Indigenous Heritage and Sustainable Design: Insights from the Ancient Houses in Binh Duong, Vietnam

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Abstract

The ancient houses of Binh Duong represent an essential layer of indigenous heritage of Vietnam, where cultural values, material intelligence, and environmental adaptations intersect. Constructed mainly during the late nineteenth and early twentieth centuries, these dwellings illustrate local ingenuity in responding to climatic conditions while sustaining social and spiritual traditions. In this context, this study investigates how such houses embody vernacular strategies of environmental adaptation and how these insights may inform contemporary sustainable design.

The research employed a field survey of five heritage houses officially recognized for their well-preserved architectural values, supported by in-depth interviews with homeowners, systematic on-site observations, and a review of existing publications and archival materials. Architectural documentation included measured drawings, photographic records, and spatial mapping to analyze construction systems, materials, and spatial orientation, as well as the climatic functions of courtyards, gardens, and extended roofs.

Findings show that these houses achieved sustainability through passive cooling, natural ventilation, and the use of durable, locally sourced materials such as timber, brick, and tile. Elevated plinths, shaded verandahs, and open courtyards provided resilience against heat and humidity, while aesthetic details in carpentry and ceramics reflected deep cultural symbolism. The paper concludes that the ancient houses of Binh Duong demonstrate "embedded sustainability" where ecological performance is integral to spatial and cultural logic. Indeed, they offer enduring lessons for environmentally responsive and culturally grounded architectural practice.

Keywords: Vernacular Architecture, Indigenous Heritage, Binh Duong, Sustainable Design, Climatic Adaptation, Local Materials.

Introduction

Vernacular architecture has long been recognised as a form of cultural knowledge in which communities articulate their ways of living, modes of adaptation, and relationships with the natural environment through the built forms. Far from being static relics of the past, vernacular houses are dynamic responses to climate, material availability, social organisation, and spiritual practices (Rapoport, 1969; Oliver, 2007). Within the discourse of vernacular settlement studies, this dynamism has been repeatedly emphasised: indigenous architecture is understood not simply as a container of cultural values but as a resource for design innovation in the present and the future (Jagatramka et al., 2021).

In recent decades, sustainability concerns have heightened the relevance of vernacular traditions. In fact, the quest for energy-efficient, climate-responsive, and resource-conscious design has pushed scholars and practitioners to revisit traditional dwellings for inspiration (Nguyen *et al.*, 2011). The ISVS e-journal consistently highlight this intersection. Studies of Himalayan settlements show how thick stone walls, wooden joinery, and compact spatial organisation ensure thermal comfort in extreme climates without mechanical interventions (Tuladhar and Dev, 2023). Research on Javanese houses, meanwhile, reveals how open pavilions, layered courtyards, and spatial symbolism maintain ecological balance while sustaining social rituals (Oliver, 2007). These inquiries illustrate how vernacular wisdom anticipates many principles now codified in sustainable architecture.

In this background, the ancient houses of Binh Duong Province in southern Vietnam represent a significant yet underexplored case. Built mainly in the late nineteenth and early twentieth centuries, these houses demonstrate a high degree of cultural and technical sophistication. Their architecture integrates elevated floors, wide verandas, and expansive courtyards—features that enhance ventilation and mitigate heat in the humid tropical climate. The use of local bricks, clay tiles, and hardwood not only reduced reliance on imported resources but also reflected deep material knowledge rooted in local craft traditions. Decorative wood carvings, ceramic inlays and symbolic ornamentations articulated social status and spiritual meaning, positioning the houses simultaneously as dwellings, sites of ancestor worship, and markers of community identity.

Despite their cultural and environmental values, the ancient houses of Binh Duong have received limited scholarly attention compared with other vernacular traditions in Vietnam and Southeast Asia. Existing studies of Vietnamese architecture focus largely on the northern and central regions, while the southern vernacular heritage remains underexplored. In this context, this study addresses this gap by examining how the houses of Binh Duong embody indigenous strategies of environmental adaptation and cultural expressions that remain relevant for contemporary sustainable design. It explores how spatial configurations, construction techniques, and material practices reflect the local ecological wisdom and social organisation thereby linking heritage conservation with modern sustainability concerns.

Therefore, the aim of this research is to ascertain the ways in which vernacular houses contribute to sustainability.

Its objectives are as follows:

- To document the architectural characteristics, spatial organisation, and material techniques of five representative ancient houses in Binh Duong;
- To analyse how these houses demonstrate indigenous principles of environmental adaptation and resource efficiency;
- To interpret how the lessons from the vernacular heritage of Binh Duong can inspire sustainable design approaches suited to tropical contexts today.

Theoretical Framework

The study of vernacular architecture provides a critical lens for understanding the relationship between culture, environment, and design. It represents a form of cultural production through which communities articulate their worldviews and ways of life in built form. According to Rapoport (1969), vernacular houses are the "direct and unselfconscious translation of culture into form". They are created by people rather than professional architects and therefore embody a holistic synthesis of social structure, belief systems, and environmental adaptation. Building traditions evolve over generations as communities respond to changes in climate, available materials, and social organisation. Thus, vernacular architecture is not merely the outcome of technological limitation or geographic determinism; rather, it is a reflection of the ecological intelligence of a society and its capacity to transform necessity into culturally meaningful designs.

Oliver (2007) deepens this understanding by describing vernacular architecture as "architecture without architects," an evolving record of human ingenuity grounded in local

experience. For Oliver, vernacular is both functional and symbolic: it mediates between human comfort and cultural identity while remaining deeply embedded in its natural context. Through repetition and variation, vernacular architecture achieves a form of cumulative design knowledge, transmitted orally and experientially through generations of craftsmen and householders. This knowledge is not codified in texts but inscribed in practice—in how builders orient a house to capture prevailing winds, how they select durable local materials, or how they arrange spaces to accommodate both domestic and ritual activities.

From the standpoint of heritage studies, vernacular architecture is a living embodiment of collective memory and identity. Lowenthal (1998a) defines heritage as the process through which societies select, reinterpret, and transmit cultural forms that embody shared meanings and values. Smith (2006a) similarly argues that heritage should not be viewed solely as the preservation of material artefacts but as a dynamic cultural process through which communities continuously renegotiate their sense of belonging. Within this view, the ancient houses of Binh Duong can be interpreted not only as historical remains but also as living heritage that connects the present with the accumulated wisdom of the past. The craft traditions of wood carving, ceramic integration, and brickmaking are not static techniques but manifestations of what Smith calls the "authorized heritage discourse" re-enacted at the local level—linking skill, identity, and sustainability.

Tradition, in this context, functions as a mechanism of adaptation rather than resistance to change. Glassie (2010) observes that tradition is "the creation of the future out of the past," highlighting the continuous negotiation between continuity and innovation. This notion resonates strongly within vernacular practices, where builders reinterpret inherited models to suit changing climatic or social demands. Similarly, Sharifi and Yamagat (2018) introduce the concept of "ecological embeddedness," emphasizing that traditional settlements sustain themselves through interdependence between human and natural systems. Vernacular thus achieves a balance between permanence and transformation—a key feature of sustainable design that modern architecture often overlooks.

The idea of vernacular knowledge is central to this discussion. It denotes a localised, experience-based understanding of environment, materials, and space. In Vietnam, as Nguyen et al. (2011) note, vernacular houses demonstrate an acute sensitivity to climatic comfort through passive cooling, cross-ventilation, and shading devices such as verandas and inner courtyards. These features anticipate many principles now formalised in sustainable architecture. Such knowledge arises not from abstract environmental theory but from lived interactions with natural forces—sunlight, humidity, wind, and seasonal change. Vernacular knowledge is cumulative, adaptive, and communal, ensuring both the functional performance of buildings and the transmission of cultural meaning.

In recent years, the discourse on sustainable principles has increasingly revisited vernacular traditions as models for resource efficiency and climate resilience. Hasan Fathy (1986) was among the first to argue that sustainability is inherently embedded in traditional architecture, where form and material are inseparable from environmental logic. Likewise, Ordóñez-Castañón & Ferreira (2024) demonstrate that adaptive reuse of vernacular buildings contributes to both cultural continuity and environmental stewardship. These perspectives shift sustainability from a purely technical paradigm to one that recognises cultural meanings and social participation as essential components of ecological resilience.

Literature Review

Vernacular Architecture as a Source of Sustainable Knowledge

The relationship between vernacular architecture and sustainable design has been widely discussed in architectural and cultural studies. Early scholars such as Rapoport (1969) and Oliver (2007) has established the foundation for understanding vernacular architecture as a form of environmental and cultural intelligence. Rapoport (1969) argues that traditional dwellings are not arbitrary responses to environmental conditions but the "direct and unselfconscious translation of culture into form." This concept positioned the vernacular house as an ecological and social product, embodying the adaptive strategies of a community.

Similarly, Oliver (1999) defines vernacular architecture as "architecture without architects," highlighting its capacity to evolve through local experimentation and collective experience rather than through professional design methods. These early works emphasize that the sustainability of vernacular buildings lies in their embedded ecological logic—the result of generations of adaptation to local climate, materials, and socio-cultural organisation.

Recent literature builds upon this foundation by reframing vernacular traditions within contemporary sustainability discourses. Fathy (1986) demonstrated that in terms of natural energy and vernacular architecture, passive cooling, shading, and orientation techniques inherent in traditional Middle Eastern architecture offer crucial insights for reducing energy demand in modern buildings. Likewise, Edwards (2005) notes that contemporary green architecture can only achieve meaningful sustainability when it re-engages with the climatic intelligence and community participation integral to vernacular tradition. This shift reflects a broader understanding that sustainability is not merely technological but cultural, involving the transmission of values, craftsmanship, and environmental ethics across generations.

Climate Responsiveness and Environmental Adaptation

One of the most significant lessons drawn from indigenous heritage for sustainable design is the ability of traditional buildings to moderate climate through form and materiality. Studies across diverse regions have shown that vernacular houses achieve thermal comfort through passive means. In this regard, Sharma (2021) analyses dwellings in Himachal Pradesh, India, revealing how sloped roofs, timber-laced stone walls, and compact layouts mitigate seismic risks and climatic extremes. Similarly, Leo Samuel (2017) examines traditional buildings in Hyderabad, India many of which combine local traditional materials with some modern construction elements perform in terms of thermal comfort. Their interest arises from the tension between modern durability (cement, steel) and the passive, climate-responsive design features of traditional architecture. Sharman et al. (2023) show that in Telangana, wide verandas and semi-open transition spaces provide shading and cross-ventilation, reducing dependence on mechanical cooling. Nishinthan & Rajapaksha (2023) found that vernacular courtyard houses in Jaffna in Sri Lanka achieve improved thermal performance through passive design strategies. Further, Sholihah (2024) describes Javanese houses where layered courtyards and open pavilions create microclimates that enhance comfort and facilitate social interaction.

Parallel research in Sri Lanka and Indonesia confirms that vernacular settlements integrate climatic adaptation and cultural symbolism. For instance, Wimalaweera (2014) demonstrates that vernacular architecture in Ratnapura district, Sri Lanka responds to social, technological and environmental forces. In Gujarat, India, Jagatramka et al. (2021) highlights how adobe, timber, and brick construction ensure thermal stability while expressing communal identity. These studies collectively reveal that vernacular design principles anticipate many of the strategies now codified in sustainable architecture: passive cooling, orientation for ventilation, and the use of thermally efficient materials.

However, while the environmental performance of vernacular buildings has been well established, translation of these principles into contemporary design frameworks remains inconsistent. Many studies emphasise documentation and typological analysis but offer limited guidance on adaptation for modern construction systems or urban settings (Sharifi and Yamagata, 2018). As a result, vernacular sustainability is often celebrated descriptively rather than operationalised as a living design methodology.

Material Traditions and Craft Knowledge

Material culture plays a crucial role in linking sustainability with indigenous heritage. Oliver (2007) observes that vernacular dwellings almost invariably use locally sourced, renewable materials—timber, earth, bamboo, and stone—crafted through techniques refined by long-standing traditions. Glassie (2000) conceptualises tradition as "the creation of the future out of the past," emphasising that craft is a living system of adaptation rather than replication. This perspective aligns with the notion of heritage (Lowenthal,1998b) as a dynamic process

that sustains cultural memory while accommodating innovations.

In Southeast Asia, studies of material traditions illustrate how local craftsmanship contributes to sustainable resource management. Nguyen et al. (2011) identify the use of hardwood, clay tiles, and laterite foundations in Vietnamese vernacular houses as examples of material efficiency and durability. These systems rely on low embodied energy and allow for maintenance and repair rather than replacement.

Beyond their ecological values, craft traditions sustain local economies and reinforce social cohesion. The making of bricks, tiles, and carvings involves communal labour and the transmission of tacit knowledge through apprenticeships, ensuring continuity across generations. However, as Sharifi (2018) notes, modern constructions often disrupt these craft ecologies through industrial materials and globalised aesthetics. The challenge for contemporary architects is to reinterpret—not replicate—such material intelligence within sustainable design frameworks that acknowledge local contexts and cultural meanings.

Symbolism, Ritual, and Cultural Continuity

Another dimension of indigenous heritage relevant to sustainable design lies in its symbolic and ritual meanings. In this regard, Smith (2006a) argues that heritage is not simply about preserving monuments but about sustaining "a sense of belonging through practice." Vernacular houses often function as spatial representations of cosmology, ancestry, and social hierarchy. Adding to this, Sholihah (2024) shows that the Javanese house embodies a cosmological axis linking the human beings, their ancestors, and the divine, while Sarkar (2013) notes that Himachali dwellings incorporate shrines and ritual zones that reinforce kinship and spiritual protection. Jayatissa (2000) emphasises vernacular traditions as qualitative attributes in the contemporary architecture context. These spatial practices ensure not only physical comfort but also psychological well-being, a component increasingly recognised in sustainable design.

Interestingly, contemporary researchers have begun to explore how symbolic and ritual dimensions of vernacular can inspire human-centred and culturally embedded forms of sustainability. For instance, Tavares, Alves and Vásquez (2021) show how intangible cultural heritage (rituals, values, communal practices) contributes to resilience in urban settings—not just climate resilience but also social and cultural resilience. It supports the idea that preserving intangible cultural practices binds people to places. Similarly, Sharifi and Yamagata (2018) links cultural resilience with ecological resilience, suggesting that sustainability cannot be reduced to energy metrics alone.

Yet, the majority of sustainability models continue to privilege technical solutions over socio-cultural processes, leaving a conceptual gap in understanding how heritage values translate into design innovation.

Contemporary Interpretations and Gaps in Knowledge

Contemporary architectural discourse increasingly recognises the value of indigenous knowledge in rethinking sustainability, but critical gaps persist. Studies such as Sharifi and Yamagata (2018) and Na et al. (2022) demonstrate the potential of traditional spatial and material systems to inform modern sustainability goals. Nevertheless, most of this research remains geographically concentrated in South Asia, the Middle East, and parts of East Asia, with limited representations from the broader Southeast Asian context.

Moreover, much of the existing literature privileges environmental performance over socio-cultural dynamics. While the thermal efficiency and passive systems of vernacular houses are well-documented, fewer studies address how cultural meanings, craftsmanship, and social organisation can guide contemporary design processes. There is also a tendency to treat vernacular architecture as a historical artefact rather than as a living framework capable of evolving with modern needs (Oliver, 2007; (Smith, 2006a).

Another gap lies in the methodological approaches adopted. A large proportion of existing research employs descriptive typologies or climatic simulations, which, while valuable, often neglect participatory and ethnographic perspectives. Rapoport (1969) cautions

that without understanding the socio-cultural logic behind built forms, designers risk misinterpreting vernacular sustainability as merely aesthetic. In this regard, recent work by Sharifi and Yamagata (2018) call for integrative frameworks that unite cultural anthropology, environmental science, and design innovation—a direction still under-developed in vernacular studies.

Finally, the transferability of indigenous principles to contemporary architecture remains a critical question. As modern societies face rapid urbanisation, climate change, and cultural homogenisation, reinterpreting vernacular wisdom requires careful mediation between authenticity and adaptation. Scholars such as Fathy (1986) and Edwards (2005) advocate for hybrid models where traditional materials and spatial patterns are reimagined through modern techniques. Yet, the balance between innovation and cultural fidelity continues to challenge designers and researchers alike.

The reviewed scholarship affirms that vernacular and indigenous traditions across the world offer profound and enduring insights for sustainability, grounded in their responsiveness to local climates, material intelligence, and socio-cultural cohesion. From the earthen dwellings of the Middle East to the timber architectures of South and Southeast Asia, researchers have demonstrated how traditional buildings achieve equilibrium between people and the environment without reliance on industrial technologies or high-energy systems. Yet, critical limitations persist within this body of knowledge. The integration of cultural values and ecological performance within contemporary sustainable design frameworks remains partial and uneven. Regional representation is also skewed, with Southeast Asia—and particularly southern Vietnam—receiving limited scholarly attention. Furthermore, methodological approaches continue to privilege typological descriptions over interpretive or participatory analyses that could connect ethnographic insights with design innovations.

In light of these gaps, this study advances the discourse by situating the southern vernacular architecture of Vietnam within global sustainability debates. It contributes a contextual and interpretive understanding of how traditional materials, spatial forms, and cultural practices constitute a living reservoir of ecological wisdom, offering applicable models and conceptual inspiration for contemporary sustainable design.

Research Methods

This research adopted a qualitative approach grounded in the disciplines of architectural anthropology and cultural heritage studies to explore how traditional building knowledge expressed in the ancient houses of Binh Duong reflects principles of sustainability. The methodological framework was based on an interpretive perspective that seeks to uncover the meanings embedded in architectural forms and spatial organisations. It approaches vernacular dwellings as living cultural expressions shaped by their social and environmental settings, rather than merely as technical constructions or aesthetic objects. Field research was conducted between April and July 2020, combining on-site observations, semi-structured interviews, and archival research. This triangulated approach aimed to capture both tangible and intangible aspects of sustainability—spatial configuration, construction techniques, and cultural practices that sustain these houses over time.

It employed case study as a method to examine in depth the interrelationships between architectural forms, cultural meanings, and environmental contexts. This method is particularly appropriate for vernacular and heritage studies, where material practice, social organisation, and ecological adaptation are intertwined and cannot be detached from the lived environment.

The field investigation centred on two key areas in Binh Duong Province—Thu Dau Mot City and Bach Dang Island (cu lao Bach Dang) in Tan Uyen Town—which together represent the historical core of the province's settlement and trade development. These two locations contain some of the most intact and architecturally distinguished nineteenth- and early twentieth-century houses in southern Vietnam, reflecting the convergence of economic prosperity, craftsmanship, and cultural hybridity.

Introduction to the Case Study area

Thu Dau Mot City emerged during the late nineteenth century as an important administrative and trading centre along the Saigon River. The town became a hub for timber, ceramics, and traditional crafts, attracting skilled artisans and wealthy merchant families. Its prosperity enabled the construction of large timber houses combining Vietnamese spatial logic with stylistic influences from Chinese and French colonial architecture. Many residences, including those of the Tran and Nguyen families, served both domestic and commercial functions—acting as living spaces, ancestral halls, and business premises—thus embodying the social and economic dynamism of the period.

Bach Dang Island (cu lao Bach Dang), by contrast, developed as an agricultural and riverine settlement. Located within a network of alluvial waterways, it supported orchard cultivation and small-scale river trade, forming a distinctive cultural landscape where architecture, livelihood, and environment were closely integrated. Houses on the island were designed to adapt to the humid tropical climate and seasonal flooding, using elevated floors, wide verandas, and open courtyards to regulate heat and moisture. The relative isolation of the island and the continuity of local family lineages have helped preserve several well-maintained examples of late nineteenth-century architecture, making it an ideal setting for the study of the vernacular.

Fig. 1: Case Areas Location on the map
Source: Author

Within these two regions, five officially recognised heritage houses were selected for detailed analysis, representing a range of social classes, spatial typologies, and construction techniques. These five case studies were selected according to three main criteria:

- Heritage recognition and preservation status, ensuring that each site represents a documented and legally protected example of Binh Duong's built heritage;
- Architectural and typological diversity, demonstrating variations in spatial hierarchy, structural systems, and cultural symbolism across urban and rural contexts;
- Accessibility and community participation, allowing for field documentation, local engagement, and the recording of oral histories from descendants and custodians.

Together, Thu Dau Mot and Bach Dang Island embody two complementary expressions of Binh Duong's vernacular landscape—one urban and mercantile, the other agrarian and riverine. Their ancient houses thus provide a comprehensive basis for understanding how indigenous knowledge shaped sustainable design solutions adapted to both socio-economic and environmental conditions.

Tran Cong Vang House, located at 21 Ngo Tung Chau Street, Phu Cuong Ward, Thu Dau Mot City, occupies a 1,333 m² plot, including a main house of 323 m² and an auxiliary house of 119 m². Built between 1889 and 1892, it comprises refined wooden architecture with intricate carvings and a balanced courtyard composition. The residence was recognised as a National Architectural and Historical Monument on 7 January 1993.

Fig. 2: Tran Cong Vang House
Source: The house owner, 2020

Fig. 3: Tran Van Ho House
Source: The house owner, 2020

Tran Van Ho House, situated at 18 Binh Duong Street, Phu Cuong Ward, Thu Dau Mot City, covers 1,296 m², with a main hall of 200 m². Constructed circa 1890, the house exhibits a Đinh-shaped plan and elaborate roof ornamentation, blending Chinese symbolic motifs with Vietnamese spatial planning. It was designated a National Heritage Site on 29 April 1993.

Nguyen Tri Quan House, located in Quarter 1, Tan An Ward, Thu Dau Mot City, stands on a 3,243 m² plot. Completed around 1890, it combines domestic and ritual spaces in a cohesive courtyard layout, embodying the moral order and aesthetic principles of the southern Vietnamese elite. The site was listed as a Provincial Architectural Heritage Monument on 2 June 2004.

Fig. 4: Nguyen Tri Quan House
Source: The house owner's, 2020

Do Cao Thua House, located in Tan Uyen Town, occupies 6,957.81 m² of land and was built in the late nineteenth century. Its deep verandas, open interior volumes, and finely crafted timber joints highlight the local adaptation of vernacular forms to tropical living. The house was officially recognised as a Provincial Architectural Heritage Site on 2 June 2004.

Duong Van Ho House, situated in Dieu Hoa Hamlet, Tan Uyen Town, sits on a 2,150.2 m² site consisting of 228.7 m² of built area and 1,921.5 m² of gardens. Constructed between 1911 and 1914, it features elevated floors and extensive eaves for flood protection and climatic comfort, integrating dwelling, worship, and landscape within a unified ecological design. It was listed as a Provincial Cultural and Historical Heritage Site on 25 August 2020.

Fig. 5: Do Cao Tri House
Source: The house owner, 2020

Fig. 6: Duong Van Ho House
Source: The house owner, 2020

Data Collection Techniques

Archival Research: Initial research involved consulting archives from the Binh Duong Department of Culture, Sports and Tourism and the Binh Duong Museum, focusing on restoration documents, inventories, and heritage listings. Published materials such as national and Binh Duong provincial monuments were also reviewed to establish historical chronology and typological context.

Field Observation: Each site was visited repeatedly to record spatial organisation, orientation, and climatic adaptations. Using spatial-sequential mapping, observations moved from outdoor landscapes to interior zones. Measurements of walls, openings, and roofs were recorded manually, supplemented by photographic documentation and scaled sketches later digitised in AutoCAD. Observations focused on passive cooling strategies, ventilation, solar orientation, and material sourcing.

Interviews and Oral Histories: To understand intangible aspects of heritage, semi-structured interviews were conducted with five homeowners, five local elders, and three heritage officials. Each interview lasted 60–90 minutes. Questions explored construction history, material sourcing, ritual practices, and community engagement. Interview data were transcribed and coded thematically to identify how sustainability is practiced and perceived within cultural frameworks.

Data Analysis

The information collected was examined through a multi-layered interpretive framework designed to connect architectural, cultural, and ecological dimensions.

- **Architectural Analysis**: This stage explored spatial composition, circulation patterns, and structural arrangements to understand how design and construction reflect functional and climatic logic.
- **Cultural Interpretation**: The symbolic significance of decorative details, spatial rituals, and room hierarchy was analysed to reveal how these elements express underlying beliefs, social relations, and moral values within the dwelling.
- **Sustainability Assessment**: The final stage evaluated how environmental awareness is embedded in building materials, spatial layouts, and settlement organisation, illustrating how sustainability emerges naturally from traditional practices rather than through external technological intervention.

Limitations

Some privately owned houses were inaccessible, narrowing the range of the case studies. The absence of quantitative environmental data (e.g., temperature, humidity) limits direct comparison with technical performance metrics. Moreover, the ongoing evolution of vernacular houses means some features may represent adaptive renovations rather than original forms. Despite these constraints, the qualitative insights contribute substantially to understanding the interplay of heritage, ecology, and design.

Findings and the Discussion

The ancient houses of Binh Duong represent a distinctive expression of Southern Vietnamese vernacular heritage, where spatial organisation, ecological adaptation, material practices, cultural symbolism, and hybrid influences intersect. These features are not isolated; rather, they resonate with wider debates in vernacular scholarship, offering critical insights for sustainable design.

Spatial Organisation and Ritual Centrality

Field observations from houses such as Tran Van Ho (1890) and Duong Van Ho (1911–1914), Do Cao Thua (late 19th century,) confirm that the dominant spatial typology is letter Đinh (丁), the traditional Vietnamese three-compartment house with two lean-tos [ba gian hai chái], in which the central bay (gian giữa) is dedicated to ancestor worship (fieldwork, 2020). This configuration not only reflects a structural logic—three bays providing balanced modularity, with lean-to side wings (chái) for auxiliary uses—but also embodies a cosmological worldview. The central compartment is consistently the most sacred space, housing the ancestral altar, carved panels (hoành phi), and parallel inscriptions (câu đối). Such arrangement demonstrates how domestic architecture functioned simultaneously as a dwelling and as a shrine, reinforcing continuity between the living and the departed.

Similarly, the Nguyen Tri Quan house employs a letter Khẩu (in English, it is Mouth) (口) courtyard typology, where four wings enclose a central court. This type is less common in Binh Duong but illustrates a flexible adaptation to both climatic needs and ritual priorities. The courtyard provides light and airflow, while also serving as a ceremonial forecourt during festivals and commemorations. The presence of multiple typologies within one region suggests that Binh Duong's architectural culture did not rigidly adhere to a singular model, but instead adapted canonical forms to family size, land availability, and symbolic aspirations.

The centrality of ritual space in these houses is significant. Unlike modern domestic architecture, where secular functions often dominate, Binh Duong houses prioritise sacred functions at the architectural core. The central compartment is carefully staged: its elevation above surrounding bays, placement of ancestral tablets, and layering of decorative symbols such as dragons, phoenixes, and longevity motifs signal its role as the moral and spiritual nucleus of the household. This echoes the assertion of Rapoport (1969) that house form is "a cultural institution" that materialises values and social systems, not merely a shelter. In this sense, the Binh Duong houses illustrate that spatial organisation is inseparable from cultural performance.

Comparable traditions can be seen across Asia. In Javanese Joglo houses, the central pendopo pavilion is sacred and hierarchical, accessible only to family elders and honoured guests, while peripheral areas host everyday domestic functions (Sholihah, 2024). In Sri Lanka, courtyard houses integrate shrines within domestic layouts, reinforcing kinship rituals and the continuity of lineage (Dayaratne and Kellett, 2008). In both cases, the spatial hierarchy encodes cosmological order into everyday living environments. The Binh Duong evidence resonates strongly with these traditions, yet it differs in its ecological emphasis: open verandas, riverside orientation, and surrounding orchards integrate ritual centrality with environmental adaptation, reflecting the Bach Dang Island's porous boundary between dwelling, ecology, and spirituality.

The comparison also reveals a theoretical insight: vernacular spatial organisation is a cultural script embedded in ecological adaptation. Oliver (2007) has argued that vernacular dwellings must be read not only as architectural artefacts but as "built expressions of a society's

worldview." Binh Duong's letter Đinh, letter Khẩu, typologies exemplify this: they are not rigid blueprints but flexible cultural codes, adjusted to geography, ecology, and social hierarchy. Their persistence over generations demonstrates the resilience of vernacular knowledge, even as external influences and modern pressures intervened.

From the perspective of sustainable design, these findings suggest that spatial organisation rooted in ritual centrality can be reinterpreted for contemporary housing. Courtyards, verandas, and hierarchical zoning are not merely cultural residues but passive environmental devices and social organisers. Re-examining their role in Binh Duong may inspire design strategies that integrate spirituality, ecology, and social life, rather than reducing housing to functionalist minimalism.

Climatic Responsiveness and Passive Comfort

Binh Duong's ancient houses reveal a sophisticated repertoire of climatic adaptations that embody the principles of passive design. Situated in the tropical monsoon climate of southern Vietnam—marked by high humidity, heavy seasonal rains, and intense solar exposure—these dwellings had to achieve comfort without mechanical cooling. The architectural responses are therefore deeply ecological, interweaving structural form, material choice, and landscaping.

A recurring feature is the use of steeply pitched roofs clad in yin–yang tiles [ngói âm dương]. These tiles, with their interlocking convex and concave profiles, not only ensure efficient drainage during monsoon downpours but also create small air gaps that regulate temperature by allowing trapped heat to dissipate. Deep overhangs extending from the rooflines provide generous shading for walls and verandas, preventing overheating of the interiors while creating semi-outdoor living zones. In the Tran Van Ho house, for example, the roof extends dramatically to shelter the surrounding veranda, producing a shaded buffer zone that mitigates glare and thermal gain.

Foundations are consistently raised on stone or brick plinths, a practice both pragmatic and symbolic. In low-lying areas such as Bach Dang Island, this elevation prevents floodwater intrusion, while in all contexts it protects timber columns from ground moisture and termite attack. The elevation also subtly enhances ventilation by permitting airflow beneath floors, reducing humidity inside the living spaces. Such measures reflect a profound understanding of microclimatic control through building form.

Ventilation is further enhanced by the careful integration of verandas, large shutters, and permeable partitions. In the Nguyen Tri Quan house, enclosed courtyards act as both light wells and wind catchers, generating cross-ventilation between opposite bays. These courtyards are not residual voids but functional climatic devices, ensuring that the central compartment reserved for ritual—remains well-lit and breathable despite its sacred status. Likewise, timber latticework and perforated panels above doors [cửa thông gió] permit continuous air circulation even when doors are closed, balancing privacy with comfort.

The landscape setting also contributes directly to climatic responsiveness. Houses in Bach Dang Island are surrounded by orchards of pomelo trees, whose foliage forms shaded microclimates that reduce solar heat gain. Small dig canals in pomelo garden adjacent to houses further assist in cooling by evaporation, creating breezes that moderate interior temperature. This integration of architecture and agro-ecology resonates with the concept of the "cultural landscape", in which dwelling and environment are mutually sustaining.

Comparative studies highlight both parallels and distinctiveness. In Telangana, India, verandas and permeable mud walls mitigate heat gain in hot-dry conditions (Devi and Srikonda, 2023), while in Himachal Pradesh, compact timber–stone houses combine seismic resilience with thermal comfort in cold climates (Sharma, Pawar and Ji, 2023). Although the material palettes differ—mud in India, stone in the Himalayas, timber and tile in Vietnam—the underlying principle is the same: passive environmental control embedded in vernacular form. This convergence underscores the same.

However, what distinguishes the Binh Duong case is the fusion of ritual centrality and environmental pragmatism. The same courtyard that channels breezes also hosts ancestral

ceremonies; the veranda that shades the house doubles as a communal reception area; the raised plinth that prevents flooding symbolises stability and prosperity. Thus, climatic responsiveness is not isolated from social and symbolic functions, but deeply entangled with them. As Rapoport (1969) observed, vernacular houses achieve sustainability not only through technical efficiency but through their ability to integrate cultural meaning with environmental necessity.

The implications for contemporary sustainable design are profound. In tropical regions increasingly dependent on air-conditioning, houses of Binh Duong demonstrate that low-energy comfort is achievable through passive means: orientation, ventilation, shading, and integration with vegetation. Furthermore, the layering of climate-responsive features with cultural functions suggests that sustainable housing today should not only focus on technical performance but also embrace social practices and cultural identity.

The ancient houses of Binh Duong thus exemplify an architecture that is at once ecologically intelligent, socially grounded, and symbolically resonant. Their climatic responsiveness confirms the enduring relevance of vernacular strategies in the global search for sustainable housing models.

Material Traditions and Craft Knowledge

The ancient houses of Binh Duong are distinguished not only by their spatial organisation and climatic strategies but also by their construction materials and artisanal craft traditions, which reveal a high degree of ecological awareness and cultural sophistication. Far from being utilitarian shelters, these houses are tangible archives of regional biodiversity, artisanal labour, and symbolic expression.

Structurally, the primary building material is hardwood, selected for durability, strength, and resistance to pests. Species such as padauk (afzelia xylocarpa), dark padauk (afzelia xylocarpa), xylia wood (xylia xylocarpa), Vietnamese Ironwood (erythrophleum fordii), and Sindora wood (sindora cochinchinensis) were commonly employed for columns, beams, and roof trusses (fieldwork, 2020). These species, abundant in Vietnam's forests during the late 19th and early 20th centuries, provide exceptional longevity—some columns still retain their structural integrity after more than a century. The Tran Cong Vang house, for instance, is supported by massive timber pillars resting on stone plinths, each column hand-hewn and polished, testifying both to the ecological wealth of the region and to the patrons' economic power.

Fig. 7: Carved panels, lintels, lacquer in Tran Cong Vang house
Source: The house owner, 2020

Floors are typically paved with unglazed terracotta tiles [gạch tàu], which moderate interior temperatures by absorbing and releasing heat slowly. Walls range from timber panels in earlier houses to later brick masonry, reflecting both material availability and shifting

aesthetic preferences. Roofs are clad with yin–yang clay tiles [ngói âm dương], their interlocking concave and convex pieces producing not only effective waterproofing but also rhythmic visual textures that enhance the silhouette of the house against the tropical landscape. Together, these material systems demonstrate an ecological cycle of local sourcing, renewable use, and climatic performance, anticipating contemporary principles of sustainable construction.

Beyond material pragmatism, Binh Duong houses are renowned for their artisanal craftsmanship, where carving, gilding, and inlay transform structural members into canvases of cultural meaning. The Tran Cong Vang house stands as a masterpiece: beams and doors are adorned with red lacquer with gilding [sơn son thếp vàng], shimmering under natural light, while door panels feature pearl in lay [cẩn xà cừ] depicting landscapes, flora, and auspicious motifs (fielwork, 2020). The Four Mythical Creatures (dragon, unicorn, turtle, phoenix) and the four seasonal plants (apricot, orchid, chrysanthemum, bamboo) recur across lintels and altar screens, reinforcing cosmological symbolism. Such decorative schemes elevated the house beyond utility, embedding it within a moral and philosophical universe shaped by Confucian and Taoist ideals.

The Do Cao Thua house offers another layer of cultural hybridity in craft. Here, Buddhist lotus motifs interweave with Confucian inscriptions, while Taoist yin–yang symbols appear in roof ridges, exemplifying the syncretic religious traditions of southern Vietnam (Nguyen Huu, 2019). This integration of multiple belief systems through material ornamentation suggests that craft knowledge functioned as a vehicle for cultural negotiation, enabling households to express moral identity, religious affiliation, and social prestige.

Comparative evidence underscores both the universality and distinctiveness of such practices. In Gujarat, India, vernacular houses feature intricate wooden brackets and carved facades, encoding social values and patron identity (Jagatramka, Ashwani and Satish, 2021). Similarly, in Japan, minka farmhouses utilise joinery and timber aesthetics to express harmony with nature, while in Indonesia, Toraja houses integrate carved panels with mythological symbols to affirm cosmological order. What distinguishes the Binh Duong case is the extraordinary fusion of structural durability with ornamental richness: the same timber column that supports the roof also bears inscriptions reminding descendants of filial piety and moral conduct. This duality of function and meaning exemplifies Rapoport's (1969) argument that vernacular dwellings are simultaneously cultural artefacts and technical solutions.

From a theoretical standpoint, these practices exemplify material culture as knowledge system. Oliver (2007) emphasised that vernacular materials are never neutral: they embody ecological wisdom, craft traditions, and symbolic values. The Binh Duong houses illustrate this triad vividly: hardwoods reflect biodiversity and ecological cycles; lacquer, inlay, and carving preserve artisanal transmission across generations; and motifs encode cosmological worldviews.

The implications for contemporary sustainable design are significant. Current discourses often emphasise technological innovations—new insulation materials, advanced glazing, or imported eco-products—while overlooking the cultural and ecological wisdom embedded in traditional materials. Binh Duong demonstrates that local materials, worked by skilled artisans, can achieve durability, climatic comfort, and cultural resonance simultaneously. Revalorising these practices could contribute to a sustainability agenda that is not only ecological but also cultural, preserving craft livelihoods and reinforcing community identity.

The material traditions and craft knowledge embodied in Binh Duong's ancient houses reveal a synthesis of ecological pragmatism, artisanal artistry, and symbolic communication. These houses remind us that sustainability is not solely a matter of technical efficiency but of cultural continuity, where materials carry stories, rituals, and collective memory. By engaging with these traditions, contemporary architecture can move towards a more holistic sustainability that honours both nature and culture.

Cultural Symbolism and Social Stratification

The ancient houses of Binh Duong are not only feats of carpentry and climate-wise construction; they are also carefully scripted interiors where symbols, texts, and objects choreograph social hierarchy and moral order. In these dwellings, decorative programs and spatial cues do more than please the eye: they encode genealogies, articulate Confucian virtues, and stage the etiquette of reception and ritual. This convergence of meaning and matter exemplifies a vernacular semiotics in which form is a social argument ((Rapoport, 1969; Oliver, 2007).

A first, recurring compositional rule is the primacy of the ritual core. Plans widely follow ritual inside, reception outside [nội tự ngoại khách] so that the altar axis and its textual field dominate the central compartment [gian giữa]. In the Do Cao Thua house, the front reception space is screened from the ancestral zone by three carved frames [bao lam], and the thresholds carry a dense iconography of auspicious motifs the four spiritual creatures [tứ linh], the four seasons [tứ quý], the Eight Treasures [bát bửu] that both ornament and admonish. The altar and its inscriptions "Đỗ phủ từ" [Ancestral Hall of the Do Clan] "Yến tử dực" [Swallow's Wings]," "Di tôn mưu" ["Legacy of Wisdom for the Descendants"] compose a moral horizon for family life, reminding descendants of intergenerational obligation and prudent stewardship (Fieldwork, 2020). In the Duong Van Ho house, a comparable emphasis on carved iconography culminates in uniquely sculpted dragon eaves-beams whose sinuous bodies support the veranda roof, an emphatic visualization of protective power at the threshold. Such alignments between text, icon, and structure anchor the dwelling in a Confucian cosmology while transforming carpentry into doctrine.

Textuality is everywhere performative. Inscribed plaques [hoành phi] and paired couplets [liễn đối] do not merely decorate; they speak—toward the ancestors, to guests, and back to household members. In Tran Cong Vang's residence, for example, more than a dozen pairs of couplets articulate rules of conduct starting at the gate "Chánh tâm vi tiên" **(正心為先)** ["Right Mind Comes First"], thereby projecting civility outward and disciplining movement inward. The couplets, often lacquered and gilded, flank the altar and column lines, their placement reinforcing axis, rank, and reverence; their content foregrounds filial piety and proper speech "ngôn ư tư, hành ư tư" **(言於思, 行於思)** [Let words be guided by thought, let deeds be guided by thought."] a script for comportment as one traverses the house. In this sense, the house functions as a didactic environment, teaching by inscription what it demands in practice. Comparative ethnographies across Southeast Asia observe similar textual and emblematic grammars whether in Malay and Javanese reception halls or Chinese lineage houses—where wall texts, plaques, and emblematic panels index prestige and virtue (Waterson, 1990; Rapoport, 1969). Binh Duong contributes a southern Vietnamese variant in which lacquer, mother-of-pearl inlay, and carved wood integrate these messages into the very load-bearing fabric.Objects and arrangements materialize rank. The reception compartment [khách đường] in Tran Cong Vang's house centers a marble-topped round table that explicitly displays the Eight Treasures, around which carved chairs seat visitors according to etiquette, while side bays accommodate secondary seating and storied chests. Along the screen between reception and altar hangs a genealogical chart [phả đồ], a material condensation of lineage that both legitimizes custodianship of the house and calibrates internal hierarchies among kin. The spatial script is unmistakable: approach through civility, sit according to status, and proceed toward the altar only under ritual terms. Cross-culturally, such seating geographies have been noted in Javanese pendopo etiquette and Chinese tangwu arrangements, where furniture placement and sightlines signal gradations of authority (Sholihah, 2024). The Binh Duong case adds a distinctive vernacular flourish by fusing these protocols with the climatic veranda, making the shaded threshold a stage for formal sociability.

Sumptuous craft indexes class. The scale and finish of Binh Duong houses required capital outlay and skilled labour over multiple years; sources stress that only wealthy lineages and local elites could have assembled such quantities of precious hardwood, lacquer, and inlay. Tran Cong Vang's house alone counts 48 free-standing round columns in the main block—an emphatic expenditure of timber and joinery—while carved panels, gilded altar screens, and

mother-of-pearl pictorials extend the rhetoric of refinement to every surface.

The presence of imported or cosmopolitan objects—French crystal chandeliers, gramophones, ceiling fans—alongside Lai Thieu and Bien Hoa ceramics telegraphs the owners' participation in colonial-era consumption and regional trade (field work, 2020). These hybrid assemblages are not contradictions; they are status technologies, announcing a family's reach while preserving ritual orthodoxy at the core.

Even architectural hybrids advertise status and worldliness. Tran Cong Vang's compound modifies the orthodox letter Đinh with a "reversed Đinh" configuration and a processional "little courtyard" bridged by a small gallery; the gate itself is said to echo Chinese temple forms while the owner claims inspiration from Indian shrines. Such gestures leave the ritual axis intact yet multiply thresholds and vistas—subtle spatial luxuries that differentiate elite houses from common dwellings. Comparable hybridization is reported across colonial Southeast Asia, where elite patrons appropriated imported motifs to thicken local prestige ecologies without displacing ancestral rites (Waterson, 1990).

At the level of iconography, Binh Duong houses mobilize a stable but richly recomposed repertoire. Dragons, phoenixes, and longevity characters march across beams and screens, while seasonal plants and scholarly implements weave allegories of cultivated life. The Duong Van Ho house, newly recognized as a provincial monument in 2020, intensifies this lexicon through virtuoso carving, demonstrating that austerity in textual heritage can be counterbalanced by exuberance in relief work. Read through the lens of material culture, these motifs operate as a public transcript of virtue and success legible to neighbours and visitors alike.

Taken together, these features demonstrate that cultural symbolism and social stratification are co-produced by architecture. Plans prioritize sacred centrality; inscriptions discipline behaviour; furniture and artifacts partition rank; and craft virtuosity signals wealth. The resulting houses are moral theatres: everyday life unfolds within a scenography of lineage and learning. This aligns with comparative theory that vernacular dwellings are not merely shelters but institutions that reproduce social order (Rapoport, 1969), and with Oliver's (2007a) insistence that vernacular form is a cultural script calibrated to ecology and economy alike. What Binh Duong adds is a southern Vietnamese articulation in which ritual orthodoxy, cosmopolitan display, and climatic pragmatics are fused—suggesting that sustainable design, if it is to be socially grounded, must attend not only to energy and materials but to the symbolic infrastructures through which communities narrate who they are and how they ought to live.

Fig.8: The Ancestor altar is in the middle hall, the most solemn place in the house.
Source: House owner, 2020

Hybrid Influences and Cultural Negotiation

While Binh Duong's ancient houses are deeply rooted in Vietnamese vernacular typologies such as letter Đinh and letter Khẩu, they are by no means closed systems. Instead,

they present a layered hybridity, absorbing and reworking external influences—Chinese, Khmer, French colonial, and even Indic motifs—into locally meaningful forms. This hybridity illustrates how vernacular traditions are not static relics but active negotiations, embodying both cultural resilience and cosmopolitan openness (Oliver, 2007a).

A clear case is the Tran Cong Vang house, completed in the late 19th century. Its layout remains essentially Vietnamese, at central compartment is the ceancestral altar and the processional axis that governs entry. Yet its decorative vocabulary is enriched with Chinese-inspired motifs: dragons (symbolising imperial power), phoenixes (prosperity and rebirth), bats (happiness), and calligraphic longevity symbols. These motifs adorn altar screens, beams, and column capitals in gilded lacquer and mother-of-pearl inlay. While originating from Chinese artistic repertoires, their use in Binh Duong is not simple imitation: they are domesticated into Vietnamese ancestral rituals, where the dragon may represent both cosmic order and the protective spirit of the lineage. This selective incorporation demonstrates how households re-signified imported symbols within a local moral economy.

Hybridisation is also evident in architectural detailing and furnishing. The same house features French crystal chandeliers, European-style marble tables, and a gramophone, juxtaposed with traditional carved timber furniture. The chandeliers illuminate the altar bay, but rather than secularising the ritual space, they enhance its prestige, reframing European luxuries as vehicles of ancestral honour. Similarly, imported floor tiles, patterned with floral and geometric motifs, coexist with Vietnamese terracotta gạch tàu in transitional spaces. These insertions speak to a colonial-era consumer economy, where local elites sought to display modernity and wealth without undermining traditional rituals. Comparable processes are documented in Hoi An merchant houses, where Chinese timber frameworks incorporate Japanese brackets and European shutters (Nguyen, 2011). In both Hoi An and Binh Duong, hybridity is a curated assemblage, not a wholesale adoption.

In Bach Dang Island, hybridity manifests in more modest but equally telling ways. The Do Cao Thua house integrates Buddhist lotus motifs with Confucian inscriptions and Taoist yin–yang emblems in its decorative program (Nguyen Huu, 2019). This syncretic layering of three belief systems reflects the religious pluralism of southern Vietnam, where village communities negotiated spiritual boundaries through material culture rather than strict doctrinal separation. The result is an architecture that is at once inclusive and adaptive, capable of hosting rituals for multiple traditions within a unified spatial and aesthetic framework.

Hybrid negotiation is also evident at the level of form and typology. Certain Binh Duong houses adjust the orthodox letter Đinh into modified forms that accommodate colonial-era courtyards, French-inspired façades, or expanded verandas. For example, the gate of the Tran Cong Vang compound echoes Chinese temple entries with its curved roof and calligraphic panels, while oral histories suggest inspiration from Indian temple forms in its tiered silhouette. These transformations confirm that vernacular typologies are porous, absorbing references across Asia while maintaining the core Vietnamese ritual axis. Oliver's (2007a) theoretical framing that vernacular is a dynamic process of adaptation rather than a frozen typology is vividly confirmed here.

Comparative cases across Southeast Asia underscore the significance of this hybridity. In Javanese urban houses, European façades were often appended to joglo structures without altering the sacred pendopo (Sholihah, 2024). Similarly, in Philippine bahay-na-bato, Spanish stone bases merge with indigenous wooden superstructures. These parallels suggest a common regional pattern: vernacular resilience expressed through selective absorption. Rather than signalling cultural erosion, hybridity functioned as a survival strategy, allowing communities to participate in new economies and aesthetics while preserving ancestral cores.

For Binh Duong, hybridity also functioned as a marker of social status. The ability to integrate French chandeliers, imported ceramics, or Chinese-inspired lacquer panels signified both wealth and cosmopolitan sophistication. Yet crucially, these markers did not erase Vietnamese ritual traditions but framed them with greater splendour. In this way, hybridity became a status performance embedded within ancestral piety.

The theoretical implications of these findings are twofold. First, hybridity in Binh Duong challenges dichotomies of "pure vernacular" versus "foreign modern." Instead, it demonstrates a continuum of negotiation, where the vernacular thrives precisely because of its adaptive capacity. Second, hybridity should be recognised as a form of cultural sustainability: by absorbing new influences without losing its ritual heart, the Binh Duong house exemplifies resilience in the face of colonialism, trade, and cultural flows. This lesson resonates today, as sustainable design increasingly grapples with the tension between global technologies and local identities.

Binh Duong's ancient houses exemplify how hybrid influences are not anomalies but integral to vernacular evolution. Their Chinese motifs, French furnishings, and religious syncretism testify to a cosmopolitan vernacular modernity—one that negotiates rather than resists change. Such hybridity, far from diluting tradition, enriches it, offering a model of how architecture can remain locally grounded while globally conversant.

Community Role and Continuity of Heritage

The ancient houses of Binh Duong are more than architectural artefacts preserved in isolation; they function as living heritage, continually embedded in community practices, kinship networks, and local economies. Their enduring significance lies in the way they mediate between past and present, serving simultaneously as symbols of lineage, sites of ritual, and potential resources for sustainable development. Unlike monuments frozen in time, these houses are socially alive, evolving with each generation's reinterpretation and negotiation.

At the household level, the ritual axis ensures continuity of lineage practices. In the Tran Van Ho and Tran Cong Vang houses, the central gian giữa continues to host ceremonies of ancestor worship, especially on death anniversaries (giỗ) and during Tết (Lunar New Year). Even when descendants no longer reside permanently in the houses, they return for commemorative rituals, reaffirming kinship bonds across dispersed families. This cyclical use sustains the houses as ritual anchors, where the built form enshrines ancestral legitimacy. Comparable patterns are documented in Chinese clan halls in Guangdong and Malay rumah adat, where ritual continuity sustains architecture long after shifts in residential use (Waterson, 1990). In this sense, the Binh Duong house is less a static dwelling than a node in an extended social network, activated by ritual time.

At the community scale, houses such as those in Cù Lao Bach Dang double as collective landmarks. Their visibility along riverbanks, shaded by pomelo orchards, makes them reference points for local identity and pride. Oral traditions, often narrated by elders, recount the histories of these houses, linking them to episodes of migration, trade, and resistance. For instance, the Duong Van Ho house is remembered not only as a home but also as a site where village deliberations were held, blurring the line between domestic and communal functions (Nguyen Huu, 2019). Such narratives embed the houses in the collective memory of place, reinforcing what Nora (1989) terms lieux de mémoire—sites where memory crystallises and secretes meaning.

Institutionally, heritage recognition by the state since the 1990s has elevated certain houses to monument status, conferring visibility and limited protection. The Tran Van Ho and Tran Cong Vang houses were designated as national architectural monuments in 1993, followed by provincial listings for Nguyen Tri Quan and Do Cao Thua in 2004, and Duong Van Ho in 2020. These designations, while symbolically important, have not always translated into adequate conservation funding or community engagement. Owners often struggle with maintenance costs, balancing pride in heritage with the practical burden of preservation. This reflects a wider tension across Asia: in Indonesia's Toraja houses, in Sri Lanka's courtyard compounds, and in Vietnam's Đông Hòa Hiệp village, formal recognition has sometimes detached heritage from everyday use, creating "museum houses" devoid of community vitality (Dayaratne and Kellett, 2008; Sholihah, 2024).

By contrast, Binh Duong's houses still largely remain in private ownership and ritual use, which, while fragile, helps preserve their living heritage character.

Economically, the clustering of houses in Bach Dang Island creates potential for cultural tourism integrated with riverine eco-tours. Yet unlike heritage clusters in Tien Giang's Dong Hiep Hoa or Can Tho's Binh Thuy, Binh Duong's houses remain under-promoted and less accessible (Nguyen Huu, 2019). This underutilisation risks neglect but also protects them from the over-commercialisation that has sometimes stripped other sites of authenticity. The challenge, then, is to develop community-based heritage tourism that provides resources for maintenance while safeguarding ritual integrity. Models from northern Thailand's heritage villages and Japan's gassho-zukuri settlements in Shirakawa-go suggest that tourism, if locally managed, can reinforce rather than erode cultural continuity (King, 1976).

The cultural sustainability of these houses also depends on intergenerational transmission of craft knowledge. Artisans who carved beams, inlaid mother-of-pearl, and lacquered panels transmitted techniques orally and through apprenticeships. Today, these skills are endangered by industrial substitutes and dwindling demand. Yet some workshops in Lai Thieu and Bien Hoa continue to produce ceramics and woodcarvings linked to heritage houses, creating a material link between tradition and modern markets. Supporting such craft economies is crucial not only for conservation but also for reinforcing the socio-material ecosystems that gave birth to the houses.

From a theoretical standpoint, the Binh Duong case highlights the concept of heritage as a process, not a product. The houses endure not because they are frozen relics but because they are continually renegotiated—ritually, socially, and economically. Their role in anchoring kinship rituals, serving as community landmarks, and enabling potential tourism demonstrates what Smith (2006b) calls the "uses of heritage": active deployments of the past to shape identity and sustain belonging.

For contemporary sustainable design, the lesson is that heritage continuity cannot be reduced to aesthetics or preservation techniques. What makes Binh Duong's houses sustainable is not only their passive climatic design or durable materials, but their integration into social life. To design sustainably today means to create spaces that communities can continue to inhabit meaningfully, embedding architecture in cycles of ritual, livelihood, and identity.

Binh Duong's ancient houses function as living heritage: they embody ritual continuity, serve as community landmarks, and hold latent potential for sustainable tourism and craft revitalisation. Their ongoing vitality demonstrates that vernacular architecture's relevance lies not only in technical adaptation but in its capacity to carry collective memory forward, ensuring that houses remain homes—socially, spiritually, and culturally—across generations.

Inspirations for Sustainable Design

The vernacular houses of Binh Duong do not merely represent the residue of a bygone era; they embody an architectural intelligence that can be reactivated for contemporary challenges. As sustainability discourse increasingly emphasizes ecological responsiveness, resource efficiency, and cultural continuity, these houses offer tangible precedents for design practices that integrate environment, material, and meaning. Drawing on their spatial organisation, material culture, and symbolic depth, several key inspirations for sustainable design emerge.

Perhaps the most direct lesson lies in the climate-responsive features of Binh Duong's ancient houses. Raised plinths, deep verandas, expansive eaves, and cross-ventilated courtyards are not antiquated devices but enduring techniques of passive environmental control. In tropical contexts where mechanical cooling dominates contemporary construction, the houses demonstrate how comfort can be achieved with minimal energy expenditure. Integrating shaded transitional spaces, porous boundaries, and vegetative landscapes into modern housing could reduce reliance on air conditioning while enhancing social interaction. This approach resonates with the concept of ecological embeddedness (Akbar,2020), where sustainability emerges organically from an integrated understanding of local context, climate, and materials—rather than being retrofitted through technology.

The reliance of the houses on locally sourced timber, bricks, and tiles highlights a circular material economy with low embodied energy. Moreover, the integration of craft—

through carved timber, lacquer, and ceramic inlays—demonstrates how construction can simultaneously support ecological balance and artisanal livelihoods. In contemporary practice, this translates into a call for revalorising local materials and reviving endangered craft traditions, rather than substituting them with imported, industrially produced elements. A sustainability framework that incorporates material provenance and craft continuity not only reduces environmental impact but also sustains cultural ecosystems, echoing Oliver's (2007a) reminder that vernacular materials always carry cultural meaning.

Spatial typologies such as the letters Đinh or Khẩu plan reveal how organisation of rooms, courtyards, and thresholds mediates between climate control and social hierarchy. These layouts are more than historical curiosities; they suggest ways in which contemporary housing can integrate flexible courtyards, layered thresholds, and multi-functional verandas to foster community life while maintaining climatic comfort. In an age of increasingly individualised and sealed housing units, Binh Duong's houses propose an alternative: domestic space as a continuum of private, communal, and ecological domains.

Contemporary sustainability discourse often privileges performance metrics—thermal efficiency, carbon footprint, or life-cycle analysis—while neglecting the cultural dimensions of place. The symbolism embedded in Binh Duong's houses reminds us that architecture sustains not only bodies but also identities. Ancestral altars, inscriptions, and symbolic motifs reinforce moral and communal values, situating the house within a cosmological framework. For modern architects, this suggests that sustainable design should not be limited to technical efficiency but must also embed cultural narratives that strengthen belonging. In this sense, sustainability becomes both ecological and existential.

The hybridity evident in Binh Duong—Chinese motifs, French chandeliers, and Vietnamese ritual cores—demonstrates that vernacular traditions are not purist relics but adaptive systems. This has particular relevance today, as designers grapple with global technologies while striving to maintain local identity. The lesson is that sustainable design need not reject innovation; rather, it should absorb external influences selectively, embedding them within local logics. Such adaptive hybridity exemplifies cultural resilience: the ability to change while remaining grounded.

Finally, the continuing ritual and communal use of these houses highlights that sustainability must be conceived as a living process. Preservation that freezes houses into static monuments risks severing them from the social life that sustains them. Conversely, designs that allow communities to inhabit, adapt, and reinterpret spaces ensure continuity across generations. For contemporary practice, this translates into designing for long-term adaptability—structures that can accommodate changing family sizes, livelihoods, and technologies without losing their core identity.

Taken together, these inspirations articulate a broader paradigm: sustainable design as a negotiation between ecology, material, and culture. The ancient houses of Binh Duong remind us that architecture is most resilient when it harmonises with climate, mobilises local resources, sustains craft traditions, and embodies cultural meaning. In re-engaging these vernacular strategies, contemporary designers can move beyond a narrow technocratic view of sustainability toward a more holistic model—one that is environmentally responsive, materially grounded, and culturally resonant.

As ISVS scholarship has consistently argued, vernacular settlements are not nostalgic artefacts but dynamic repositories of ecological and social intelligence. By engaging Binh Duong's heritage in this light, sustainable design becomes not an imported agenda but a locally rooted practice—one that affirms identity while addressing the global urgency of climate adaptation.

Conclusions

This study has highlighted the ancient houses of Binh Duong as an underexplored yet significant strand of southern Vietnam's vernacular heritage. By situating them within the wider discourse of indigenous architecture and sustainability, the article contributes a novel perspective to ISVS scholarship, which has often focused on traditions in South Asia or

northern Vietnam. The paper demonstrates that Binh Duong's houses embody a synthesis of environmental adaptation, material intelligence, and cultural symbolism that offers valuable lessons for contemporary sustainable design. Their passive climatic strategies, reliance on local materials, and integration of ritual meaning underscore the depth of ecological and cultural knowledge embedded in vernacular practice.

At the same time, the research acknowledges several limitations. The analysis was restricted to a small number of case studies due to access constraints, and the evaluation of climatic performance relied primarily on qualitative observation rather than quantitative measurement. Furthermore, as many houses have been altered over time, it is not always possible to distinguish original features from later modifications. These factors suggest that future research would benefit from broader sampling, comparative thermal analysis, and more systematic engagement with archival sources.

Despite these constraints, the findings hold important implications. For heritage conservation, they highlight the need to treat ancient houses not merely as aesthetic artefacts but as living cultural systems where material, ecological, and symbolic dimensions are inseparable. Preservation strategies should therefore support both the physical structures and the craft traditions, rituals, and community practices that sustain them. For designers, the study suggests that inspiration should come not from imitating forms, but from reinterpreting underlying principles—passive cooling, material cycles, spatial symbolism, and adaptive hybridity—in ways suited to contemporary needs. Through this approach, the study redefines Binh Duong's ancient houses not as mere vestiges of history but as dynamic sources of inspiration for shaping sustainable and culturally meaningful futures.

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Ethical Practice: The author declares that this research has been conducted employing accepted ethical research practices and does not violate the rights of any social group, a person or animals. The data was generated with a full understanding and agreement of the respondents, and owners of the case studies.

Availability of Data: The author declares that the data used in this study are available for verification upon request.

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