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From 'On-stilts' to 'On-ground': Spatial Form Development of Sarawak River Malay Houses in Kuching, Malaysia, 1840s-1960s

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ABSTRACT

The Malays in Sarawak have lived in riverine settlements since pre-colonial times, with the Sarawak River in Kuching housing the largest Malay population. Kampung Seberang, on the river's north bank opposite Kuching Waterfront, holds the highest Malay concentration and historical significance, yet the architectural development of Malay houses in this area remains understudied. This paper investigates the most common house form and spatial layout of houses in Kampung Seberang, tracing its spatial form development. Using archival research, fieldwork observations and interviews, 47 samples were selected based on predetermined criteria. Samples were categorized into architectural types and mapped to uncover settlement patterns. The findings reveal four architectural styles: (1) *bumbung panjang*, (2) *potong Limas*, (3) *limas Serani*, and (4) hybrid *limas Serani*. Type 2 houses are most common near the Astana, while Type 3 houses are found further away- indicating newer settlements with differing lifestyles. The study concludes that Kampung Seberang's architectural development is closely linked to socio-economic changes in the 1940s and infrastructure development in the 2000s, significantly altering spatial uses and house forms. As Sarawak's riverbank settlements face redevelopment, these findings can guide conservation efforts, inform preservation policies, and standardize the evaluation of architectural significance, to safeguard Sarawak's rich architectural legacy for future generations.

1.0 INTRODUCTION

Based on the Malaysia Census 2020, Malay is the third largest ethnic group after the Iban and Chinese in Sarawak (Pim, 2022) - a Malaysian state located northwest of Borneo Island. Since the pre-colonial period, the Malay have created settlements along the coastlines bordering the South China Sea and various river systems throughout the region (Lockard, 1976; Said, 2010). However, the highest concentration of the Malay population can be found in the Sarawak River basin, one of the primary river systems besides Rajang and Limbang-Lawas (Said, 2010). The river cuts through the present-day capital city of Kuching, dividing it into the north and south banks, where Malay inhabited both riverbank settlements. According to the Sarawak Census Report 1947, the north bank settlement, namely Kampong Seberang, was even more densely populated (Noakes, 1950). About half of the Malay population in Kuching resides in Kampong Seberang (Mohd Salleh & Abidin, 2002) alongside their White *Rajah*, whose residence sits on top of the Astana hill.

Being a traditional Malay settlement spread along the riverbank across the town center, Kampong Seberang plays a pivotal role in constructing the identity of Kuching town. Settlements on the banks of the Sarawak River are unique, in that various architectural influences could be observed, possibly linked to pre-colonial ties with Johor-Riau, Bruneian and Sambas sultanates, and the century-long rule of the Brooke dynasty. Recurring styles in house form and roof design of houses built between the 1840s and 1960s indicate pre-existing spatial patterns, forming part of the riverine settlement architecture. Influential Malay houses appear to emulate foreign influences (Walker, 2010), with round stone columns adorning the façade, although the form and spatial configuration are essentially an extended version of the smaller-scale ordinary Malay house. The roof is a monumentally profound feature- often exaggerated in height, varying depending on the house dimension and social status (Yusuf et al., 2012).

Unfortunately, this historical evocation will not last. According to the webpage of Sarawak's Housing Development Corporation (2018), the Darul Hana resettlement project will relocate the villagers of Kampung Seberang to a new residential development further inland from the Sarawak River. At the end of 2023, approximately 317 *Ketua Isi Rumah* (KIR) or head of households in Kampung Seberang Hilir have vacated their ancestral homes (Dayak Daily, 2023). Not long after the first group of villagers left for Darul Hana, the kampong house demolition began, as reported by Ahmad Nasrullah (2023) from TV Sarawak (Figure 1).

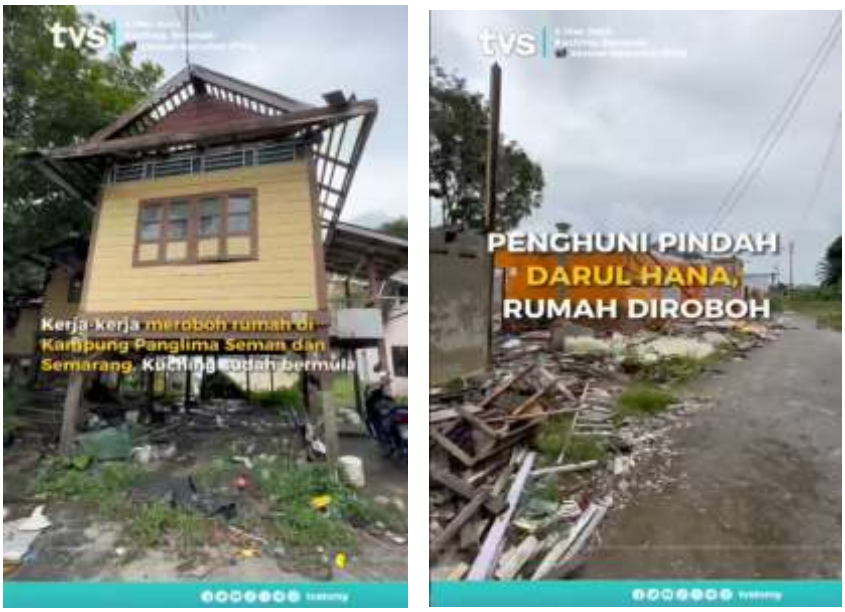


Figure 1. Demolition of houses in Kampung Seberang on the north bank of Sarawak River, opposite Kuching Waterfront, as reported in March 2023. (Source: Ahmad Nasrullah, 2023).

The state government's planning for Seberang Hilir is still unclear. Regardless, the resettlement scheme is foreseen to cause a dramatic change in Kampung Seberang and Kuching's heritage precinct as a whole. Yaldız et al. (2014) stress that building groups in a city's historical area hold architectural characteristics of a certain period, significantly contributing to the city's cultural continuity. Demolitions of traditional houses, deemed a testament to a society's shared values and formed part of the city's historical fabric, could lead to the risks of

losing identity. The urgency to investigate these architectural forms is even heightened by the scarcity of resources concerning the Malay architectural historiography in Sarawak (Ting, 2022). In this regard, the gravity of the study calls for an immediate investigation of Kampung Seberang's architectural development before more are lost to the threat of urbanization.

The primary purpose of this research is to document these architectural artefacts, which provides a fundamental step to recording what is left of Kuching's centuries-old Malay settlement. This paper has two objectives; (1) to investigate the most common form of traditional Malay houses in Kampung Seberang and (2) to examine spatial transformation which causes house form development from the earliest known example during the Brooke era (1840s) to the period prior to the formation of Malaysia (1963).

2.0 MALAY SETTLEMENTS IN BORNEO

Sarawak is an eastern state of Malaysia on Borneo Island (Figure 2) with its inhabitants sparsely distributed across the region. The Malay is the third largest ethnic group after the Iban and Chinese (Pim, 2022) in the ethnically and culturally diverse state, comprising 27 ethnic groups altogether. The Malay settlements exist along the coastline of northwest Borneo, which faces the South China Sea. However, the majority of them can be found in three major river systems: the Sarawak River, the Rajang River and the Limbang-Lawas River since pre-colonial Sarawak (Said, 2010). The highest concentration of Malay population is in the First Division, on the Sarawak River settlements, where the capital city of Kuching is located (Mohd Salleh & Abidin, 2002).

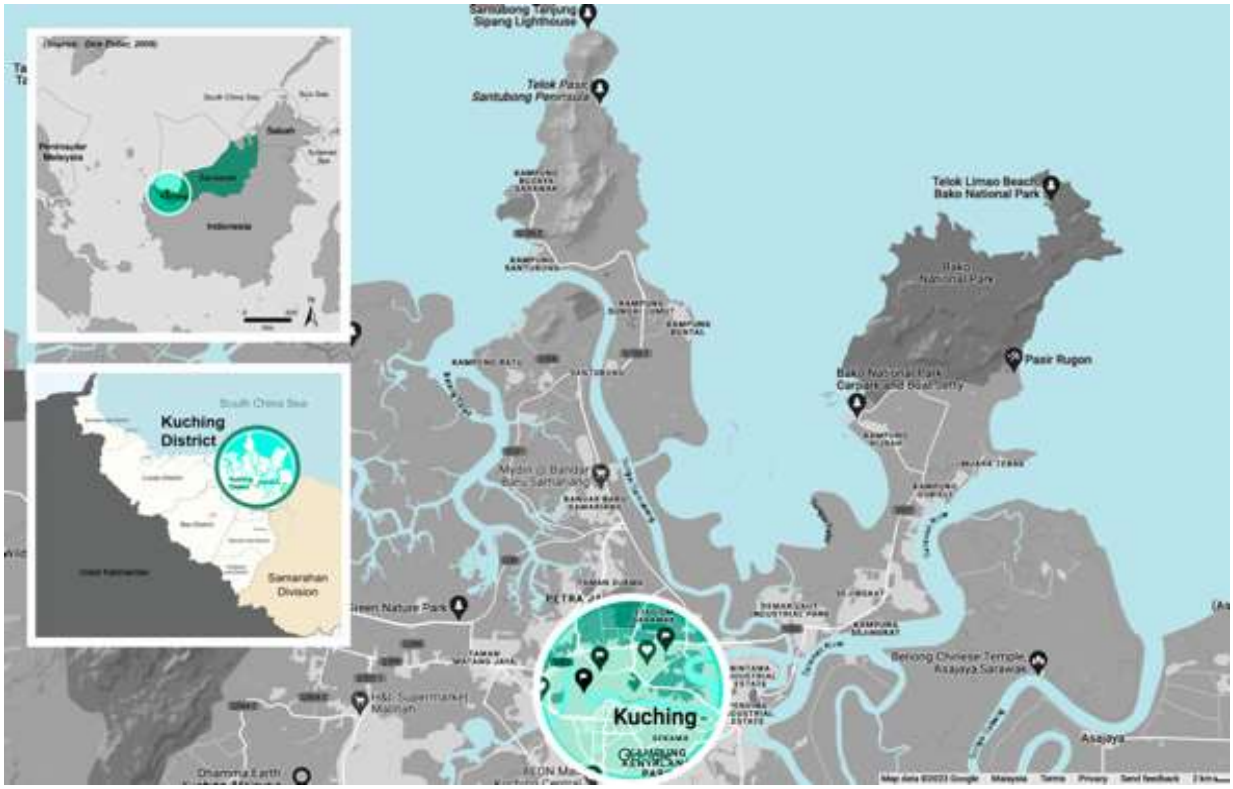


Figure 2. Location of the Sarawak River in Kuching, Sarawak, in the Borneo Island (Source: Google Map, 2023)

In the early nineteenth century, Sarawak covered the area from Tanjung Datu to Batang Samarahan, a territory approximately 18,000 square kilometres wide (Chang, 2008), generally known as Northwest Borneo (Ting, 2018). Northwest Borneo was then a disputed territory between Brunei and Sambas through affiliations of Sultan Tengah- a Bruneian prince, with the two sultanates (Walker, 2017). Under the Brookes dynasty, Northwest Borneo's territory expanded northwards to its present boundary, with Lawas as its final expansion (Chang, 1999). Sarawak went under Japanese control in 1941 and was ceded to the British Colony in 1945, before achieving independence and forming the Federation of Malaysia in 1963.

2.1. A Brief History of Sarawak River Settlement

The settlement on the Sarawak River began as a small Malay village or *kampong* of 800 inhabitants with about 20 Chinese traders (Chang, 2008; Pollard, 1972). The present-day Sarawak, a name originating from the river, traces its existence to the discovery of antimony ore in the upriver around the 1820s (Ho, 2004). Known as *serawak*, antimony was in high demand, particularly in the use of ammunition production, fabric paint and food canning technology. Pengiran Indera Mahkota, a government representative of the Brunei sultanate, was sent to Kuching in 1827 (Chang, 2008) to oversee the exploitation of the deposits, a material much desired by newly established nations such as Singapore (Ho, 2004).

Mahkota and his followers resided on a hill on the Sarawak River's north bank, between Sungai Bedil Kecil and Sungai Bedil Besar (Chang, 2008), as his presence was not welcomed by the local Sarawak Malay *datus* upriver at Lidah Tanah and Katupong (Walker, 2002), which are nearer to the antimony mines. Opposition towards Mahkota became more severe when their income from the antimony exploit was threatened (Walker, 2002), leading to a revolt. To suppress the rebellion, Rajah Muda Hassim and his brothers were sent to Kuching by the Brunei sultanate in 1836 (Walker, 2002), where they occupied the south bank kampong. Both riverine villages grew into larger settlements when more Malays of mixed origins migrated and resided in Kuching (Ho, 2004).

Figure 3. Location of Kampung Seberang on the north bank of Sarawak River in 1951.
Source: Open Research Repository, ANU, 2023.

Intrigued by Borneo and the antimony ore business, James Brooke, an Englishman with a handsome amount of inheritance, set sail to Sarawak in 1839 (Ho, 2004). Upon his arrival, he witnessed settlements of riverine character, a pattern frequently recurring in Northwest Borneo (Ting, 2018). He described them as '*a little town with brown huts and long-houses made of wood of the hard stems of the nipah palm, sitting in brown squalor on the edge of mudflats*.' (James Brooke, 1842, in Ho, 2004). The writings by Brooke and his confidantes provide the early narrative of the architecture and settlements of the area (Ting, 2018).

Mahkota's settlement on the north bank grew into today's Kampong Seberang (Figure 3), a strip of kampong clusters approximately 7 km along the riverbanks opposite the Kuching Waterfront. It is further divided by the Astana hill in the centre into two village clusters on the west (Seberang Hulu- upriver) and east (Seberang Hilir- downriver). Each kampong is separated by streams, making the distinction between them easily recognizable today by a small bridge interconnecting them.

2.2. Theoretical Framework; Architecture as Part of City's Identity Formation

The study of architectural development is fundamental in that it records the transition from one period to another. Torabi & Brahman (2013) argue that the shape and form of the building, materials, relationship with the context and spatial organization are some of the components that shape architectural identity. This is supported by Alzahrani (2022), who asserts that 'architecture through the building's façade, structures, and interior spaces are among the noticeable manifestations of culture in each nation' (Alzahrani, 2022, p. 117). Meanwhile, Yaldız et al. (2014) debate that architectural works could manifest differing lifestyles in different

periods involving socio-economic conditions, technological developments, and society's preferences. Yaldız et al. (2014) further stress that these elements contribute to the city's identity formation, which, if removed, will eliminate 'local originalities', damaging the perception of the city and the citizen's sense of belonging.

Unfortunately, architectural artefacts of nations worldwide are facing deterioration and urbanization threats. The loss of cultural identity caused by this phenomenon has led scholars to develop preservation measures for distinctive architectural traits of the nation's heritage (Al-Mohannadi et al., 2022). Tracing the architectural progress provides many perspectives not only on the history but also on the social, cultural, and economic aspects of a city (Namicev Ekaterina & Todorovska, 2024), which in return form part of the society's identity. Studying architectural development over time is, therefore, highly imperative and urgently required, especially in Kampong Seberang, where houses are currently facing demolition (Ahmad Nasrullah, 2023).

Adding to this concern is the limited knowledge base on Sarawak Malay vernacular houses. Yusuf's survey in 2015 found that 26% out of 80 respondents did not know that traditional Sarawak Malay houses existed, while a subsequent survey revealed that 33.75% had no clue about the house's physical attributes. This limitation may be caused by the disregard of Malay house research in Sarawak, where past scholars only emphasized those in the Malay Peninsula (Yusuf, 2015). As a result, the identity of Sarawak Malay house architecture remains obscure.

2.3. Architecture Types of Malay Vernacular Houses Along the Sarawak River

According to Ting (2018), the traditional Malay house in Sarawak conforms to the principles of the Austronesian house as established elsewhere in Southeast Asia. Ong (1983) discovers three significant architectural styles in the south bank kampong, where spaces are divided into three distinct zones: the *luar*, the *tengah* and the *dapor*, as illustrated in Figure 4. Despite the multiple origins of Sarawak River Malay, the physical appearance of their dwellings seems to be dictated by a set of pre-existing architectural designs. On closer inspection, the conspicuous commonalities in house forms in the Sarawak River settlement were predicated by the spatial arrangement of the house (Ong, 1983; Yusuf, 2015; Yusuf et al., 2012, 2018).

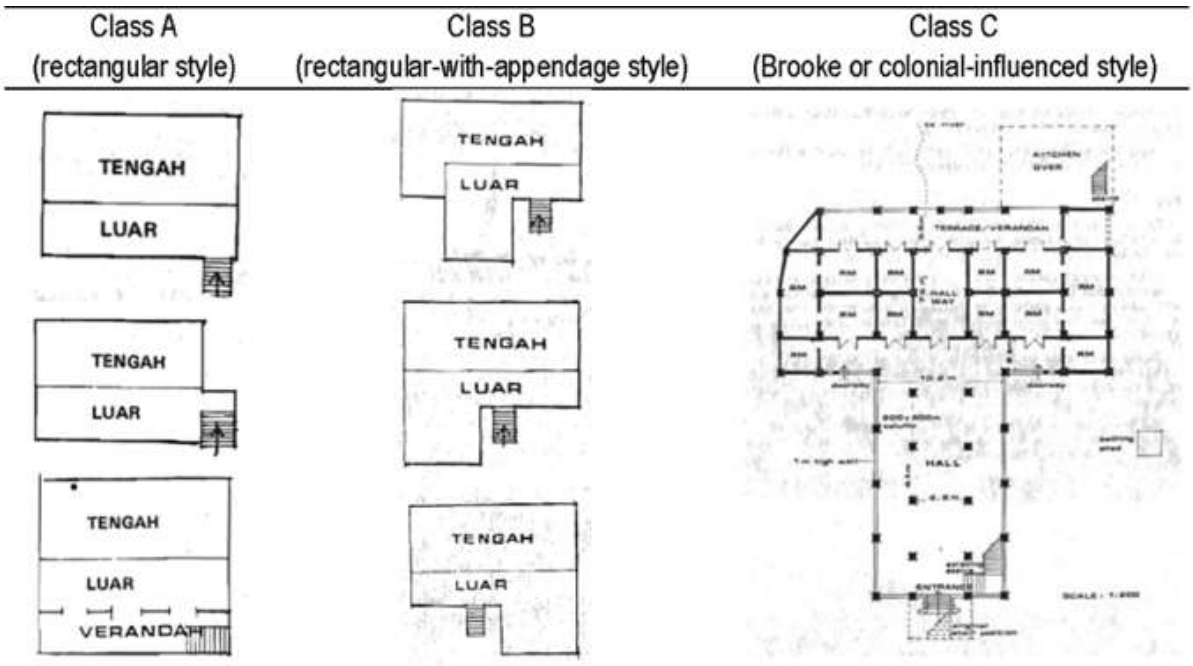
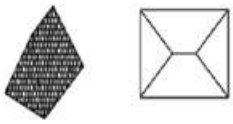
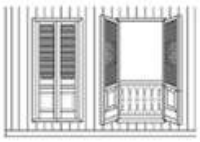
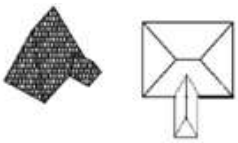
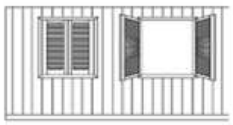


Figure 4. Architectural style of Malay house in Kuching.
Source: Ong, 1983.

According to Yusuf (2015) and Yusuf et al. (2018), two dominant physical design types of traditional Malay houses were discovered in the ten most populated Malay settlements in Sarawak: Kuching (most quantity of house samples), Miri, Samarahan, Betong, Asajaya, Sibu, Simunjan, Bintulu, Saratok and Sri Aman.

Table **1** below illustrates the types of Malay houses prevalent in Sarawak, where the second dominant type is an architectural style which emerges after the former.

Table 1. Two dominant physical designs of traditional Malay houses in Sarawak.
Source: Yusuf, 2015.

Design	Physical Design (Architectural Element)			
	Roof	**Window**	**Wall**	**Staircase**
First Dominant Design	 *perabung lima* (hipped roof)	 *jendela panjang* (full-length window)	 *papan berdiri* (vertical wooden plank)	 *tangga bertebuk* (perforated staircase)
Second Dominant Design	 *perabung lima + potong Perak* (hipped roof + Perak roof)	 *jendela pendek* (low window)	 *papan lidah berasok* (tongue and groove horizontal wooden plank)	 *tangga bertakak* (segmented staircase)

The present study also examines the Malay house literature of Indonesian Borneo's West Kalimantan region, as Sarawak was once a disputed territory between Sambas and Brunei. The proximity of this region to the Sarawak River basin (as compared to Brunei) and the historical linkages between them could lead to shared architectural types. In this context, Ciptadi et al. (2021), Putro & Zain (2021), and Zaın & Andı (2020) reveal that the *potong Limas* house type has great similarities to that of the rectangular style house and the first dominant design. However, a more detailed investigation should supplement these discoveries to provide a linkage and comprehensive analysis of the architectural development of Sarawak River Malay houses.

3.0 METHODOLOGY

The research employs a qualitative case study approach with archival research, fieldwork observation and semi-structured interviews as its main data collection methods. The samples were taken from the north bank settlement of the Sarawak River, namely Kampong Seberang Hulu and Kampong Seberang Hilir, which involves 13 kampongs altogether. The research process is divided into the preliminary study, data collection and analysis phase.

3.1. Preliminary Study: Archival Research

Archival research was conducted to find images and descriptions of Malay houses in the Sarawak River basin, sourcing from books, journal articles, monographs and websites. These images, including sketches, paintings, drawings, and videos- some of which are shown in Table 2, provide a visual narrative of Malay-style houses from the early nineteenth century to the 1970s. Zaini et al. (2023) emphasize that photographs serve as significant secondary evidence, especially when no architectural records remain. These visual records could illustrate the architectural forms, materials, and settlement patterns of the early riverine built environment.

Table 2. Photographs from various archival sources.

No.	Image	Analysis
1		What was believed to be James Brooke's first house actually belongs to Pengiran Indera Mahkota, which was built by the Malay carpenters on the north bank, around the 1840s. The image shows a rectangular form house with a gable roof, in which staircase was positioned to the left. Surrounding the house seems like a palisade to protect the house from enemies' threat. (Source: Ho, 2004)
2		James Brooke's second house reflects Malay design, built around 1842-1843 also on the north bank. The rectangular form is very much similar with the house shown in Image No. 1, but the roof has obviously changed to a hipped roof. (Source: Drawing by A de Bar (1821-1908) from Travel by Ida Pfeiffer (1797-1858), 1857)
3		Plan of a Malay house recorded in 1953 in Gersik, one of the 13 villages in Kampung Seberang, showing a rectangular spatial arrangement divided into two spaces with a kitchen extension at the rear. The spatial layout reflects the rectangular form of the buildings built in the 1840s previously. (Source: Mohd Salleh & Abidin, 2002)
4		A screenshot of a video recorded during Queen Elizabeth's visit to Kuching in 1972, showing the hipped roof of Kampung Seberang houses. (Source: "Retrospektif: Queen Elizabeth II di Sarawak Malaysia 1972", Youtube FINAS Malaysia)
5		A photograph courtesy of Jaafar Abong, believed to depict Kampung Gersik (one of the 13 kampongs in Kampung Seberang) probably around the 1960s-1970s, as indicated by the electrical wiring posts that had already been installed along the street. Several houses on the photograph resemble the second dominant design (Yusuf, 2015), where their frontal appendage or *teko* with *Perak* roof is evident. (Source: Courtesy of Jaafar Abong, in Astro Awani, 2020)

Images in Table 2 above chronicle the architectural evolution of Malay-styled houses along the Sarawak River from the 1840s to the 1960s. Early-style houses, such as the 1840s gable-roofed structures with palisades, highlight a utilitarian approach shaped by local resources and security concerns during periods of instability. It is difficult to say when the hipped roof replaced the gable roof, but Brooke's second residence adopted the hipped roofs as early as 1842. Image No. 5 displays *Perak* roof, and this form continues to dominate the houses in Kampung Seberang until around the 1970s. Over time, the houses' proximity to the river emphasizes the enduring reliance on waterways, while the gradual uniformity in design by the 1960s indicates modernization efforts and a more stable socio-political context. The data gathered at this stage assisted in constructing a typological framework for Malay houses along the Sarawak River (refer Table 4), which was then used to develop the sample evaluation tool and interview questions.

3.2. Pilot Study

Before conducting the pilot study, a virtual survey of the kampongs was performed using Google Street View to create an initial list of house samples. This process identified 38 potential houses that met the sampling criteria, along with their coordinates. These coordinates guided the fieldwork directly to each location, significantly reducing the time spent searching. The "See more dates" option in Google Street View also allowed for recording house types that have since been demolished.

The pilot study included informal interviews with house owners, approached through a village representative contacted beforehand. Respondents provided information on their family background, the original spatial layout of their houses, subsequent changes, and the function of each space. The pilot study results were used to refine the evaluation tool for assessing the original condition of the house samples. This phase also helped in formulating the interview questions for the actual fieldwork.

3.3. Data Collection: Fieldwork Observation

The fieldwork commenced after obtaining approval from the authority of Kampong Seberang. For easier conduct of the fieldwork, Kampong Seberang is divided into 13 zones, each representing a kampong. House samples were selected based on three criteria: (1) the house must still maintain traditional Malay architectural attributes: rectangular floor plan, timber frame construction with original roof form; (2) the space and façade of the main house or *rumah ibu* must not be altered; and (3) the first house owner must be of Sarawak Malay descent. Physical measurement was conducted on selected houses that retain the original form and spatial configuration. Details on the family background and physical features of the house were recorded in an observation form, while the spatial layout was hand-drawn to produce floor plan drawings based on house measurements.

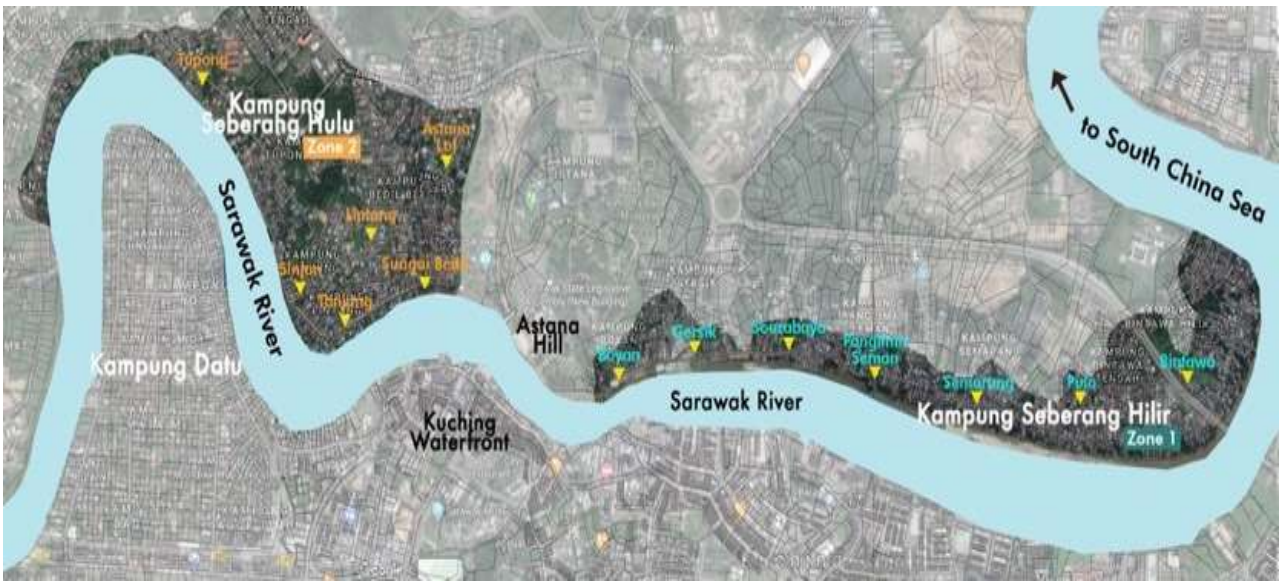


Figure 5. Location of each kampong in two village clusters- Kampong Seberang Hulu and Hilir. (Source: Author)

3.4. Data Collection: Semi-structured interview

The interview is based on a semi-structured format. Respondents were selected based on the house samples chosen earlier, of whom must fulfil two criteria; (1) the respondent has lived in the house for a minimum of 25 years (2) the respondent is a descendant of the first house owner. An observation checklist was used to guide the interview, which aims to acquire the original spatial layout of the house, such as which space has been removed, added or replaced with a new purpose. Based on the drawings of the current house layout and the interview, original floor plans of the houses were produced using digital computer-aided drawing software for the data analysis stage.

3.5. Data Analysis

All house samples were analyzed via content analysis and categorized into architectural style tabulation constructed based on previous literature (Ong, 1983; Samat, Syed Ariffin, et al., 2023; Ting, 2018; Walker, 2010; Yusuf, 2015), archival research and pilot study. The floor plan of each house was compared to identify their form and spatial development. Finally, the location of each house type on the digital map of the Sarawak River was analysed in terms of its architectural style distribution.

4.0 FINDINGS AND DISCUSSIONS

The fieldwork gathered 47 house samples with data on their original physical design. Access to two (2) sample houses was not possible due to the inability to acquire permission from house owners. Three (3) house samples fitting the criteria have long been abandoned, therefore, the background of the house and family, together with the spatial layout could not be obtained. Nevertheless, their physical form and estimated year of build were recorded based on information from neighbours and village representatives.

4.1. Architectural development: Changes in house form

From the literature review and fieldwork findings, four distinct architectural types were discovered from three different periods. As not all photographs of sample houses could be displayed here, only selected samples are shown as representations of each architectural type. The house types are described below:

4.1.1. Traditional architecture; pre-1840s

Figure 6. The rectangular plan on stilts, with a double-pitched roof, is the earliest known type of Sarawak Malay house architecture. (1st Image Source: Author; 2nd Image Source: www.alamy.com/stock-photo/borneo-history)

The long-roofed house or *rumah bumbung panjang* is the earliest known type of traditional Sarawak Malay house architecture (Ting, 2018; Walker, 2010), relatively similar to those in the Malay Peninsula. Dwelling architecture during this period can be described as houses on stilts or *rumah berpanggung* (Mohd Zen, 2005), with rectangular floor plans, timber frame construction, and double-pitched roof (attap) made of *Nipah*-leaves. Due to the ephemeral nature of construction material for houses of this period, no such house samples exist in the kampong today. However, the long-roofed house type was still being adopted in the following periods, with more robust materials employed for the roof, walls, floors, and structural elements.

4.1.2. Brooke-period architecture; 1840s – mid 1940s

The rectangular-plan-with-hipped roof style is said to have emerged during the Brookes' reign (Walker, 2010) around the 1840s, in which a distinct house form was prevalent- the potong Limas type (Figure 7).

Figure 7. The hipped roof form of potong limas type is said to emerge during the Brooke period. Source: Author's fieldwork.

Potong Limas

The *potong limas* house, also termed the "rectangular-style Malay house" (Ong (1983), features a monumental, high-hipped roof. Samat, Ariffin, et al. (2023) explain that this feature results from attic spaces rising between 9 to 11 feet, creating its distinctively tall silhouette. The introduction of *belian* (Eusideroxylon zwageri) shingles during this period likely influenced the adoption of the hipped roof. Belian, a highly durable Bornean timber often used for boatbuilding and heavy construction (Aiso-Sanada et al., 2019), required greater protection from wind displacement, and the hipped roof provided a more secure solution compared to the gable roof (Ong, 1983).

While Walker (2010) connects the emergence of the hipped roof with Brooke's second residence, suggesting a colonial influence, there is no direct evidence that Brooke administration mandated or popularized this architectural form. Instead, the adoption of the *potong limas* house may reflect syncretic ideas—local architectural traditions responding to colonial visibility while maintaining indigenous cultural values. This notion aligns with findings from Zain (2012), which indicate that *potong limas* houses were already established in the Riau Archipelago and West Kalimantan before their appearance along the Sarawak River.

In regions such as Pontianak and Sambas, *potong limas* houses predated the Brooke period and were often associated with individuals of high social status—palace officials, affluent traders, and nobility—who resided along riverbanks (Ciptadi et al., 2021; Zain, 2012). Given the geographical proximity of these areas to the Sarawak River basin, it is plausible that *potong limas* houses in Sarawak reflect a cross-regional influence rather than direct colonial imposition. Malay *Datus* residing on the Sarawak River's south bank may have introduced this house form, which subsequently spread to Kampung Seberang. This hypothesis requires further research into the origins of the hipped roof form and its cultural transmission.

While the *potong limas* house represents a newly developed form during the Brooke period, long-roofed houses continued to be built, particularly among lower-income Malay families who maintained the use of traditional *Nipah attap* roofing. In contrast, better-income households began employing sturdier timber materials for walls, including *merakak*, *meranti*, *selangan batu*, and *engkabang* (Yusuf, 2015).

4.1.3. Colonial architecture: 1945 – 1970s

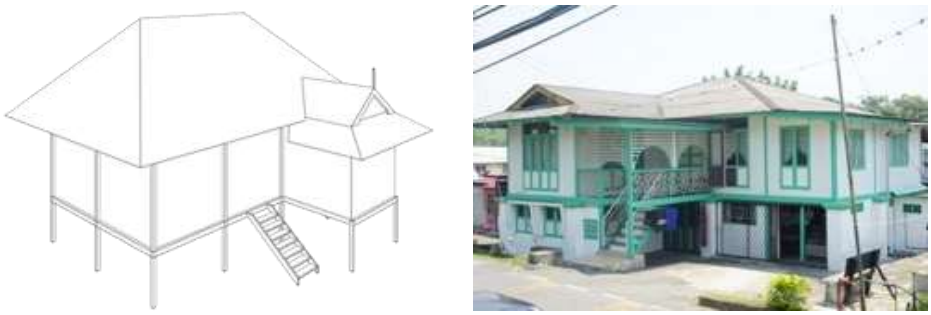


Figure 8. *Limas Serani* type, a combination of hipped and *potong Perak* roof, became a prevalent style during the colonial period. (Source: Author's fieldwork)

Figure 9. The roof facade of *segitiga Serani*, of *limas Serani* house type. (Source: Author).

War, political change, and global development have affected Sarawak's architecture and settlements of this period (Ting, 2018: 143). Sarawak was ceded to Britain by the third Rajah- Vyner Brooke, in 1946 and became 'British Sarawak'. An architecture style combining the hipped roof with *potong Perak* roof (Figure 8) started to surface in Sarawak's capital, where it resembles the Malay house in the west coast region of the Malay Peninsula.

Limas Serani

The limas Serani style (Yusuf, 2015), also known as the rectangular-with-appendage model (Ong, 1983), was prominent during the colonial period but appeared earlier in south bank kampongs (Samat, Syed Ariffin, et al., 2023). A defining feature is the *teko* space—a frontal appendage for hosting male guests—often topped with the Perak roof showcasing the *segitiga Serani* design (Figure 9). Local carpenters attribute this design to the Serani ethnic group, which inspired its name (Yusuf, 2015). Two sample houses exhibit a semi-octagonal *teko* space with a *limas satah tiga* roof, deviating from the typical rectangular plan with a Perak roof.

Another significant attribute of this type is the *balkoni kecik* attached to the bedroom, tengah, or kitchen (Figure 10). With only 750mm wide, it serves as a place to dry clothes without stepping outside the house. This finding reinforces the riverine character of these houses, unlike Peninsular Malay houses, which are not predominantly located along riverbanks. Though the balkoni kecik may appear trivial as a clothes-drying space, it reflects the Sarawak River Malay's adaptation to riverine life. Respondents from houses B9-H25 and B9-H22 shared that the balkoni offers convenience by avoiding muddy ground during tidal changes and occasionally serves as a space to greet neighbours and guests. This feature is a rare sight in any traditional Malay house in the peninsula, and it also did not appear in the earlier houses of potong Limas. Fieldwork findings reveal that this style was still being adopted until the 1970s.

Figure 10. The balcony, of limas Serani houses. (Source: Author's fieldwork, 2020-2023)

Hybrid Limas Serani

There are two (2) houses of hybrid limas Serani, with only ground floor columns made of brick and mortar. Some houses with existing Belian columns constructed a brick infill of each column to make them appear as stone. This is a display of social wealth, as not everyone could afford this foreign material then. However, the number of houses adopting this style is insignificant in Kampong Seberang. It is either many that have been demolished or renovated or the relatively lower economic status of the people here (Mohd Salleh & Abidin, 2002) compared to those on the opposite riverbank made the style unaffordable.

4.2 Frequency of architecture types in Kampung Seberang

Table 3 shows the frequency of architectural types across 13 kampongs, arranged by their position along the riverbank, with Tupong and Bintawa at the extremes. Astana Hill is located between Astana Lot (6) and Boyan (7). The red shading indicates proximity to Astana, with darker shades representing closer distances.

The table shows that limas Serani is the most common architectural type in the 13 kampongs, followed by potong Limas. Larger potong Limas houses can be found near the Rajah's residence. The age of these houses, which are over 80 years old, indicates that these kampongs are the earliest settlements on the north bank of the Sarawak River. Notably, there are also high numbers of potong Limas houses in Tupong- the western-most kampong. Respondents from house A1-H33 and A1-H34 reveal that their families were originally from the south bank settlements and moved to the north bank. The hybrid limas Serani and bumbung panjang style are the least common across the 13 kampongs. Table 4 summarizes the house types and their characteristics.

Table 3: Frequency of architecture types in each kampong. (Source: Author)

Kampong Cluster	Zone	Name of Kampong	House Code	Architecture Types			
				RBP	RPL	LS	HLS
Seberang Hulu (A)	1	Tupong	*A1-H4	•			
			*A1-H48		•		
			A1-H41		•		
			*A1-H34		•		
			*A1-H33		•		
			*A1-H20		•		
			A1-H18s			•	
	2	Sinjan	A2-H45s			•	
			A2-H35s			•	
			A2-H36s			•	
			A2-H32s			•	
			A2-H31s			•	
	3	Tanjung	A3-H40	•			
			A3-H37m			•	
	4	Lintang	A4-H39s			•	
	5	Sungai Bedil	A5-H30		•		
			A5-H28		•		
			A5-H23		•		
			A5-H43s			•	
			A5-H42s			•	
			A5-H38s			•	
			A5-H27m			•	
			A5-H8s			•	
			A5-H29s				•
	6	Astana Lot	A6-H44s			•	
			A6-H26m			•	
			A6-H24s			•	
			A6-H16s			•	
Seberang Hilir (B)	7	Boyan	B7-H21	•			
			B7-H10		•		
	8	Gersik	B8-H14s			•	
	9	Sourabaya	B9-H49s		•	•	
			B9-H17		•	•	
			B9-H47s				
			B9-H15s				
			B9-H25s				•
			B9-H22s				•
	10	Panglima Seman	B10-H2s			•	
			B10-H12s			•	
			B10-H5s			•	
			B10-H3s			•	
			B10-H1m			•	
	11	Semarang	B11-H6		•		
			B11-H7m			•	
	12	Pulo	B12-H13s			•	
	13	Bintawa	B13-H11	•			
			B13-H46s			•	

**RBP: rumah bumbung panjang, RPL: rumah potong limas, LS: limas Serani. HLS: hybrid limas Serani, m: middle teko, s: side teko.*

Table 4: Four Malay house types on Sarawak River north bank settlement in three different periods. (Source: Author)

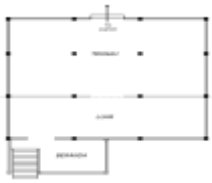
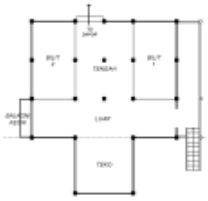
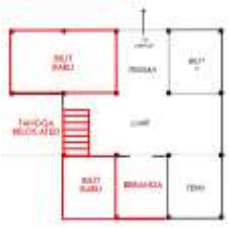
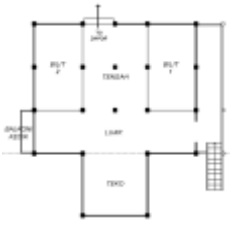
Period	**pre-1840s**	**1840s – mid 1940s**	**1945 – 1970s**	
Category	**Traditional architecture**	**Brooke period architecture**	**Colonial architecture**	
Typology	Rumah bumbung panjang (long-roofed house)	Potong limas (rectangular with hipped roof)	Limas serani (rectangular with appendage)	Hybrid limas serani
				
Physical Characteristic				
Roof	Constructed out of the nipa palm (Pfeiffer, 1861, in Walker, 2010)	• Hipped roof with Belian shingles for the well-to-do Malay families • No gable ends, no *tunjuk langit* or finials • Carved wooden fascia board • Roof with skylights or attic openings.	• Belian shingles remain material of choice for Malays working for the government with steady income • Presence of *tunjuk langit* at the apex of the appendage (teko) • Emergence of the *segitiga Serani* (or better known as gable end or *tebar layar*) at the Perak roof of teko space • Some houses employed new roofing material in the 1950s such as corrugated asbestos cement and galvanised steel roof sheet (Ting, 2018)	
Wall	Wall made up of wooden planks or sometimes with *kajang* (Ho, 2004), and mat partition (Lady Margaret Brooke, 1913)	• Timber framed wall, clad with <u>vertical</u> wooden planks • Material usually from *merakak, meranti, selangan batu,* and *engkabang* (Yusuf, 2015) • Main installation type - *papan berdiri*	• Timber framed wall, clad with <u>horizontal</u> wooden planks • Only a few houses still have vertical wooden planks for the wall • Material usually from *merakak, meranti, selangan batu,* and *engkabang* (Yusuf, 2015) • Main installation type - *papan lidah berasok*	
Floor	• (in 1845) open bamboo floors (Peter McQuhar, 1848, in Walker, 2010). (The floor) made of coarsely plaited network of thin smooth bamboo canes. (Pfeiffer, 1861, in Walker, 2010)	Framing with Belian, planked with other robust wooden material		
Staircase	• 'The entrance is by a ladder, the rungs of which are so wide apart'	• Larger houses of influential/well-to-do Malay often employ *tangga bertakak* type as front staircase • Houses of commoners and kitchen staircase often utilize the simpler *tangga berasok* type		

Undercroft	The lower space in the hut, beneath the grated floor, is used as a dwelling-place for fowls, dogs, and other animals.	•Floor level: a minimum of 5 to 10 feet above ground level (Mohd Salleh & Abidin, 2002) •Wooden lattice covers the undercroft of front facade		•Undercroft is built up with brick infilled for the columns and the wall
Spatial Pattern	luar – tengah – dapor	beranda - luar – tengah (panggor) - padong – antara dua - dapor - jungkar	teko – luar – tengah – bilit (balkoni kecil) – antara dua – dapor (balkoni kecil)	
Spatial attributes	• The usage of clambus or *kelambu* in Malay- a canopy-like structure, made of cambric muslin curtains as space partitioning. It is lightweight, movable and broad, with five feet high that 'hang down to the ground' • Used to form separate sleeping apartments for grown girls and unmarried people • To protect from mosquitoes. (Pfeiffer, 1861, in Walker, 2010)	• Luar (serambi): semi-open area with ample windows for ventilation • Tengah: middle area • Dapor (kitchen) at the rear, connected to tengah with antara dua (passageway) • Existence of *'jungkar'* next to kitchen, function as washing area • Bathing shed outside of the house • Addition of small or full-front verandah attached to luar (Walker, 2010) • Existence of *panggor* at tengah for multi-purpose use; wedding, female living area • *Padong* (attic) used as sleeping space for maidens and unmarried girls, become living space during gatherings • Prominent Malay families have 'peeping gallery' above tengah, on the padong floor	• Addition of two bedrooms at both sides of tengah space • Addition of bathing room and water closet near the kitchen • Removal of jungka (washing area where water was collected in large pots called *tempayan*)	
Variations	-	• Most basic: front step with lean-to roof • Additional small front verandah, small side verandah or full-front verandah attached to luar with lean-to roof	• Front middle teko / teko tengah • Front side teko / teko tepi (left or right)	3 categories; (1) brick and mortar columns at front façade (2) brick and mortar columns as design and structural elements for entire ground floor (3) columns used as design and structural elements for both ground and first floor

4.3 Spatial layout development

Table 5 below depicts changes in spatial layout and physical development of a potong Limas house (A5-H23), a limas Serani with side teko (A6-H44s) and a limas Serani with middle teko (A5-H27m). These floor plans were drawn based on the current layout and interviews with house inhabitants. Out of the three architecture types, the limas Serani with middle teko model has the least modification, be it extension, removal or relocation. In contrast, limas Serani with side teko has the most modification, portrayed by house A6-H44s below. House A5-H23 represents the potong Limas type, often only having additional wooden partitions in the tengah to make up two additional bedrooms. 17 out of 47 house samples have walled up their ground floor for habitational space, while the rest remained open.

Table 5: Changes in spatial layout for each house type. (Source: Author)

House Code	A5-H23 (built in 1937)	A6-H44s (built in 1942)	A5-H27m (built in 1935)
Original Floor Plan			
Changes in Floor Plan			
Current House Condition			

Verbal data from interviews reveal that changes in socio-economic conditions, particularly through access to formal education, significantly influenced the spatial transformation of Malay houses along the Sarawak River. The introduction of formal education in the mid-twentieth century played a pivotal role in improving literacy rates and opening pathways to steady income employment, replacing irregular wage labour. For instance, residents of B13-H11 and B13-H46 noted that the construction of SK Matu Baru in the mid-1960s provided children in Bintawa and Pulo with better educational access. This shift corresponds to a sharp rise in Malay literacy rates from 17.6% in 1947 to 40.3% in 1970, and later 90.3% by 2010 (Kheung, 2014). Improved education enabled families to secure salaried jobs, particularly in clerical positions (*orang kerani*), which, as Abang Yusuf Puteh (2005) highlights, marked a transition for the ordinary Malay class toward economic stability.

Economic stability facilitated by fixed incomes allowed homeowners to invest in durable construction materials and adopt newer architectural styles. The limas Serani house, regarded as a modern type in the late 1940s, emerged in place of traditional bumbung panjang and potong limas houses, reflecting a socio-economic transformation in Kampong Seberang. For example, residents of B12-H13 in Pulo attributed their ability to adopt the *limas Serani* style to income stability from formal employment. Additionally, the migration of Malays from Matu further increased the prevalence of limas Serani-type houses in the eastern kampongs.

Family expansions further contributed to spatial transformations, but always in alignment with the riverine context. Residents revealed that house extensions were made backwards or downwards rather than sideways. Post-2000, the introduction of the Kuching Barrage and Shiplock system (Kuok et al., 2011; Hui, 2006) effectively mitigated flooding and tidal issues, encouraging homeowners to transform the previously unused

ground-floor spaces into functional areas, such as living rooms, bedrooms, or small retail shops. This shift reflects a gradual detachment from the river as a primary mode of transportation and economic activity, marking a transition from traditional *perahu*-dependent riverine livelihoods to land-based practices.

In summary, the spatial transformation of Malay houses along the Sarawak River results from the interplay between socio-economic progress driven by education and the riverine ecosystem. While education facilitated economic stability and the adoption of new architectural styles, the river's influence is evident in both the original design of stilted houses and the adaptive reuse of ground-floor spaces following improved flood mitigation. This synergy between socio-economic and environmental factors underscores the evolving relationship between the built environment and the riverine lifestyle.

5.0 CONCLUSION AND RECOMMENDATIONS

This study aims to investigate the most common form of traditional Malay houses in Kampung Seberang and to examine spatial transformation causing the changes in house form. The findings reveal that the most common forms found in the Sarawak River settlement are the limas Serani and potong Limas types, followed by the bumbung panjang and hybrid limas Serani. Potong Limas houses frequently recur in the villages closest to Astana, along the main path, such as in Sungai Bedil, Boyan and Gersik. Meanwhile, limas Serani-type houses increase in commonality the further away from Astana, signifying newer settlements with houses built based on differing lifestyles. The lesser quantity of hybrid-type houses, which are considered belonging to the higher section of Sarawak Malay social hierarchy exhibit the social and economic position of the north bank people.

These architectural forms can be further distinguished into four major periods. Firstly, in the pre-Brooke period, or traditional architecture, houses were simplistic in form with gable roofs made of Nipah palm. The later Brooke period witnessed hipped-roof dominating Malay houses, with construction materials mainly made of Belian. The houses were extended with a frontal appendage during the successive period post-World War 2, in which house form closely resembles those found on the west coast of the Malay Peninsula during this colonial era. Architectural transformation involves spatial extension on the ground floor or to the rear part of the house- there were never sideways extensions. These changes could be linked to the north bank Malay's socio-economic progression, in terms of formal education and better job opportunities. Subsequent infrastructural development in the river barrage further improved flood control and facilitated the needs of house inhabitants to expand their house spatial use.

The present study provides numerous insights into the Sarawak River Malay's way of life a century ago, while particularly delineating the effects of historical, social and economic forces on house form. It detailed various physical and spatial changes happening in different time periods, along with their unique attributes. These findings are significant as the Sarawak River is the starting point of the modern Sarawak, therefore, they could form a fundamental baseline for how Malay house architectural typology in Sarawak's other divisions could be compared and established. This recommendation aligns with Halipah's (2015) proposal to increase knowledge of traditional Sarawak Malay houses due to limited resources available as references for developers, architects and interested parties.

Additionally, the physical and spatial characteristics in Table 4 could be developed into an assessment tool to evaluate the architectural values of other Malay houses in Sarawak for conservation purposes. The study is limited in this regard, as it only focuses on the Sarawak River area. This geographical constraint is combined with the temporal limitation; it only focuses on the period during the Brooke era and beyond as the only sources portraying houses before the 1840s could only be found in books, drawings, paintings and journals. A more comprehensive historical context could be provided if the temporal boundary was widened to include Malay-style bungalow houses- the later development beyond the 1970s.

Urgent conservation of traditional villages like Kampong Seberang is vital to preserving community heritage, Kuching's identity, and Sarawak's history. Rigorous documentation of Sarawak's vernacular Malay houses must be prioritized before they vanish entirely.

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