

Thermal Comfort and Cultural Wisdom in Contemporary Landscape Design: Lessons from Chinese Peranakan Yards and Gardens in Kampung Tirok

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Abstract

The yards and gardens of Chinese Peranakan houses in Kampung Tirok, Terengganu, offer a fusion of cultural aesthetics and sustainable environmental practices. These traditional landscapes enhance thermal comfort, support social interaction, and promote eco-conscious living. This study employs a qualitative case study approach involving field observations and semi-structured interviews to explore the spatial organization, plant selection, water features, and indoor–outdoor transitions of these gardens. It identifies how these vernacular strategies foster natural cooling, regulate microclimate, and manage water efficiently. By situating this discussion within the context of global urban challenges such as rising temperatures and the loss of cultural identity. The study proposes how elements from Peranakan gardens can inform contemporary urban housing and public park designs. The findings promote a culturally grounded approach to sustainable landscape architecture that prioritizes climate resilience and communal well-being.

Keywords: Vernacular Landscape, Thermal Comfort, Chinese Peranakan, Yard Garden, Cultural Sustainability, Kampung Tirok

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Introduction

Traditional Chinese Peranakan gardens, particularly in Kampung Tirok, are a testament to the integration of environmental sensitivity and cultural expression. These spaces have evolved over generations, blending Chinese design philosophies such as feng shui with Malay vernacular architecture to create yards that function as social, spiritual, and ecological zones (Talib & Sulieman, 2012; Abbas et al., 2016; Darmayanti & Bahauddin, 2020).

However, in the context of rapid urbanisation, these heritage landscape models are at risk of being lost, replaced by hardscaped modern parks and housing developments that often ignore cultural continuity and passive environmental strategies. Contemporary urban landscapes face pressing challenges such as the urban heat island effect, stormwater runoff, and declining communal interactions. These challenges are often addressed with high-tech or standardized solutions that are costly, resource-intensive, and culturally detached. The problem, therefore, lies in the lack of integration between indigenous knowledge especially landscape strategies rooted in thermal comfort and cultural symbolism, and current urban landscape planning. Despite growing interest in sustainable and climate-responsive landscape design, limited research has been conducted to explore the practical lessons embedded in traditional Peranakan Garden systems and how they can be adapted to urban typologies. Specifically, there is a need to understand how the spatial configuration, planting systems, material use, and water features of

these gardens contribute to thermal regulation and social cohesion in hot-humid climates. The absence of such studies results in missed opportunities for low-energy, culturally grounded landscape solutions in contemporary settings.

This study addresses this gap by examining how Kampung Tirok's Chinese Peranakan yards offer both ecological and sociocultural benefits, aiming to translate these elements into design recommendations for modern urban spaces such as housing schemes and public parks.

Literature Review

Vernacular Wisdom in Chinese Peranakan Landscape Design

Chinese Peranakan traditional homes in Kampung Tirok exhibit a synthesis of Chinese and Malay design elements, especially in their yard and garden configurations. These houses typically feature stilted floors, open yards, and internal yards that facilitate airflow and daylight penetration, enhancing passive cooling and comfort (Talib & Sulieman, 2012). Gardens are designed with native vegetation and feng shui principles, using water elements, shade, and orientation to harmonize human activities with the natural environment (Fan & Kim, 2019). Plants often serve multifunctional purposes, providing medicinal resources, culinary ingredients, and spiritual symbolism (Yang, 2018). These features reinforce the Peranakan community's sustainable lifestyle, where architecture and landscape support both environmental adaptation and cultural practices. Figure 1 showcases the cultural and environmental strategies embedded in the traditional landscape design of Chinese Peranakan homes.



Figure 1: Provides an Overview of How Peranakan Landscape Design Translates Cultural Wisdom into Environmental Performance.

Source* Author 2024

Philosophies and Symbolism in East Asian Gardens

The underlying principles of Chinese gardens, deeply rooted in Daoist and Confucian worldviews, emphasize balance, contemplation, and symbolic spatial experience (Tuffs, 1991). Design features such as moon gates, zigzag bridges, and scholar rocks create sequential landscapes that engage the senses and mind. These philosophies influenced broader East Asian traditions including Japanese dry gardens and Korean palace gardens, where asymmetry, borrowed scenery, and metaphysical symbolism were central. These garden traditions shaped Western landscape interpretations, particularly in European estates and botanical parks, which adopted rockeries, bamboo groves, and curvilinear layouts to evoke the serenity and mysticism of Far Eastern design (Tuffs, 1991). Such cross-cultural influences illustrate the global resonance of spiritual and climate-responsive design principles rooted in East Asia.

Environmental Functions and Contemporary Relevance

Chinese Peranakan gardens not only hold aesthetic and symbolic value but also serve vital environmental functions (Misni, 2016). The use of local materials such as clay tiles, porous pebbles, and terracotta ensures water permeability and reduces surface heat (Salleh et al., 2016). Vegetation like bamboo symbolizes strength and regulates microclimate, while frangipani and jasmine provide both shade and olfactory ambiance, enhancing thermal comfort and sensory experience. However, modern urban parks frequently fail to incorporate such passive strategies, often dominated by impermeable pavements, decorative rather than functional vegetation, and limited biodiversity (Anderson, 2011). These limitations highlight the need to revisit vernacular landscape systems, where plant selection, spatial planning, and ecological processes are inherently integrated, offering replicable models for resilient and meaningful urban green spaces. Table 1, showcases a comparative overview of vernacular and modern urban landscape approaches, highlighting the distinctions in design philosophy, material use, vegetation, and environmental strategies.

Table 1: Showcases The Comparative Overview of Vernacular vs. Modern Urban Landscape Approaches.

No.	Aspect	Traditional Peranakan Gardens	Contemporary Urban Parks
1.	Design philosophy.	Culturally symbolic, climate responsive.	Aesthetic-driven, standardized.
2.	Material use.	Local, porous, and thermally adaptive.	Synthetic, impermeable surfaces.
3.	Vegetation.	Multipurpose native plants.	Ornamental or monocultural.
4.	Water management.	Natural infiltration and retention.	Drains and artificial channels.
5.	Social role.	Family gatherings, rituals, and daily life.	Recreation and passive viewing.
6.	Climate strategy.	Shading, evapotranspiration, ventilation	Reliance on artificial cooling.

Methodology

This study adopts a qualitative case study approach to examine the landscape design principles of Chinese Peranakan traditional houses in Kampung Tirok, Terengganu. The case study method is appropriate for understanding complex cultural phenomena embedded within real-life contexts, especially where environmental, architectural, and symbolic meanings intersect. The methodology comprises two primary phases; field observation and semi-structured interviews, both of which are supported by photographic documentation, sketches, and spatial mapping. The field observation component involves the in-depth documentation of a well-preserved traditional house Chinese Peranakan in Kampung Tirok, selected based on their; (1) intact yard features; (2) active residential use; and (3) heritage authenticity. Each site was observed for spatial arrangement, circulation flow, plant typology, materials used in paving and structures, and the presence of water elements. Observations were conducted during different times of the day

to capture variations in lighting, thermal sensation, and space usage. Specific attention was given to how verandas, open yards, and plantings facilitate ventilation and thermal comfort, and how these areas are used for social interaction or ceremonial functions. Sketches were made to capture the spatial relationships and microclimatic features, while photographs were used to document physical details such as species diversity, shadow casting, and construction techniques. In the second phase, semi-structured interviews were conducted with five participants, comprising house owners, elderly residents, local landscape practitioners, and cultural historians. The interviews were designed to elicit insights into the historical development, symbolic meanings, and environmental performance of the garden spaces. Questions included inquiries about the origins of specific plant choices, the functional use of space across generations, and any changes or adaptations over time due to climatic or social factors. The qualitative data collected from these interviews were transcribed and thematically analysed to identify patterns of use, cultural significance, and environmental performance. The thematic analysis followed Braun and Clarke's six-step method, which includes familiarisation with data, generating initial codes, searching for themes, reviewing themes, defining themes, and producing the report. As well as basic descriptive analysis. This mixed-methods qualitative strategy ensures that both tangible elements (e.g., spatial layout, materials, plants) and intangible cultural knowledge (e.g., symbolism, memory, use patterns) are captured comprehensively. By triangulating data from physical observation and local narratives, the study builds a grounded understanding of how Kampung Tirok's yard gardens contribute to both thermal comfort and sociocultural sustainability. This holistic methodology positions the research to draw meaningful comparisons between traditional and modern landscape needs, ultimately contributing to a culturally and climatically responsive design framework for contemporary urban development. Figure 2, illustrating the methodology of the research, showcasing the relationships between the research design, qualitative approach, data collection methods; field observations, and interviews, and the data analysis process leading to outcomes.

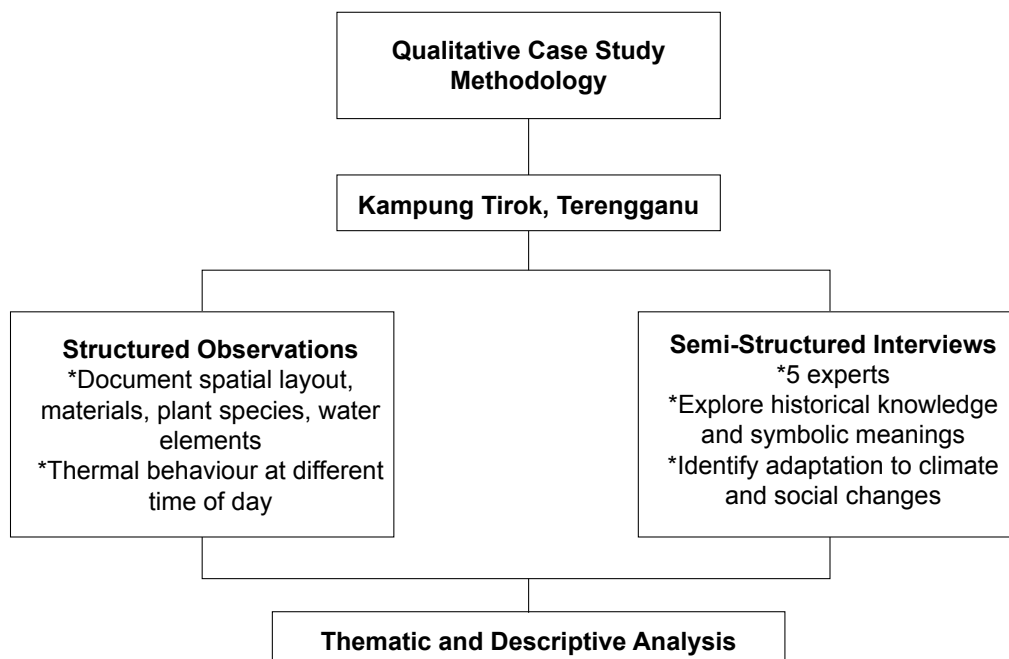


Figure 2: Relationship Between Data Collection Techniques and Data Analysis in the Study of Kampung Tirok.

Source* Author 2024

Results and Discussion

4.1 Key Plant Selection Features in Chinese Peranakan Traditional Homes Open Yards Gardens in Kampung Tirok

The findings of this study reveal how the traditional gardens of Chinese Peranakan houses in Kampung Tirok are strategically designed to support both environmental comfort and cultural practices. One of the most notable aspects is the careful selection of plant species, which serve multiple roles beyond their ornamental value. For instance, bamboo is used not only to provide shade and serve as a windbreak but also carries deep symbolic meaning in Confucian philosophy, representing strength, flexibility, and humility. Lemongrass, widely planted in open yards, functions as a natural insect repellent and medicinal herb, while also being associated with cleansing rituals in Malay and Chinese traditions. Banana trees, planted at the periphery of the yard, serve both as a food source and a visual buffer, representing abundance and fertility within domestic settings. Frangipani, often planted near water basins or veranda corners, adds a fragrant dimension to the garden and is frequently used in ritual offerings, symbolizing immortality and spiritual transition. Jasmine, another fragrant and shade-producing plant, is linked to purity and plays an important role in both Malay and Chinese ceremonial contexts. Together, these plant choices demonstrate how Kampung Tirok's Peranakan gardens embody a living archive of ethnobotanical knowledge that integrates health, symbolism, and environmental adaptation.

These selections collectively regulate microclimate through evapotranspiration, reduce direct solar gain, and maintain relative humidity—key indicators of passive cooling in tropical climates. Figure 3 illustrates the layout of Mrs. Yee Choo Im's house as a representative case. Table 2 showcases the plants commonly seen in Chinese Peranakan traditional house gardens, in the open yards area and highlights their functional well as aesthetic significance along, with their cultural importance.



Figure 3: Offers a Comprehensive View of the Chinese Peranakan Traditional Houses Belonging to Mrs. Yee Choo Im, in Kampung Tirok.
Source* Author 2024

Table 2: Showcases the Plant Selection Commonly Found in Chinese Peranakan Traditional House Open Yards Gardens, with Emphasis on their Functional, Aesthetic, and Cultural Purposes.

No.	Plant Name	Functional Purpose	Aesthetic Value	Cultural Significance
1.	Bamboo.	Provides shade, natural cooling, wind blocker.	Tall, elegant, vertical growth.	Symbol of resilience and flexibility in Peranakan culture.
2.	Betel Leaf.	Medicinal uses, natural health remedy.	Lush green leaves.	Used in traditional medicine and rituals.
3.	Lemongrass.	Medicinal uses, insect repellent.	Fragrant and slender grass.	Culinary and medicinal purposes, part of daily life practices.
4.	Banana Tree.	Provides shade, edible fruit.	Large, tropical leaves.	Symbol of fertility, sustenance; often used in ceremonies.
5.	Frangipani.	Aromatic, enhances spiritual rituals.	Beautiful white or pink flowers.	Commonly used in religious offerings, symbol of immortality.
6.	Jasmine.	Aromatic, spiritual significance.	Delicate white.	Used in religious rituals and cultural celebrations.
7.	Areca Palm.	Provides shade, air purification.	Graceful, feathery leaves.	Often seen in traditional homes for its elegance and tropical feel.

Key Spatial Features of Chinese Peranakan Traditional Homes Open Yards Garden Layout and Their Functions

In addition to plant selection, the spatial configuration of these yard gardens plays a significant role in achieving thermal comfort and supporting cultural functions. The houses are laid out with aligned front and back open yards, facilitating effective cross-ventilation throughout the interior spaces. This alignment allows cool breezes to flow unobstructed, reducing indoor heat accumulation and promoting passive cooling. Within the gardens, the presence of pebble flooring and shaded basins filled with water contributes to evaporative cooling, further reducing the ambient temperature in outdoor sitting areas. These cooling strategies are particularly effective during the afternoon heat, enabling the yards to remain usable throughout the day. Verandas lined with timber screen panels function as transitional zones between indoor and outdoor areas, providing shade while allowing filtered light and airflow to enter. These spaces often serve as platforms for daily prayer, storytelling, tea gatherings, or ancestor veneration rituals—thereby reinforcing family cohesion and social engagement. This seamless blending of climate-responsive design and social spatiality demonstrates the sophistication of Peranakan landscape planning, where thermal regulation is not an isolated objective but one embedded within the broader context of communal living and cultural preservation.

Stakeholder interviews indicate that practitioners value the gardens' thermal performance, while residents highlight their emotional and communal significance. This duality suggests that traditional landscapes succeed not only in climate responsiveness but also in cultural continuity. Table 3 showcases the characteristics found in Chinese Peranakan traditional homes garden design and their respective functions.

Table 3: Outlines the Essential Spatial Elements of Chinese Peranakan Traditional House Open Yards Garden Layout and their Roles.

No.	Feature	Functional Purpose	Impact on Social Interactions	Environmental Benefit	Resident Feedback
1.	Open yards.	Open front and back yards act as central space for gathering and relaxation.	Facilitates communal activities and family gatherings.	Enhances natural light, ventilation, and cooling.	5 (100%) respondents agreed appreciated yards for family events and airflow.
2.	Open verandas.	Semi-outdoor transition space.	Promotes casual social interactions between indoor and outdoor spaces.	Provides shaded areas, cooling, and air circulation.	4 (80%) respondents agreed mentioned verandas encourage flexible usage.
3.	Water Features.	Small ponds.	Creates a serene atmosphere for socialization.	Enhances cooling through evaporation, supports biodiversity.	4 (80%) respondents agreed found water features calming and useful for cooling.
4.	Greenery.	Dense foliage, trees, and potted plants.	Offers shaded areas for outdoor conversations.	Provides shade, reduces heat, improves air quality	5 (100%) respondents agreed praised greenery for beauty and temperature control.

Conclusion

Findings show that plant selection in these gardens balances functional shade, cooling via evapotranspiration, and cultural symbolism. Bamboo provides structural shading, frangipani and jasmine contribute fragrance and spiritual ambiance, while edible plants like banana and lemongrass respond to household needs. Spatially, open front and rear yards aligned with internal corridors enable cross-ventilation, with water basins and pebble surfaces further moderating temperature through evaporative effects. Timber verandas act as transitional thresholds that support airflow while facilitating social gatherings.

Peranakan yards embody passive climate-control strategies that reduce reliance on mechanical systems. By using vernacular vegetation and water features, they effectively regulate microclimates and enhance occupant comfort. These gardens also maintain cultural identity through native plant species used in ancestral rituals, herbal traditions, and symbolic representation—elements frequently missing in modern park landscapes. Environmental and sociocultural values are thus co-created in a design system that is both ecologically sound and culturally meaningful.

The Kampung Tirok Peranakan yard exemplifies how vernacular landscape design inherently supports sustainability, heritage preservation, and microclimatic adaptation. By integrating shade, water management, and cultural plant use, these gardens achieve thermal comfort and social reinforcement long before modern sustainability discourse. Embedding such principles in modern urban green design presents a promising direction toward climate-responsive, culturally anchored environments.

Contemporary housing and public gardens can integrate Peranakan-inspired design by creating compact yard typologies with shade trees, permeable flooring, and shallow basins to foster both thermal comfort and social interaction. Stormwater retention principles derived from traditional gardens—such as layered planting and sunken planting beds—could help mitigate urban flooding. Future research should include quantitative microclimate assessments (temperature, humidity, shading coefficients), cost–benefit analyses for urban replication, and pilot projects that test Peranakan-inspired features in modern housing and public parks. Figure 4 proposed understanding the balance of interpersonal interaction in architecture, the function of open yards and flexible spaces.



Figure 4: Opportunities for Promoting Communication Between Buildings, Understanding the Balance of Interpersonal Interaction in Architecture, the Function of Open Yards and Flexible Spaces.

Source* Author 2024

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