# Development of Traditional House Forms in Riparian Communities in Thailand

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Abstract—The distinctive qualities of traditional house forms in riparian communities in Thailand and other countries in Southeast Asia are being affected by the forces of modernisation. The transformation is determined mainly by the influence of communications changing from waterways to roads. The new houses tend to be built close to roads, as the road is a more convenient way of transportation and there is more available land than in the area along the waterside. Also, the diversification of house forms is related to the variety of more modern building materials and technologies and the influence of telecommunications and flow of population between rural and urban areas. This paper studies the nature of these changes based on a field study of two settlements on the Chao Phraya River Basin in Thailand. On-site measurements, observations and semi-structured interviews were used to trace the changes and reasons for them. A typology of house forms was developed. It was found that although there is much development and change, there is still a strong connection to some traditional features.

## Introduction

Much research has been done on traditional Thai architecture (Chaichongrak, 2002; Chompunich, 1987; Nildech, 1998; Nimlek, 2002; Nimmanahaeminda, 1965; Piromdha, 1995), but it mostly focusses on the physical characteristics of traditional buildings, aiming to document the authentic or classic characteristics of the past before they are changed by modernisation. There is a lack of studies that explore the new forms of housing developed as a result of the influences of modernisation. Furthermore, Thai vernacular architecture, especially in riparian culture, has not been the subject of many studies written in English.

The distinctive qualities of traditional house forms in riparian communities in Thailand and other countries in Southeast Asia are being affected by the forces of modernisation. The transformation is determined mainly by the influence of communications changing from waterways to roads. The new houses tend to be built close to roads, as the road is a more convenient way of transportation and there is more available land than in the area along the waterside. Also, the diversification of house

forms is related to the variety of more modern building materials and technologies and the influence of telecommunications and flow of population between rural and urban areas. This paper studies the nature of these changes based on a field study of two settlements on the Chao Phraya River Basin in Thailand.

The Chao Phraya River Basin is a large flood-prone area covering the majority of the Central Plain region of Thailand. The Chao Phraya is the main river, which is formed from four rivers, the Ping, the Wang, the Yom and the Nan, which originate from the mountainous northern part. Apart from the Chao Phraya, the Basin is fed by three other main rivers, the Mae Klong, the Tha Chin and the Bang Pakong rivers. All the rivers run into the South China Sea at the Gulf of Thailand, and the network of their tributaries, streams and canals is spread through the Central region or the Chao Phraya River Basin. Annual flooding brings with it fertile sediment soil to the mouths of the four main rivers; consequently this region is one of the most richly nourished alluvial agriculture areas in the world (Molle and Srijantr, 2003; Pendleton, 1962; Tachakitkachorn, 2005).

The Chao Phraya River Basin can be separated into two main parts by the nature of terrain: the Upper Delta and the Lower Delta. The Upper part is an old delta, the flood plain being 5-30 metres above sea level, which later developed into the main agricultural area of the country, suitable for paddy fields. Thus, the unique characteristic of the Upper Delta is the farmers and their rice fields (Molle and Srijantr, 2003; Tachakitkachorn, 2005). Whereas, the Lower Delta is a new delta with soft and new sediment soil, some 1-3 metres above sea level (Tachakitkachorn, 2005). This area has diversity of crops: apart from rice fields, some areas of the upper part of the Lower Delta have fruit orchards and vegetable gardens, mainly in the Mae Klong and Tha Chin sub-basins. These specific features have formed the specific identity of the riparian region, including the house designs, settlement patterns, economic systems, way of life, belief systems and cultural behaviour. All these are being strongly affected by the impacts of modernisation.

The aim of this paper is to trace the evolution of house design that has resulted in response to these impacts.

## Methods

Two case studies were chosen in order to achieve the depth of analysis required within the given time and resource constraints.

Criteria for the selection of case study communities were:

- Location: two criteria were considered. They are 1) rural communities far away from large towns and 2) closeness to watercourses, such as a river, stream or canal, in the Chao Phraya River Basin.
- Relation to road: distance to and the role that new roads have played in communities.

- Topography: the two characteristics of the Delta - namely the Upper Delta and the Lower Delta - were considered in the selection of cases.
- Age of the settlement: that there were at least three generations of inhabitants and that there was more than one house type within the community.
- Socio-demographic profile: in order to control the cultural variations within Thailand, Thai Buddhist groups, which form a majority, were chosen for this research.

Using the above criteria, the two selected communities were Rang Chorakhae in Ayutthaya province, and Plai Phongphang in Samut Songkhram province.

To investigate and understand the continuity and change of building traditions in the case studies, qualitative inquiries through participant observation and semi-structured and in-depth interviews were the main methods of collecting data. Data on material aspects or physical characteristics such as settlement patterns, house forms, orientation, building techniques and materials, and objects inside the house, both historical elements and new equipment, were recorded by free-hand drawings, photographs and descriptive narrative. Spatial characteristics include spatial organisation, area of the upper part of the house, ground floor and the intermediate spaces between the inside and outside of the house and the watercourse. A cross-case analysis of the typology or classification of house forms and spatial configuration was used to identify the differences among these houses and how modernisation factors had changed them. The impacts of modernisation on the physical appearance of houses were illustrated by narratives, photographs, drawings of floor plans and sections of houses.

The houses of the two communities can be categorised into two main groups by their physical appearance and relation with the water environment: the stilted house and the two storey house. The stilted houses are: 1) the traditional Thai house in the style of *ruenkhrung sab* or so-called *ruen* Thai; 2) the modified traditional Thai house; and 3) the low pitched roof house or bungalow house. The two storey houses are: 1) the low pitched roof two storey house; 2) the modern concrete house; and 3) the modern traditional Thai house (Figure 1).

If categorised by chronology, the house types can be divided into before and after modernisation. The emergence of varieties of house forms are related to time periods when the communities were forced to make changes due to external interventions, especially developments in materials and technology. Originally, the traditional Thai house had been the typical riparian house for hundreds of years before modernisation took place. Since the 1960s, the impact of modernisation on vernacular house forms began with the traditional Thai house being adjusted to become the modified traditional Thai house and a new house type being created, called the low pitched roof house, because of the introduction of corrugated iron sheet, nails, and plank wood from mills. The next stage was the two storey house,

| House form | Period | House type | |
|---|---|---|---|
| Stilted house | *Before* modernisation | Traditional Thai house |  |
| | *After* modernisation | Modified traditional Thai house |  |
| | | Low-pitched roof house |  |
| 2 storey house | | Low- pitched roof two-storey house |  |
| | | Modern concrete house |  |
| | | Modern traditional Thai house |  |

Figure 1. House types of the two communities

influenced by the introduction of concrete and steel. These two storey houses exhibit considerable variation up to the present.

## The impacts of modernisation

The turning point for the vernacular houses and traditions of the riparian communities in the Chao Phraya River Basin was the start of rural development sponsored by the central government in the 1960s. The developments, or impacts, of modernisation were different in form and degree in each individual settlement. The impacts of modernisation caused many changes to the way of life of rural people, and certainly innovative building material is a major factor that affected the development of house form. This commonly happened throughout the Chao Phraya River Basin as well as in other regions of Thailand and Southeast Asia.

With the influence of new building materials, the first stage of change was the introduction of corrugated iron sheet, nails and plank wood from mills. The second stage was when concrete and steel structures became widely used by local builders a few decades later.

## First stage of modernisation

### *The stilted house*

During the earlier stage of modernisation, the introduction of industrial building materials and economic constraint after World War II meant that normal wood from

mills was cheaper, lighter and easier to build with nails than teak from the northern region; corrugated iron sheet was large and lightweight, and could be easily put on a simple wooden structure, compared to the complicated and heavy structure of the traditional Thai house. Moreover, nails and wooden boards were plentiful in rural markets; low pitched roofs were to be found in almost every old and new house.

There were two vernacular house forms; the first was the modified traditional Thai house, developed from the old traditional Thai houses; and the second was the low pitched roof house or bungalow house (a new house built like a wooden box on stilts and covered with a large low pitched roof of corrugated iron sheet).

*Modified traditional Thai houses*

Most traditional Thai houses have been modified in both Rang Chorakhae and Plai Phongphang in rather similar ways; and very few of them have been left in the original condition. A common adaptation was that the *chan,* or the raised wooden platform, was covered by a low pitched roof of corrugated iron sheets. Apart from the roof, other parts of the house were modified: for instance, a toilet was added in almost every house.

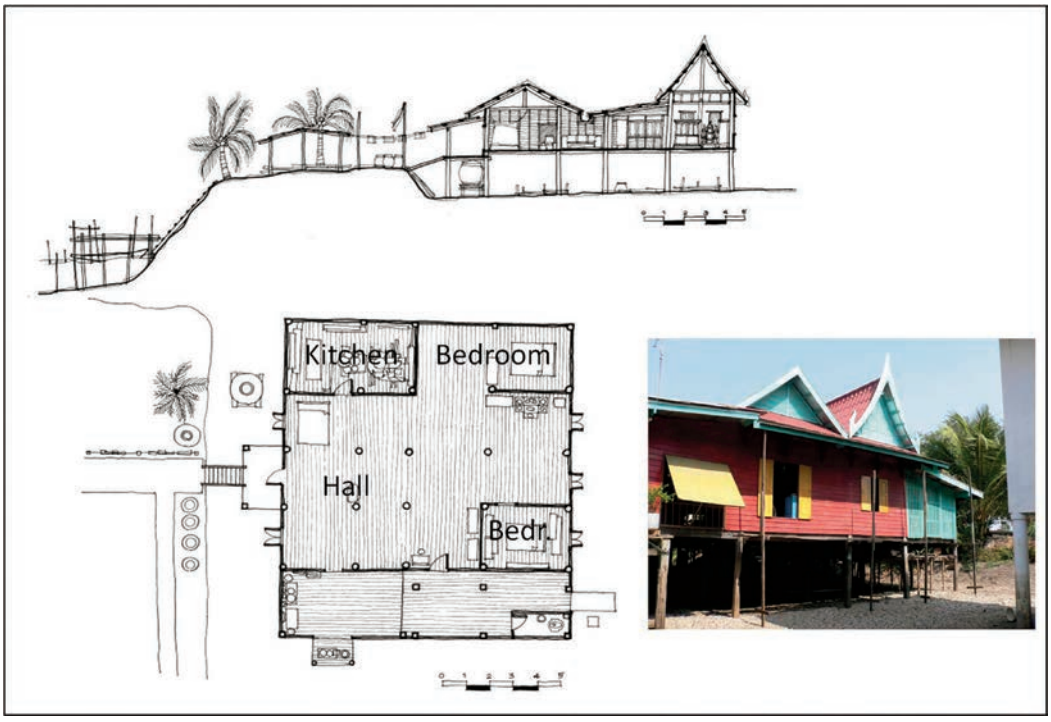



Figure 2. The modified traditional Thai hous

Orientation of the houses.

Nowadays, most modified traditional Thai houses still exist along the stream where they were originally built, but the main entrances for many houses have been shifted from the waterside to the roadside. This is especially the case in Rang

Chorakhae community where almost every housing compound can join the road; modified traditional Thai houses commonly have entrances from the roadside and the waterside.

Lower part: *taitun*

After the house was modified, its *taitun,* or the space underneath the raised floor, did not change much; normally it was left open as it was originally. Both physical features and functions are mostly similar to the traditional Thai house.

In Rang Chorakhae, the *taitun* of the modified traditional Thai houses are mostly the same; they are left with earth floors because floods continue to occur every year. Conversely, the earth floors of the *taitun* in many houses in Plai Phongphang were replaced by concrete floors later, in houses that had built concrete dikes preventing ingress of high tides and leaving the ground floor always dry. Furniture and electric items such as tables and chairs, televisions and refrigerators are placed there permanently. The smooth concrete floor makes the ground floor space look more neat and tidy. Some parts of the *taitun* in both Rang Chorakhae and Plai Phongphang have been adapted for parking cars or motorcycles.

Upper part: covered *chan*

The greatest change in the physical characteristics of the traditional Thai house is the new low pitched roof of corrugated iron sheet covering the space of the *chan,* the roofless platform. This situation has occurred in both Rang Chorakhae and Plai Phongphang. Once the *chan* is covered, the roofless open space of the traditional Thai house is converted to indoor space. The traditional roof structure of the veranda is adapted to be compatible with the new structure of the new roof.

The *chan* walls of the traditional houses of Plai Phongphang, which were about 1.5 metres high, were turned into house walls. The *chan* of the Rang Chorakhae traditional house, normally enclosed with a wooden banister, now had new wooden walls with ready made windows bought from the market. The new roof not only covered the terrace at the front, but also covered in every direction where there was open space. The different floor elevations of *chan* and veranda were adjusted to be the same floor level, as they became one space under the same roof. This one floor level makes the space efficient to use as well as preventing accidents caused by tripping. However, the disadvantages are that the interior is dark during the daytime (Figure 3); and heat increases because of the corrugated iron sheeting, and solid walls blocking air ventilation. Electric lights and electric fans became necessary for rural life.

In terms of house form, the traditional good mixture of open, semi-open and indoor space, which was appropriately designed for a hot humid climate, became a stuffy and dark enclosed house, like a wooden box covered by mixed roof forms. However, the unique steep roof of the traditional Thai house still conforms to the origin of the house.

Figure 3. The modified traditional Thai house and interior

Another change in the upper floor, apart from the covered *chan,* is that a bathroom and toilet may be added at one corner of the upper floor. This is a result of piped water being provided in both Rang Chorakhae and Plai Phongphang. Mostly, the new bathrooms and toilets were built as wood or concrete structures separate from the original wooden structure of the houses.

Even though the modified traditional Thai houses of Rang Chorakhae and Plai Phongphang were modified in quite similar ways, there are some differences, based on the variations of their original traditional Thai houses as shown in the following summary figures (Figures 4 and 5).

It can be concluded here, from the evolution from traditional Thai house to modified traditional Thai house, that the traditional Thai house is dynamic in terms of physical features and functions, as many have been adjusted to become modified traditional Thai houses (social, cultural and meaning aspects are also dynamic, as will be discussed in the next chapter). It responds to the present needs of its dwellers, and becomes the contemporary vernacular house, which has been continued and changed from its original form through the course of its lifetime.

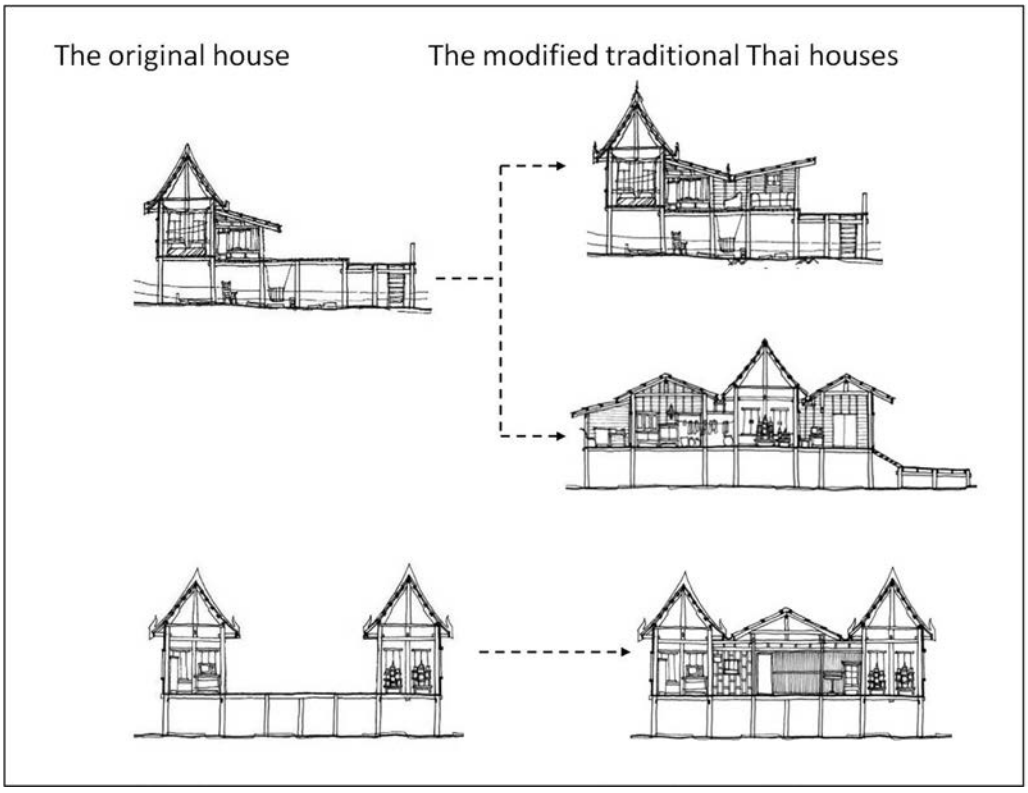
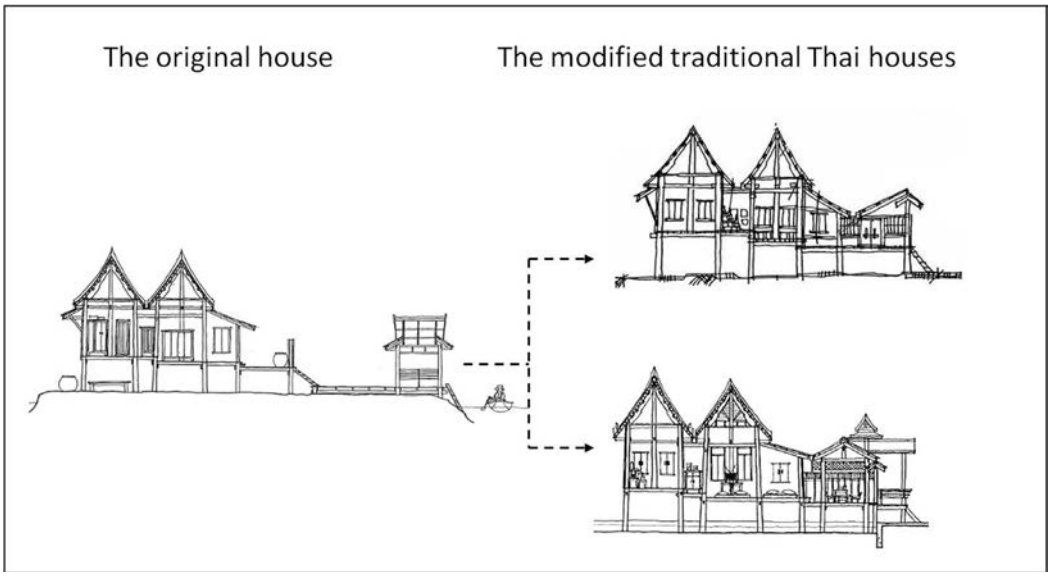



Figure 4 (above). Development of Rang Chorakhae's traditional Thai houses to modified traditional Thai houses

Figure 5 (below). Development of Plai Phongphang's traditional Thai houses to modified traditional Thai houses




*Low pitched roof houses or bungalow houses*

The low pitched roof house or bungalow house is the new form of vernacular house popular in rural settlements of Thailand and Southeast Asia. The majority of the new rural houses built between the 1960s and 1980s were low pitched roof

houses while the old traditional Thai houses were being modified. This house form looks like a wooden box covered with a low pitched gable roof, built on piles like the traditional Thai house (Figure 6).

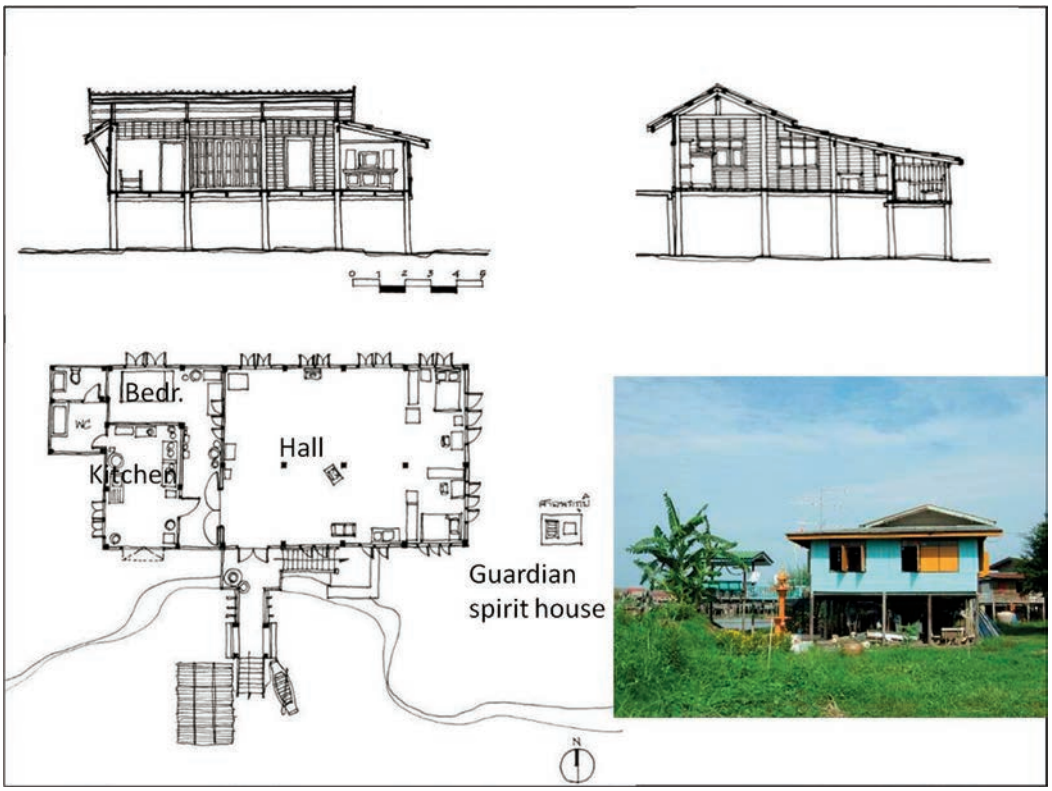



Figure 6. The low-pitched roof house

The roof can have a low 10-15 degree slope made possible by using big corrugated iron sheets that require only a small amount of roof structure. It seems that people got excited about these new materials, which went beyond the scope of traditional materials. Local builders and house owners paid excessive attention to new materials, which were cheaper and conveniently found in markets, while good quality hardwood and high skills of craftsmanship are in short supply. In terms of building technique, there was a complete change from the traditional way of using the mortise and tenon joint system to using nails. The size of roofing materials was changed from small pieces of baked tiles or thatching to larger sizes of corrugated iron sheet. The new building materials provided easier building techniques and a longer lasting house.

The low pitched roof house provides a large area underneath which can freely extend to cover additional space if required. It appeared to be the most suitable house for the time. It responded to the new rural modern lifestyle and economic constraints with its easy and fast building process providing good functional spaces including keeping new household items safely inside, like covering the *chan* in the modified

traditional Thai house. Therefore, it became widespread in rural areas, including the two riparian communities of this study.

The majority of houses of this type are found along rivers, streams or canals, similar to the traditional Thai house or the modified one. The relationship between the house and water environment is quite similar to the traditional house in terms of location and the way it is built on piles. The front of the house mainly faces the waterway, even though some houses changed the main entrance to face the road later, as noted in the modified traditional Thai house section.

Lower part: *taitun* of the low pitched roof houses

Generally, the *taitun* of the low pitched roof houses in Rang Chorakhae and Plai Phongphang are used in similar ways to the *taitun* of the modified traditional Thai house, as noted before. A small difference might be only the shape of columns – that of the low pitched roof house is square in section as wood or concrete columns are industrially produced, while the columns of the traditional Thai house are round in section as they were trimmed by hand.

Upper part of the low pitched roof house

As the house looks like a rectangular wooden box, two thirds of the floor plan is a large hall and one third is divided into a few rooms. The majority of the interior space is a common hall shared among family members. One side of the house generally consists of three rooms, one sleeping room for the daughters, kitchen and bathroom. This house can be occupied by one family or more as an extended family house. The hall is usually divided by cabinets or wardrobes acting as a partition to give sleeping space or temporary individual spaces for family members.

Building materials

Wood is the main structure and material, and can be bought from provincial markets or local markets. The walls are plank wood coated with bright colours to protect the wood, as the quality of wooden planking nowadays is not as good as that of teak or hard wood in the past.

What continues from the previous house generations to this low pitched roof house is the large space for gathering and sharing among family members, both in the *taitun* and the hall in the upper part. The *taitun* has almost the same area as the hall or indoor space in the upper part; the spatial feature and functions are rather similar to the covered *chan* of the modified traditional Thai house, which is more enclosed than the *chan* of the traditional Thai house, but seems to have the same function. The outstanding changes are the house's form and construction system. The physical features of the upper part are completely changed from the cluster house of the traditional Thai house, which combined open space, semi-open space and interior space, to an enclosed space in a wooden box. The structure and building

technique have been adapted to suit the new building materials. In short, the lower part continues the same form and function while the upper part is changed to be more enclosed.

Figure 7. The upper floor of the low-pitched roof house

## Second stage of modernisation

*The two storey house*

The second stage of rural modernisation impacted on vernacular house forms in the Chao Phraya River Basin in that more two storey houses were built. These houses can be claimed to result from the popular use of concrete and steel building materials, together with the adaptation to road in terms of usages, and the influence of urban life from Bangkok. Wood has become more expensive and rare; thus concrete is an alternative choice, or the only choice, for the new vernacular house. The earlier form of the two storey house was the low pitched roof form, sometimes developed from the low pitched roof stilted house, and recent forms are the modern concrete house and the modern traditional Thai house.

The concrete house is not dynamic like the wooden stilted houses that can be modified again and again; the whole house is built at one time and the concrete structure and its design make the house not suitable for modification later.

*The low pitched roof two storey house*

As some of this house has been developed from a low pitched roof house built on stilts, this two storey house is half wood, half concrete. Building materials are a mixture of wood in the upper part and concrete in the lower part. The roof material is mostly cement tile. Windows and doors are glass or wood (Figure 8).

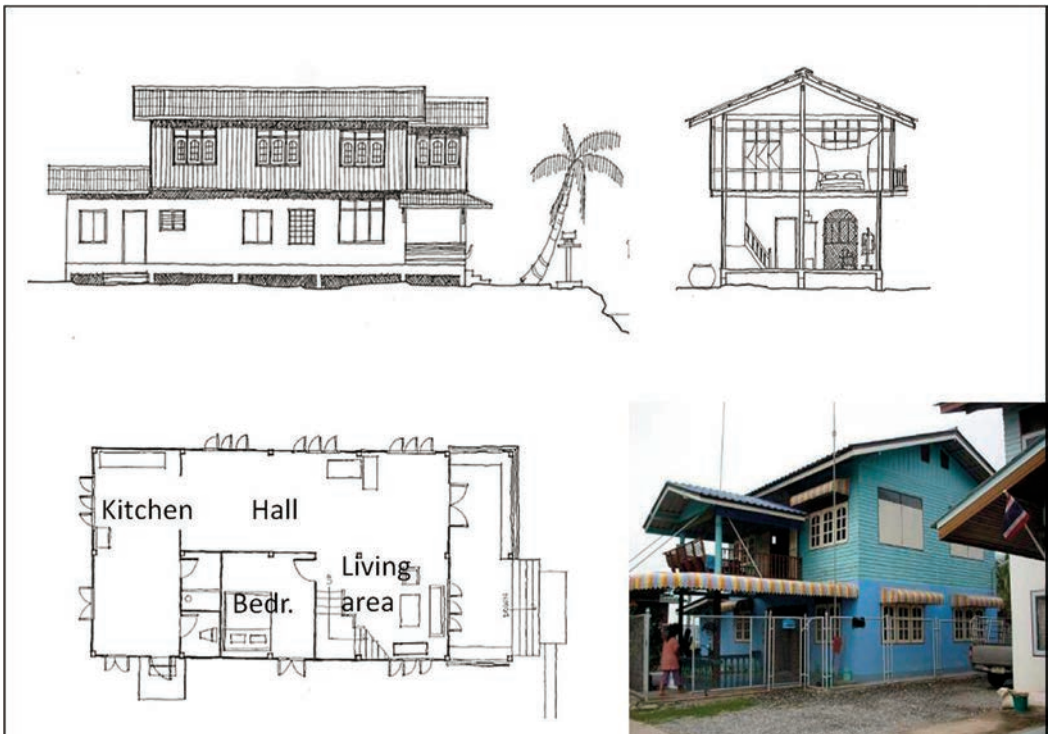



Figure 8. The low-pitched roof two storey house

The relationship of this house with the water environment can be assumed to be less than that of the stilted house. Firstly, the house is built further inland or closer to the roadside rather than the waterside. Secondly, the majority of this type of house located near the water's edge are protected from floods and high tide by a high concrete dike.

This house type is found in the Plai Phongphang community more than in the Rang Chorakhae community. In Plai Phongphang, many of the low pitched roof houses earlier built on stilts have been developed to be two storey houses, as many houses have concrete dikes to protect them from floods and high tide. Conversely, in Rang Chorakhae, few low pitched roof houses built on stilts along the streams are adapted as few concrete dikes are found. In Rang Chorakhae, most new low pitched roof houses built as two storey houses have been increasingly built along the roads rather than along the streams.

Lower part of the low pitched roof two storey houses

In Plai Phongphang, flooding is rare and the level of high and ebb tides does not have a great impact on the majority of land. Therefore, most low pitched roof houses in Plai Phongphang have been modified to have the *taitun* enclosed by wooden or brick walls making two storey houses. Some *taitun* are enclosed on every side and some have been left open on one or two sides. The open sides are typically in the direction of wind blowing from the watercourse. These characteristics are similar to the *taitun* of the modified traditional Thai houses mentioned in the previous section.

The ground floor is designed as a big hall, a common space for family members, similar to the *taitun* but with enclosed walls with windows and doors. Only the kitchen and bathroom are at the back of the house. On the ground floor, we find sofas, television, radio, computer, cupboards, bookshelves, toilet and bathroom. The ground floor appears to be similar to the *taitun* of the stilted houses, with few partitions inside, but it is different in that the ground floor is enclosed by brick walls.

Upper part of the low pitched roof two storey house

The upper part of the house is made of wooden materials similar to the low pitched roof house in stilted house form, but the spatial arrangement is different, in that the interior space is usually divided into rooms - approximately three to five bedrooms for individual family members. The changes are the division into rooms of the upper floor while the previous stilted houses had a common hall shared among family members or the *chan*, veranda and rooms of the traditional Thai house. The kitchen and toilet have moved downstairs so that only sleeping occurs on the upper floor.

In short, the ground floor becomes public space for sharing and is suitable for rural behaviour, while the upper floor seems to support the privacy of an urban lifestyle. The low pitched roof two storey houses reveal the beginning stage of the transformation of rural space to more urban.

*Modern concrete houses*

The next generation of house found in Rang Chorakhae and Plai Phongphang is the two storey concrete house, which mostly appeared less than ten years ago. Originally, this new house copied the floor plan and façade from housing estates in Bangkok and its suburbs. These modern houses in the two communities mostly belong to people who used to live in Bangkok and have moved back to their home villages; they are familiar with the urban lifestyle, space and house form. This house type can be said not to have emerged from the locality, and to bear no relation to the riparian environment; it is imported from urban culture and somehow supports the needs and changes related to modernisation.

This house is usually found along the roadside rather than the waterside in both Rang Chorakhae and Plai Phongphang communities. There are very few of them

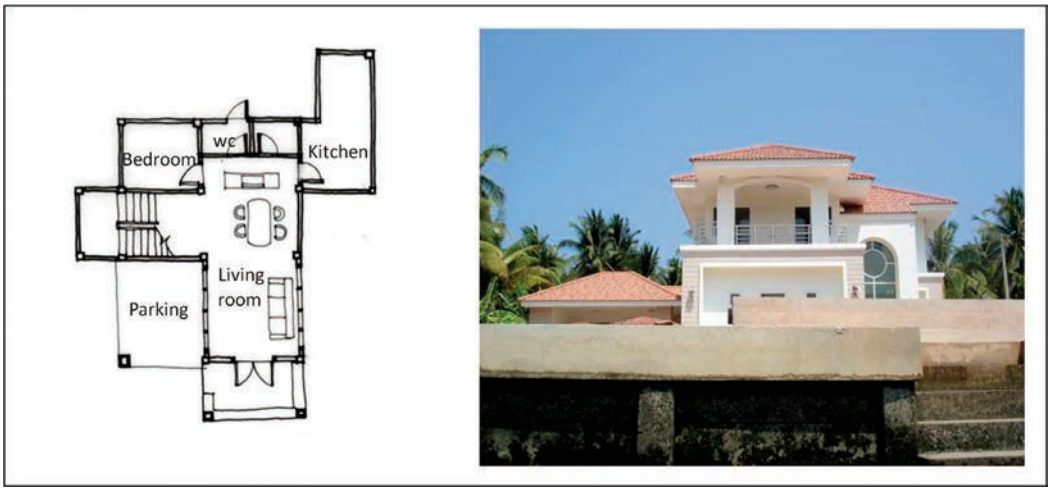



Figure 9. The modern concrete house

located on the banks of canals. Most are placed far away from the water's edge if compared to the stilted houses. A concrete dike is always found at the waterside. However, their front sides face the waterway even if there is another entrance from the road. Parking is commonly found at the road side and a *thanam* (jetty) with pavilion is at the waterside, built in the same modern style as the main house.

In terms of house form, the roof form is hipped with cement tiles or ceramic tiles derived from factories. The interior space of this house, both ground floor and first floor, is divided into rooms: living room, dining room, kitchen and storage room are basic rooms at ground level and individual private rooms for every family member are found on the upper level. The spatial organisation of the house is not different from houses in Bangkok. The traditional Thai house, the modified traditional Thai house and even the low pitched roof house, by contrast, have more common space and fewer rooms (Figure 9).

Lower part of the modern concrete house

The distinctive difference between this modern concrete house and the previous one, the low pitched roof two storey house, is the disappearance of the common hall on the ground floor, which is found in every type of vernacular house in the three communities. The living room is a small size and suitable for sharing among the members of a nuclear family. In contrast, the hall of the low pitched roof two storey house, or the hall of the upper part of stilted houses, are intended for gathering large number of relatives, friends and neighbours. The living room of this house is basically for the three piece suite and the television.

Generally, one room has one function, such as kitchen, dining room, working room, living room; these functional spaces are divided by vertical walls, not like the traditional house that used different floor elevations, and rarely walls. The kitchen

is one room on the ground floor. In many houses, there are high stove counters with ovens and various kinds of electrical cooking equipment.

Upper part of the modern concrete house

Mostly, the individual bedrooms contain bed, desk, television, stereo, and some are en suite. The facilities seem to be completed within one private room, without the need to share among other family members.

Air conditioning tends to be found in this house type more than in others. Concrete houses notoriously collect heat from sunlight during the daytime and release the heat at night. In addition, the thick brick walls block ventilation and make the inside stuffy. The nature of the tropical climate is hot and humid; living in a shaded space open to cooling breezes is a more comfortable local way of passive cooling, as in the *taitun* space of the stilted house. Thus, air conditioning is an important facility for the modern concrete house. Mosquito nets are also common for this type of house.

In conclusion, the modern concrete house has less connection to the traditional Thai house. There is no large space for gathering many people reflecting the reduced size of rural families nowadays. There is less in the material form that shows the relationship to the riparian environment and the house is more compatible with the roadside. There are individual rooms for individual activities. The issues of stuffiness

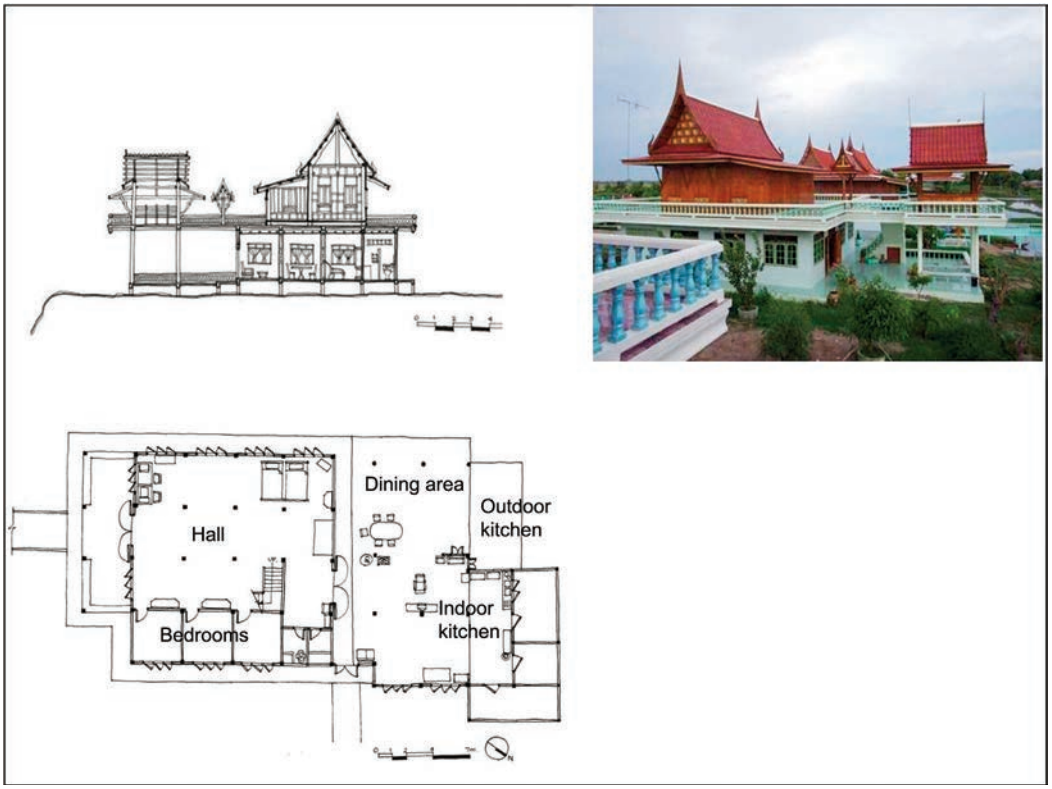



Figure 10. Modern traditional Thai house of Rang Chorakhae

and heat inside the house are solved by air conditioning and electric fans rather than in tested local ways. The whole house is a concrete structure while other two storey vernacular houses are mostly half wood, half concrete.

*The modern traditional Thai house*

The modern traditional Thai house is the latest vernacular house type found in many rural riparian settlements of the Chao Phraya River Basin, including Rang Chorakhae and Plai Phongphang. Basically, it is a two storey house; the lower part is a concrete structure with enclosed walls, and the upper part comprises wooden traditional Thai building units. This house type appeared in the riparian suburb area of Bangkok around the 1970s, mostly modified from old traditional Thai houses (Chompunich, 1987). Around ten years ago, this house type became more popular in rural riparian settlements of the Chao Phraya River Basin.

It is a contemporary traditional Thai house and is counted as a traditional Thai house in local people's perceptions, as they call it *'baan song Thai mai'* or 'new Thai house'. The house can be built as a new whole house or half old and half new, whereby the upper part is an old traditional Thai house, re-composed with a new concrete base. This modern traditional Thai house is not flexible to be adapted or expanded like the previous vernacular wooden houses. Mostly, it is occupied by more nuclear families, rather than extended families.

In terms of orientation, modern traditional Thai houses are increasingly built both along the watercourses and roads in Rang Chorakhae and Plai Phongphang. The houses located along streams or canals are mostly built a bit inland or have concrete dikes at the edge of the stream or canal. These houses face the waterway but usually there is also access from the road. At the same time, many of this modern traditional Thai house is built near roads and facing the road.

In terms of spatial arrangement, the ground floor provides space for modern activities and equipment with generally a concrete structure and ceramic tile finishing, while the upper floor is the more traditional or conservative part of the house (Figure 10). Compared to the traditional Thai house, some spaces have disappeared, such as the *taitun* (space under the raised floor), the *chan* (raised wooden terrace), and the *rabieng* (veranda).

Lower part of the modern traditional Thai house

The lower part of this house is enclosed by plastered and painted brick walls with sets of windows and doors. The interior space comprises a large hall on the ground floor and one third of the floor plan is a series of rooms: bedroom, kitchen, storage, bathrooms and toilet. Inside the hall, furniture and objects such as a suite, television, computer and stereo or modern entertainment system are commonly found.

In some ways, the hall of this modern traditional Thai house is quite similar to the hall of the low pitched roof two storey houses, in which there is a big hall designed

for gathering family members and occasionally collecting a lot of participants during family ceremonies (Figure 11). Besides, the function of a hall is similar to the hall in the upper part of the low pitched roof house built on stilts. It can be compared to the function of the *taitun* and *chan* of the traditional Thai house, but is more enclosed than open to the surroundings. This is in contrast to the common room of the modern concrete house mentioned previously, which is only a small living room for a few people.

The kitchen inside the house is similar to the kitchen of the modern concrete house complete with some modern cooking equipment. However, this kitchen is rarely used, while another outdoor kitchen is built separately and is more regularly in use. The outdoor kitchen is a simple wooden shelter and more open which is more familiar to inhabitants' behaviour and better ventilated compared to the indoor kitchen, so suitable for the strong smell of Thai cuisine. Parking or a garage is usually found in houses connected to the road in both Rang Chorakhae and Plai Phongphang; for instance this could be a lean-to roof extending from the main house.

Upper part of the modern traditional Thai house

The upper part of the house is a single or twin building unit, or is composed of a few building units surrounded by a narrow terrace or extending to a small pavilion. The upper building is the traditional building unit, mostly similar to those of the traditional Thai house. The different floor elevation is not as clear as in the traditional house; mostly the floors are the same level. Typically, there are rooms and a *rabieng* with a Buddha shelf and ancestor altar at the front of the room. The Buddha shelf is full of various Buddha images, charms and sacred objects from masters of the occult. The ancestor altar is also full of forebears' images and has the ancestral pot at the top for Rang Chorakhae families (Figure 12). The new modern traditional Thai house in both communities is popularly built as a twin building with a small pavilion at the front and a staircase connecting to the terrace on the ground floor. These components make the house look elegant with good proportions in the local inhabitants' eyes.

Because of economic factors nowadays, the traditional Thai house is rarely modified by adding more building units as in the past. Brick and concrete are cheaper than good wood. Local people have to adapt new materials to modify their old houses. The half wood, half concrete construction of modern traditional Thai houses is the result of this situation.

This modern traditional Thai house reveals the re-emergence of the traditional Thai house in riparian communities even though many of those riparian settlements have shifted their main communication route from waterway to road. The new and old materials and technologies mix together because of the intentions of the owners and builders.

In terms of material aspects, the changes in the modern traditional Thai house are obvious. The half wood, half concrete construction is the residents' response to

Figure 11 (above). Ground floor of modern traditional Thai house

Figure 12 (below). Upper floor of the modern traditional Thai house; sleeping area (left), Buddha and ancestor altar (right)

the rarity and expense of wood and the cheaper and easier nature of concrete and other new building materials. The old part on top is the local heritage that should not be abandoned; at the same time, adaptation to the modern rural way of life is needed. This house form is a result of a mixture between traditional and modern materials.

## Conclusions

The transformation of settlements presented in this study is determined mainly by the influence of the communication mode changing from waterways to roads. The new houses tend to be built close to roads, which are a more convenient mode of transportation, and there is more available land than in the area along the waterside.

The roads and other changes related to modernisation also resulted in changes in family occupation or in the mode of agriculture, which in turn effect changes in elements and patterns of housing compounds. The changed manner of rice cultivation caused the disappearance of the threshing floor, granary and buffalo shelter. The decline of sugar making is one reason for the change of function and disappearance of sugar shelters in Plai Phongphang. Also, the diversification of house forms is related to the variety of more modern building materials and technologies, due to the decentralisation of industrial products through the convenience of road transportation.

The vernacular houses have been dynamic in their physical dimension since before modernisation took place: they had been adapted all their life as *ruankhrungphuk* became *ruenkhrung sap,* or modified cluster traditional Thai houses, according to the dynamics of local families. Since modernisation took place, rural houses have exhibited more variety of styles, which directly relates to new building materials such as, initially, corrugated iron sheeting, nails and plank wood creating the low pitched roof house and modified traditional Thai house. The next stage, of building concrete structures provided for the two storey house, the modern concrete house and the modern traditional Thai house. These houses also show the influence of telecommunications and flow of population between rural and urban areas, other modernisation impacts.

Not only new building materials, but also innovative electrical equipment is now widespread throughout the country. The need for more security for inhabitants and belongings as roads come closer to the houses is one reason behind the development of the enclosed ground floor.

Due to changes in way of life and occupations, household spaces are used differently. Some old parts still continue while others are replaced by new materials and functions. The household spaces are divided for more individual space and smaller family sizes. At the same time, the common hall for relatives gathering in later house types confirms the continuance of strong relationships among relatives. Likewise, with the connection to water, the concrete dike and enclosed walls of ground floors to prevent flooding seem to suggest running away from water. Obviously, some spaces have disappeared, such as the *chan* and *taitun,* but new spaces such as the common hall can serve the same function.

Although there is a lot of development and change, there are still strong connections to tradition, in terms of social and cultural dimensions, including to the riparian environment and to the family.

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