The Cross Socio-cultural and Climatic Adaptation Aspects of the Peranakan Chinese House in Kelantan

Yong Long, Lim, PhD
[KALAM, Dept. of Architecture, Faculty of Built Environment, Universiti Teknologi Malaysia]
yllim@utm.my, limyonglong@gmail.com

Yaik-Wah, Lim, PhD
[Dept. of Architecture, Faculty of Built Environment, Universiti Teknologi Malaysia]

ABSTRACT

This study unveils PCK house by revealing its sustainable architectural features in both cross-cultural and climatic adaptation aspects. The Kelantan Peranakan Chinese (KPC) are a group of Chinese-Malay-Siamese mixed-race community living in the state of Kelantan, Malaysia bordered with south Thailand, a Malay-Muslim majority region. The KPC’s ancestors were Chinese from Min Nan, the southern Fujian province who migrated to and settled down in Kelantan in the last 300 years. Throughout these periods, KPC have socio-culturally assimilated into Malay-Thai native identity and adapted into the local tropical environment. One of the most noticeable features of these cross-cultural and cross-regional climatic adjustments is their unique domestic architecture. Ritually, the layout of a KPC house strictly inherits the basic Chinese domestic house planning, where the ancestral hall is positioned in the central and both sides of the hall are bedrooms. Externally, the style of the KPC house resembles typical Malay-Thai timber stilt houses. These amalgamations are required in order for KPC to fulfill their spiritual needs, and at the same time to harmoniously sustain in a new socio-cultural and nature environment. This study unveils the KPC’s creativity in modifying the architecture of their domestic house by regulating certain socio-cultural and ritual-religious variables to suit local climate and contexts. The purpose is, certainly, towards creating a more socially and environmentally sustainable residence. The methodology of this study is based on contents analyses of five measured drawings and observations on more than 400 visited houses. Simple temperature, humidity and illuminance measurements have been taken to provide some quantifiable figures. These analyses suggest that in adapting into a new local context, KPC are more concerned on how to achieve and maintain their ritual needs and identity over climatic aspects.

INTRODUCTION

In the quest of energy conservation and visioning the low carbon developments, investigation on how vernacular houses sustain naturally by their passive energy mechanism is getting more attention in environmental science researches recent years. Undeniably, vernacular architecture has been highly cited by scholars as one of the established archetypes evolving over the time through the processes of intertwining and adapting nature and socio-cultural aspects. The purpose is to achieve a balance living condition for humans to sustain harmoniously in their domestic sphere and surrounding contexts.
Vernacular house is the metaphor of these nature and socio-cultural symbiosis reflecting on its house form, spatial layout, site planning, material selection, etc. In searching for the lessons of sustainability aspects of vernacular architecture, however, most researchers focus on quantifiable climatic aspects than human or socio-cultural aspects. Albeit climatic architecture features are important supportive mechanisms to help providing climatically comfortable living to the residents, it is not always the main choice for vernacular houses where socio-cultural contexts, inherited rituals and identity aspects may play decisive factors over the climatic aspects.

So far, most environmental researches on vernacular architecture focus on homogeneous setting. The outcomes might not offer diverse and alternative lessons which are very useful in hypothesising the way of sustaining the growing plural and cross-cultural living environment in today’s world. Hybrid vernacular architecture, or fusion of two or more cultures, perhaps is one of the best subjects to be examined. KPC’s vernacular architecture offers great research exploration on how cross-cultural and cross-regional climatic adaptations could happen, particularly when involving different socio-cultural and environmental contexts; for example adapting sub-tropical climate into tropical climate or from a Min Nan Chinese culture into Muslim-majority context. The study shows the KPC are adaptable to their external architecture identity by adapting local influences in materials, design elements, and styles in order to sustain ecologically in the new environment. However, these amalgamations do not prevent their strong instinct to inherit their Chinese cultural identity, ritual and spiritual needs by remaining the Chinese architectural principal in spatial organizations in their house layouts by scarifying some climatic quality aspects.

The methodology of this study is based on contents analyses and observations on five measured drawings from KALAM (Center for the Study of Built Environment in the Malay World), UTM, and more than 400 identified houses from five fieldworks. In the aspects of climatic adaptations and socio-cultural assimilations, analyses are made from the comparisons between KPC houses and their vernacular houses in Min Nan, China as well as Malay houses in Kelantan. In the aspect of climatic adaptations, aspect of ventilation, lighting, materials, etc. are discussed and supported by some simple quantifiable measurements. Socio-cultural amalgamations such as factors which influence the adaptations and changes in KPC architecture were gathered through observations, interviews and literature reviews.

GEOGRAPHY AND CLIMATE

The Peninsula Malaysia, strategically located between West and East Asia, has been an important melting pot of commercial and cultural exchange since six hundred years ago. Today the diverse multi-racial demographic, comprising 60% Malays, 27% Chinese, 10% Indians and others, in the Peninsula is the result of these historical consequences. Kelantan, the most north-eastern state of Malay Peninsula, shares its border with Southern Thailand. Covering the area of 15,099 km2, Kelantan is the sixth biggest state in Malaysia. With a population of 1.5million, the density of the state is about 100 where the concentration of population can be found in Kelantan Plain, a fertile agriculture plain dominated by the main river system, Kelantan River, and other smaller river systems.

Generally, the climate of Malaysia is tropical rainforest, having hot and humid ambience and no distinct rain and dry seasons year round. With the latitude and longitude slightly north from the equator 5.2500° N, 102.0000° E, Kelantan has clearer dry and wet seasons compared to southern part of Peninsula Malaysia. The wettest period is from end of October to early January when the Northeast Monsoon brings heavy rain to the state, whereas the driest period is from February to May. The average
yearly rainfall and temperature in Kota Bharu, the state capital, is about 2600mm and 26.7°C.

HISTORY

Facing the South China Sea, the Northeast Monsoon does not only bring heavy downpours to Kelantan, but historically it had been shipping the Chinese immigrants to the east coast of Peninsula Malaysia. The coming of the Chinese into the Southeast Asia can be traced back to 3rd century A.D. There are very rare academic records on the history of the Kelantan Chinese in the early period, but the existence of a 300-year old Chinese temple at Kampung Tok’ kong proves that a small group of Chinese had already established their community in Kelantan in 18th century.

The early Chinese immigrants who landed in Kelantan were mainly from Min Nan, Fujian province, China. Most of them settled down in rural areas along Kelantan rivers’ basins to find livelihood. Their comings were much earlier and small in numbers compared to those Chinese immigrants who migrated massively into the British Malaya in 19th to 20th century. Due to separation by the central mountain range and limited infrastructures, social contacts and economic exchanges between Kelantan Chinese and Chinese from other Malayan states have been scant. Having long been away and disconnected from their Chinese roots has resulted in that the Kelantan Chinese gradually assimilated to the natives’ way of life by acquiring local Malay language as their mother tongue, adapting to local food, costume and others. One of the most obvious assimilated features is their fusion domestic house which shows interesting cross-cultural and cross-regional climatic adaptations. This community is widely known as Cina Kampung or village Chinese by the local Malay and Siamese natives, but the community prefer to be called as Kelantan Peranakan Chinese (KPC), means local born Chinese or the Peranakan in short.

KELANTAN PERANAKAN CHINESE VILLAGES AND STILT HOUSES

Almost all KPC villages can be found along the fertile river basins of Kelantan, Pengkalan Datu and Kemasin rivers. Alike native Malay and Siamese traditional villages, their houses are usually located near to the source of their livelihoods such as paddy fields and rivers (Chen, 1998). River fish provides important source of protein to the KPC. Besides, rivers were the main highway for the KPC to communicate from one village to another and ferry their livestock, goods and crops to towns for trades. Although the rivers have not been actively used as in former days, the rivers are an important symbol of how the community sustained their living in the new environment. This could be deduced from the practical way on how most of the KPC orientated their houses facing the rivers, significant to their source of livelihood, economy, transport and communication. Traditionally, the orientation of Chinese house is facing south (坐北朝南) following the Chinese geomancy principals, while to climatically avoid cold northern winds during the winter months. Nevertheless, extreme weather is not part of issues in the hot-humid climate of Kelantan and the principal of orientating the house facing south is impractical for KPC to conduct their daily activities with rivers.

Most KPC houses are sparsely located from each other on linear grid pattern by facing rivers or roads. The KPC village pattern is obviously disparate from Min Nan traditional village pattern, as Min
Nan villages are arranged in cluster group patterns. Two reasons could be hypothesized; least concern of security and climate in Kelantan. In Min Nan, traditional houses are closely grouped together to form a big cluster. The purpose is to create a strong surveillance network to defend the villages from bandit attacks. Secondly is to keep the villages warm during colder months. Since security is not part of the concerns in Kelantan, KPC houses are not densely planned or arranged in cluster manner, which allows greater wind velocity and penetrations to help discharge contained humidity. Besides, the practice of opening new lands after the existing villages have reached certain levels help to maintain the villages in low density, which is critical to help KPC village to sustain its micro-climatic aspects. To maintain the social networking and kinships, normally the new villages are opened opposite the rivers or adjacent to the existing villages. Therefore, many KPC villages can be found located side by side or facing each other along the rivers in Kelantan. Due to small number of population, KPC villages’ public facilities such as schools, markets, public spaces, etc. are shared with surrounding Malay and Siamese native villages. Sharing these facilities enhances the interactions between the natives and the KPC, which it is very important for the KPC to mutually and socio-culturally sustain as a minority in the natives’ socio-cultural landscape.

THE HOUSE UNIT

![Diagram of KPC house plan](image)

Figure 4 (left) The KPC house plan comprises two units: main unit and kitchen unit. Figure 5 (right) shows the façade of KPC house with large curvy roof to help discharge rain water and reduce the velocity of strong wind.

Basically, a KPC house consists of two units, which are the main house (unit) and kitchen house (unit). The main unit has an ancestral hall and bedrooms. The kitchen unit is where kitchen, dining area and bathroom are located. Similarly to a Malay house, a KPC house also comprises of *rumah ibu* (main house) and *rumah dapur* (kitchen unit). In Min Nan, China, the house unit can be repeated and expanded to form a big enclosed complex to accommodate bigger family members of few generations. From climatic point of view, the enclosed complex is not suitable in hot-humid climate where accumulating humid and high air temperature will make residents feel uncomfortable. In Malay village, extended families normally will establish their own houses adjacent to or in the nearby areas to their parent houses. Several Malay houses form a family cluster and several family clusters form a Malay village. This trend also applies to the KPC house where a village normally comprises of several family clusters. Besides, the reason why the KPC and Malay houses are small may be due to the limited spans of timber material. Most of KPC house structure is about 9 x 6 m (main unit). Technically, it might be difficult for timber structure to hold a large span without established construction skills. Another interesting sustainable feature of Malay and KPC houses is these houses can be dismantled and reinstalled from one location to another location.

The House

Western scholar Kohl (1984), who studied on the development of Chinese architecture in West Malaysia and Singapore, observed that the Chinese community is pretty practical in dealing with their domestic houses, signifying that "satisfied with their fitness of purpose, serviceability and aesthetics, the Chinese have not altered their architecture forms, with architecture becoming more a rule of thumb than ‘art’
"after the Tang dynasty." Even the Chinese immigrants who have settled down in foreign lands for few hundred years would stick with the basic house plans. This is suggested by Chua (1997), stating that the principal of Chinese house is “not only cut across time, but also ‘survived transplantation’ from its origin to a new environment.” This principle has been reflected in KPC house.

The KPC house basically can be divided into three parts: the body, lower floor, and roof. The body is the main house where rooms are located. The lower floor is the area below the elevated timber floor of the main house. The roof is the upper level of the main house. This configuration provides a natural mechanism for KPC house to adapt into its environment.

The Body

As mentioned above, in term of spatial arrangement, Chinese domestic houses are rarely seen having much of regional differences. The internal layout of the Chinese house strictly follows the Chinese architectural concept of “one bright, two darks.” (一明两暗). The bright zone is where the ancestral hall is located in the middle of the house facing the main door. The dark zones are the bedrooms located at both left and right sides of the ancestral hall.

To achieve brightness in the ancestral hall, two small windows can be found at two sides of the main door of the ancestral hall. Above the main door are timber lattices to allow further penetration of light and air into the hall. Sometimes, small openings covered by transparent glasses can be found on the roof over the ancestral hall to enhance the brightness of the hall. According to the Chinese architectural principal, the dark zones are the bedrooms located at both left and right sides of the ancestral hall. Normally in the bedroom, no window is placed on the wall facing the front part of the house. Only a small window can be found at the side wall of each bedroom. Therefore, the bedrooms are darker than the ancestral hall. Usually, native Malay and KPC houses have low lighting ambience in indoor spaces. According to the simple indoor lighting measurements on a KPC house (refer Graph 1), most of the internal rooms hardly receive 100 lux. However, it creates a more relaxing indoor atmosphere for occupants to rest since most of the daily works are conducted outside of the house or in the kitchen. However, the method of using smaller windows is not due to native influences but the KPC’s intention to maintain the origin identity of the Min Nan architecture. The purpose of smaller windows in Min Nan
house functions for security reasons and minimizes the effect of northern cold wind. Nevertheless, the atmosphere of Min Nan house is much brighter than KPC house because there is a big central courtyard in the enclosed compound of Min Nan house. In KPC house, in the quest of achieving its ritual needs and architectural identity, the spatial arrangement of “one bright, two darks” with minimum opening makes the indoor lighting extremely low. The long and large overhung roof at veranda further reduces the light penetration into the house. This situation is worsened by the main door and windows of the ancestral hall being closed in the most of the time. The rational of this incomprehensible practice perhaps is due to the feeling of insecurity and sensitivity being in the majority Muslim social setting. As Teo (2003) suggested, the attitude of the KPC is vividly reflected in their way of life where they practice native behaviour (local costume, culinary, sociolinguistic, etc.) in the frontage, while keeping their own Chinese religion and ritual in the backstage, which are usually contained in their own houses and domestic spheres. It shows that maintaining good ethnic relationships and sustaining a mutual-respect living environment with the local natives are given the priority by the KPC and the external factors such as climate and thermal comforts are relegated as secondary aspects.

Indoor ventilation and lighting are interrelated. Both are determined by the size and position of openings. Cross ventilation, particularly at body level, is critically important to achieve thermal comfort in hot-humid climates. The airflow will evaporate heat from the human skin allowing the occupants to feel cooler (Lim, 1987). In a Malay house, even though the indoor spaces are considered private to family members, usually windows and doors are open widely to allow natural ventilation occur. Furthermore, the concept of open plan where there is less or no partition is used to divide indoor spaces allows greater cross ventilation to happen in Malay house. In contrast, the concept of indoor space in KPC house is obviously more private, perhaps sacred, than that of Malay house. As mentioned previously, the main door and windows of the ancestral hall are remained closed to prevent direct contact of passer-by to the ancestral hall. Besides, the internal spaces, bedrooms and the ancestral hall are divided by walls which will definitely slow down or block the wind entering the house. However, the problem of limited body level ventilation in the indoor spaces is reduced by roof level ventilation. The steep pitch roofs provide higher roof attics which allow accumulated indoor hot temperature release at the roof level and keep the lower part of rooms cooler. However, this is not sufficient to reduce the indoor air temperature to comfort level.

Graph 1 (left) and 2(right): Sample air temperature and daylight measurements taken from a KPC house (Chan Awang’s house, Kampung Sering). The house has an extended living room in front of the ancestral hall. The thermal comfort temperature ranged from 23.5 - 28.5 deg C with neutral temperature (feel neither cold nor hot) = 26 deg C. Generally, all the spaces yielded temperature higher than the comfort zone starting from 11.00am to 11.30pm (except day 2, it was a raining day). For daylight, the living hall only yielded > 100 lux during 1030am to 330pm on the 1st and 3rd day (except second day).
Although the indoor air temperature and lighting are poor, KPC rarely use indoor spaces at daytime. KPC men preferred spending their daytime and doing domestic tasks in the open veranda, while women and children spend most of their time in the dining area and kitchen where Ratio Humidity (RH%) and air temperature are relatively lower due to better openings. Guests are usually entertained in the open veranda area, and the indoor spaces are only generally being used at night when the air temperature and RH% decrease to the comfort level. The roof level’s fenestrations and the thin clay roof tiles easily release hot heat, making the indoor area comfortable to relax at night. This suggests that in maintaining the ancestral ritual and identity, KPC choose not to change their spatial layouts and opening for better lighting and indoor temperature but choose to change their living behaviour by assimilating native’s way of life and alter its domestic architecture.

The Lower Floor and Roof

Either on lower plains or higher ground, KPC houses are usually elevated on timber stilts, like those of Malay, Siamese and many Southeast Asian traditional houses. Formerly, the underneath of elevated floor was used for storage and to rear domestic livestock. This space allows for a buffer zone between elevated timber floor and the ground. This gap prevents the humidity and moistures from the ground sip into timber and damage its strength and make the residents feel uncomfortable when touching or sitting on it. The elevated floors are very important for the KPC, since most of their daily household activities such as eating, sitting, relaxing, and sleeping are conducted on the elevated timber floors. This shows that KPC has changed their Chinese way of life from using furniture to sitting on the floor as Malay native. From the climatic aspects, the higher the house is elevated, the greater wind velocity can penetrate into the house. This helps to reduce the KPC house’s RH level.

Once, the roof of KPC house was made from thatch. Since 1960s, the roofs have been covered by a type of clay roof called atap Singgora, imported from Songkhla, Thailand (Winzeler. 1985). The roof is pretty thin and easily broken but it looks closer to the roof tiles in Min Nan house. Like those of Kelantan Malay house, the roof tiles are loosely hanged on the batten to allow breeze to slip inside the house, compared to Min Nan houses whose roof tiles are cemented onto each other to prevent blowing up by typhoons. The curvy tapering roof form is the most expressive part of the KPC house. It symbolizes the Chinese Min Nan architecture identity and their origin. The typical Min Nan house’s roof curves into two directions – the ridge and hip rafter, making the roof having greater velocity to discharge water and redirect wind; particularly during the typhoon seasons. In response to higher precipitation average 2600mm in Kelantan, the KPC design the roof steeper in the angle at about 45 degrees. The purpose is to discharge the rain water more smoothly, particularly during the heavy downpour in monsoon seasons from November to January. The pitch of the Min Nan house roof is at about 30 degrees, making the depth of roof lower than that of KPC house. With shallower roof depth, Min Nan house is able to allow greater daylight penetrating into the building and to make the building interiorly and exteriorly brighter. In contrast, the KPC house has steeper pitch and longer roof overhang to shade excessive sunshine. Therefore, the proportion of the roof is much greater than the body of the house, which provides deeper shades to the open veranda. It also helps to reduce excessive glare. The effect of glare provides some security protection to the house owners, particularly in sunny days where one at the veranda can easily recognise any pass-by, but the pass-by having difficulty to figure out whether anyone is inside the house due to glare effect.
CONCLUSION

Having been migrated from sub-tropical region of south China into the tropical region of Malaysia, KPC have to judge what aspects that they can retain and what aspects they should adjust, accept and change in order to sustain environmentally and socio-culturally with the new native environment. These negotiations are illustrated in their domestic house design. Most obviously, KPC ancestors had chosen to follow the local Malay and Siamese natives in using local natural material to build their homes. The lightweight natural material with low thermal capacity such as wood and bamboo provide the house better thermal comfort in tropical climate, besides being visually and contextually harmoniously with the native villages’ surrounding environment. To get rid the problem of contained humidity in tropical climate, KPC houses are kept in small units, with the houses being sparsely arranged and the floors are elevated. The purpose is to allow better wind velocity to penetrate into the house compounds and units for reducing the level of humidity. This illustrates that KPC have no longer follow their ancestor’s norm of expanding their houses into a big complex to accommodate generations of family members, which it is not suitable in tropical climate where humidity will be difficult to be discharged. Besides, KPC has got rid their Chinese ancestor’s furniture culture by adapting Malay natives’ way of life by utilizing elevated timber floor as a living platform to conduct their daily activities. Judging from the KPC house’s stilt house architecture, the KPC seem to have adapted into Southeast Asia native architecture tradition and further dissociated with their ancestral traditional house typology in Min Nan, China, where most of the houses are made from masonry and placed on stone platforms (Else Glahn, 1982).

However, the domestic sphere of KPC house is still ruled by the concept of Chinese ritual. Descending from Chinese origin, the practice of ancestral veneration is one of their cultural pillars which have to be performed in the ancestral hall. At two sides of the ancestral hall, the norm of placing male’s bedroom at the left side and female’s bedroom at the right of ancestral hall has further determined the concept of spatial planning inherited from their Chinese origin. Due to sensitivity to the Muslim-majority communities, the main door of the house where ancestral hall is located is always in closed condition. The smaller-size windows further restricts the penetration of light and air into the buildings, making the level of luminance low and air temperature hardly achieve comfortable level. To solve the problem, KPC have adjusted the use of these spaces. To avoid uncomfortable air temperature and low luminance level, these interior spaces are rarely used during the daytime but only at night when both aspects achieve comfortable levels. To substitute the interior spaces, KPC houses, like native houses, have wide veranda for men to rest and do their daily tasks during the daytime and women and children do their activities in kitchen unit where dining and extended family rooms are located.

These architectural adjustments are needed in order for them to fulfill their daily activities and spiritual needs and at the same time to harmoniously sustain in a new socio-cultural and natural environments. The KPC architecture reveals how certain socio-cultural and ritual-religious variables could be adjusted architecturally towards creating a more socially and environmentally sustainable habitat.

References and Notes