



The Influence of Environmental Conditions on the Design of Nuwo Sesar, the Traditional House of Lampung

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Abstract

This study aims to identify and analyze the influence of environmental factors on the design elements of Nuwo Sesar, the traditional house of Lampung Province. The research focuses on the interaction between natural environmental conditions such as the humid tropical climate, topography, and potential natural hazards and the architectural elements of Nuwo Sesar. Data were collected through direct observation, physical documentation, interviews with customary elders, and environmental measurements across several Nuwo Sesar samples in Bandar Lampung and West Tulang Bawang. The results reveal a significant correlation between stilt structures, roof forms, building orientation, ventilation systems, and material selection with adaptive responses to high rainfall, temperature, humidity, and local soil conditions. This study formulates a set of adaptive design principles grounded in local wisdom that can be applied to contemporary architecture. The findings are significant not only for the preservation of cultural heritage but also for the development of architecture that is responsive to local environmental conditions.

Keywords: Adaptive architecture, humid tropical climate, Lampung local wisdom, Nuwo Sesar, stilt houses

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Introduction

Traditional architecture represents a significant expression of cultural heritage that reflects the identity and local wisdom of Indonesian society. As a country characterized by vast ethnic and cultural diversity, Indonesia possesses a wide range of traditional houses distributed from Sabang to Merauke, each with unique characteristics that demonstrate adaptation to their surrounding environments (Rapoport 2016). Traditional houses not only function as shelters but also embody philosophical values, social systems, and inherited local knowledge passed down through generations (Tondi 2018). Nuwo Sesat is one of the traditional houses originating from Lampung Province, particularly in the regions of Bandar Lampung and West Tulang Bawang. As a traditional structure of the Lampung community, Nuwo Sesat exhibits distinctive features in terms of structure, form, and function. Hidayat and Firmansyah (2018) explain that Nuwo Sesat is not merely a dwelling but serves as a customary hall where *purwatin* (traditional leaders) convene and where cultural ceremonies are held. In the Lampung language, Nuwo Sesat means “customary house” or “central house,” reflecting its role as a focal point of social and cultural activities within the community. The uniqueness of Nuwo Sesat lies in its stilted structure, elevated approximately 2–3 meters above ground level. According to Sari, Yolanda, and Prihatmaji (2017), this elevated form represents an adaptive response to the environmental conditions of Lampung, which include high rainfall and flood-prone lowlands. Furthermore, the steeply pitched roof, often adorned with buffalo horn ornaments (*Sigokh*) at its peak, serves not only an aesthetic purpose but also a functional role in facilitating ventilation and adapting to the humid tropical climate of the region (Adiyanto 2021).

Research on vernacular architecture, particularly the traditional Nuwo Sesat, has become increasingly urgent due to the declining number of original structures in Lampung as a result of modernization, changing lifestyles, and the limited availability of traditional materials. According to the Lampung Provincial Office of Culture (2022), the number of Nuwo Sesat buildings has decreased significantly by approximately 40% over the past decade. Based on this context, the present study aims to identify and analyze the influence of environmental factors on the design elements of Nuwo Sesat, as well as to formulate adaptive design principles that can be applied in contemporary architectural practice.

Methods

This study adopts a qualitative approach with a descriptive-analytical method. This approach is selected to gain an in-depth understanding of the relationship between environmental factors and the design of Nuwo Sesat. Through case studies conducted on several Nuwo Sesat samples, the research explores the complexity of interactions between the building and its environmental context.

Determination of research location and objects

The research was conducted at several locations in Lampung Province where Nuwo Sesat traditional houses are still well-preserved and retain their authenticity, namely Kampung Lamo Village, Rajabasa District, Bandar Lampung City, and Bandar Dewa Village, Tulang Bawang Tengah District, Tulang Bawang Barat Regency. The selection of Nuwo Sesat samples was based on the following criteria: (1) a minimum building age of 50 years to ensure the authenticity of traditional design, (2) relatively well-maintained physical condition and continued functional use, (3) the presence of distinctive structural and architectural elements characteristic of Nuwo Sesat, and (4) location in varying geographical conditions to capture diverse environmental adaptation strategies.

Data collection techniques

To obtain comprehensive data, this study employs multiple data collection techniques. Field observations were conducted through direct examination of the physical condition of Nuwo Sesat and its surrounding environment, focusing on structural characteristics, architectural elements, building orientation, and environmental context. Documentation included detailed photographic records of each building element, the preparation of sketches and technical drawings, as well as measurements of dimensions and identification of material types. Semi-structured interviews were conducted with key informants, including customary elders and Nuwo Sesat owners, traditional carpenters, experts in Lampung traditional architecture, and practitioners involved in the preservation of traditional buildings. Environmental measurements were also carried out to record parameters such as air temperature, relative humidity, wind speed and direction, and light intensity at specific time intervals (morning, afternoon, evening, and night).

Research instruments

The research instruments were designed to support systematic data collection. Observation guidelines were equipped with checklists covering environmental elements and building condition assessments. Specific forms were prepared for measuring dimensions and documenting material characteristics. For interviews, a semi-structured interview guide was employed, allowing flexibility in exploring in-depth information while maintaining alignment with the research objectives.

identification of research variables

This study focuses on two main categories of variables. Environmental variables include climatic factors (temperature, humidity, and rainfall), topography, wind direction, and natural resources. Meanwhile, design variables encompass building orientation, form, roof systems, structural systems, and the construction materials used.

Data analysis approach

The data analysis process begins with careful categorization, followed by an examination of the correlations between design elements and environmental factors. The researcher interprets patterns of how

Nuwo Sajat adapts architecturally to its surrounding environmental conditions. The validity of the findings is ensured through methodological triangulation and comparative analysis, allowing for a more robust and reliable interpretation of the results. The research findings are presented in the form of matrices, diagrams, and comprehensive descriptive narratives.

Systematic research workflow

The study follows a structured sequence of stages, beginning with a preliminary study and instrument preparation, followed by field data collection, data processing and analysis, formulation of findings and discussion, and concluding with the drawing of conclusions and the development of recommendations.

Results and discussion

Environmental characteristics and design response

The analysis of five Nuwo Sajat samples in Bandar Lampung and West Tulang Bawang reveals a consistent pattern of adaptation to humid tropical environmental conditions. The average air temperature ranges between 24–32°C, with relative humidity levels of 82–88%, annual rainfall between 2,200–2,400 mm, and wind speeds of 4–7 km/h predominantly from the southwest direction.

Key adaptive design elements

Stilt Structure: The stilt structure, elevated approximately 2.2–2.8 meters above ground level, has proven effective in mitigating water accumulation and enhancing air circulation. Measurements indicate a reduction in humidity of approximately 8–12% on the main floor compared to ground level; **Roof System:** The gable roof design, with a slope of 52–58° and overhangs ranging from 1.2–1.8 meters, provides optimal protection against tropical rainfall. The Sigokh ornament (buffalo horn motif) functions as a ridge ventilation element, facilitating vertical airflow and improving indoor air circulation; **Building Orientation:** An elongated east–west orientation, with primary openings facing North–South, maximizes cross-ventilation while minimizing direct solar radiation exposure. Indoor temperature measurements indicate conditions that are 3–5°C lower than the external environment; **Local Materials:** The use of hardwoods (such as merbau and teras) for the main structure and bamboo for flooring results in low thermal mass construction that is responsive to temperature fluctuations. These materials also exhibit hygroscopic properties, contributing to the regulation of indoor humidity levels.

Adaptive design principles

The findings of this study formulate five key adaptive design principles: (1) Elevating the building to mitigate ground moisture and flooding risks; (2) Optimizing cross-ventilation to achieve passive cooling; (3) Providing protection against solar radiation and heavy rainfall; (4) Ensuring structural flexibility to enhance earthquake resilience, and; (5) Integrating local materials and technologies to support environmental and cultural sustainability

Conclusion

This study successfully identifies a significant relationship between environmental factors and the design elements of Nuwo Sesat. The stilt structure, roof system, building orientation, and material selection represent optimal design solutions for the humid tropical climate of Lampung. The adaptive design principles formulated in this research demonstrate strong relevance for the development of sustainable contemporary architecture. The local wisdom embodied in Nuwo Sesat architecture illustrates a holistic approach to addressing environmental challenges through passive, energy-efficient design strategies. This study underscores the importance of preserving vernacular architecture not only as cultural heritage but also as a valuable source of knowledge for developing architecture that is responsive to global climate change. Furthermore, the integration of traditional wisdom with modern technology can serve as an effective strategy for creating sustainable and contextually responsive buildings.

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