

# Suan Nai Bangkok and Suan Nok Bangchang: The Emergence and Transformation of Floating Markets in the Chao Phraya River Delta of Thailand

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## ABSTRACT

**T**his article aims to analyze the emergence and transformation of orchard-based floating markets in Suan Nai Bangkok in Thonburi district, Bangkok and Suan Nok Bangchang, Samut Songkhram provinces on the west bank of the Chao Phraya River Delta, Thailand. Riverside settlements originated as ridge and groove orchard farming and developed into a complex water network of floating markets as the trading centers of the regional community. However, the development of roads as the main routes for transportation has altered the larger regional system from water to land-based distribution and communication. From an analysis using geo-informatics and the Space Syntax configurational model, as well as information from in-depth interviews and surveys, it was found that Suan Nai Bangkok has completely changed into an urban settlement while Suan Nok Bangchang has still sustained its complex water network and socio-cultural value where some floating markets are able to maintain their traditional roles while others have mainly been transformed for tourism purposes leading to riverside community revival and eco-tourism development.

**Keywords:** *emergence and transformation, orchard-based floating market, west bank of the Chao Phraya delta*

## 1. INTRODUCTION

Floating markets are integral to the traditional lifestyle of orchard farmers and are closely related to the local ecological system around the delta on the west bank of the Chao Phraya River. Most of this area comprises lowland plains roughly 1.5 – 2.0 meters above sea level. The Chao Phraya River is the main river running through this area and empties into the Gulf of Thailand and is also connected to the Tha Chin and Mae Klong Rivers further west. In addition, there are many branching canals between the rivers, such as Dan Canal, Maha Chai Canal, Sunak Huan Canal, Mae Klong Canal, Pasi Charoen Canal and Damnoen Saduak Canal. The network of these tributaries and canals connects Suan Nai Bangkok in Thonburi and Suan Nok Bangchang, Samut Songkram Province on the Mae Klong River. Evidence reveals that the Bangchang family and their servants started clearing and relocating to these areas during the late Ayutthaya Period (1594 – 1655). They planted their fruit trees on ridges in Suan Nai Bangkok and Suan Nok Bangchang on the west side of the Chao Phraya River delta (Terdsak Tachakitkachorn, 2005). These fertile low-land plains are inundated from time to time due to the ebb and flow of the river and the floods during the rainy season. As a result of the river dynamics, a ridge and groove orchard farming was widely practiced

in this area, and more canals were dug, resulting in a vast water network. Boats were the main means for transportation. Since these areas produced a variety of fruits, they were widely known as Suan Nai Bangkok and Suan Nok Bangchang (Wallipodom, 2001, p.50).

According to the type of settlement and the available means of transportation, orchard farmers would load their boats with fruit and vegetables once every full moon, and head to a floating market at a central meeting location at the mouth of the canal. The floating market served not only as a place for exchanging products but also as a place for social interactions. The sellers, the buyers and those who played important roles in the community would come to exchange ideas and opinions in addition to selling and buying products. The practice of ridge and groove orchard farming is a way to manage water not only for the orchard irrigation but also for daily household use and as a means for transportation. The water is managed in the form of a network of canals, which is in line with the topography and the functional purposes. Orchard farmers can reach their destinations easily by choosing to travel from the many canals. This network form creates a spatial configuration with centralities where transportation is concentrated. Some of these spatial centralities turn into floating market-trading centers.



Figure 1:  
Suan Nai Bangkok Suan Nok Bangchang at present. Source: Google earth.

The land transportation network has been developed since 1957 resulting in substantial land use change. The tourism promotion policy as part of the National Economic and Social Development Plan has put an emphasis on infrastructure development to meet global demands. At present, the area to the east in Suan Nai Bangkok is becoming urbanized and orchard production has substantially (Figure 1) while the area to the west in Suan Nok Bangchang has increased orchard production. Suan Nok Bangchang is the only area in Thailand that still maintains a relationship between the spatial configuration and socio-culture of ridge and groove orchard farming and water transportation, preserving the socio-culture values of fruit and vegetable growers. Because of the tourism promotion, some floating markets have been transformed, while others have been revived. The floating market is an economic center representing socio-cultural values based on the sufficiency of production and consumption and the balance between natural resources and the environment. This balance has been achieved by the Suan Nok Bangchang orchard farmers' ability to adjust to a new tourist oriented floating market economy without destroying the environment. Through the water network spatial configuration and the orchard farmers' socio-cultural practices, natural resources are allocated in a sustainable manner.

The study of Suan Nai Bangkok Suan Nok Bangchang aims to analyze the emergence of the spatial configuration and morphology of orchard-based floating markets and to the transformation of orchard-based floating markets resulting from the change of transportation from water-based to land-based. The related socio-cultural characteristics of orchard farmers were also analyzed in relation to this transformation. The understanding of these dynamic conditions and related factors can be used for planning to improve orchard-based floating markets in different contexts.

## **2. RELATED CONCEPTS AND THEORIES**

The emergence of the spatial centrality of floating markets can be understood through applying the theory of natural movement (Hillier, 1996). A grid configuration, like the canal network in the western delta, brings about increased transportation in one area more than that in another. Natural movement takes advantage of the transportation network

spreading unevenly in various places, leading to the higher concentration of activity in one area. Spatial configuration plays an important role in determining the functional role of each area. The spatial configuration accommodates an increase in natural movement in one area more than in another area thus attracting more transactions resulting in multiplier effects, which, in turn, lead to further economic growth. Spatial centrality, such as a floating market, is characterized by a closely interwoven transportation network offering a variety of transportation modes. The transportation network within the spatial centrality also connects more widely with the transportation network in the vicinity. The transportation network within the center will become more closely interwoven through a grid intensification process.

According to the configurational model (Space Syntax) studies conducted by Kasemsook and Subsook (2001, 2002), Bangkok went through a major spatial transformation when most of the canals were transformed into roads. The city center was moved away from Rattanakosin Island to the outer area. The canal construction affected the spatial configuration as roads constructed along one side of a canal bank tended to stop on one side. The entrance and the exit of the water transport system were transformed into road transport. Consequently, the front of the house becomes its back. In addition, a new business area emerges where transport by road is faster. The studies of Suan Nai Bangkok Suan Nok Bangchang carried out by Yantrasat and Tachakitkachorn (1995, 2005) found that multi-centric network settlement was a major type of settlement there. The strip-axis settlement or fish bone type settlement was closely related to ridge and groove orchard farming which helped develop the floating market center of trading network and distribution of orchard products. Building on this research this study attempts to explain the transformation of the spatial centrality due to the change of transportation mode from water-based to land-based in Suan Nai Bangkok Suan Nok Bangchang.

The socio-culture of Thai orchard farmers is based on a sufficiency economy related to water-based settlement. The farmers highly regard kinship and cooperation. They support each other and their lifestyle and business activities show a certain degree of self-sufficiency. They also rely on their own orchard culture, which includes planting practices, knowledge gained from observing nature and the environment and applying it to their planting practices as well as the "floating market" - a unique

symbol for Thai orchard owners (Wallipodom, 2001, p.13). One characteristic of the Thai society is bonding with imaginary relatives. This unifies community members. Those who play important roles in the community provide help and support to those who are socially inferior. The former refers to monks, teachers, village headmen and sub-district headmen as well as the outsiders or agents who play roles in the orchard culture.

The emergence and the transformation of orchard-based floating markets are conditions of the relationship between spatial configuration and socio-cultural practices (Hillier and Hanson, 1984). The configuration structure of orchard farmers is based on underlying rules and the logic of the arrangement of space is a mechanism, which affects the orchard owners' way of life and sustains the floating markets. External factors resulted from promoting floating markets as a tourist attraction by the Tourism Organization of Thailand since 1971 has made some floating markets changed for tourism purposes. Therefore, the framework analysis used in this study is based on the assumption that the transformation of the orchard-based floating markets resulted from the conditions of relationship between the spatial configuration and the socio-culture of orchard farmers and the related external factor of tourism.

### 3. METHODOLOGY

This study used spatial analysis using the configurational model (Space Syntax) and socio-cultural analysis of orchard farmers from interviews. The spatial analyses were divided into three periods (water transportation from 1860 to 1931, water and land transportation from 1932 to 1977 and land transportation from 1978 to the present time) as follows:

1) Analysis of the transformation of transportation mode and changes in land use by using Geographic Information System (GIS) based on overlay analysis of canal network, road and rail network, land use and community settlements.

2) Analysis of spatial centrality by using the configurational model (Space Syntax) to analyze efficiency accessibility of areas by the integration

value of various routes within the network of water and land transportation by using axial maps which showed the relationship between “the characteristics of the structure of spatial configuration” and “the characteristics and the level of popularity of land use or transportation routes”. The public areas were divided into convex spaces and determined whether they could be reached on foot and whether their boundaries could be identified. Subsequently, the smallest number of axial lines was drawn and arranged according to the relationship between accessibility to transportation routes based on integration values by using the following equation:

$$RA = 2 (MD-1)/k-2$$

RA: (Relative Asymmetry) refers to the integration value

MD: (Mean Depth) refers to the average depth of an axial line

k: refers to the number of axial lines in the network

Furthermore, the integration values ranged from high level to low level according to the rainbow bands –red, orange, yellow, green, light blue and dark blue. The red line represented high global integration value. Maps showing the configuration structure of different colors were obtained. This study analyzed the emergence and the transformation of the spatial centrality of the floating markets based on the urban morphological structure.

3) In-depth interviews were conducted to analyze related aspects about the emergence and the transformation of floating markets in terms of socio-culture values of the floating markets related to spatial configuration. The interviews also covered the roles of the floating markets at present and their differences from other contemporary markets. The results were processed to determine the emergence and the transformation of the floating markets based on the relationship between the spatial configuration and the socio-cultural information.

4) Based on the mentioned synthesis and conclusion, the findings were used to explain the emergence and transformation of the orchard-based floating markets.

## 4. RESULTS

### 4.1 Context of orchard-based floating markets in Suan Nai Bangkok Suan Nok Bangkok

The settlement on the Chao Phraya River delta displays indigenous knowledge obtained from observing the environment. The locals have had to adjust to living near the water. They grow their fruit trees and vegetables on ridges. The vegetable plantations and the orchards are called Kanut Suan. This method is achieved by making mounds around the plot of vegetables and fruit trees. The mound is called Kwang and Tanaon. Ditches known as Tong Rong are dug between the ridges. The mounds prevent the plot from inundation and facilitate the care of vegetables and fruit trees. Trees are planted on the mound to mark the boundaries. The ditches serve as reservoirs so that the water in the reservoirs can be used during the summer dry season. Troughs are dug to let the water in and out of the plot. Lampradong refers to small streams connecting plots of vegetables and fruit trees to increase the drainage and the water circulation through Klong-suan. The water circulation helps improve the quality of the soil as the organic residue in the ditches is a natural fertilizer. During the summer, orchard farmers will dredge the residue from the ditches and pile it on the ridges. This kind

of cultivation allows enough space for the roots of trees to grow deep into the soil. The plots vary in length. The short plot is near the house. Kitchen vegetables and fruit which can fetch high prices and require a lot of care are grown in this plot. Further away lie long plots where one variety of fruit tree or mixed varieties of fruit trees is planted (Figure 2 and Figure 3). (Nimlek, 2002, p. 3-9; Chirawet, 2005, p. 75)

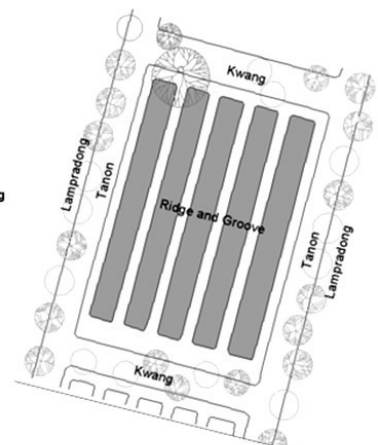
The ridge and groove orchard is embedded in a complex canal network where boats are the main means for transportation. The orchard farmers build their houses along the canals, and carry out their daily life in a sustainable manner by depending on themselves in terms of production and consumption. After finishing their work, they would bring fresh food from their gardens to be cooked as meals. After harvest, the fruit is taken by boat laden with a lot of fruit to the floating market to be sold on a full moon day when the water level is high so they can travel more easily. Different regions yield different kinds of fruit: Durians come from Bang Bon, Ma Prang from Ta It, rambutans from Bang Yi Kan, longan from Bang Nam Chon, carton from Klong Om, Ma Fai from Bang Lamjiak, guavas from Bang Sao Tong, langsung from Klong San, pomelo from Wat Chan, oranges from Bang Mot, coconut from Bang Sai Kai, beetle nuts from Bang Lang and mangos from Bang Chang. The floating markets converge around the mouth of the river, near a temple or a



Surajit Chirawet, 2001.



Terdsak Tachakittachorn, 2001.



Somjai Nimlek, 2001.

1) Spatial configuration of Mae Klong River

2) Characteristic of ridge and groove orchard

3) Kanad-suan

Figure 2:

Spatial configuration of Mae Klong River, characteristics of the ridge and groove orchard and Kanad-Suan

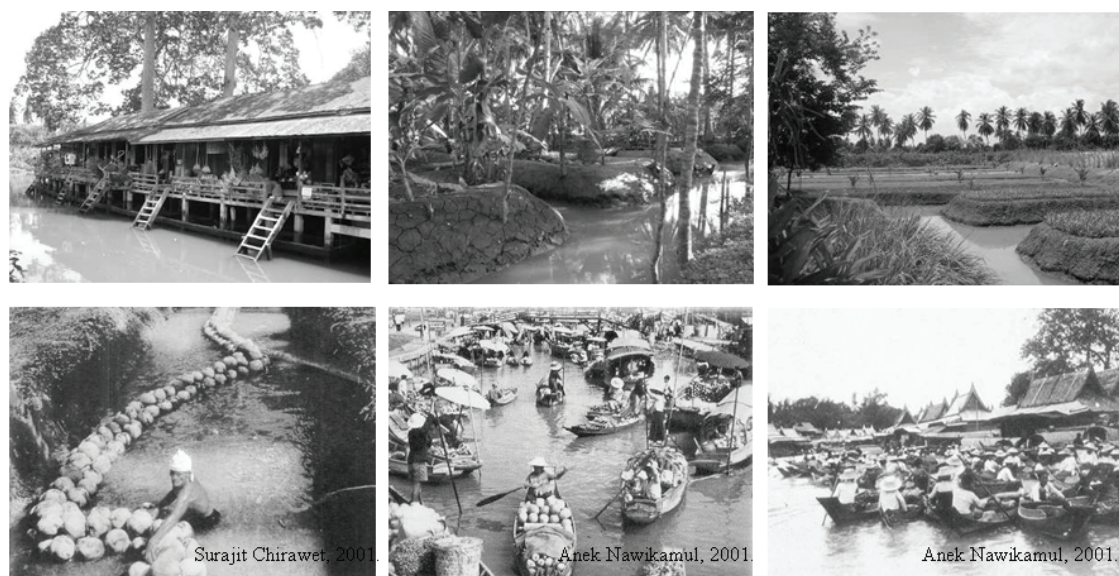


Figure 3:  
Water-based settlement, ridge and groove orchard, and floating market

community leader's house. A floating market is set up every morning while bigger ones are held on every full moon. The orchard farmers, boat merchants and related people decide when and where to exchange their products. (Charoenpon and Chantorn, interview on November 29, 2010). The floating market is not only a place for orchard farmers and merchants to sell and buy necessary items for a living but also a place for them to get things that they cannot produce due to the limitations of the land. The orchard farmers produce a variety of fruits and vegetables so they can exchange their products on the floating market.

## 4.2 The emergence and the transformation of floating markets

The orchard-based floating markets emerged with this water-based network but has transformed as a result from the change of the transportation course and land use. According to the analysis of important phases, the amount of orchard-based farmland in Suan Nai Bangkok decreased during the three periods: from 218.82 sq. km. (1860-1931), to 202.66 sq. km. (1932-1977), and 168.15 sq. km. (1978-present), while the amount of built-up area increased accordingly in the same periods from 2.50 sq. km., to 9.73 sq. km., and 245.13 sq. km. In contrast, the amount of orchard-based farming area in Suan Nok Bangchang increased during the same three periods: from 218.48 sq. km., to 453.71 sq. km. and 689.52 sq. km., respectively while the amount of built-up area stayed the same 1.90 sq. km. (Table 1 and Figure 4).

Table 1: Changes in land use as orchard-based farming and built-up area during the three periods

Land use	Suan Nai Bangkok (sq.km.)			Suan Nok Bangchang (sq.km.)		
	Period 1 (1860-1931)	Period 2 (1932-1977)	Period 3 (1978-present)	Period 1 (1860-1931)	Period 2 (1932-1977)	Period 3 (1978-present)
Orchard-based Farming	218.82	202.66	168.76	218.48	453.71	689.52
Built-up Area	2.50	9.73	245.13	-	-	1.90
Others	390.88	399.81	198.83	700.22	464.99	211.70

Source: Map 1:50000, from 1903 to 1913, from 1968 to 1975, from 1998 to 2001, Royal Thai Survey Department.

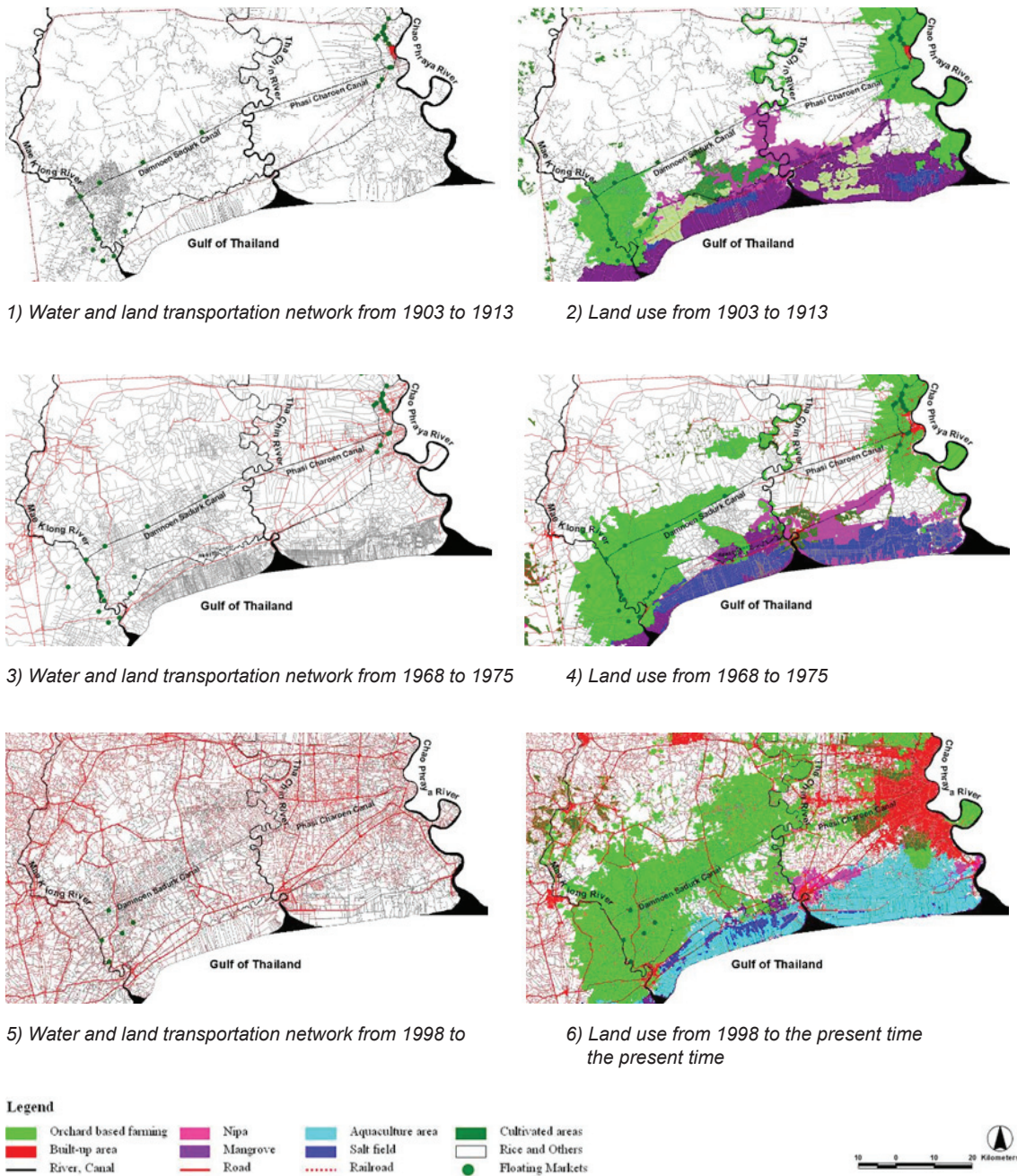


Figure 4:  
Changes in transportation courses and land use in Suan Nai Bangkok Suan Nok Bangchang Source: Analysis of map 1:50000, from 1903 to 1913, from 1968 to 1975, from 1998 to 2001, The Royal Thai Survey Department.

**Table 2:** Efficiency accessibility of water and land transportation (integration value)

Integration Values	Suan Nai Bangkok			Suan Nok Bangchang		
	Period 1 (1860-1931)	Period 2 (1932-1977)	Period 3 (1978-present)	Period 1 (1860-1931)	Period 2 (1932-1977)	Period 3 (1978-present)
Maximum Integration Value	0.01693	0.17922	0.16412	0.10803	0.11052	0.12036
Minimum Integration Value	0.03163	0.03693	0.33931	0.02651	0.02673	0.02792
Average Integration Value	0.10470	0.11186	0.10824	0.07223	0.07466	0.08216
Standard Deviation (S.D.)	0.02718	0.02828	0.02339	0.01830	0.01850	0.01589

Source: Analysis of configurational model based on the Space Syntax program

According to the analysis of efficiency accessibility of areas by integration values of water and land transportation (Table 2), the floating markets can be seen to have developed according to changes in transportation routes from water transport to land transport. The integration values increased during the three aforementioned periods as follows: the average integration values of the area in Suan Nai Bangkok measured 0.10470, 0.11186 and 0.10824 respectively while the average integration values of the area in Suan Nok Bangchang measured 0.07223, 0.07466 and 0.08216 respectively. The emergence and transformation of orchard-based floating markets during the three periods were as follows:

**Period 1: water transportation (1860 – 1931).** This period marks the pioneering period in orchard-based floating markets at both of the above locations. People came to settle along the canals and practiced ridge and groove orchard farming. The linear settlement was found in Suan Nai Bangkok and the floating markets were the trading centers which operated daily. The markets were at the mouth of the river, the intersection of canals, or near a temple. The integration value was high. The markets were located on the red line of the map (Figure 5).

Linear settlement was also found in Suan Nok Bangchang with a freeform grid connection surrounding communities and, an orthogonal grid comprising closely interwoven canals. The floating markets in particular, represented lively and sustainable spatial centrality. Most floating markets here were also found around the mouth of the river, the intersection of canals or near a temple. The integration value was high (Figure 6). However, some floating markets in Suan Nok Bangchang were found further away from the river or main canals but near a community leader's house. Their integration value was not as high as those along the river or canals;

their emergence was brought about by agents, such as community leaders, orchard farmers and, boat merchants who determined the time and the place to organize the floating markets (Charoenpon and Chantorn, interview on November 29, 2010). Most of the floating markets in Suan Nok Bangchang were organized on a lunar month, which governed the orchard farmers' way of life to the natural tidal ebb and flow in Suan Nok Bangchang area. The floating markets were organized on the first to the third, the sixth to the eighth and the eleventh to the thirteenth day of the waxing and waning moon or every fifth day. However the large floating markets such as Amphawa Floating Market used to be organized every day (Figure 6).

**Period 2: water and land transportation (1932 – 1977).** The transportation course was constantly undergoing restructuring from water transportation to land transportation. Most of the area in Suan Nai Bangkok had become centers of land community settlements due to the development of road networks in Thonburi. The locals were obligated by law to relocate their houses which were built on the water to land and there was a build-up around Wongwian Yai. The locals had to adjust to the lifestyle on land. The development of road networks in Suan Nok Bangchang in Samut Songkram led to the development of new areas, resulting in new land-based centers. These forced the Amphawa Floating Market, which was the main trading center, to close down. The land-based linear settlement along the Mae Klong River and the development of road networks increased the integration value. The main characteristics of the road networks were: first, the roads paralleled the main rivers or canals thus facilitating the transportation to and from the floating markets; second, roads which did not replace the waterways had no relevance to the original floating market centers (Figure 5 and 6).

The change in transportation course from water to land forced most floating markets to close down. However, some have been transformed into tourist attractions because of the policy promoting boat trip tourism. During that time, internationally-known floating markets were Wat Sai Floating Market and Damneon Saduak Floating Market. The road networks also affected the orchard farmers' way of life in terms of transporting their products, giving up their occupation as mixed orchard farmers and practicing monoculture for sale (Nut-udom, interview on November 26, 2010). However, some orchard farmers in Suan Nok Bangchang remained. The floating markets which were located further away from the main rivers or canals such as Ta Ka Floating Market and Donmanora Floating Market could be accessed by boats and the locals continued to practice ridge and groove orchard farming (Figure 6).

**Period 3: land transportation (1978 to the present).** The area in Suan Nai Bangkok had become part of Bangkok's city center resulting from urbanization and was virtually surrounded by urban areas. . The development of road networks did not follow the existing waterways. Areas under construction expanded along main roads, creating new trading centers along the roads with high integration values. Consequently, all of the floating markets in this area had to close down. The locals stopped farming and the canals were filled up, leading to drainage problems, deteriorating soil quality and flooding. However, the area in Suan Nok Bangchang still remained intact, and in fact expanded orchard production. The water networks and the practice of ridge and groove orchard farming continued. The spatial centrality is clearly marked along the Mae Klong River and Damneon Saduak

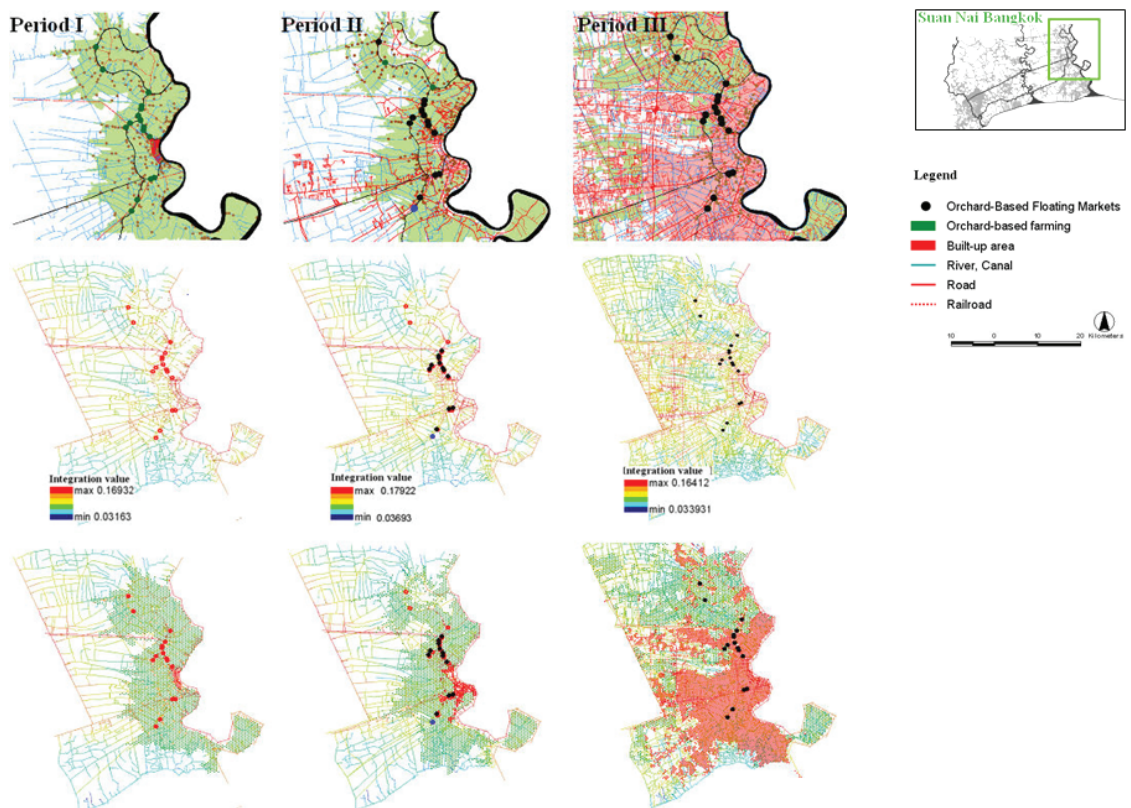
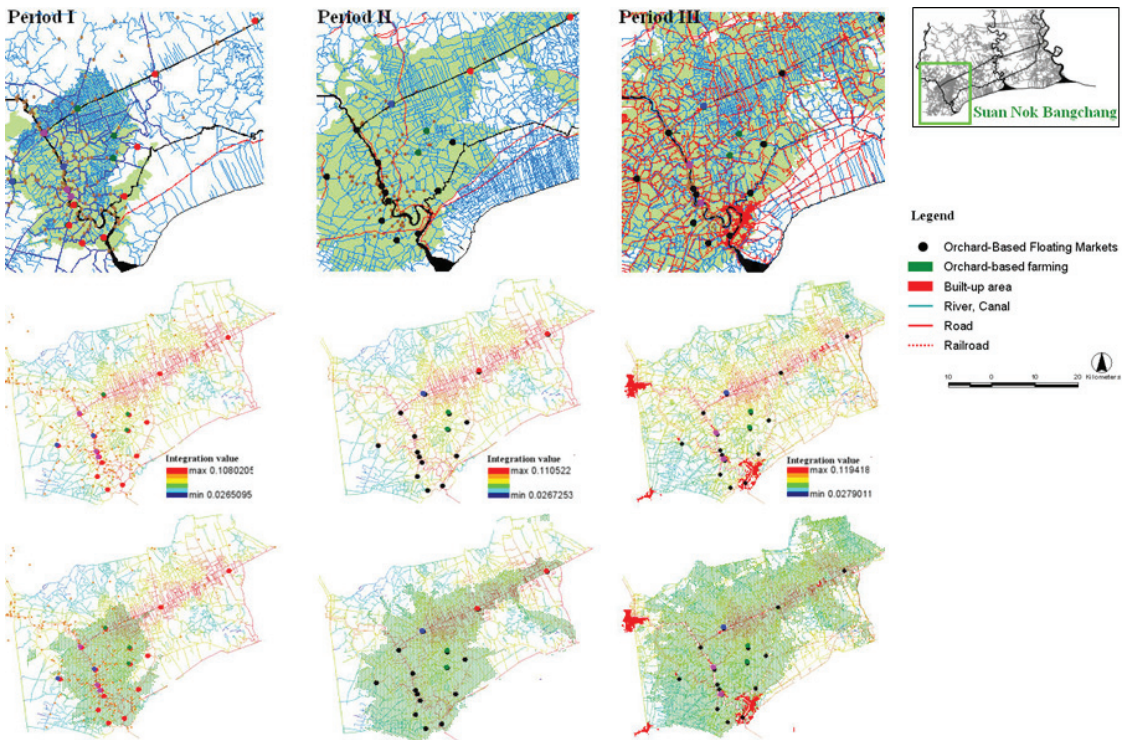


Figure 5:  
The transformation of spatial configuration of transportation and land use, Suan Nai Bangkok  
Source: Analysis of configurational models based on the Space Syntax program.



**Figure 6:**  
*The transformation of spatial configuration of transportation and land use, Suan Nok Bangchang*  
 Source: Analysis of configurational models based on the Space Syntax program.

Canal. The land settlement is still related to water spatial configuration and the orchards (Figure 6). The roads run along the main rivers and canals but some roads were not connected and tended to end at one river or canal bank. This affected the change of water transportation to land transportation and the front part of a building, which once faced the canal, became the back, facing the road.

The water transportation networks, the orchard farming and the development of road networks in Suan Nok Bangchang create an equilibrium, representing the relationship between the locals' way of life; the water as a resource, orchard farming and new road accessibility to tourists. As a result, some old floating markets such as Ta Ka Floating Market and Donmanora Floating Market still survive. Other floating markets such as Damnoen Saduak Floating Market have been transformed while still others such as Amphawa Floating Market have been revived. A wide variety of orchard-based floating markets can be found only in Suan Nok Bangchang and this makes it successful in reviving the canal-based

communities and promoting the orchard-based eco-tourism.

### 4.3 Present orchard-based floating markets in Suan Nok Bangchang

At present, some of Suan Nok Bangchang area is under the jurisdiction of Samut Songkram Province and other areas fall under the jurisdiction of Rachaburi Province. Suan Nok Bangchang still maintains its water transportation grid, as well as, ridge and groove orchard farming especially along the Mae Klong River and the Damnoen Saduak Canal. Different forms of floating markets are found there. Moreover, there are other floating markets which have been revived as tourist attractions. Amphawa Floating Market, Damnoen Saduak Floating Market and Ta Ka Floating Market are examples of floating markets that have been revived as tourism sites.

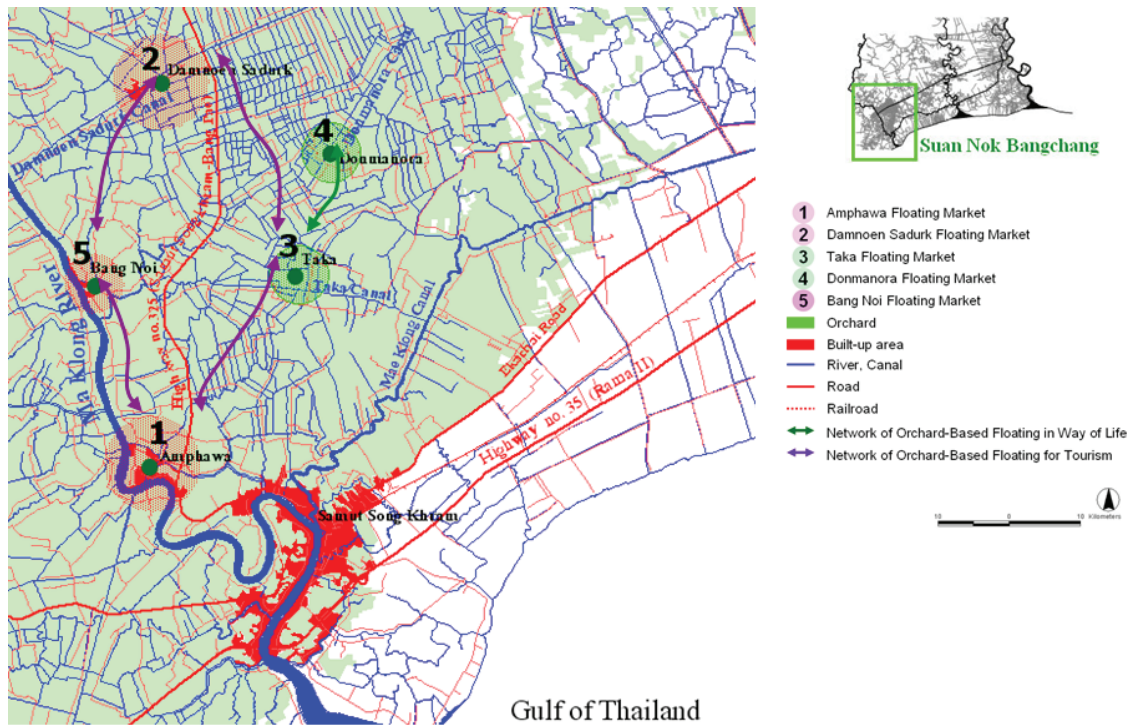


Figure 7:  
Present orchard-based floating markets and their links with eco-tourism in Suan Nok Bangchang

All of these floating markets can be accessed either by boat or by car. Almost all of them are a part of an eco-tourism network relating the spatial configuration and socio-culture of orchard farmers, orchard farming and transportation networks linking water-based urban communities. Damnoen Saduak Floating Market and Amphawa Floating Market are major tourist markets. Ta Ka Floating Market and Donnanora Floating Market are original markets representing orchard farmers' way of life (Figure 7 and Figure 8).

**Amphawa Floating Market** was once a major trading center on the Mae Klong River, and now has been revived due to its strong spatial configuration. Owing to its location within the linear freeform grid, at the mouth of Amphawa Canal, adjacent to the Mae Klong River, the Amphawa floating market had a high integration value. This market operated every day. Orchard products from in and around the area could be purchased and in the evening food would be sold to the orchard farmers who were heading home after finishing their work in their orchards.

The market was abandoned when roads replaced boats in 1972 and, a new spatial configuration on the land emerged. The revival of Amphawa Floating Market was carried out in 2004 by local agencies and an academic consortium in order to conserve and revive water-based communities (Unsuwan, interviewed on November 12, 2010). The revival was launched by academics from the Research Project, Faculty of Architecture, Chulalongkorn University and later involved related agencies. At present, the market operates on weekends from 1:00 to 8:00 PM. This crowded water-based community has high integration value both as a water market and as a land market. The market is surrounded by orchards. Boat merchants and orchard farmers load their orchard products and food to be sold to tourists in their boats. In addition, tourists can take a boat trip to see the market and observe the water-based way of life as part of the eco-tourism project. The Amphawa community was awarded the 2008 UNESCO Asia-Pacific Heritage Award (Peerapan, 2009, p.23-38). The successful revival of Amphawa Floating Market for tourism purposes directly affects the revival of water-based communities and that of other floating markets in Suan Nok Bangchang.



1) Amphawa floating market



2) Damnoen Saduak floating market



3) Taka floating market



4) Donmanora floating market

Figure 8:

*Different types of floating market in Suan Nok Bangchang at the present time*

**Damnoen Saduak Floating Market** has maintained its original spatial configuration and is a major trading center on Damnoen Saduak Canal. It is located at the mouth of Lad Ratchaburi Canal adjacent to Damnoen Saduak Canal and its integration value is high. The market is located within the orthogonal grid combined with canal grid

intensification. This water grid configuration market represents a lively and sustainable floating market example. It was moved from the original location further into Ton Kem Canal mainly because of the tourism promotion policy in 1973. The market operates every day from 6:00 AM to 1:00 PM (Kiatkasemsuk, interviewed on November 30, 2010). This crowded water-based community has a

high integration value both for water and land. The market is surrounded by orchards. Boat merchants and orchard farmers carry their orchard products, food and souvenirs to be sold to each other and tourists in their boats. In addition, tourists can take a boat trip to see the market and observe a water-based way of life. At present, both Thai and foreign visitors come to this market every day.

**Ta Ka Floating Market and Donmanora Floating Market** represent the original orchard farmers' way of life. The markets were formed by related agents such as community leaders, orchard farmers and boat merchants. They set up the markets every second, seventh and twelfth waxing and waning moon or every fifth day. The markets are located further away from the Mae Klong River and their integration value is not high. The water-based communities are sparsely distributed but there are many orchards. Ta Ka Floating Market is in Sala Canal and Donmanora Floating Market is in Donmanora Canal. They are located near community leaders' homes and have become the local orchard socio-cultural markets of the time when road transportation replaced water transportation. At present, the markets are set up at the mouth of Donmanora Canal at 6:00 AM. The orchard farmers and boat merchants bring their

products to be sold until 8.00 AM then the farmers go back to work in their vegetable gardens while some boat merchants join the coconut growers at Ta Ka Floating Market in Sala Canal which is open from 8:00 AM to 2:00 PM (Cheuthai, interviewed on November 26, 2010; Chantorn and Teonsuwan, interviewed on 29, 2010). Most of the products are orchard products, coconut sugar, and daily food consumption items.

However, Ta Ka Floating Market becomes an alternative for tourism during weekends. The local agents organize this market on weekends from 8:00 AM to 2:00 PM. Boat merchants will bring orchard products, food and souvenirs to be sold to tourists. There are also boat trip services. Tourists can learn how to make coconut sugar, observe orchard farmers' way of life and visit historical sites (Nuch-udom, interviewed on November 26, 2010). However, this alternative floating market is not a part of the spatial network and socio-cultural network of Ta Ka Floating Market and Donmanora Floating Market.

It can be founded that the emergence and the transformation of orchard-based floating market dynamics are based on conditions of the relationship between spatial configuration of the transportation

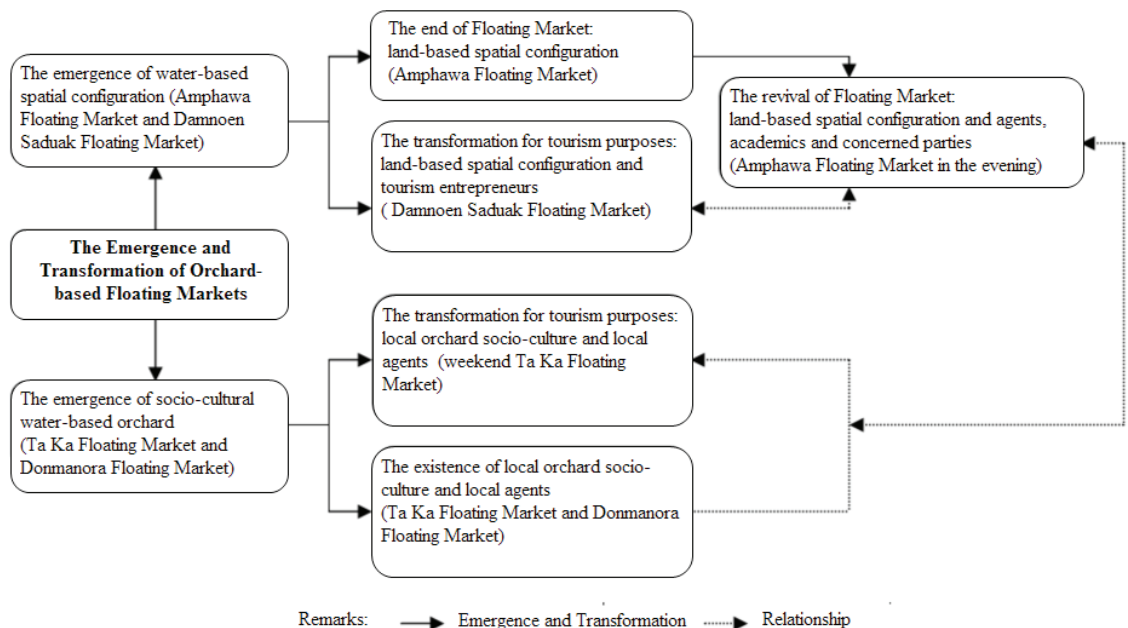


Figure 9:  
Dynamics of the emergence and the transformation of orchard-based floating markets

network, orchard products and land use and socio-cultural factors. These conditions respond to a sustainable logic in the process of recurrence or preservation of the relationship between orchard farmers' way of life, the social interactions between boat merchants and orchard farmers. In addition, organizing agents are the main factors affecting the emergence and the transformation of floating markets. Such organizing agents are the locals, tourism entrepreneurs, academics and concerned parties. They conduct the emergence and the shift in the roles of the floating markets from being water based centers of trade to tourist attractions in the context of orchard culture. There is a spatial network on the one hand, of producing fruits and vegetables and, on the other, offering boat trips for the interested outsiders to observe the water-based way of life (Figure 9).

## 5. DISCUSSION AND CONCLUSION

Based on the synthesis of the findings; the emergence of the floating markets results from spatial configuration conditions involving the water-based settlement, the ridge and groove orchard farming method, the use of water transportation networks and the spatial network of orchard products. These constitute the orchard farmers' way of life, their social interactions and various products and services offered on the markets. The social logic of space involves the recurrence and the preservation of the orchard farmers' way of life, the ridge and groove orchard farming, the use of water transportation network and the spatial network of orchard products. In this case, floating markets take place in areas where accessibility rate is high. There is grid intensification and the markets are trade centers packed with action which also operate in a sustainable manner. The floating markets are water-based spatial configuration markets and function as community centers. However, if their accessibility rate is not high enough, the floating markets undergo the promotion and support condition created by local agents. The agents set the time and the site; as a result, these floating markets become water-based orchard socio-cultural destinations.

All of the floating markets are transformed into tourist attractions when land transportation is coupled with the promotion and support created by tourism entrepreneurs, academics and concerned parties and local agents to revalue the floating market system. These agents use management techniques

to deal with the spatial network of orchard products and the promotion of products and services for tourism purposes. The products include orchard products and souvenirs and also provide the service of boat trips related to orchard-based tourism on water to supplement land-based tours. There are communities along the canal banks and the land is used as orchards. The prevalent orchard socio-culture of floating markets still maintains the triangular connection between the social logic of space, the functions of floating markets and the local agents concerned.

The findings of this study can be concluded as follows. The emergence and the transformation of orchard-based floating markets can be explained using theories concerning the process of spatial centrality based on natural movement along canal networks. Floating markets act as lively trading centers and operate in a sustainable manner. Their existence depends on the spatial configuration of high efficiency and accessibility. They are usually located at the mouth of canals and near temples. The canals are structured in the form of orthogonal grids, like Damnoen Saduak Floating Market for example. The emergence and the transformation of floating markets stem from the social logic of space reflecting orchard farmers' way of life, the ridge and groove orchard farming method, and the use of transportation networks to distribute orchard products. The floating markets are a characteristic of Thai orchard farmers' socio-cultural context. Evidently, a floating market does not have to be located in an area where efficiency of accessibility is high; Ta Ka and Donmanora Floating Markets which are organized by local agents are two examples of this. These floating markets are usually located at the mouth of a canal and near community leaders' homes. The transformation of floating markets involves agents such as local agents, tourism entrepreneurs, academics and concerned third parties. Therefore, in addition to the relevant theoretical framework the crucial role of the local agents have to be taken into consideration to explain the emergence and the transformation of floating markets.

As a result of the replacement of water transportation with land transportation, water-based trading centers along the canals were transformed into land-based communities connected by roads. Roads were constructed along major rivers and canals connecting floating markets. In addition, some roads were constructed without taking the original water course into consideration; as a result, autonomous

land communities were born. At present, Suan Nai Bangkok has become an urban area and the land is used for purposes other than orchards. This area has developed into one of the major urban areas of the country. The land-based communities do not reveal any connection with the original water-based communities. The original floating markets in this area were wiped out. This shift in land use gave rise to urban problems such as the disappearance of the canals, drainage problems and flooding. In contrast, the area in Suan Nok Bangchang still maintains its original identity. Its spatial configuration consists of land-based urban communities along canals and the land transportation networks are still linked with the water transportation network. The orchard farming is still practiced, resulting in like an orchard and urban mix. Some floating markets still exist and some have been transformed into eco-tourism attractions.

The study also concluded that spatial centrality tends to change according to the change in transportation mode from water transportation to land transportation with high accessibility. The change in land use and the orchard-based socio-cultural values have to be taken into consideration when the policies concerning orchard-based community area are being implemented. At present, the spatial configuration of Suan Nok Bangchang is still maintained and its canal networks and water-based trading centers remain intact. The land transportation runs through land-based communities which are located along canals. These communities are surrounded by orchards. Orchard-based socio-cultural values have maintained orchard farmers' simple, sustainable and somewhat updated lifestyle affecting the relationship between the spatial configuration and the orchard-based socio-culture which lead to the emergence and the transformation of orchard-based floating markets and the revival of water-based communities and tourism in Suan Nok Bangchang where the residents use both boats and cars as means of travel. Finally floating markets are a successful part of orchard-based tourism.

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## **INTERVIEWS**

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