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**PROCEEDINGS OF THE 16TH REGIONAL
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SIMPORA XVI: 2025**

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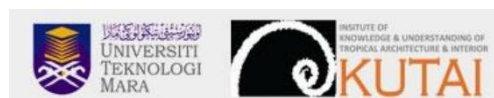
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FROM TRADITION TO TRANSFORMATION: TYPOLOGICAL EVOLUTION OF RIVERINE VERNACULAR HOUSES IN TELUK RUMBIA, ACEH SINGKIL

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Abstract: This study examines the architectural characteristics of vernacular houses located along the Singkil River, particularly in Teluk Rumbia Village, Aceh Singkil Regency. Built by the Singkil ethnic community, these houses represent cultural continuity while adapting to the geographical and climatic conditions of a riverine environment. The research employs a descriptive qualitative approach, using observation, interviews, documentation, and re-drawing of existing buildings. The findings reveal that the vernacular houses in Teluk Rumbia demonstrate adaptive and contextual design strategies, especially in response to floods and earthquakes, through the use of binangun (elevated stilt structures) and timber joinery without nails, which effectively reduce seismic vibrations. Local materials such as Sengketan and Punak wood as well as rumbia leaves are predominantly used, although a gradual shift to modern materials like corrugated metal and Rengas wood is observed due to resource limitations. Beyond their physical form, these houses embody social and cultural resilience through communal construction practices (gotong royong) and ritual traditions. Furthermore, typological transformations, including additional bedrooms, integrated sanitation facilities, and enlarged terraces, indicate continuous adaptation to lifestyle changes. Therefore, Teluk Rumbia vernacular houses can be regarded not only as cultural heritage but also as a sustainable architectural model for disaster-prone regions.

Keywords: Vernacular architecture; Singkil River settlement; Sustainable housing; Cultural tradition; Local wisdom

INTRODUCTION

Indonesia is widely recognised for its rich cultural heritage and local wisdom, which are strongly reflected in vernacular architecture. Vernacular houses are built through empirical knowledge and community practice, using local materials and construction techniques that adapt to geographical and climatic conditions (Nursaniah, Izziah, & Qadri, 2015). Scholars emphasise that vernacular architecture embodies both ecological and cultural values, making it a critical reference for sustainable built environments (Pardo, 2023; Zong, Utaberta, Ismail, & Al-Ashwal, 2024).

International studies have highlighted the adaptive and sustainable qualities of vernacular buildings. Flood-prone settlements across Asia, for example, demonstrate how elevated stilt systems, lightweight structures, and flexible timber joints contribute to resilience against hydro-climatic risks (Tavares, González, & Vellinga, 2022). Thermal comfort studies also confirm that passive strategies such as natural ventilation, breathable materials, and porous spatial layouts ensure low-energy performance (Guttikonda & Li, 2024). These findings reinforce the argument that vernacular strategies remain relevant as sustainable solutions in contemporary contexts.

In Indonesia, riverine vernacular architecture illustrates a strong interplay between ecology, culture, and resilience. Research in Banjarmasin documents rumah lanting (floating houses) that employ buoyant foundations and incremental spatial growth, integrating community livelihoods with riverine ecology (Mentayani, Husin & Hidayat, 2022). Other studies of riverside settlements in Palangka Raya identify typological transformations in spatial layout, sanitation integration, and terrace expansion, shaped by social and economic change (Ririsintari, Hadi, & Sudikno, 2021). In Aceh, stilted house typologies along wetlands reveal ecological adaptation through elevated floors, permeable construction, and the use of local timber to manage tidal and flood conditions (Nursaniah et al., 2015). Moreover, studies in Aceh Singkil demonstrate that local wisdom contributes significantly to community resilience in the face of recurring floods (Ismail, Rahman, & Hasyim, 2020).

Despite these insights, limited academic research has examined the typological evolution of riverine vernacular houses in Aceh Singkil, particularly in Teluk Rumbia Village along the Singkil River. Modernisation and urban housing preferences increasingly threaten the survival of these houses, leading to the gradual loss of both tangible forms and intangible cultural practices. This research, therefore, seeks to address this gap by (1) identifying and analysing the architectural characteristics of riverine vernacular houses in Teluk Rumbia, Aceh Singkil, and (2) investigating the cultural traditions embedded in their construction processes. By situating local findings within broader discourses on vernacular sustainability and resilience, this study contributes to cultural preservation efforts and provides practical insights for sustainable housing development in disaster-prone riverine environments.

1.1 Literature Review

Vernacular architecture arises from local knowledge systems and is characterized by materials, construction techniques, and spatial logics adapted to place. Recent syntheses indicate that vernacular forms often deliver strong environmental performance (natural ventilation, passive cooling) alongside social and cultural benefits that support community resilience (Pardo, 2023; Zong et al., 2024).

Studies on flood-prone settlements show that raised stilt systems, flexible timber connections, and modular plan layouts contribute to both short-term coping and long-term recoverability (Tavares et al., 2022). Translating these strategies into contemporary practice requires attention to material transitions, maintenance practices, and community capacity (Guttikonda & Li, 2024).

Field studies in Indonesia (Banjarmasin, Palangka Raya, West Coast Aceh) document a spectrum of riverine typologies, floating houses, stilted dwellings, and transitional hybrid forms, each reflecting interactions among ecology, economy, and culture (Mentayani et al., 2022; Ririsintari et al., 2021; Nursaniah et al., 2015). These works show that typological evolution often involves trade-offs between modern comfort demands (sanitation, additional rooms) and the loss of traditional materials and skills.

1.2 Research Gap and Objectives

Although vernacular architecture in riverine contexts has been studied in various regions, there is limited academic research specifically addressing the typological evolution of riverine vernacular houses in Aceh Singkil, particularly in Teluk Rumbia Village along the Singkil River. Rapid modernisation and urban housing preferences increasingly threaten the continuity of these dwellings, leading to the gradual erosion of both tangible forms and intangible cultural practices. This research therefore seeks to bridge this gap by analysing the architectural characteristics of riverine vernacular houses in Teluk Rumbia while also exploring the cultural traditions embedded in their construction processes. By situating these findings within broader discourses on vernacular sustainability and resilience, the study contributes to the preservation of local culture and provides practical insights for sustainable housing development in disaster-prone riverine environments.

METHODS

2.1 Research Design

This study adopted a qualitative descriptive design to examine the architectural characteristics of vernacular riverside houses in Teluk Rumbia, a village in Aceh Singkil, Indonesia. The approach was chosen because the research sought to generate a contextual understanding of how architecture reflects both environmental adaptation and cultural traditions, rather than measuring or quantifying physical attributes.

2.2 Study Site

Teluk Rumbia was selected purposively as the research site because it remains an active settlement of the Singkil ethnic community situated directly on the banks of the Singkil River. The village is known for its distinctive riverside houses, which embody traditional construction methods and spatial patterns. Its continued reliance on vernacular forms made it a representative case for exploring the interaction between architecture, ecology, and community life. Figure 1 shows the location of Teluk Rumbia Village along the Singkil River, which forms the geographical and cultural setting of the study.

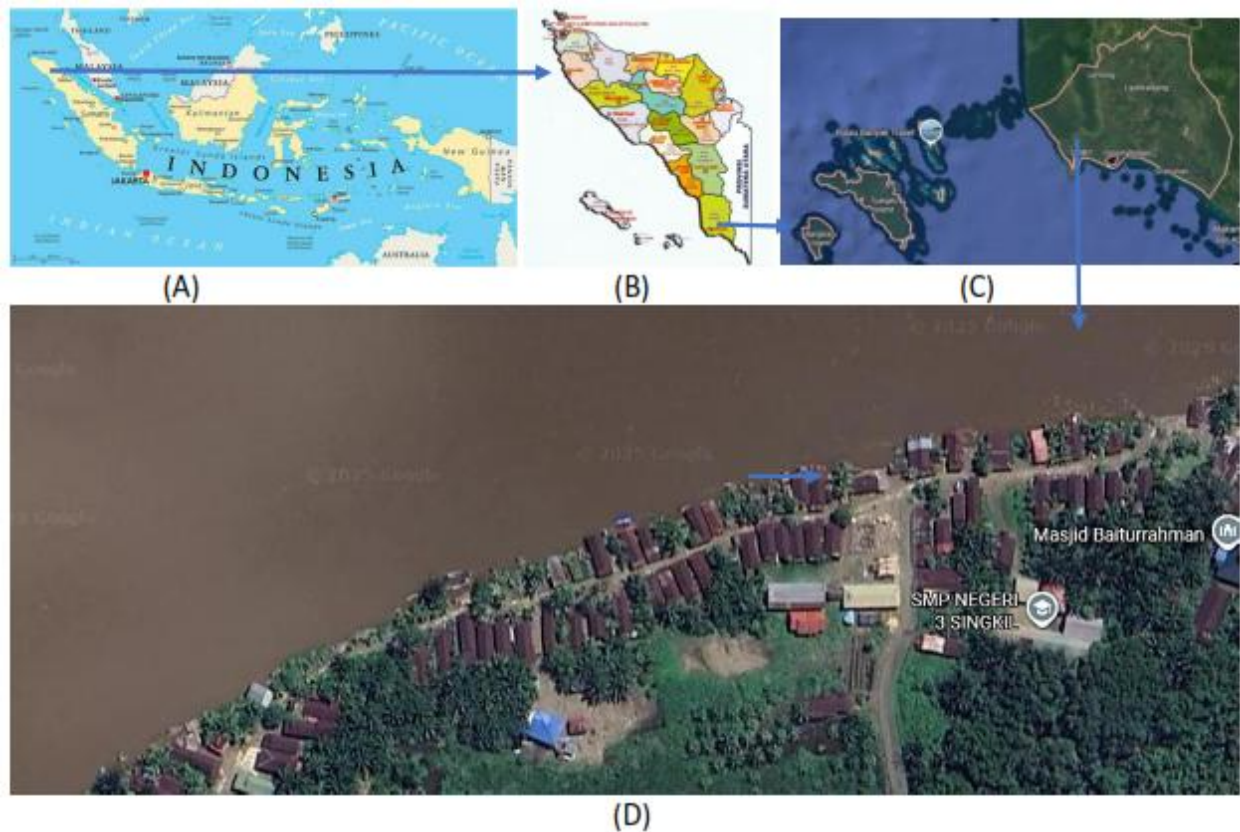


Figure 1: Research location map. (A) Indonesia/Coordinates (0.7893° S, 113.9213° E), (B) Aceh/Coordinates (4.6951° N, 96.7494° E), (C) Aceh Singkil/Coordinates (2.2606277° N, 97.1519679° E), and (D) Research location Teluk Rumbia Village, Aceh Singkil Regency, Indonesia. (2°19'39.26" North latitude and 97°46'35.41" East longitude).

2.3 Data Collection

Data collection relied on four complementary techniques. Observation was conducted to document physical features such as form, structure, and spatial organization, along with their relationship to the surrounding environment. Semi-structured interviews were held with the village head, cultural figures, and residents, focusing on the historical development, functions, and cultural meanings of the houses, as well as the role of environmental factors in shaping their design. A total of 10 participants were interviewed, selected purposively to represent different perspectives, including community leadership, cultural expertise, and household-level experiences.

Archival materials, including photographs and written records, were reviewed to provide historical and visual context, while architectural redrawing was used to record existing conditions through sketches and measured drawings, thereby preserving details not fully captured by field notes and photographs. The integration of these techniques created a

comprehensive dataset that reflected both tangible and intangible aspects of the vernacular dwellings.

2.4 Data Analysis

The analysis followed an inductive process consistent with qualitative descriptive research. Raw data from observations, interviews, and documents were first organized and reduced to highlight information most relevant to the study. The refined data were then arranged in descriptive narratives and supported by visual materials to illustrate recurring themes such as spatial arrangements, material usage, and adaptive strategies.

To systematize the process, data were coded thematically following Creswell and Creswell (2018), allowing recurring patterns and categories to emerge across the dataset. Verification was conducted continuously by comparing information across different data sources to strengthen the validity of the findings.

Credibility and reliability were further enhanced through triangulation and member checking. Triangulation ensured that observations, interviews, and documentation consistently supported each other, while member checking allowed participants to confirm or clarify the researcher's interpretations. These strategies increased confidence in the accuracy of the results and ensured that the conclusions reflected the perspectives of the community studied.

2.5 Limitations of the Method

While the study provides in-depth insights into Teluk Rumbia, its findings may not fully represent other Singkil riverine settlements or different regions of Aceh. The limited number of participants and the localized focus mean that broader generalizations should be approached with caution. Future comparative studies across multiple riverine communities would be valuable to extend the applicability of these findings.

Through this methodological framework, the research was able to provide a clear and reliable account of how vernacular riverside houses in Teluk Rumbia simultaneously preserve cultural identity and respond to the ecological demands of their riverine environment.

RESULT AND DISCUSSION

3.1 Settlement and Environmental Context of Teluk Rumbia

Aceh Singkil Regency consists of mainland and island territories, including the Banyak Islands, with Singkil serving as the capital. Its most prominent geographic feature is the Krueng Singkil River, the largest in southeastern Aceh, which drains a watershed of approximately 12,500 km² (BWSS I, 2019). The topography of the regency ranges from swampy lowlands to hilly areas, dominated by tropical forests and farmland that support the local economy. With an

annual rainfall of 3,700–4,200 mm, relative humidity between 70–85%, and daily temperatures ranging from 21°C to 32°C, the region belongs to the tropical rainforest climate zone.

Teluk Rumbia, one of the villages in Singkil sub-district, has a population of 1,009 (Kemendagri, 2024). Located about 5.5 km from Singkil town, the village is situated in a swampy area along the Krueng Singkil River, the longest river in Aceh. Transportation relies on both land and river routes, with the river becoming the main access point during floods. Livelihoods are closely tied to both riverine and terrestrial resources, with fishing, farming, and plantation activities forming the backbone of the economy.

Historically, Teluk Rumbia was established by Pakpak Barat groups of fishermen and farmers who built simple houses from timber and sago leaves available locally. Settlement patterns evolved organically from scattered and irregular dwellings to more systematic clusters adapted to the terrain and community needs. Today, the village is characterized by a linear settlement typology, with houses aligned along the riverbank and the main road. This arrangement facilitates transportation, supports economic activity, and fosters social interaction among residents (see Figure 2). This spatial configuration reflects both the practical need for access to the river and the socio-cultural importance of water as a life-sustaining element (Syarifuddin & Pratama, 2021).



Figure 2: Riverside settlement along the Krueng Singkil in Teluk Rumbia Village.

3.2 Architectural Characteristics of Vernacular Houses in Teluk Rumbia

The most distinctive feature of Teluk Rumbia's vernacular houses is their stilted wooden construction. Elevated floors provide protection from seasonal flooding and create multifunctional spaces beneath the houses, used for storage, livestock, or semi-public activities (Figure 3). Traditional joinery techniques such as mortise and tenon enhance the structural flexibility of the houses, allowing them to withstand seismic shocks (Nursaniah et

al., 2022). Similar adaptive strategies have been documented in other Southeast Asian riverine settlements, such as Kalimantan and the Mekong Delta (Rizki et al., 2023).



Figure 3: Characteristic of vernacular houses.

Spatially, the houses are organized around three main zones: a front reception space (jokhong), a central living area (khuang tengah), and a rear kitchen or service zone. Bedrooms are arranged around the central space, reinforcing familial closeness (Figure 4). Most houses are oriented toward the river, symbolizing the strong interdependence between domestic life and the river as a source of livelihood. Local materials dominate construction: hardwoods for structural frames, bamboo for lighter elements, and rumbia leaves for roofing. These materials not only lower costs but also enhance thermal comfort, aligning with vernacular practices elsewhere in the tropics (Putra & Widiastuti, 2024).

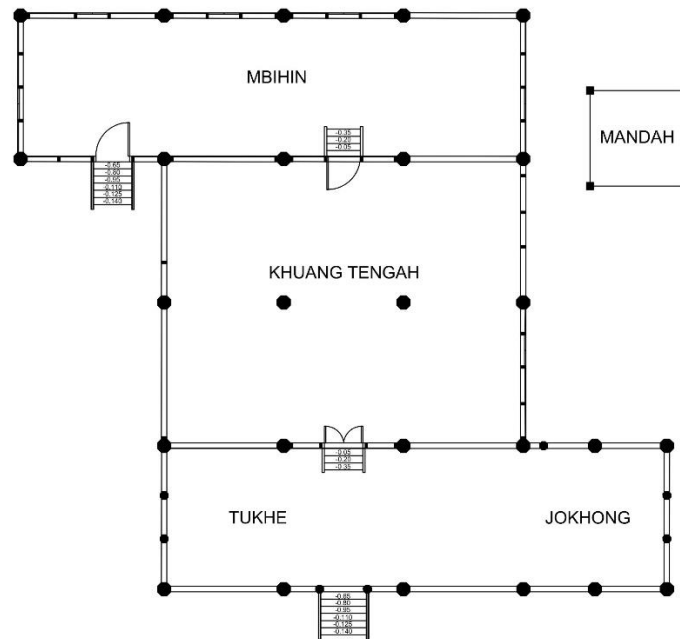


Figure 4: Sapo Belen Sinanggal floor plan. Vohry, (2013).

3.3 Cultural and Symbolic Dimensions

Beyond their physical form, Teluk Rumbia's houses embody cultural meanings. The division between public and private areas reflects norms of hospitality and family hierarchy. The jokhong is traditionally maintained as a clean, formal space for receiving guests, while the central living area functions as the heart of family activities. This arrangement reflects communal values, emphasizing cohesion and togetherness (Pratiwi et al., 2019).

House orientation toward the river further symbolizes the community's deep relationship with water as a cultural and ecological lifeline. In interviews, residents emphasized that the river is not merely a physical resource but also a marker of identity. Such symbolic relationships underscore Amos Rapoport's view of vernacular architecture as a cultural phenomenon shaped by values and traditions (Groat & Wang, 2013).

3.4 Transformation and Adaptation to Modernity

Over time, typological and material transformations have emerged. Roof orientation shifted from cross-gabled forms to longitudinal configurations, as seen in the Sapo Belen Sinanggal type (Figure 5). The guest room, once obligatory, has become optional in newer houses, reflecting a shift toward greater family privacy (Figure 6).

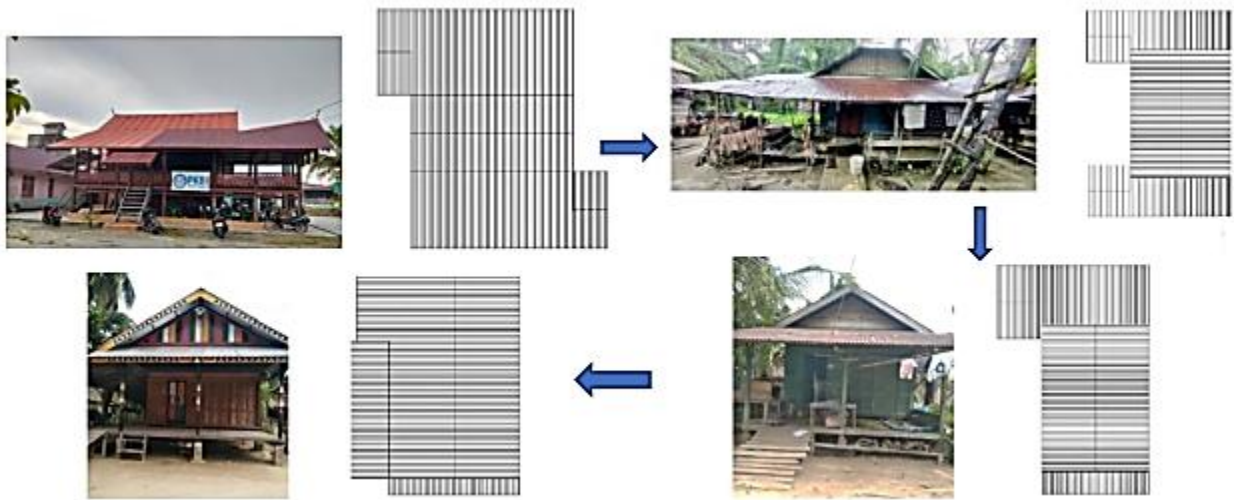


Figure 5: Roof shape transformation.

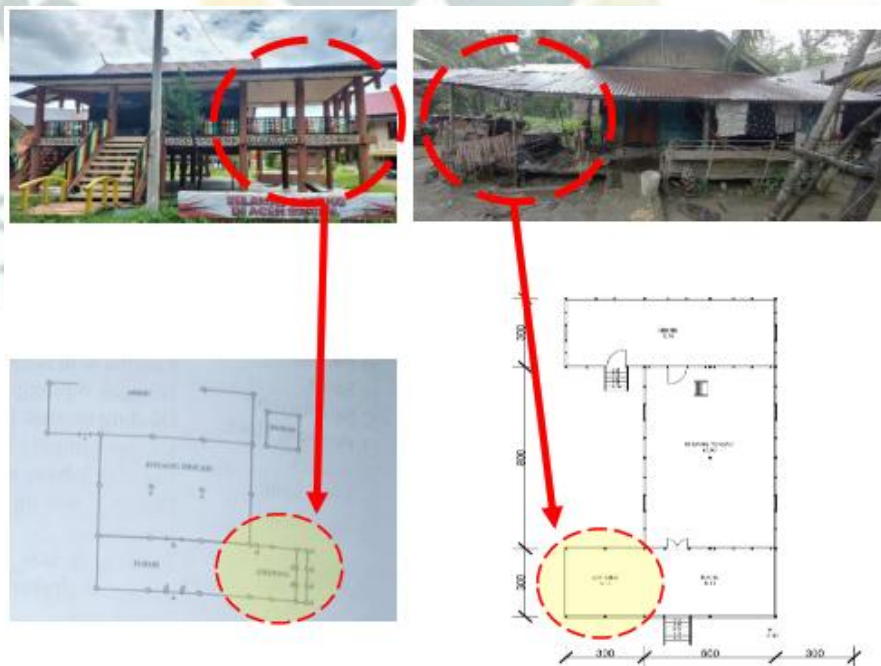


Figure 6: Flexible changes in the location of the jokhong (living room).

Material use has also evolved: the binangun foundation system (timber posts embedded in the ground) gave way to umpak (stone footing), hardwood species were replaced due to availability, and nails and bolts substituted traditional joinery methods (Figure 7). These changes parallel findings from China and Indonesia, where vernacular houses have adapted to resource scarcity and practical demands (Li et al., 2024; Rizki et al., 2023).



Figure 7: Sandi (Umpak) Foundations in Vernacular Houses in the 1990s.

Floor plans expanded with the addition of bedrooms in the 1980s, followed by the integration of sanitation facilities in the 2000s (Figure 8). Such modifications reflect demographic growth and rising awareness of health and comfort, consistent with broader trends in Southeast Asian vernacular housing (Pratiwi et al., 2019; Rizki et al., 2023).

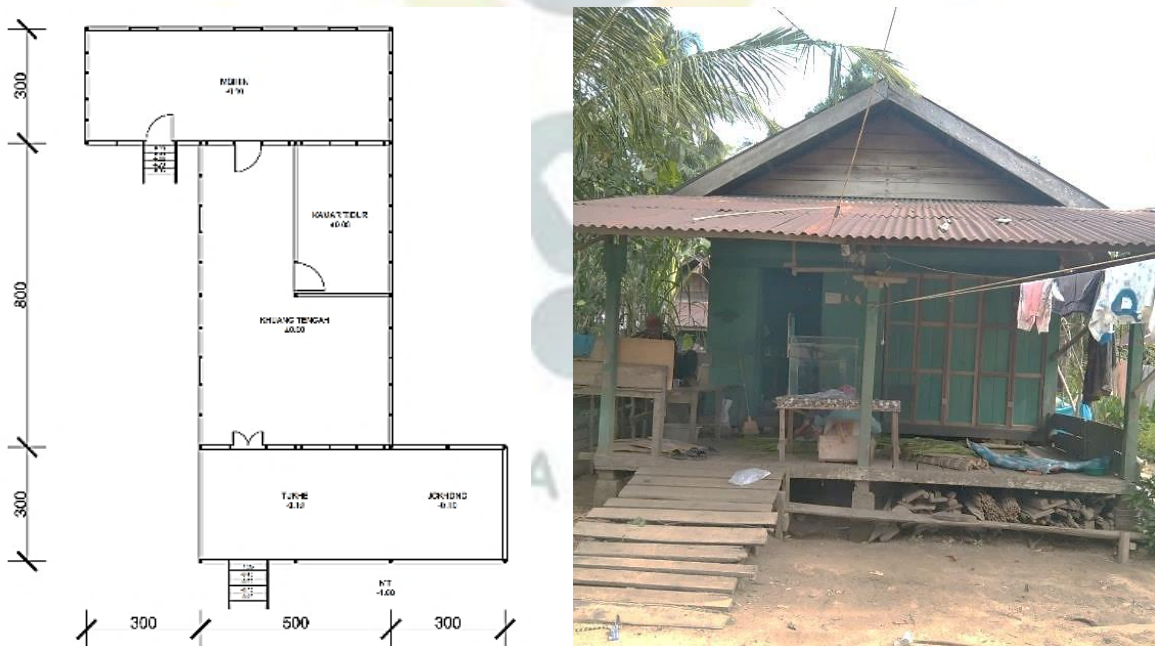


Figure 8: Plan and appearance of a 1990s vernacular house

The 1990s marked an important phase in the evolution of vernacular architecture in Teluk Rumbia, characterized by the introduction of bedrooms within the *khuang tengah* (main living area). This change represented a turning point in the traditional spatial concept, as it

was the first time that elements of family privacy were integrated into the dwelling structure, reflecting a broader transformation in the community's social values.

A space that had previously been dominated by an open and collective layout began to accommodate the need for personal rooms, indicating a paradigm shift from a communal family space toward an arrangement that more carefully acknowledged the boundaries of privacy. Another notable modification was the alteration of floor levels, where the central space (*khuang tengah*) was adjusted to the same elevation as the terrace (*tukhe*) and the kitchen (*mbihin*), eliminating the need for steps between these zones.

While these transformations introduce elements of modernity, they also highlight community resilience. The persistence of symbolic orientation, the expansion of transitional terraces (*tukhe*), and the continued reliance on elevated structures illustrate the community's ability to negotiate between tradition and contemporary needs.

3.5 Synthesis

The results show that Teluk Rumbia's vernacular houses embody both cultural continuity and adaptive change. They remain deeply tied to the ecological and social realities of riverine life while gradually incorporating modern materials, spatial practices, and technologies. This negotiation between tradition and transformation exemplifies how vernacular architecture in Southeast Asia functions as a living system: simultaneously conserving cultural identity and accommodating environmental and socio-economic demands (Rizki et al., 2023; Susanti & Wardhani, 2024; Putra & Widiastuti, 2024).

CONCLUSIONS

This study reveals that the vernacular houses of Teluk Rumbia are dynamic architectural forms that embody both tradition and transformation. While their stilted construction, spatial orientation toward the river, and use of local materials highlight long-standing strategies of environmental adaptation and cultural continuity, significant changes have occurred over time. The evolution of roof forms, the increasing flexibility of the guest room (*jokhong*), and the introduction of bedrooms and sanitation facilities reflect demographic growth and shifting social values. Material transformations from traditional hardwood and *binangun* foundations to the adoption of sandi systems, nails, bolts, and metal components, further illustrate how local knowledge adapts to technological and economic realities.

These transformations indicate a gradual transition from communal and open spatial concepts toward layouts that accommodate privacy, health, and comfort. At the same time, the persistence of symbolic elements, such as the orientation of houses toward the river and the expansion of transitional terraces (*tukhe*), demonstrates the community's resilience in preserving cultural identity. The case of Teluk Rumbia thus exemplifies how vernacular architecture in Southeast Asia negotiates between tradition and modernity, remaining responsive to environmental conditions while integrating contemporary needs.

In conclusion, Teluk Rumbia's vernacular riverside houses should be recognized not only as heritage artifacts but also as living architecture. They offer valuable lessons for sustainable housing design, particularly in flood-prone tropical environments where ecological adaptation and cultural continuity must coexist.

The adaptive strategies embedded in vernacular houses, such as stilt structures, passive cooling techniques, and spatial orientations, offer valuable insights for sustainable housing design in flood-prone tropical areas. Policymakers and urban planners should incorporate these principles into local housing development and climate adaptation strategies.

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