultural Heritage serves as the primary legal framework for preservation efforts in Indonesia, emphasizing three main strategies: protection, development, and utilization [6]. Protection focuses on preventing damage through actions such as maintenance and restoration; development aims to enhance value and function through sustainable adaptation; while utilization seeks to optimize the use of cultural heritage for public benefit without diminishing its historical value. Although this framework provides a strong normative foundation, it tends to be procedural and does not explicitly address the dynamic relationship between buildings, culture, and the environment as an integrated system.

In this context, the concept of *cultural ecology*, as proposed by Guy and Farmer, offers a more integrative perspective by positioning architecture as the result of interactions between humans, culture, technology, and the environment [7]. This approach emphasizes that buildings should not be understood merely as physical objects, but as systems that respond to ecological conditions and social practices within their surroundings. Therefore, in this study, cultural ecology is operationalized as an analytical framework to examine how preservation strategies not only maintain the physical authenticity of buildings but also sustain the relationships between space, activities, materials, and environmental context.

The Jakarta Cathedral Church represents a prominent example of a cultural heritage area that embodies such complexity (Fig. 1). This neo-Gothic building, reconstructed in 1899 and inaugurated in 1901, holds significant historical, architectural, and religious values [8]. Its location in the city center, directly opposite the Istiqlal Mosque, reflects symbolic values of interfaith tolerance, while also placing it under intense urban environmental pressures.

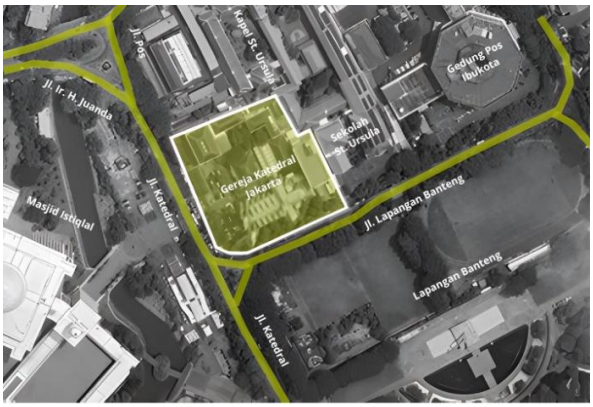

Figure 1. Jakarta Cathedral Church area

Based on the observations and interviews, the current condition of the Jakarta Cathedral Church faces several challenges, particularly related to material degradation caused by tropical climate as well as increasing urban environmental pressures. High humidity levels, heavy rainfall, and extreme temperature fluctuations accelerate the deterioration of building materials [9]. On the other hand, preservation efforts often encounter limitations in balancing material authenticity, the need for adaptation, and the evolving functional demands of space.

Previous studies have examined the preservation of historical buildings in Indonesia. However, they generally focus on the physical aspects of buildings or regulatory approaches based on existing policies. Studies that integrate environmental, cultural, and spatial practices within a unified analytical framework remain relatively limited. Therefore, a research gap exists in understanding cultural heritage preservation as a process that is simultaneously ecological and cultural, rather than merely technical or administrative.

Based on these conditions, this study aims to identify and analyze the preservation strategies of the Jakarta Cathedral Church area using a cultural ecology approach integrated with the preservation framework

outlined in Law No. 11 of 2010. This research not only describes the forms of preservation implemented but also evaluates the extent to which these strategies respond to the interrelationships between physical, cultural, and environmental aspects.

The contribution of this study lies in integrating the cultural ecology approach into the analysis of cultural heritage preservation in Indonesia, thereby providing a more comprehensive perspective on the relationship between buildings, humans, and the environment. Accordingly, this study is expected to enrich architectural conservation discourse, particularly in the context of historical areas in tropical regions facing simultaneous environmental pressures and urban development.

Methods

This study employed a descriptive qualitative approach aimed at gaining an in-depth understanding of the preservation strategies of the Jakarta Cathedral Church area in relation to the interconnection between physical, cultural, and environmental aspects. This approach was selected because it is capable of revealing preservation phenomena as complex and contextual processes, as well as addressing research questions related to how preservation strategies are implemented and why such strategies are carried out under specific conditions [10].

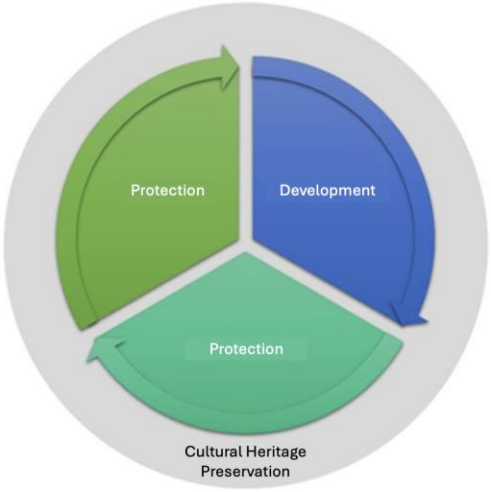

Figure 2. Preservation concept based on Law No. 11 of 2010

In this study, the analytical framework was constructed through the integration of the cultural ecology concept and the preservation principles outlined in Law No. 11 of 2010. The law serves as a normative foundation, explaining that cultural heritage preservation is carried out through three main actions, namely protection, development, and utilization, as illustrated in Figure 2. The diagram demonstrates that these three aspects form an interconnected system in maintaining the sustainability of cultural heritage. Therefore, preservation cannot be understood as a partial effort, but rather as an integrated system [2].

Table 1. A synthesis of analytical variables

No	Theory	Conservation Aspects
1	Cultural Ecology - Guy & Farmer	1. Space and Activities 2. Spatial Experience 3. Material 4. Construction Techniques
2	Law No. 11 of 2010	5. Place and Zoning

Meanwhile, the concept of cultural ecology was operationalized as an analytical tool to examine how the relationships between humans, space, materials, and the environment are formed within preservation practices. To bridge these two frameworks, this study developed a synthesis of analytical variables, as presented in Table 1. The table illustrates the interconnections among the aspects of cultural ecology, including space and activities, spatial experience, material, construction techniques, and place and zoning. Accordingly, Table 1 functions as an operational basis for guiding the data collection and analysis processes, ensuring that this study is not merely descriptive but also analytical and systematically structured.

Data Collection Methods

Data collection in this study was conducted through two main sources, namely primary and secondary data. Primary data were obtained through field observations and semi-structured interviews. Observations were carried out directly at the Jakarta Cathedral Church area on October 2, 2025; November 25, 2025; and January 3, 2026. These observations aimed to identify the physical condition of the building, spatial patterns, user activities, and the relationship between space and its surrounding environment. Visual documentation in the form of photographs was used to support the analysis process, particularly in examining aspects of space, materials, and construction techniques as defined in the research variables outlined in Table 1.

Interviews were conducted using a purposive sampling technique by selecting informants with direct knowledge and involvement in the building preservation process. The informants consisted of Jakarta Cathedral Church management responsible

for facilities and infrastructure, as well as representatives of HAP Architect, who were involved in the renovation and restoration of the building. The interviews were conducted in a semi-structured format using a set of guiding questions covering material aspects, construction techniques, preservation policies, and challenges in responding to tropical environmental conditions. This approach enabled the researcher to obtain not only factual data but also reflective insights based on the practical experiences of the informants.

Secondary data were obtained through the review of renovation archives provided by HAP Architect, as well as relevant literature on cultural heritage preservation and cultural ecology. These data were used to provide theoretical context and to strengthen the interpretation of field findings.

Data Analysis Methods

Data analysis in this study was conducted qualitatively using a thematic analysis approach [10]. The analysis process began with data reduction, which involved organizing and simplifying data obtained from observations, interviews, and documentation. Subsequently, the data were categorized through a coding process based on the variables formulated in Table 1, namely space and activities, spatial experience, material, construction techniques, and place and zoning, which refer to the cultural ecology concept [7].

Following the coding process, the data were analyzed by identifying patterns of relationships between empirical conditions observed in the field and the preservation principles illustrated in Figure 2, namely protection, development, and utilization [2]. Through this approach, each finding was not only described but also evaluated based on the extent to which the implemented preservation practices reflect the integration of physical, cultural, and environmental aspects [11]–[13].

To enhance data validity, this study employed source triangulation by comparing data obtained from observations, interviews, and documentation. Accordingly, the analysis results are not merely descriptive but are grounded in a robust basis for explaining the relationship between the conceptual framework and actual field conditions.

Results and Discussions

Space and Activities

The spatial organization of the Jakarta Cathedral Church emphasizes the relationship between spatial configuration, patterns of use, and the cultural values embedded within it. From a spatial perspective, the church layout reflects the concept of image of space proposed by Guy and Farmer, which views space not merely as a container for physical activities, but as a representation of cultural identity and the relationship between humans and their surrounding environment [8]. In the context of a Catholic church, this is manifested through the cruciform plan, building orientation, and spatial arrangement, all of which carry symbolic meanings and represent the religious values of the congregation [14], [15].

As illustrated in Figure 3, the circulation pattern within the Jakarta Cathedral Church demonstrates a differentiation of pathways based on user types, namely visitors and worshippers. Visitor circulation, indicated by red paths, is restricted by the management to prevent access to sacred areas, while white paths are designated for worshippers attending mass. In addition, a transitional space (no. 3) is provided before entering the main prayer hall, functioning as a preparatory zone between the exterior and interior spaces.

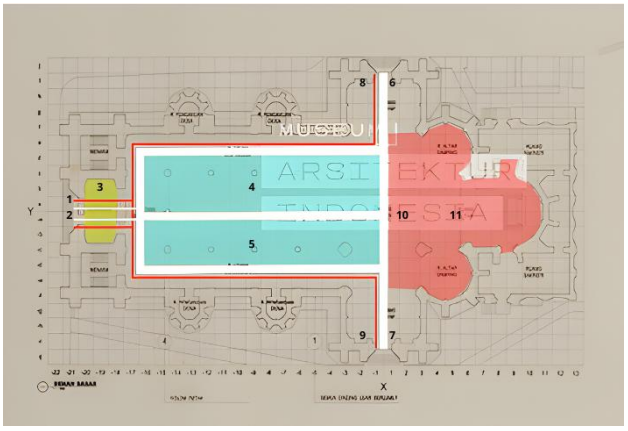

Figure 3. Circulation pattern inside the Jakarta Cathedral Church

This spatial arrangement indicates that space is not organized solely based on practical functions, but also structured according to a hierarchy of sacredness and the regulation of spatial experience.

From a cultural ecology perspective, this condition reflects how space is shaped through the interaction between religious practices, cultural values, and the need for visitor management. In this context, space functions as a medium that regulates the relationship between humans and their symbolic environment, making spatial configuration an integral part of a living cultural system. Accordingly, the spatial organization of the Jakarta Cathedral Church not only preserves its historical form but also sustains the continuity of spatial meaning through the regulation of activities within it.

However, field findings indicate that this spatial system has also undergone adaptation in response to changing patterns of use. This is evident in the utilization of side entrances numbered 6 and 8, which are directly connected to the plaza area and are used as additional worship spaces when the main hall, with a capacity of approximately 800 people, reaches its limit. This condition suggests that sacred space is not entirely static, but rather extends its function into external areas as a response to user demands. Meanwhile, side entrances numbered 7 and 9 function as additional access points as well as dedicated circulation routes for the choir, indicating a differentiation of spatial functions based on specific activities.

This phenomenon reveals a tension between the effort to maintain the sacred spatial structure and the need to adapt to increasing intensity of use. Within the cultural ecology framework, this condition can be understood as a process of negotiation between the cultural values embedded in space and the evolving demands of environmental conditions and human activities. Space is therefore no longer preserved as a fixed form, but as a system that adapts to change.

Thus, the spatial arrangement and circulation patterns in the Jakarta Cathedral Church not only reflect the aspect of protection within the preservation framework of Law No. 11 of 2010, but also demonstrate that preservation is a dynamic process involving the adjustment between spatial authenticity, sacred values, and contemporary functional demands.

Spatial Experience

The spatial experience of the Jakarta Cathedral Church emphasizes how users' sensory interactions shape the meaning of space. Within the cultural ecology framework, the concept of source of environmental knowledge proposed by Guy and Farmer explains that understanding of the environment is not formed solely through theoretical knowledge, but through direct experience and continuous interaction between humans and space [7]. Thus, space is understood not only in functional terms, but also as a construction of sensory, emotional, and cultural experience.

As illustrated in Figure 4, the interior of the Jakarta Cathedral Church features a high ceiling, which directly influences the spatial experience of its users. This vertical dimension allows for effective air circulation, creating more comfortable thermal conditions within the tropical climate context. This condition indicates that spatial configuration is not only driven by symbolic considerations, but also represents a response to local environmental conditions, as emphasized in the cultural ecology approach.

Figure 4. The high ceiling of the Jakarta Cathedral Church

Furthermore, the resulting spatial experience is not only physical in nature, but also psychological and spiritual. The vertical scale of the space creates a visual perception that diminishes the human presence within it, thereby reinforcing the sense of sacredness and the spiritual relationship between users and the worship space. In this context, space functions as a medium that shapes religious experience through the interplay between physical dimensions and sensory perception.

However, these findings also indicate that the quality of spatial experience is highly dependent on the maintained physical condition of the building. In other words, the degradation of architectural elements, such as materials or lighting [16], has the potential to disrupt the sensory experience that constitutes an essential part of the space's value.

The concept of building image in cultural ecology emphasizes that a building's identity is not determined solely by its form, but also by its materials, details, and visual qualities that shape users' perception of space

[7]. As shown in Figure 5a, the interior mural paintings on the walls represent a significant component of the church's visual identity, possessing high historical and artistic value. These murals were executed by traditional craftsmen using manual techniques, resulting in a distinctive visual character while also making them highly vulnerable to damage from direct contact. To address this issue, the Jakarta Cathedral Church management installed iron barriers along the walls (Fig. 5b) as a measure to protect the material.

Figure 5a. The mural wall (left)
Figure 5b. The mural wall barrier (right)

From the preservation perspective, the installation of these barriers should not be understood merely as a technical intervention, but also as a strategy to maintain the continuity of the building image and spatial experience. The presence of the barriers allows the mural elements to remain visually preserved, ensuring that the colors, textures, and artistic details that shape the sacred atmosphere of the space can still be perceived by users.

This condition reflects a compromise between accessibility and material protection. The physical barriers indirectly limit direct user interaction with architectural elements, resulting in a spatial experience that is more visual than tactile. Within the cultural ecology framework, this condition represents an adjustment between the need for material preservation and the quality of user interaction with space. Thus, the preservation strategy implemented is not only oriented toward the physical protection of materials, but also aims to maintain the quality of spatial experience and the building's visual identity.

Materials

The material aspect is not merely a physical element, but forms part of a system of meaning, technology, and environmental adaptation within the cultural ecology framework. In the concept of building image, materials play a significant role in shaping visual identity while also representing the relationship between the building, culture, and its environmental context [17].

At the Jakarta Cathedral Church, material selection reflects a process of adaptation between European neo-Gothic architectural typology and tropical climatic conditions. As shown in Figure 6, the use of teak wood in the ceiling structure replaces the stone material commonly used in neo-Gothic churches in Europe. Based on interview findings, teak wood was selected due to its suitability for local environmental conditions, particularly in resisting high humidity and pest attacks. This indicates that material selection is not based solely on aesthetic or historical considerations, but also on ecological responsiveness.

Figure 6a. The Jakarta Cathedral ceiling (left)
Figure 6b. The ceiling detail (right)

Within the cultural ecology perspective, this condition reflects a process of localization, in which global architectural elements are adapted through local materials to function optimally within a specific environmental context. Thus, the use of teak wood not only preserves the neo-Gothic architectural form, but also represents an ecological adaptation that enables the building to endure over time.

However, these findings also indicate that material adaptation is not entirely free from compromise. The use of local materials, which are lighter than stone, may influence both the structural character and the resulting spatial perception. This suggests that preservation is not solely concerned with maintaining visual form, but also involves negotiation between the authenticity of architectural typology and the need to adapt to tropical environmental conditions.

Furthermore, as shown in Figure 7, the replacement of the roof material from Ulin wood to copper following its collapse in 1890 represents an intervention aimed at improving structural resilience. The use of copper not only provides a technical solution to material durability issues, but also produces a visual transformation through natural oxidation, which changes the roof color into a greenish patina. This transformation indicates that materials are not static, but evolve over time, contributing to the building's visual identity [18].

Figure 7a. The Jakarta Cathedral roof (left)
Figure 7b. The roof detail (right)

In the context of preservation, the decision to use copper can be understood as part of an adaptive strategy that integrates aspects of protection and sustainability. However, interview findings reveal that the roof design lacks sufficient overhang, causing rainwater to directly impact the walls and windows, thereby accelerating deterioration of the façade elements. This condition indicates that material durability is not always accompanied by an optimized architectural design response.

These findings reveal an imbalance between material selection and design configuration in responding to tropical climatic conditions. Within the cultural ecology framework, buildings should not only adapt through materials, but also through architectural form and elements that can more comprehensively mitigate environmental impacts. Thus, the preservation strategy implemented remains relatively partial and has not yet fully integrated material and design aspects [19].

The preservation approach applied by the Jakarta Cathedral Church refers to the principle of minimum intervention, maximum invention, which emphasizes minimal physical alteration while allowing innovation to support long-term sustainability. This approach reflects an awareness of maintaining material and structural authenticity, while also accommodating functional and environmental adaptation.

Within the framework of Law No. 11 of 2010, material interventions such as roof replacement can be categorized as part of protection efforts, particularly in the form of restoration. However, based on the findings of this study, such restoration is not merely technical, but also involves ecological considerations and long-term building performance.

Construction Techniques

Construction techniques emphasize the methods, systems, and building practices applied in the preservation process. Within the cultural ecology framework, the concept of technologies proposed by Guy and Farmer does not refer solely to modern technology, but also encompasses practical knowledge, craftsmanship, and the use of local resources developed within specific cultural contexts [7]. Thus, construction techniques are understood as part of a socio-ecological system that connects humans, materials, and the environment.

Based on interview findings with HAP Architecture, the restoration process of the Jakarta Cathedral Church began with a historical assessment of the building through archival research conducted using records stored in the Netherlands. This approach indicates that the applied construction techniques were not only based on existing field conditions, but also considered the authenticity of the original design as part of maintaining the building's historical integrity. In this context, the "reset" process can be understood as a reconstruction effort grounded in historical knowledge to restore architectural consistency.

Furthermore, as shown in Figure 8, the application of a protective coating on the exterior walls represents a technical strategy to address environmental issues, particularly moss growth due to high humidity. This action demonstrates that the construction techniques employed do not merely preserve original materials, but also integrate additional technologies to enhance the building's resilience to tropical climatic conditions [20].

Figure 8. The exterior wall of the Jakarta Cathedral Church

The use of traditional craftsmen in the restoration process also reflects the application of the technologies concept within cultural ecology, where local skills play a crucial role in sustaining the building. Construction techniques based on traditional knowledge enable ongoing maintenance and repair, as the methods employed remain understandable and replicable by local communities.

However, field findings indicate that the applied construction techniques still face limitations in responding comprehensively to environmental challenges. As shown in Figure 8, deterioration of the

exterior walls continues to occur due to intense exposure to rain and heat, despite repairs using materials that resemble the original composition, such as a mixture of sand, lime, and crushed brick [16]. This condition suggests that the conservation approach tends to focus on material compatibility, but has not been fully complemented by a comprehensive environmental protection strategy.

From the cultural ecology perspective, this indicates that construction techniques cannot be separated from the ecological context in which the building exists. Structural resilience is not determined solely by material authenticity or traditional techniques, but also by the capacity of the construction system to respond to evolving environmental conditions, including increased rainfall intensity, air pollution, and complex urban dynamics.

Furthermore, the limited availability of authentic materials, along with the advancement of modern construction technologies, places preservation practices in a dilemma. On the one hand, there is a need to maintain the authenticity of techniques and materials; on the other hand, there is a demand to enhance building performance to withstand contemporary environmental conditions. This situation reflects a tension between conservation principles and the need for adaptation, which constitutes a key challenge in cultural heritage preservation. Thus, the construction techniques applied in the Jakarta Cathedral Church not only reflect protection efforts, but also demonstrate that preservation is an adaptive process involving the integration of traditional knowledge, modern technology, and environmental responsiveness.

Place and Zoning

The aspect of place and zoning in this study is analyzed based on the place and zoning variable as formulated in Table 1, which emphasizes the relationship between spatial structure, area function, and cultural values within the preservation framework. From a cultural ecology perspective, the concept of Idealized Concept of Place asserts that a building cannot be understood in isolation as a physical object, but rather as part of a spatial system shaped by the interaction between environmental conditions, social practices, and cultural values [7].

In the context of the Jakarta Cathedral Church, this is reflected in the implementation of a zoning system that refers to the provisions of Law No. 11 of 2010, which divides cultural heritage areas into four main zones: core, buffer, development, and supporting zones. As illustrated in Figure 9, the core zone represents the area with the highest level of protection, encompassing the main church building as a space of worship. Preservation efforts in this zone are carried out through routine maintenance and the use of materials that resemble the original condition of the building, indicating an effort to maintain both the physical authenticity and sacred function of space.

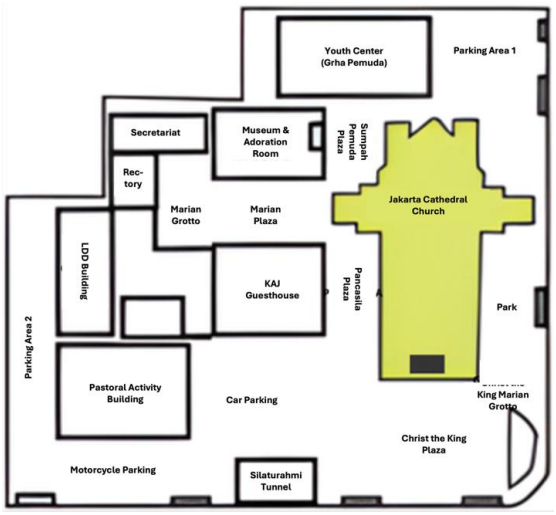

Figure 9. The core zone of the Jakarta Cathedral Church

However, the core zone cannot be understood independently from the role of other zones that collectively form an integrated spatial system. As illustrated in Figure 10, the buffer zone functions as a transitional layer between the sacred space and the urban environment, encompassing plazas, gardens, and parking areas. This function indicates that preservation efforts are not solely focused on the main building, but also involve the regulation of surrounding activities to maintain visual quality and spatial experience.

Figure 10. The buffer zone of the Jakarta Cathedral Church

On the other hand, as shown in Figure 11, the development zone extends the function of the area through the presence of the Cathedral Museum and Grha Pemuda, which serve as spaces for education and social activities. The utilization of this zone indicates that preservation is not static, but involves functional adaptation to support the cultural and economic sustainability of the area. This condition aligns with the utilization aspect outlined in the Cultural Heritage Law, which emphasizes the importance of productive use of space without diminishing its historical value.

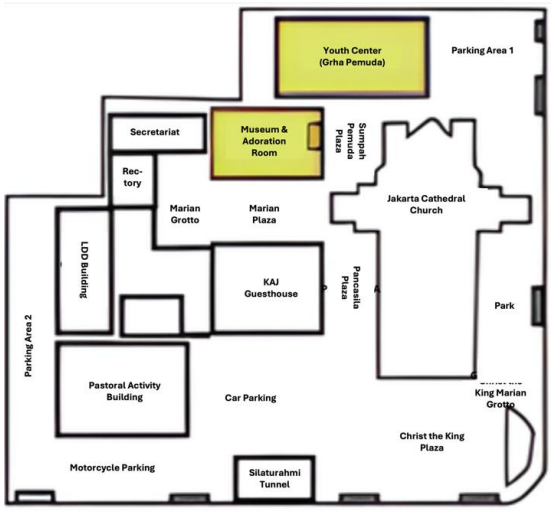

Figure 11. The development zone of the Jakarta Cathedral Church

Meanwhile, as illustrated in Figure 12, the supporting zone functions as an operational element that ensures the continuity of activities within the area as a whole. The presence of facilities such as the Pastoral Building, Secretariat, and other pastoral facilities indicates that preservation is not only concerned with the primary object, but also with the supporting system that enables its functions to be sustained.

Figure 12. The supporting zone of the Jakarta Cathedral Church

From the cultural ecology perspective, this zoning structure reflects that the Jakarta Cathedral Church area operates as a spatial ecosystem composed of multiple functional layers that interact with one another. Each zone does not stand independently, but forms a dynamic relationship between sacred spaces, public spaces, and supporting spaces.

The study also indicates that the boundaries between zones are not always rigid, particularly during specific conditions such as major religious events, where the plaza area within the buffer zone is utilized as an extension of the worship space. This condition reflects a degree of flexibility in spatial use, which on the one hand accommodates user needs, but on the other hand may create pressure on the established zoning boundaries.

Thus, the zoning system of the Jakarta Cathedral Church not only represents the implementation of preservation policies, but also demonstrates that preservation is an adaptive process involving negotiation between the protection of historical values, functional spatial demands, and the dynamics of the urban environment [21].

Based on the analysis of variables including space and activities, spatial experience, material, construction techniques, and place and zoning, it can be understood that the preservation of the Jakarta Cathedral Church does not operate as a set of isolated processes, but rather as an interconnected and dynamic system. Through the cultural ecology approach, the findings reveal that the building is not merely preserved as a physical artifact, but as a living space that continuously adapts to environmental conditions, social practices, and user needs.

This adaptation is reflected in the adjustment of materials to tropical climate conditions, spatial arrangements that maintain sacredness while accommodating increased activity, and zoning systems that balance protection and utilization [22]. The study further identifies that preservation does not only face technical challenges, but also requires a more holistic approach in managing the relationship between physical, cultural, and environmental aspects [23]. Accordingly, the preservation of the Jakarta Cathedral Church area can be understood as a continuous process that not only safeguards historical values, but also demands adaptive capacity to remain relevant within the context of an evolving urban environment [24].

Conclusion

The preservation of the Jakarta Cathedral Church demonstrates that preservation cannot be understood merely as an effort to maintain the physical form of a building, but rather as a process that involves the interconnection between space, activities, materials, construction techniques, and zoning systems within a dynamic whole. Through the cultural ecology approach, this study confirms that cultural heritage buildings should be understood as systems that continuously adapt to environmental conditions, social practices, and user needs. Accordingly, preservation is not static, but adaptive and contextual.

The findings indicate that the integration between cultural ecology principles and the preservation framework of Law No. 11 of 2010 has been implemented through spatial organization, material selection, and zoning arrangements. However, this integration has not yet been fully optimized, as imbalances remain between efforts to maintain material authenticity and the need to adapt to tropical climatic conditions and urban environmental dynamics. Several preservation interventions tend to be partial, particularly in terms of materials and construction techniques, and have not been fully integrated with environmentally responsive design strategies.

From a theoretical perspective, this study contributes by demonstrating that the cultural ecology approach can serve as an effective analytical framework for understanding cultural heritage preservation as a simultaneously ecological and cultural process, rather than merely a technical or administrative intervention. In the context of tropical architecture, these findings also highlight the importance of integrating materials, construction techniques, and spatial design in responding comprehensively to environmental conditions.

From a practical perspective, this study implies that preservation strategies for cultural heritage areas need to be developed in a more integrative manner, by strengthening the interconnection between protection, development, and utilization, as well as by considering zoning relationships as a mutually supportive system. This approach is expected to maintain historical authenticity while enhancing the building's resilience to environmental challenges and ongoing urban development.

AI Use Declaration

The authors acknowledge the use of ChatGPT (OpenAI, GPT-5.3) to assist with grammar checking and language refinement in translating the manuscript into English. The prompt used was: "Please translate this text into formal academic English while maintaining the original meaning and improving grammatical accuracy." The output from this tool was used to improve sentence structure, clarity, and grammatical correctness. While the authors acknowledge the use of AI, the authors maintain that they are the sole authors of this article and take full responsibility for the content, analysis, and conclusions presented, in accordance with publication ethics recommendations and journal policies.

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