Jurnal Arsitektur Zonasi

Journal homepage:
https://ejournal.upi.edu/index.php/jaz

Eco-Green Architectural Approach in the Development of the Pulau Datu Tourism Area within the Meratus Geopark

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ABSTRACT

The development of nature based tourism has increased significantly due to rising awareness of environmental sustainability. The Meratus Geopark has strong potential for sustainable tourism through the integration of geological, ecological, and cultural values. Pulau Datu is one of the key areas with coastal landscapes, preserved ecosystems, and historical-religious significance. However, existing conditions show limited infrastructure and the lack of optimal application of sustainable architectural principles, which may lead to environmental degradation. This study aims to examine the application of an eco-green architectural approach in developing the Pulau Datu tourism area. The research uses a qualitative descriptive-analytical method through observation, interviews, literature review, and documentation. Data analysis includes existing condition analysis, evaluation of eco-green principles, and SWOT analysis. The results indicate that the eco-green approach effectively integrates ecological, social, and economic aspects through energy efficiency, water management, use of eco-friendly materials, and adaptive design. The proposed concept includes sustainable development of docks, pedestrian paths, sanitation facilities, and religious areas. This study concludes that the eco-green approach enhances tourism quality while maintaining ecological balance in Pulau Datu.

ARTICLEINFO

Article History:
Submitted/Received 21 Mar 2026
First Revised 5 April 2026
Accepted 27 May 2026
First Available online 1 June 2026
Publication Date 1 June 2026

Keywords:
eco-green architecture,
tourism area,
sustainability,
Pulau Datu

1. INTRODUCTION

The development of nature-based tourism areas in recent decades has shown significant growth, driven by increasing public awareness of the importance of environmental conservation and sustainable tourism experiences. Geoparks represent a form of regional management that emphasizes not only geological conservation but also the integration of education, economic development, and environmental preservation. The Meratus Geopark, as one of Indonesia's geopark areas, holds considerable potential for sustainable tourism development based on its geological richness, biodiversity, and distinctive local culture.(Cranmer et al., 2020)

One of the locations with strong development potential within this area is Pulau Datu, located in Tanah Laut Regency, South Kalimantan Province. The island is known for its scenic coastal landscapes, relatively well-preserved natural ecosystems, and its embedded historical and cultural values. These potentials make Pulau Datu a strategic tourism destination to be developed, particularly in supporting the concept of a sustainable geopark. However, poorly planned tourism development may lead to environmental degradation, ecosystem damage, and a decline in the quality of the tourist attraction itself. In this context, a design approach is required that can accommodate tourism development needs without neglecting environmental sustainability aspects. A sustainable architectural approach through the eco-green concept offers a relevant solution. This approach emphasizes energy efficiency, the use of environmentally friendly materials, water resource management, and the integration of design with local natural conditions. In addition, the eco-green approach is oriented toward improving the quality of a healthy and comfortable built environment while maintaining ecosystem balance.(Putri Amanda & Tamiami Fachrudin, 2025)

The implementation of an eco-green approach in the development of the Pulau Datu tourism area is crucial, considering the characteristics of coastal regions that are vulnerable to environmental changes such as coastal erosion, sea-level rise, and habitat degradation. Therefore, the planning and design of the tourism area must comprehensively consider ecological aspects, including adaptation to tropical climate conditions, utilization of local potential, and community involvement in area management. Based on this background, this study aims to examine the application of an eco-green architectural approach in the development of the Pulau Datu tourism area within the Meratus Geopark. This study is expected to contribute to formulating a sustainable tourism area design concept that is adaptive to the environment and capable of enhancing economic value without compromising environmental preservation. Furthermore, this research is expected to serve as a reference for the development of similar tourism areas in Indonesia based on sustainability principles.(Maulida et al., 2024)

2. LITERATURE REVIEW

The study of eco-green approaches in architecture has developed rapidly over the past two decades as a response to issues of climate change and environmental degradation. This concept is part of sustainable architecture, which emphasizes energy efficiency, the use of environmentally friendly materials, and the integration of buildings with natural conditions. Several studies have shown that the implementation of green architecture can improve the environmental performance of buildings. Asserts that green architecture plays a role in reducing the negative impacts of development on the environment (Karimi et al., 2023). Furthermore, state that the main principles include energy efficiency, water management, and the use of sustainable materials. A study by (Fina Astuti & Nabila Shania, 2024) on the

DOI: http://doi.org/10.17509/jaz.v9i2.99169
p- ISSN 2621-1610 e- ISSN 2620-9934

Green School Bali demonstrates that the use of natural materials and passive design strategies is effective in improving building energy efficiency.

In the context of tourism areas, the eco-green approach is not only applied to individual buildings but also to overall site planning. Argue that the integration of ecological, social, and economic aspects can create sustainable tourism areas. Meanwhile, (Pebriyanti, 2017) emphasizes the importance of resource efficiency and environmental management in the development of tourism facilities such as hotels.

In addition, the use of environmentally friendly materials and passive design strategies is an important factor in supporting the successful implementation of eco-green concepts. (Azhari et al., 2025) reveal that local and recycled materials make a significant contribution to building sustainability. Based on these studies, it can be concluded that the eco-green approach has strong relevance in the development of sustainable tourism areas, including in the context of Pulau Datu within the Meratus Geopark, by emphasizing a balance between development and environmental preservation.

The research entitled "Eco-Green Architectural Approach in the Development of the Pulau Datu Tourism Area within the Meratus Geopark" offers novelty through the integration of a sustainable architectural approach at the scale of a geopark-based tourism area, which has not been widely explored, particularly in the context of the Meratus Geopark and Pulau Datu.

Unlike previous studies that generally focus on the application of eco-green concepts to individual buildings (such as schools, hotels, or public facilities), this research proposes a more comprehensive approach by examining the implementation of eco-green principles in integrated tourism area development. This includes spatial planning, landscape design, circulation systems, natural resource utilization, and connections with coastal ecosystems.
Other novelties of this study include:

1. A geopark-based contextual approach that integrates geological, ecological, and local cultural values into tourism area design.
2. The development of a conceptual eco-green model for coastal areas, which considers environmental vulnerabilities such as coastal erosion, tropical climate conditions, and ecosystem sustainability.
3. An emphasis on the integration of design and conservation, resulting in planning recommendations that are not only aesthetic and functional but also adaptive and sustainable.

Thus, this study provides a new contribution to the field of architecture, particularly in the application of eco-green concepts at the scale of geopark-based tourism areas, and serves as a reference for the development of similar areas in Indonesia.(Windapo et al., 2021)

3. RESEARCH PROBLEM

The development of nature-based tourism areas, particularly in the Meratus Geopark region, faces challenges in maintaining a balance between enhancing tourism attractiveness and preserving the environment. Pulau Datu, as one of the potential destinations, has coastal ecosystem characteristics that are vulnerable to development pressures, such as vegetation degradation, land use changes, and declining environmental quality due to tourism activities that are not sustainably managed.

The main problem identified is the suboptimal implementation of sustainable architectural principles in the development of the tourism area. Existing planning tends to focus primarily on functional and economic aspects, without comprehensively considering ecological aspects such as energy efficiency, water management, the use of environmentally

DOI: http://doi.org/10.17509/jaz.v9i2.99169
p- ISSN 2621-1610 e- ISSN 2620-9934

friendly materials, and the integration of design with natural conditions and local culture. In addition, there is no specific model or design concept for tourism area development that adapts the eco-green approach within the context of geoparks and coastal regions. Based on these conditions, this study seeks to address the main research question, how can the eco-green architectural approach be effectively integrated into the development of the Pulau Datu tourism area to ensure sustainability and environmental adaptability.(Cranmer et al., 2020)

Descriptively, the hypothesis of this study can be formulated as follows the implementation of an eco-green architectural approach in the development of the Pulau Datu tourism area within the Meratus Geopark is expected to improve environmental quality, enhance resource efficiency, and create a sustainable tourism area through the integration of ecological, social, and economic aspects. This hypothesis emphasizes that the more optimal the application of eco-green principles such as energy efficiency, the use of local materials, water management, and site-responsive design the higher the level of sustainability and overall quality of the resulting tourism area.

4. RESEARCH METHODS

This study employs a qualitative approach with a descriptive analytical research type aimed at comprehensively understanding the application of eco-green architecture principles in the development of sustainable tourism areas. The qualitative approach is chosen because it enables an in-depth and contextual examination of phenomena, particularly in understanding the relationship between environmental physical conditions, human activities, and sustainable architectural principles. The descriptive-analytical method is used to interpret empirical data obtained from the field and relate it to relevant theoretical concepts. This approach is widely applied in sustainable architecture research as it allows for the holistic integration of environmental, social, and design aspects (Maulida et al., 2024).

The research was conducted in the Pulau Datu area, which is part of the Meratus Geopark. The selection of this location is based on the characteristics of coastal areas that have high ecological sensitivity as well as significant potential for geology and environment based tourism development. In this context, eco-green architecture is understood as a design system that is not only oriented toward buildings but also toward the integration between the natural environment and human activities. This concept emphasizes energy efficiency, the wise use of resources, and the integration of design with natural ecosystems.(Purnomohadi, 2011)

Data collection techniques in this study were carried out through several methods to obtain comprehensive and valid data. First, field observations were conducted to identify the existing conditions of the area, including aspects of topography, climate, vegetation, and tourism activity patterns. Observation is an important method in architectural research because it allows researchers to directly understand the relationship between space and user behavior. Second, semi-structured interviews were conducted with stakeholders, such as local communities, site managers, and government representatives, to gather information related to needs, perceptions, and development potential. Third, a literature review was undertaken by examining various scientific sources such as journals, books, and articles related to eco-green architecture, green buildings, and sustainable tourism. The literature review serves as a theoretical foundation for formulating research variables and indicators as well as strengthening the analysis. Fourth, documentation in the form of visual data collection (photographs, maps, and planning documents) was used to support the interpretation of field

DOI: http://doi.org/10.17509/jaz.v9i2.99169
p- ISSN 2621-1610 e- ISSN 2620-9934

data. This combination of techniques is commonly used in sustainable architecture research to produce holistic and integrated data (Yuliani et al., 2025)

Data analysis was conducted in stages using a descriptive-analytical approach, followed by a design synthesis process. The first stage is the analysis of existing conditions, which aims to identify the physical, environmental, and social characteristics of the area. This stage includes the analysis of topography, climate, vegetation, and existing tourism activity patterns. The second stage is the analysis of eco-green architectural suitability, which evaluates site conditions based on sustainable architectural principles such as energy efficiency, water management, the use of environmentally friendly materials, and integration with the landscape. These principles are key elements in green architectural design aimed at minimizing environmental impact. (Li et al., 2017)

Furthermore, a SWOT (Strengths, Weaknesses, Opportunities, Threats) analysis was conducted to identify potentials and constraints in tourism area development. The SWOT method is widely used in planning and architectural research as it provides a strategic overview of internal and external conditions. In the context of sustainable architecture, this analysis helps formulate design strategies that are adaptive to environmental and social conditions. The final stage is the synthesis of design concepts, which integrates all analysis results into a comprehensive eco-green architecture-based tourism development concept. This synthesis produces design recommendations that consider ecological, social, and economic aspects in an integrated manner.

Through these methodological stages, this study is expected to generate a tourism area development concept that is not only oriented toward aesthetics and functionality but also toward environmental sustainability and ecosystem balance within the Meratus Geopark, particularly in the Pulau Datu area.(Purnomohadi, 2011)

5. RESEARCH PROCESS

a. Problem Identification
   The research stages are systematically structured to develop a sustainable tourism area concept based on eco-green architectural principles. The study begins with the problem identification stage, which aims to examine the initial conditions and identify the main issues within the study area. At this stage, preliminary observations are conducted to identify issues related to limited infrastructure, the suboptimal implementation of sustainable architectural principles, and the potential for environmental degradation caused by tourism activities. The results of this stage serve as the basis for defining the research focus and direction.
b. Literature Review
   The next stage is the literature review, which is conducted to establish a theoretical and conceptual foundation related to eco-green architecture, sustainable design, and geopark-based tourism development. This review involves various scientific sources, including journals, books, and relevant previous studies. The literature review functions to construct the conceptual framework, define research variables and indicators, and strengthen the scientific arguments underlying the study.
c. Data Collection
   Subsequently, the data collection stage is carried out to obtain comprehensive primary and secondary data. Primary data are collected through field observations to identify the physical and environmental conditions of the area, as well as semi-structured interviews with stakeholders to explore information regarding needs, perceptions, and development potential. Meanwhile, secondary data are obtained through

DOI: http://doi.org/10.17509/jaz.v9i2.99169
p- ISSN 2621-1610 e- ISSN 2620-9934

documentation, including photographs, maps, and relevant planning documents. This combination of data collection techniques is employed to ensure the validity and completeness of the research data.

d. Data Analyisis

The following stage is data analysis, which is conducted using a descriptive-analytical approach through several methods. First, the existing condition analysis is performed to identify the physical, environmental, and social characteristics of the area. Second, the eco-green analysis evaluates the suitability of the site based on sustainable architectural principles, including energy efficiency, water management, the use of environmentally friendly materials, and integration with the landscape. Third, a SWOT analysis (Strengths, Weaknesses, Opportunities, Threats) is conducted to identify the potentials and constraints in the strategic development of the area. The results of these analyses serve as the foundation for formulating the design concept.

e. Concept Synthesis

Furthermore, the concept synthesis stage is conducted by integrating all analytical findings into a comprehensive design concept for a sustainable tourism area. At this stage, design strategies are formulated based on eco-green architectural principles, encompassing the development of key facilities, circulation systems, resource management, and spatial organization that is adaptive to environmental conditions and site characteristics.

f. Conclusions And Recommendations

The final stage of the research is conclusions and recommendations. The conclusions are drawn based on the results of the analysis and synthesis to address the research objectives. Meanwhile, the recommendations provide guidance for the development of sustainable and environmentally adaptive tourism areas and are expected to serve as a reference for the planning of similar areas in the future.

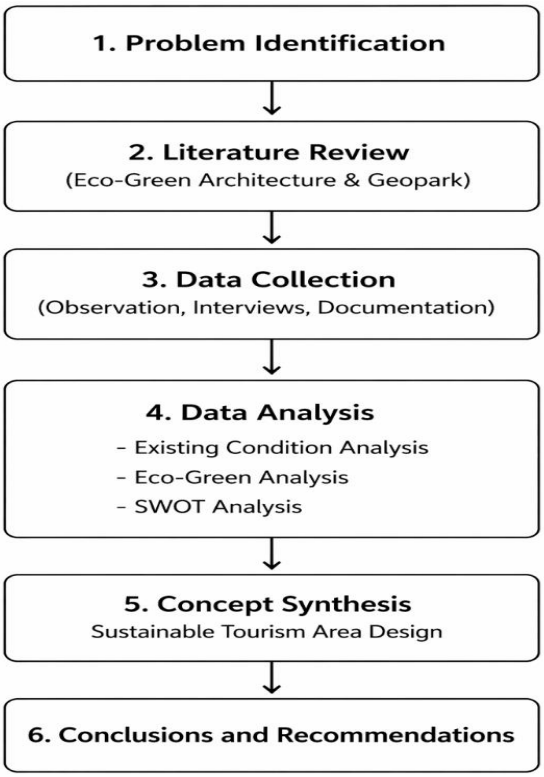

Figure 1. Research Diagram
(Source: Author, 2026)

DOI: http://doi.org/10.17509/jaz.v9i2.99169
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6. RESULTS AND DISCUSSION

Pulau Datu is one of the unique tourist destinations in Tanah Laut Regency, South Kalimantan Province. Geographically, the island is located in waters near Batakan Beach, specifically in Tanjung Dewa Village, Panyipatan District. This small island lies a few kilometers offshore and can be accessed by boat or klotok (traditional motorized boat) from the mainland with a relatively short travel time. Physically, Pulau Datu is characterized as a small rocky island with fairly dense natural vegetation and a coastal landscape dominated by rock formations and relatively calm sea waters. The scenic beauty of the ocean panorama, vast open skies, and the presence of small hills give the island strong visual appeal, particularly for marine tourism and nature photography.

However, the main distinctive feature of the Pulau Datu tourism area lies not only in its natural aspects but also in its strong historical and spiritual values. The island is known as a religious site due to the presence of the tomb of an Islamic preacher known as Datu Pamulutan. The existence of this tomb makes Pulau Datu a pilgrimage destination that is regularly visited by people from South Kalimantan as well as other regions. This pilgrimage activity has become the primary function of the area, and Pulau Datu is often categorized as a religious tourism site or a “cultural beach.”

In the context of tourism development, Pulau Datu has significant potential as an integrated tourism area that combines natural (marine) tourism with religious tourism. Its proximity to Batakan Beach, a major tourist destination in Tanah Laut, positions the island as part of an interconnected coastal tourism system. Visitors to Batakan Beach often continue their journey to Pulau Datu as part of a local tourism package.

In addition, the area holds cultural value and local legends that are widely recognized within the community. Stories about Datu Pamulutan and the history of the island—once believed to have been connected to the mainland of Tanjung Dewa enrich the narrative dimension of the site, thereby enhancing its appeal as a destination rooted in local wisdom. From a management perspective, Pulau Datu is included as a regional tourism development potential promoted by the Tanah Laut Regency government, particularly within the religious tourism sector. This development is expected to increase the contribution of tourism to the local economy while preserving existing cultural and spiritual values.

Overall, Pulau Datu is a tourism area with a unique character, combining the natural beauty of a coastal landscape with strong religious and cultural significance. This combination makes Pulau Datu not only a place for recreation but also a space for spiritual reflection and the preservation of local history.

a) Existing Condition

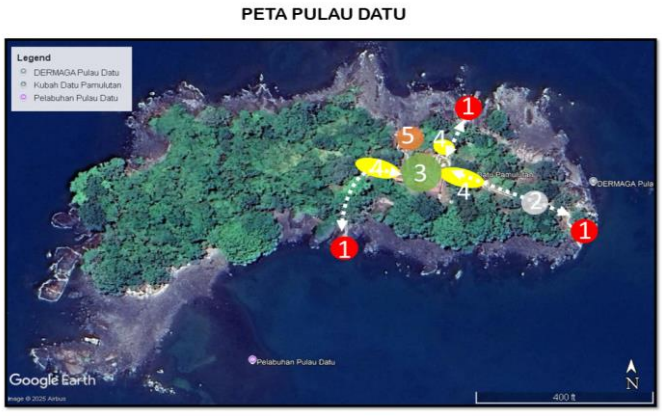

Figure 2. Pulau Datu Island
(Source: Google Maps, 2025)

DOI: http://doi.org/10.17509/jaz.v9i2.99169
p- ISSN 2621-1610 e- ISSN 2620-9934

The image shows a map of Pulau Datu derived from satellite imagery, with several key points and analysis zones marked. The island area is dominated by dense green vegetation cover in the central part, while the edges display a rocky coastline. There are colored numerical markers indicating specific points, such as the main access point (pier), activity areas, and potential development zones. Dashed lines illustrate connectivity or circulation between different areas on the island. In addition, a core zone is marked in the central area, which likely serves as the primary focus of planning, surrounded by supporting zones. Overall, this map is used to identify existing conditions as well as the development potential of the tourism area based on an ecological approach.

Figure 3. Piers of Pulau Datu Island
(Source: Author, 2025)

The piers on Pulau Datu, located on the northern, eastern, and southern sides, are generally not functioning optimally. The northern pier has a relatively good structure; however, it lacks supporting facilities and still depends on wave conditions. The eastern pier remains basic in condition, poorly maintained, and difficult to access, making it unsuitable for accommodating large boats. Meanwhile, the southern pier does not yet have adequate infrastructure, rendering it unfit to serve as a primary facility for tourism activities and marine transportation.

Figure 4. Pedestrian Pulau Datu Island
(Source: Author, 2025)

DOI: http://doi.org/10.17509/jaz.v9i2.99169
p- ISSN 2621-1610 e- ISSN 2620-9934

The pedestrian path leading to the mushola (prayer room) on Pulau Datu currently does not meet proper standards. The existing pathway is difficult to traverse as its surface consists of loose gravel, it lacks directional signage, and poses a high safety risk during rain due to slippery conditions. In addition, there is no lighting provided along the path, further increasing the risk for pedestrians. Overall, this pedestrian route has many deficiencies and requires comprehensive improvement and reorganization.

Figure 5. Rest Room of Pulau Datu Island
(Source: Author, 2025)

The WC/toilet facilities on Pulau Datu consist of four buildings with a total of six toilet units; however, only a few are still usable. They are located in a low-lying area near the shoreline, making them frequently affected by rising sea levels during high tide. The level of cleanliness is still inadequate, accompanied by unpleasant odors, limited availability of clean water, and the absence of lighting at night. These conditions render the toilet facilities unfit for proper use and in need of comprehensive improvement and reorganization.

Within the toilet area, there is a historical well that is unique because, despite being located close to the shoreline, it still produces fresh water. However, the well remains uncovered, making it vulnerable to contamination from surrounding waste. The well boundary is relatively low, cleanliness is not well maintained, and there is no informational signage explaining its historical significance and uniqueness.

SWOT (Strengths, Weaknesses, Opportunities, Threats) analysis is a strategic approach used to systematically identify the internal and external conditions of an area. In the development of the Pulau Datu tourism area, this analysis plays an important role in assessing the potentials, limitations, opportunities, and threats that influence the sustainability of the area. By integrating physical, socio-cultural, and environmental factors with external dynamics such as tourism trends and regional policies, SWOT analysis serves as a foundation for formulating adaptive and sustainability-based development strategies. The results of this analysis are expected to support the development of Pulau Datu as a competitive tourism destination aligned with eco-green architectural principles.

Table 1: SWOT Analytic

Strategy	Strategy Formulation	Implementation Direction
SO (Strength–Opportunities)	Leveraging the area's strengths (nature and religious tourism) to capture opportunities in sustainable tourism trends	-Developan eco green tourism concept based on religious and nature tourism -Create an integrated area design using an environmentally friendly architectural approach -Integrate tourism packages with Batakan Beach

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p- ISSN 2621-1610 e- ISSN 2620-9934

Strategy	Strategy Formulation	Implementation Direction
WO (Weakness–Opportunities)	Overcoming infrastructure weaknesses by utilizing tourism development support	-Improve basic facilities (piers, sanitation, rest areas) based on eco design principles -Develop a safe and sustainable marine transportation system -Plan the area based on zoning (religious, conservation, tourism)
ST (Strength–Threats)	Utilizing cultural and natural strengths to address environmental threats and competition	-Strengthen the identity of religious tourism as the main attraction -Provide conservation based tourism education -Control the number of visitors (carrying capacity) to maintain sustainability
WT (Weakness–Threats)	Minimizing weaknesses and avoiding threats through defensive strategies	-Establish regulations for sustainable tourism area management -Improve the capacity of managers and local communities -Implement waste management and coastal environmental damage mitigation

Source : Author 2025

b) Concept Desgin

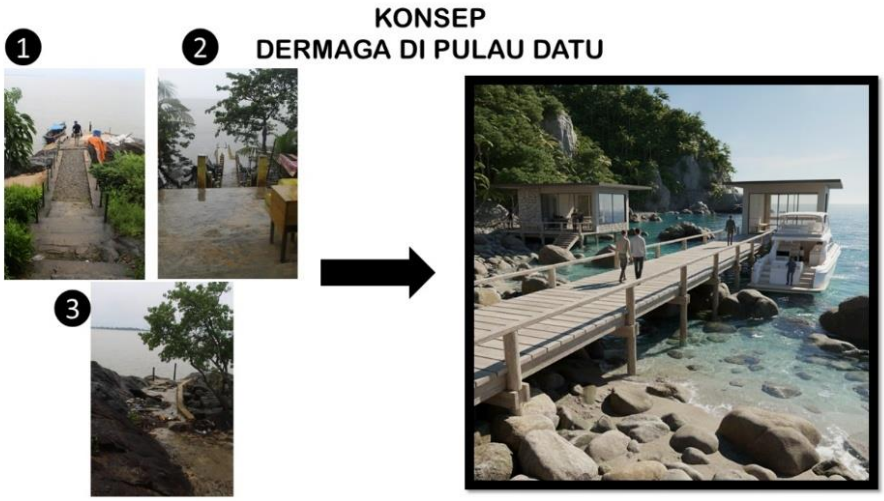

Figure 6. Pier of Datu Island
(Source: Author, 2025)

The concept for developing the pier on Datu Island in the image shows the transformation of the existing condition, which was still simple, narrow, unsafe, and disorganized, into a modern, safe, and functional tourist pier. The pier is designed to extend out into the sea with a sturdy structure and appropriate elevation, so it can be used safely in various tidal conditions. The pedestrian path is made wide, stable, and comfortable with side barriers to reduce the risk of falls, while also supporting pedestrian and tourist activities. The pier edge area is developed with supporting buildings with modern tropical architecture such as shelters, waiting rooms, and tourist service facilities that remain integrated with the natural character of the island. The layout of the site takes into account the contours of the natural

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p- ISSN 2621-1610 e- ISSN 2620-9934

rocks, vegetation, and the clarity of the seawater, creating an aesthetic and classy spatial experience. Overall, this concept emphasizes safety, comfort, visual appeal, and improving the quality of the tourist destination so that the Datu Island pier can function as the main gateway to a representative and high-standard tourist area.

Figure 7. Pedestrian of Datu Island
(Source: Author, 2025)

The pedestrian concept on Datu Island emphasizes comfort, safety, and sustainability, utilizing eco-friendly wooden boardwalks and tropical canopies for shade. Solar-powered lighting ensures energy efficiency and nighttime safety. The path is designed to follow the coastline while preserving natural vegetation, ensuring it serves not only as a circulation space but also as a recreational space and tourist experience.

Figure 8. Rest Room and Well of Datu Island
(Source: Author, 2025)

The toilet design implements a sustainable concept, focusing on comfort, cleanliness, and environmental friendliness through an efficient sanitation system. The materials used are water-resistant and resistant to coastal corrosion. The structure is elevated above sea level to prevent flooding and is equipped with a proper drainage system to maintain cleanliness, safety, and functionality. The development of the historic well on Datu Island emphasizes preservation, safety, and comfort through the addition of a roof, fence, paving, and improvements to the pathways, lighting, and drainage. It is equipped with educational information boards to ensure its preservation and religious tourism value.

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7. FINDINGS, CONCLUSION, RECOMMENDATIONS

a. Findings

The findings of this study reveal that Pulau Datu, as an integral part of Geopark Meratus, demonstrates substantial potential to be developed as a sustainable tourism destination that integrates ecological, cultural, and spiritual values. The area is characterized by its coastal landscape, rocky shoreline, relatively intact vegetation, and calm marine environment, which collectively provide strong visual and ecological appeal. In addition, the presence of the tomb of Datu Pamulutan establishes the island as a religious tourism destination, thereby creating a unique combination of natural and spiritual tourism. This dual identity represents a significant competitive advantage in the context of sustainable geopark-based tourism development.

However, the analysis of existing conditions indicates that the current state of infrastructure and supporting facilities is inadequate and not aligned with sustainable tourism standards. The piers located on different sides of the island exhibit varying levels of structural quality but generally lack supporting facilities, safety features, and resilience to tidal conditions. Accessibility remains limited, particularly for larger vessels, which constrains tourism capacity and operational efficiency. Similarly, pedestrian pathways are poorly constructed, lacking proper surface treatment, signage, and lighting, thereby posing safety risks to visitors. Sanitation facilities are also insufficient in both quantity and quality, with issues related to cleanliness, water supply, and vulnerability to tidal flooding due to their location near the shoreline.From an environmental perspective, the study identifies that the current development pattern has not yet fully integrated ecological considerations. The absence of proper waste management systems, the risk of contamination of natural water sources (including the historic freshwater well), and the lack of environmentally responsive design strategies indicate a gap between existing conditions and sustainable development principles. These issues, if not addressed, may lead to long-term environmental degradation, particularly in the fragile coastal ecosystem.

The eco-green analysis demonstrates that the site possesses strong potential for the application of sustainable architectural principles. The natural characteristics of the island support the implementation of passive design strategies, including natural ventilation, solar orientation, and the use of shading devices. The availability of local materials and the potential for integrating renewable energy systems further enhance the feasibility of eco-green development. Additionally, the spatial configuration of the island allows for zoning strategies that separate conservation areas, religious zones, and tourism activity zones, thereby supporting both environmental protection and functional efficiency.

The SWOT analysis further strengthens these findings by systematically identifying internal and external factors influencing development. The strengths of the area include its unique combination of natural and religious tourism, strong cultural identity, and scenic coastal environment. Weaknesses are primarily associated with inadequate infrastructure, limited accessibility, and insufficient environmental management. Opportunities arise from increasing global and national demand for sustainable tourism, as well as policy support for geopark development. Conversely, threats include environmental vulnerabilities such as coastal erosion, sea-level rise, and the risk of overdevelopment that may compromise ecological balance.

The synthesis of these analyses results in a comprehensive eco-green design concept that emphasizes sustainability, adaptability, and contextual integration. Key design interventions include the development of a resilient and safe pier system adapted to tidal conditions, the construction of eco-friendly pedestrian pathways using boardwalk systems that minimize

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p- ISSN 2621-1610 e- ISSN 2620-9934

environmental disturbance, the provision of sustainable sanitation facilities elevated above flood levels, and the preservation and enhancement of religious and cultural spaces. These design strategies collectively demonstrate the applicability of eco-green architecture at the scale of an integrated tourism area.

b. Conclusion

Based on the findings, this study concludes that the eco-green architectural approach provides a comprehensive and effective framework for the sustainable development of tourism areas in Pulau Datu. The approach enables the integration of environmental, social, and economic aspects into a cohesive development strategy, ensuring that tourism growth does not compromise ecological integrity.

The study confirms that the application of eco-green principles—such as energy efficiency, water resource management, the use of sustainable and locally sourced materials, and site-responsive design—can significantly improve the environmental performance and functional quality of tourism infrastructure. Furthermore, the incorporation of passive design strategies and climate-responsive planning enhances the adaptability of the built environment to coastal conditions, thereby reducing long-term environmental risks.

In addition, the research highlights the importance of integrating cultural and spiritual values into tourism development. The preservation of religious sites and local narratives not only strengthens the identity of the area but also contributes to its attractiveness as a unique tourism destination. This integration reflects a holistic approach to sustainability that goes beyond environmental considerations to include socio-cultural dimensions.

Overall, this study demonstrates that the successful development of geopark-based tourism areas requires a multidisciplinary approach that combines architectural design, environmental management, and community participation. The eco-green architectural approach thus serves as a strategic model for achieving sustainable, adaptive, and context-sensitive tourism development, particularly in environmentally sensitive coastal regions.

c. Recommendations

Based on the results of the study, several detailed recommendations are proposed to guide future development and ensure long-term sustainability:

1) Sustainable Infrastructure Development It is essential to redesign and upgrade existing infrastructure, including piers, pedestrian pathways, and sanitation facilities, using eco-green design principles. These improvements should prioritize structural safety, user comfort, and environmental resilience, particularly in response to tidal fluctuations and coastal conditions.
2) Integration of Eco-Green Design Principles All future development should adopt eco-green architectural strategies, including passive design, natural ventilation, optimal solar orientation, and the use of renewable energy sources such as solar power. The selection of materials should prioritize locally sourced, recyclable, and low-impact options to reduce the environmental footprint.
3) Environmental Protection and Resource Management Comprehensive environmental management systems should be implemented, including waste management, water conservation, and coastal protection measures. Special attention should be given to preserving natural resources, such as the historic freshwater well, through protective design and proper maintenance.
4) Zoning and Spatial Planning Strategy The area should be organized into functional zones, including conservation zones, religious zones, and tourism activity zones. This zoning

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approach will help regulate land use, minimize environmental impact, and enhance the overall spatial organization of the tourism area.

5) Community Participation and Local Empowerment Local communities should be actively involved in the planning, development, and management of the tourism area. Capacity-building programs and training initiatives are needed to enhance community skills in sustainable tourism practices, ensuring that economic benefits are distributed equitably.
6) Policy Support and Institutional Framework Government agencies and stakeholders should develop integrated policies that align tourism development with geopark conservation objectives. Regulatory frameworks should be established to control development intensity, enforce environmental standards, and support sustainable practices.
7) Visitor Management and Carrying Capacity Control A visitor management system should be implemented to regulate the number of tourists and prevent over-tourism. Carrying capacity assessments are necessary to maintain ecological balance and ensure a high-quality visitor experience.
8) Future Research Directions Further studies are recommended to explore quantitative assessments of environmental performance, the application of smart tourism technologies, and the long-term socio-economic impacts of eco-green tourism development in geopark areas.

REFERENCES

Bahari, P. I., & Zuhri, S. (2024). Penerapan arsitektur berkelanjutan pada bangunan komersial & pariwisata sebagai upaya mewujudkan kota hijau. Journal of Architecture and Urbanism Research, 8(1), 59–68. https://doi.org/10.31289/jaur.v8i1.11818 Issue: Vol. 8 No. 1 (2024): Oktober 2024

Astuti, F., & Shania, N. (2024). Penerapan prinsip arsitektur berkelanjutan pada Green School Bali. Jurnal Venus Teknik, 2(6). DOI: https://doi.org/10.61132/venus.v2i6.615 Vol. 2 No. 6 (2024): Desember

Fathir, M., et al. (2024). Penerapan eco-green pada bangunan gedung sarana olahraga Kabupaten Garut. Jurnal Konstruksi, 22(2). https://doi.org/10.33364/konstruksi/v.22-2.2129 Vol 22 No 2 (2024)

Fadhlan, J. R., et al. (2023). Penerapan arsitektur berkelanjutan pada perancangan taman wisata Riverland di Kota Bandung. Prosiding FAD Itenas. Vol. 3 No. 2 (2023): Arsitektur

Christine, S., & Agustin, D. (2025). Implementasi karakteristik eko arsitektur pada fasad rumah susun. JAUR, 9(1). https://doi.org/10.31289/jaur.v9i1.14692 Issue: Vol. 9 No. 1 (2025): Oktober

Cesa, F. J., & Zakariya, A. F. (2025). Penerapan green architecture pada hotel sebagai mitigasi perubahan iklim. JAUR, 9(2). https://doi.org/10.31289/jaur.v9i2.15103 Issue: Vol. 9 No. 2 (2026): April

Alifianto, A. P., & Satwikasari, A. F. (2023). Kajian konsep arsitektur hijau pada bangunan pendidikan. Jurnal Purwarupa. https://doi.org/10.24853/purwarupa.7.2.43-48 Vol. 7 No. 2 (2023)

Pratama, A. B. A. (2020). Strengthening the definition of green architecture in Indonesia. Jurnal Arsitektur. DOI http://dx.doi.org/10.36448/ja.v14i2.3408 Vol. 14, No. 2, Juli 2024, 83-98

Wicaksono, G., et al. (2017). Sustainable architecture for green city. Journal of Architectural Research and Design Studies. https://doi.org/10.20885/jars.vol1.iss1.art1 Vol. 1 No. 1 (2017)

Yuliani, S., et al. (2025). Green architecture in sustainable tourism. Journal of Asian Architecture and Building Engineering. https://doi.org/10.1080/13467581.2024.2421232 Volume 24, 2025

Issa, N., & Kiraz, A. (2025). Green architecture and sustainable design. Sanat ve Tasarım Dergisi. https://doi.org/10.20488/sanattasarim.1828187

Amanda, J. P., & Fachrudin, H. T. (2025). Implementasi arsitektur hijau. JAUR Journal. https://doi.org/10.31289/jaur.v9i1.14674 Vol. 9 No. 1 (2025): Oktober

Christine, S., & Agustin, D. (2025). Eco-architecture façade. JAUR Journal. https://doi.org/10.31289/jaur.v9i1.14692 Vol. 9 No. 1 (2025): Oktober

Cesa, F. J., & Zakariya, A. F. (2025). Green architecture and climate mitigation. JAUR Journal. https://doi.org/10.31289/jaur.v9i2.15103 Vol. 9 No. 2 (2026): April

Tacanahui, R. G. A., et al. (2024). Biophilic architecture. Environmental Research and Ecotoxicity. Vol. 3 (2024) https://doi.org/10.56294/ere2024102 Vol. 3 (2024)

Mohamed, A. S., et al. (2024). Sustainable landscape design. Springer Journal of Engineering and Architecture. https://doi.org/10.1007/s43995-024-00076-y Volume 15, pages 558–573, (2024)

ArchipelagoID. (2025). Pulau Datu: Kisah spiritual dan legenda yang abadi di Kalimantan Selatan. https://archipelagoid.com/pulau-datu-kisah-spiritual-dan-legenda-yang-abadi-di-kalimantan-selatan/

ANTARA News Kalimantan Selatan. (2018). Objek wisata Batakan sajikan legenda Pulau Datu. https://kalsel.antaranews.com/berita/70449/objek-wisata-batakan-sajikan-legenda-pulau-datu

ANTARA News Kalimantan Selatan. (2025). Pemkab Tanah Laut berupaya kembangkan sektor wisata. https://kalsel.antaranews.com/berita/60819/pemkab-tanah-laut-berupaya-kembangkan-sektor-wisata

Enampagi. (2022). Destinasi wisata unik Pulau Datu di Kalimantan Selatan. https://www.enampagi.id/travel/pr-1255865034/destinasi-wisata-unik-pulau-datu-di-kalimantan-selatan-miliki-sumur-kembar-air-tawar-lho

Stekom. (n.d.). Pulau Datu. https://p2k.stekom.ac.id/ensiklopedia/Pulau_Datu

Tripadvisor. (2017). Pulau Datu review. https://www.tripadvisor.co.id/Attraction_Review-g3680098-d9979484-Reviews-Datu_Island-Hulu_Sungai_Selatan_South_Kalimantan_Kalimantan.html

Kalselpos. (2022). Kurang lengkap berwisata ke Pantai Batakan jika tidak berkunjung ke Pulau Datu. https://kalselpos.com/2022/09/10/kurang-lengkap-berwisata-ke-pantai-batakan-jika-tidak-berkunjung-ke-pulau-datu/

Azhari, R. M., Lukman Ery, M., & Panjaitan, N. (2025). Sinergi : Jurnal Ilmiah Multidisiplin Penerapan Material Ramah Lingkungan dalam Arsitektur Modern di Indonesia. *Jurnal Ilmiah Multidisiplin*, *1*(2), 2025. https://publikasi.ahlalkamal.com/index.php/sinergi

Cranmer, E. E., tom Dieck, M. C., & Fountoulaki, P. (2020). Exploring the value of augmented reality for tourism. *Tourism Management Perspectives*, *35*, 100672. https://doi.org/10.1016/J.TMP.2020.100672

Fina Astuti, & Nabila Shania. (2024). Penerapan Prinsip Arsitektur Berkelanjutan pada Green School Bali. *Venus: Jurnal Publikasi Rumpun Ilmu Teknik* , *2*(6), 01–17. https://doi.org/10.61132/venus.v2i6.615

Karimi, H., Adibhesami, M. A., Bazazzadeh, H., & Movafagh, S. (2023). Green Buildings: Human-Centered and Energy Efficiency Optimization Strategies. In *Energies* (Vol. 16, Number 9). MDPI. https://doi.org/10.3390/en16093681

Li, X., Su, S., Zhang, Z., & Kong, X. (2017). An integrated environmental and health performance quantification model for pre-occupancy phase of buildings in China.

Environmental Impact Assessment Review, *63*, 1–11. https://doi.org/10.1016/J.EIAR.2016.11.003

Maulida, F. V., Tiara, R., 105, M. |, & Maharani, R. T. (2024). STUDY ON THE IMPLEMENTATIONS OF SUSTAINABLE ARCHITECTURE STRATEGIES IN INNOVATION PRECINCT DESIGN. *International Journal of Built Environment and Scientific Research*, *08*, 2.

Pebriyanti, P. E. (2017). *STRATEGI DESAIN BERKELANJUTAN PADA BANGUNAN HOTEL BERBASIS KONSEP GREEN HOTEL*. *11*(6), 253–262. https://doi.org/https://doi.org/10.24002/jars.v11i6.1359

Purnomohadi, N. (2011). *Sustainable, Ecologic, and Green Architecture Towards Indonesia Sustainable Future*. *10*(Architecture & Environment), 65–86. https://doi.org/http://dx.doi.org/10.12962%2Fj2355262x.v10i1.a521

Putri Amanda, J., & Tamiami Fachrudin, H. (2025). *ECO HIVE: Implementasi Konsep Arsitektur Hijau di Youth Public Space dengan Pendekatan Iklim*. *9*, 79–86. https://doi.org/10.31289/jaur.v9i1.14674

Windapo, A., Omopariola, E. D., Olugboyega, O., & Moghayedi, A. (2021). Use and performance of conventional and sustainable building technologies in low-income housing. *Sustainable Cities and Society*, *65*, 102606. https://doi.org/10.1016/J.SCS.2020.102606

Yuliani, S., Winarto, Y., Hardiana, A., Sumadyo, A., Lake, R. C., & Ekawati, J. (2025). Retrofit of green architecture through adaptive reuse of heritage buildings in sustainable tourism management. *Journal of Asian Architecture and Building Engineering*, *24*(6), 4758–4770. https://doi.org/10.1080/13467581.2024.2421232

DOI: http://doi.org/10.17509/jaz.v9i2.99169
p- ISSN 2621-1610 e- ISSN 2620-9934