

Conservation and Development of Koh Kret Community Environment in Nonthaburi

การอนุรักษ์และพัฒนาลักษณะสภาพแวดล้อมชุมชนท้องถิ่นเกาะเกร็ด จังหวัดนนทบุรี

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Abstract

The expansions of urbanization and economic growth over Bangkok area generate rapid changes on several small communities surrounding Bangkok, especially on the potential ones such as Koh Kret, Nonthaburi. Due to its unique physical, social and cultural virtues, Koh Kret has been promoted as an eco-cultural tourist attraction. This, to some extent, has impacts on Koh Kret's physical transformations concerned with their original way of life and cultures, causing the difficulties between retaining the cultural heritage and modernizing the community area.

This research had studied on both theoretical and related topics along with a field research, focusing on the studies for conservation and sustainable development of Koh Kret community environment related to the tourism. Two main issues were covered in this research, that is, the community planning and the vernacular architecture. In this study, the participating research was performed by using field surveys and questionnaires for gathering information on community attitudes toward the above issues. This could be useful to identify the solution approaches directed to the community problems. The approaches for conservation and development of Koh Kret community environment as shown in this research could be further used to design a policy that can be implemented in practical use for the community.

บทคัดย่อ

การขยายตัวทางความเจริญของชุมชน และระบบเศรษฐกิจที่ออกสู่ออกนอกกรุงเทพมหานคร ส่งผลให้เกิดการเปลี่ยนแปลงอย่างรวดเร็วต่อชุมชนเล็ก ๆ โดยเฉพาะบริเวณพื้นที่ที่มีศักยภาพ อย่างเช่นตำบลเกาะเกร็ด จังหวัดนนทบุรี ก่อปรกับความโดดเด่นทางด้านลักษณะทางกายภาพ สังคม และวัฒนธรรม เกาะเกร็ดจึงได้รับการสนับสนุนให้กลายเป็นแหล่งท่องเที่ยวทั้งเชิงวัฒนธรรมและเชิงนิเวศวิทยา การเปลี่ยนแปลงดังกล่าวส่งผลต่อลักษณะสภาพแวดล้อมทางกายภาพที่สัมพันธ์กับวัฒนธรรมความเป็นอยู่ของชุมชนดั้งเดิมของเกาะเกร็ด และก่อให้เกิดปัญหาความขัดแย้งระหว่างการอนุรักษ์และพัฒนาพื้นที่ของชุมชนชนบทรอบนอกเมืองหลวง

การวิจัยนี้ได้ทำการศึกษาทฤษฎีและเนื้อหาที่เกี่ยวข้องของควบคู่กับการสำรวจพื้นที่ศึกษา โดยมุ่งเน้นประเด็นการศึกษาถึงแนวทางการอนุรักษ์และพัฒนาสภาพแวดล้อมท้องถิ่นที่สัมพันธ์กับการท่องเที่ยว ซึ่งแบ่งออกเป็น 2 ระดับ ได้แก่ ระดับการวางผังชุมชนและระดับสถาปัตยกรรมพื้นถิ่น ในการสำรวจข้อมูลได้อาศัยวิธีการสำรวจรวบรวม 2 ทาง คือ การลงพื้นที่สำรวจโดยผู้วิจัยและการสำรวจทัศนคติความคิดเห็นของชุมชนซึ่งเป็นผู้ที่มีส่วนได้ส่วนเสียกับการเปลี่ยนแปลง การศึกษาวิจัยดังกล่าวเป็นการศึกษาวิจัยแบบมีส่วนร่วม (participating research) เพื่อกำหนดกรอบแนวทางในการแก้ไขปัญหาของชุมชนได้อย่างตรงประเด็น แนวทางการอนุรักษ์และพัฒนาสภาพแวดล้อมชุมชนท้องถิ่น เกาะเกร็ดที่ได้นำเสนอนี้สามารถนำไปศึกษาต่อถึงรายละเอียดความเป็นไปได้ และใช้พิจารณาในการกำหนดนโยบาย เพื่อให้เกิดการปฏิบัติที่เป็นรูปธรรม และเหมาะสมกับความเป็นจริงของชุมชน

Keywords

Community Environment¹ (สภาพแวดล้อมชุมชน)

Community Planning² (การวางผังชุมชน)

Vernacular Architecture³ (สถาปัตยกรรมพื้นถิ่น)

Sustainable Tourism⁴ (การท่องเที่ยวอย่างยั่งยืน)

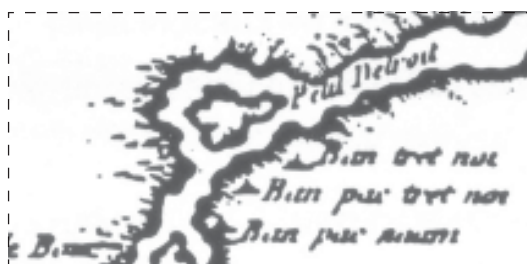
Notes:

- ¹ Built environment related to ecology system, social, culture and community economics. In this research, “community environment” refers to two main levels; the community planning and the vernacular architecture.
- ² A planning of physical environment in the level of local community, based on their activities and way of life. The factors for conservation and development of the community, i.e., zoning of land use, circulation system, and community image reflecting social status, culture, lifestyle and Koh Kret’s identity, are mainly concerned for the “community planning” in this study.
- ³ The local dwellings and all other buildings related to their natural environment, climate, social belief and culture. The values of vernacular architecture cannot be evaluated by only physical characters of built forms, but should be concerned with intangible factors, i.e., dwelling existence, way of life, and culture. “Vernacular architecture” in this study is categorized into three types, such as *wat*, vernacular house, and ancient pottery kiln, the unique feature of this community.
- ⁴ The tourism with the management of all resources in such a way that economics, social and aesthetic needs can be fulfilled while maintaining cultural integrity, essential ecological processes, biological diversity and life support systems. A sustainable tourism rising from the participation of community, could meet the balance between conservation and development for the community environment.

1. Introduction

The expansions of urbanization and economic growth over Bangkok area generate rapid changes on several small communities surrounding Bangkok, especially on the potential ones such as Koh Kret, Nonthaburi. Due to its unique physical, social and cultural virtues, Koh Kret has been promoted as an eco-cultural tourist attraction.

Koh Kret is located in *Pak Kret* district, Nonthaburi province, northwest of Bangkok. Koh Kret (the word “*Koh*” means an island in Thai language) is a small island of 3.5 square kilometers situated in the Chao Phraya River (Figure 1). The community of Koh Kret has unique historical heritage and identity for more than 350 years (Bunpook, 2000). This island was previously man-made. In 1722, during the reign of King Thaisa of Ayutthaya, a canal was constructed as a shortcut to bypass a bend in the *Om Kret* branch of the Chao Phraya river. As the canal was widened several times, the section cut off eventually became a separate island as we have seen today. The island served as a refuge to the Mon tribes between the 6th and 10th centuries and has retained a distinct identity in their culture and, particularly their pottery (Pirom, 1999).



Ban Pac Tret Noi

*The words “Tret” or “Kret” means a shortcut of narrow water way which links to a main river in both sides.
(Royal Dictionary, 1982)

Having a geographical characteristic as an island, the Koh Kret community faces the difficulties in transportation and communication. However, this constraint turns to be a great advantage of the community, resulting in the way of life and their ethnic identity maintained. Even being very near Bangkok, Koh Kret sub-district has seen a little change in terms of the physical development, while Pak Kret district has been quickly and highly urbanized. Pak Kret district today is surrounded by urbanized built-environment such as a theater complex, shopping malls, superstores as well as the bridge over the Chao Phraya River linking from Pak Kret Interchange to west outer-links of Bangkok (Figure 2).

Koh Kret settlement has long been characterized by households located along the edge of island for the reason of water supply. This settlement establishes the 25 kilometer narrow loop of community circulation with a 1.50-2.00 meter wide path used only for pedestrian and bicycle lanes. For this reason, there are no cars allowed on the island except motorcycles which tend to be



Figure 1. Ancient map of Chao Phraya River in Ayutthaya period (Bunpook, 2000, p. 5).

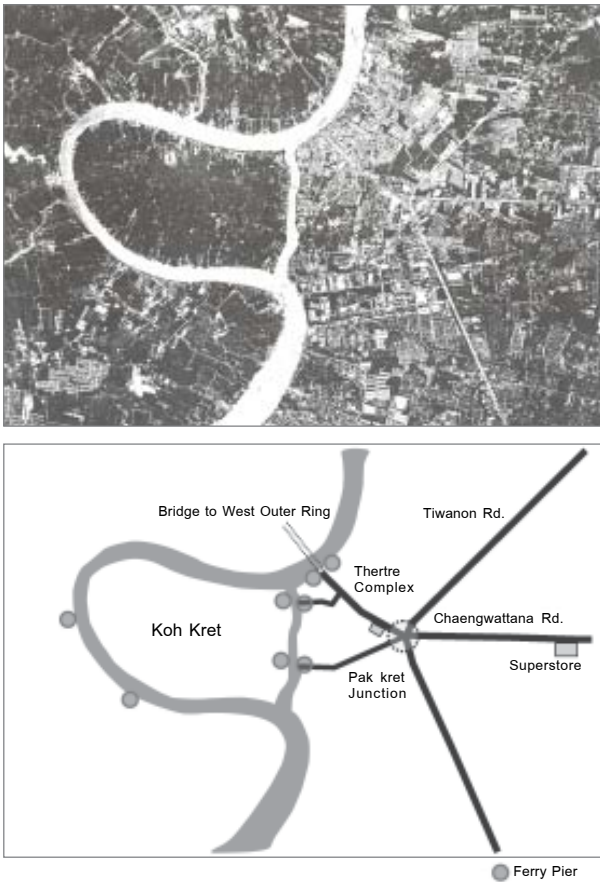


Figure 2. Map of Koh Kret community and its surroundings.

increasing in numbers due to the growth of tourism. In 1993, Department of Public Works and Town & Country Planning, Minister of Interior, Thailand, once proposed the guideline for tourism development in Koh Kret by building a bridge crossing between Koh Kret island and Pak Kret district. Fortunately, this proposed plan was not implemented due to many disagreements in the community.

However, there were so many campaigns coming after the announcement “Amazing Thailand in 1998” by Tourism Authority of Thailand (TAT) (2001). “Tourism” has been employed as one of the tools for alleviating the economic crisis in the country (Thadaniti, 2002). Due to its unique physical, social and cultural virtues, Koh Kret has been promoted as an eco-cultural tourist attraction. In the midst of uncertain changes, it is necessary to preserve Koh Kret for their local identity, in both of intangible value; their culture and tradition, and tangible value;

physical environment, historical area, vernacular architecture, as well as pottery craft works of Mon community. The question is how we could conserve all these values of community and at the same time develop their physical environment in merging of tourism impact.

This research had studied on both theoretical and related topics along with a field research, focusing on the studies for conservation and sustainable development of Koh Kret community environment related to the tourism (Phattanawasin, 2004). Two main issues were covered in this research, that is, the community planning and the vernacular architecture.

2. Study Approach

In this study, the research was performed by using field surveys of physical environment and questionnaires for gathering information on community attitudes toward the community planning and the vernacular architecture. The studies for conservation and development of Koh Kret community environment were performed as follow:

Step 1: Collecting primary data

Primary data of the study area on the following subjects, i.e., concept and theory of urban design, sustainable development, sustainable tourism development (Swarbrooke, 2000), eco-urbanism (Ruano, 1999), Koh Kret’s origin, history of the settlement, socioeconomic factors, and community environment impacts on tourism growth; both levels of community planning and vernacular architecture, were collected and analyzed so as to assess the cultural significance of Koh Kret and to prioritize community problems.

Step 2: Field-survey of the physical environment

In this study, the community environment was studied into two levels related to tourism;

community planning and vernacular architecture. On the community planning survey, the study investigated on significant criteria including zoning area, circulation system, and community image. On the vernacular architectural survey, the three architectural types; religious architecture, residential architecture, and historical place, were examined for selecting the leading areas of architectural attractions for development of a pilot plan related to a tourism strategy.

Step 3: Community opinion survey

Self-administered questionnaires and interviews were used for collecting opinion from households in Koh Kret community. Convenience sampling technique and statistical assessment on SPSS (Statistical Package for the Social Science) were applied to analyze the data obtained. The same scope of works; planning and the vernacular architecture issues, was asked in these questionnaires to understand their attitudes towards above issues and current problems related to tourism growth.

Step 4: Integrative analysis of both field-survey of physical environment and opinion survey

Data derived from steps 1 to 3 were analyzed in order to determine the solution plan for community problems. The results of two survey methods framed the design guideline proposed for community conservation and development in two levels; community planning and vernacular architecture.

Step 5: Design guideline for conservation and development of Koh Kret community environment related to the sustainable tourism

The design guideline for conservation and development of Koh Kret community environment was proposed in terms of solution policies, conceptual diagrams, maps, drawings, master plans, as well as perspective views.

3. Results and Discussion

The results of integrative analysis in this study were discussed into two levels; macro level—community planning in Koh Kret and micro level—vernacular architecture in Koh Kret.

3.1 A Macro Level—Community Planning in Koh Kret

3.1.1 Zoning Area in Koh Kret

Generally, Koh Kret's geography is a flat island surrounded by the Chao Phraya River. The community of Koh Kret is composed of 7 villages with 23 canals linking from villages inside to the Chao Phraya River (Figure 3). 44.90 percents of a whole island was used for agriculture. However, from comparative analyses of aerial photographs taken between 1987 and 2001, an agriculture area tended to be decreasing due to an increasing urban area for commercial and tourism promotion. The majority of agricultural land was left unused. The expansion of community development was found along the outer loop of pedestrian (1.50-2.00 meter wide path). There were two different types of household settlements; water-based community clustered around major landmarks e.g. wats (monasteries), boat piers, schools, and pottery factories, and small households scattered among agricultural areas inside the island.

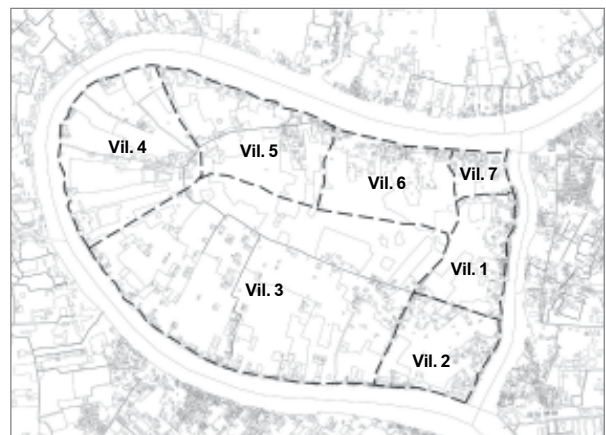


Figure 3. Map of Koh Kret shown the boundary lines of each village.

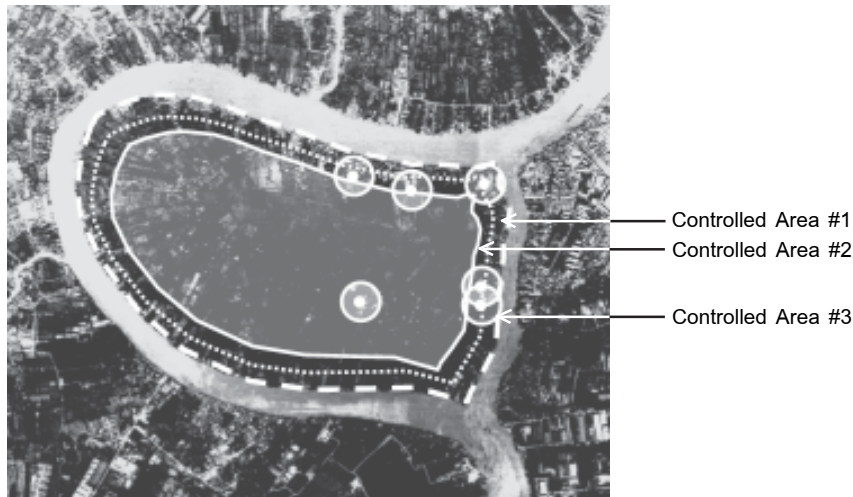


Figure 4. Set back area according to the plan for the physical environment control in Koh Kret (1997-2001).

From the previous plan for expansion of physical environment of Nonthaburi (from 1997 to 2001) by BMA (Bangkok Metropolitan Authority)'s Building Regulations Act, the development areas of Koh Kret were determined into three areas as follow (Administration Office of Nontaburi Province as cited in Vichayaprasertkul, 2002, pp. 166-167): (Figure 4)

Controlled Area #1: The area from the edge of island to the area inside 100 meters, no any buildings has taller than 9 meters.

Controlled Area #2: The area next above the controlled area #1 to the area inside 100 meters, no any buildings has taller than 16 meters.

Controlled Area #3: The area within the radius of 100 meters from the significant temple such as Wat Poramaiyikavas, Wat Sao Tong Thong, Wat Salakul, Wat Phai Lorm, Wat Chimplee, and Wat Pa Fai, no any buildings has taller than 9 meters.

In the present, the areas related to tourism promotion have mostly clustered in villages 1, 6 and 7 since they are very close to a boatyard at Wat Poramaiyikavas in village 7, the major access from the mainland of Pak Kret district. However, there are other interesting spots located out of a tourist major route which are difficult for accessibility, for example, agriculturist villages inside the island and vegetable gardens on the east side area of island. Both still maintain ecological values very well.

3.1.2 Circulation System in Koh Kret

The problems of circulation system in Koh Kret were divided into two types, land transportation and water transportation (Figure 5). On land transportation, there were increasing numbers of motorcycles due to the growth of tourism, especially in villages 1, 6 and 7 which are the community of pottery industry. Mixed use between pedestrian ways and motorcycle lanes endangered to both tourists and people in these communities and created disorderly environment. On water transportation, from the field survey, it was found that 23 canals inside the island were too shallow to convey the boat and also left unused. In the past,



Figure 5. Circulation system in Koh Kret.

these canals branching from Chao Phraya River, interconnected as a transportation network and served as a blood vessel of community for both agriculture supply and transportation use.

3.1.3 Koh Kret Community Image

In the image analysis of Koh Kret, referring to Kevin Lynch's theory "The Image of City" (Lynch, 1960), the important criteria were 1) Identity of Koh Kret (analysis of geography condition, way of life, built environments which reflect culture and life-style), 2) Structure; interrelationship between the way of life and physical environments, and 3) Meaning; both tangible and intangible elements which mean to the community. From the community opinion survey and a study on the fact of the historical, aesthetic, and cultural value of each place in Koh Kret (Vichayaprasertkul, 2002), the ranking of significant places were arrayed due to community's perception and historical facts shown in Table 1.

Therefore, from this study, the selected areas for conservation and development were proposed as follows; 1) Wat Poramaiyikavas in village 7, 2) Vernacular shop-houses in village 7, and 3) Ancient kiln in village 1 (Figure 6).

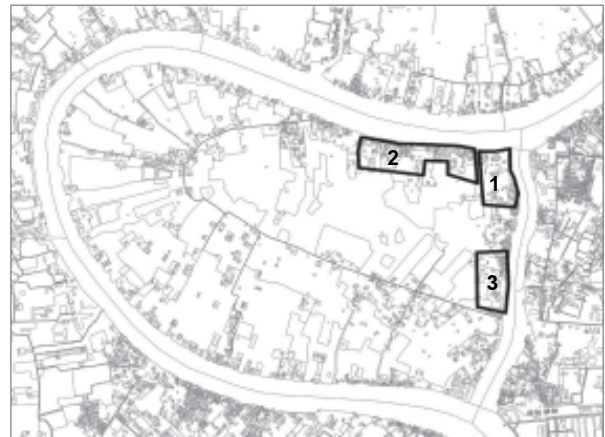


Figure 6. Map of Koh Kret shown leading areas of attractions; 1) Wat Poramaiyikavas in village 7, 2) Vernacular shop-houses in village 7, and 3) Ancient kiln in village 1.

3.2 A Micro Level–Vernacular Architecture in Koh Kret

From the image analysis of Koh Kret, the field survey of architecture in Koh Kret, and the study of related documents, the leading areas for development could be classified into three architectural types, religious architecture, residential architecture, and historical place, based on the following criteria:

1. The ranking of significant areas in Koh Kret (Table 1).
2. The relationship to the tourist loops reflecting both tangible and intangible value of Koh Kret.

Table 1. The ranking of significant areas reflecting the community's perception of Koh Kret.

Ranking No.	Place / Significant Area	Location
1	Wat Poramaiyikavas	Village 7
2	Ancient kiln for pottery artwork	Village 1, 6 and 7
3	Water-based community	Area along the island
4	Agriculture-based community	Village 2, 3, 4 and 5
5	Wat Sao Tong Thong	Village 6
6	Wat Phai Lorm	Village 6
7	Wat Chimplee	Village 1
8	<i>Kwan Arman</i> (Mon Pottery) Cultural Center	Village 6
9	Wat Salakul	Village 3
10	Wat Pa Lelai	Village 1

(Source: Vichayaprasertkul, 2002, p. 155)

3. The current activity of the community and crisis problems derived from both field survey of physical environment and opinion survey.

Thus, the selected buildings and related areas shown below were included in the design guideline of conservation and development for these architectural types:

1. For religious architecture – *Wat Poramaiyikas in village 7* should be developed as a cultural place for both community and tourist.

2. For residential architecture – *The shop-houses in village 7* should be subjected to the suitable renovation plan.

3. For historical place – *The ancient kiln area in village 1* should be preserved and developed as a tourist attraction with the revival of community space.

3.2.1 Wat Poramaiyikas

Background

Wat Poramaiyikas is the main temple on the island, at the north-east corner right next to the ferry landing. This temple serves as a node of Koh Kret community since there is a main access from the mainland of Pak Kret sub-district by boat from pier at Wat Sanam Nua. The temple was built in 1744 during the reign of King Thonburi and was restored again in 1873 during King Rama V (Uruchata, 2003). The temple consists of significant architectures such as *Phra Ubosot* (ordination hall), *Phra Maha Raman Chedi*, *Wiharn* (assembly hall) *Phra Buddha Saiyart*, *Kuti* (monk's residences), and *Chedi Mon* (*Chedi Muta*) or an inclined bell-shaped stupa which is located at the small cape on the island corner (Figure 7). This *Chedi Mon*, white marble pagodas inclining toward the riverside due to continuous tide from the North, is currently recognized as a significant landmark of Wat Poramaiyikas and also Koh Kret. There is also a small museum displaying the treasures and interesting collections from the period of King Rama V.

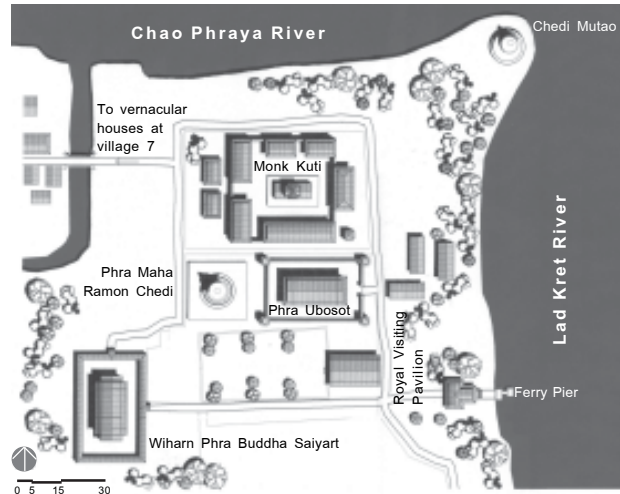


Figure 7. Layout plan of Wat Poramaiyikas, Koh Kret.

Physical conditions and problems

According to the field survey of current physical conditions, the observations were as follow:

- Since the location of temple serves as node of this community, many activities take place here; for example, ferry pier, tourist center, open market full of many kiosks and open-air restaurants. These activities happened without planning or spatial arrangement. The community is facing the rapid-growth of tourism, so mixed use and disorder circulation are automatically increasing. The unique identity of this area might be devalued from economic reason and tourism. For example, mixed use area between *Phutthawat* (wat's ceremonial grounds) and *Sanghawat* (monks' private zone), lacking of accessible control and spatial definition, was observed.
- Some areas have not been developed and restored; and some vacant areas were occupied with trashes or misused. The intrusion of scattered kiosks in waterfront area also caused unpleasant view.

3.2.2 Vernacular Shop-houses at Village 7

Background

Even though a number of household in village 7 is the lowest, but this community is considered as a significant area due to its location next to a ferry pier at Wat Poramaiyikas, the main access for tourist to Koh Kret. In the past, major

career of Thai-Mon residents in the village was based on pottery craft. However, after the economic crisis in 1996, the rapid growth of tourism made many changes in both way of life and physical environment. The way of life bonding to pottery craftwork, has changed to other occupations, for example, trader and employee in capital city. Some residents located in the tourist loop have opened the grocery stores or souvenir shops. The following consequence is, thus, a changing in physical environments, e.g. the abandonment of the pottery kiln and the transformation of vernacular house into a shop-house or a restaurant for tourist.

Such these changes could not be assessed totally as negative impacts since a mechanism of socioeconomic factor is unavoidable in the globalization age. On the other hand, a current concern in tourism impact with positive viewpoint turned to revitalize and reshaped this community to adjust itself in the midst of crisis. The emerging of cultural

existence and modernized development could be considered as meaningful attractions founded in Koh Kret, especially in area of villages 1, 6 and 7.

Physical conditions and problems

In the research “The Study of Vernacular Thai-Mon Houses” by Ornsiri Panin (1999), traditional Thai houses built in Koh Kret 20 years ago, have rarely founded today, particularly in village 7. This could be due to the reason that this area serves as a frontage of Koh Kret facing the outside changes of urban mainland. Houses with timber constructions, low-pitched gable roof tiling with corrugated cement or iron sheet similar to vernacular houses in common rural area, were mostly seen. The configuration of settlement is linear shape along Chao Phraya River. The settlement in this village is separated into a riverside and plantation side by a pedestrian way built in concrete about 1.50-2.00 meter width (Figure 8 and 9).

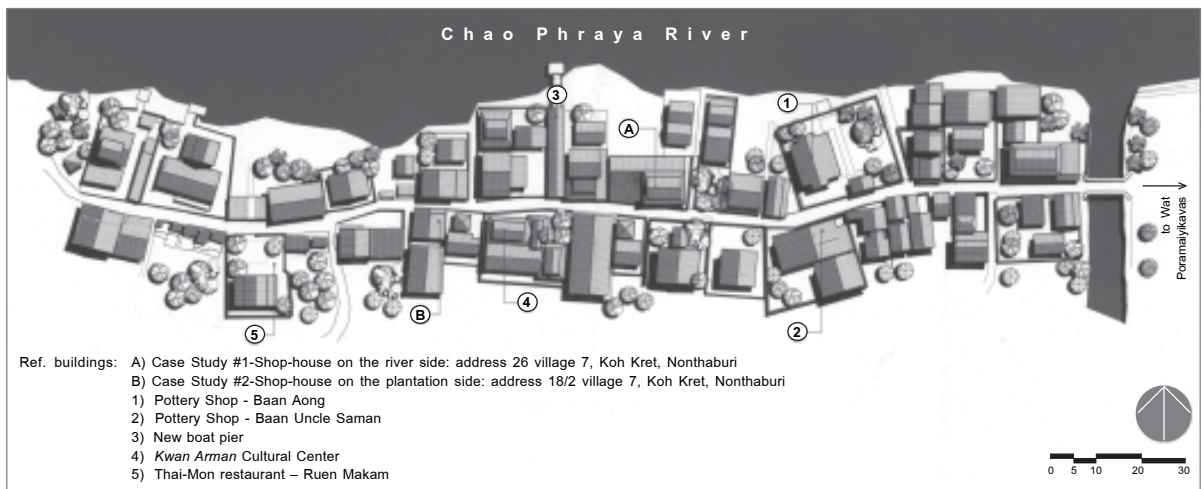


Figure 8. Layout plan of vernacular shop-houses community in village 7, Koh Kret.



Figure 9. Elevation of vernacular shop-houses community in village 7, Koh Kret.

Top row: Houses built on riverside, Bottom row: Houses built on plantation side.

According to this study, two cases of vernacular shop-houses (one case from each side of walkway) were selected to analyze their changes and tendency to be developed and transformed for a commercial purpose. The selection criteria were based on: 1) having recent renovation for a commercial purpose, 2) showing different types of activities and services, 3) having timber as a major construction, and 4) serving as a representative for each side of the settlement in village 7.

Case study #1: Shop-house on the riverside

Address: 26 village 7 Koh Kret, Pak Kret District, Nonthaburi

This case has characteristics of traditional Thai house of the central part of Thailand (Jaijongrak, 1996); timber construction, pilotis with raised floor, prefabricated wooden wall, high-pitched gable roof facing on east-west orientation, and corrugated iron sheet instead of terracotta tile in the past. Another interesting component is a roof bracket which was made of round steel. This characteristic of steel brackets has rarely seen today because they were transformed to be bullet used during the World War II. This building had once renovated in 2003 by restoring some timber columns, adding new fences, adding open-air terrace as a multipurpose area for avoiding flooding problem, and adding a bathroom in reinforced concrete structure attached to the existing building (Figure 10). This house is currently used as a food shop for tourists by occupying a front area and adding raised floor at the back of house to place the tables and seats.

Case study #2: Shop-house on the plantation side

Address: 18/2 village 7 Koh Kret, Pak Kret District, Nonthaburi

This case has a 2-storey timber structure. The owner had changed the previous living area and the front terrace to be a small store for selling incense and aromatic vapor products. The upper floor composed of bedroom, Buddhist meditation room, and stair hall. The balcony on upper floor was left unused and substituted with expanding canopy in order to cover more space below as shop front. This house is also similar to other rural houses; however, it shows the way of life adapting to survive itself in the stream of consumerism.

Problems founded in renovation of the two building cases are as follow:

- Flooding is a major problem for houses on river side.
- The method of renovation is not suitable in terms of space planning, construction, ventilation, view, and material selection.
- The existing infrastructure does not support the changing pattern of living. For example, more sanitary lines as well as septic tanks are required when changing a house to a restaurant.
- The replacing of new owner and mechanism of socioeconomic factors cause the difficulty in building preservation, moreover the lack of knowledge and skill in renovation might effect in negative outcome on architectural preservation.

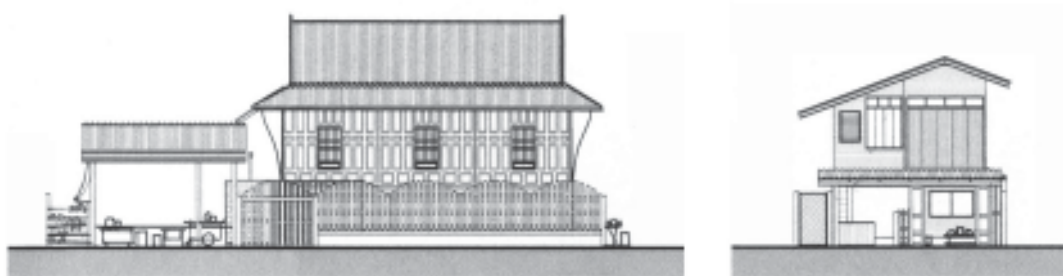


Figure 10. Elevation of vernacular shop-houses case study #1 (left) and case study #2 (right).

- The intrusion of selling stall on pedestrian way causes the problems in circulation, especially on weekend that full of tourists.

3.2.3 Ancient Pottery Kiln at Village 1

Background

Being similar to community in villages 6 and 7, the community in village 1 was Thai-Mon which originally had their settlements along the back of river in order to convey the pottery by boats. According to the field survey, only 2 from total 7 pottery kilns have still been used (see Figure 11

and 12). However, due to changing of the property owners and need for other usage, these kilns will possibly be removed in the future. The area of village 1 has less potential in accessibility for tourists than villages 6 and 7. As mentioned earlier, main access to Koh Kret for tourists is by taking a boat from the pier at village 7. From the pier, most tourists usually have a walk trip to village 6 and walk back for boarding in village 7: instead of walking further to village 1, which is located on the other side of pier (see the location of villages 1, 6 and 7 in Figure 3).

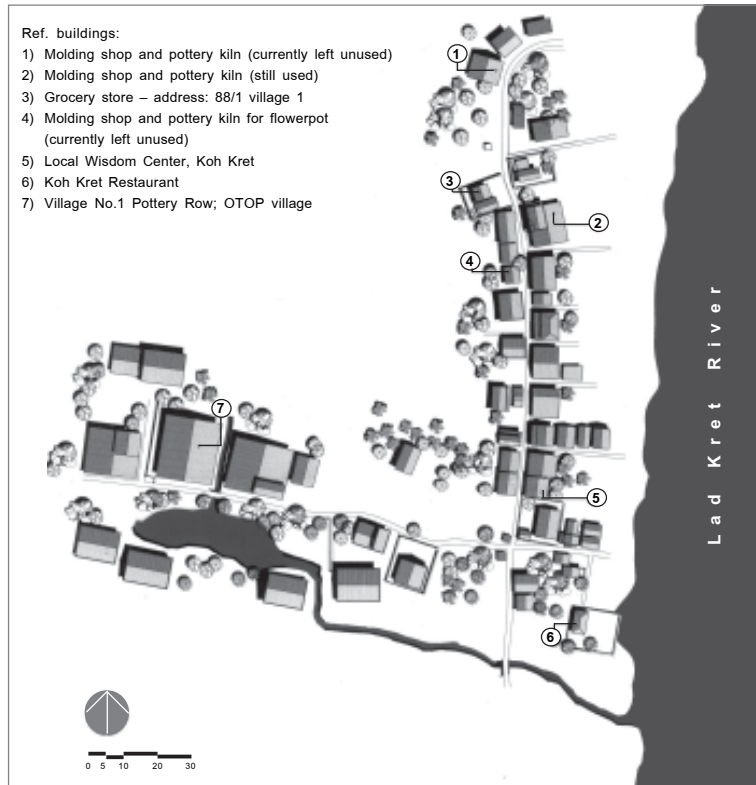


Figure 11. Layout plan of ancient kiln community in village 1, Koh Kret.

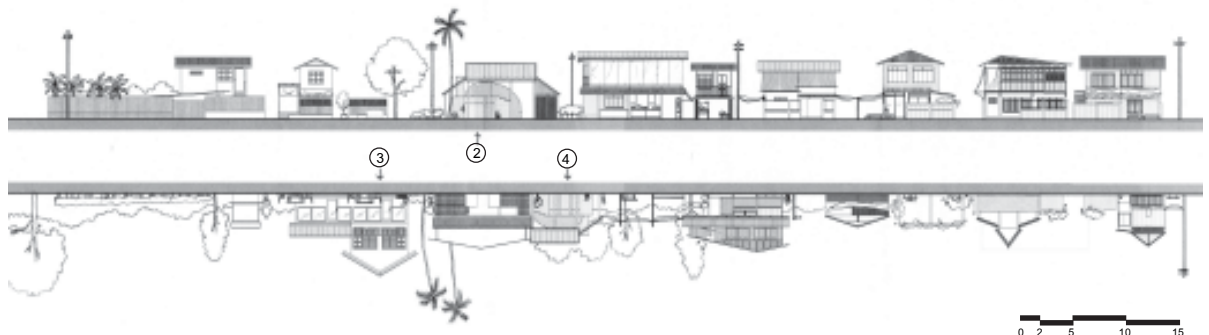


Figure 12. Elevation of ancient kiln community in village 1, Koh Kret.

The settlement of village 1 has a linear shape along a pedestrian way. Two-storey timber houses are commonly seen in this area and some of them are demolished and rebuilt in reinforced concrete construction being similar to a convenience store in urban area.

The most important feature in village 1 is the ancient kiln for pottery craftwork. Due to a changing of socioeconomic factor, most pottery kilns were left unoccupied and not received any restorations. The built features involved with this activity, such as kilns, molding shops, drying lawns, storehouses, and even trading shops, were entirely in original making process. If the process of pottery making has been changed, these features and their environment would be useless and disappeared in the future. Nowadays, we can see some electric kiln usage instead of ancient kiln due to its capacity of temperature control and more convenience. As equal as the other vernacular architecture, the values of these ancient kilns lie in the way of life which related to their traditions and environments. Therefore, to maintain these ancient kilns, the community really needs to continue their usages and activities.

Physical conditions and problems

- The inheritance profession of pottery is likely to be ceased. Some ancient kilns have left unused and turned into a garbage dump of surrounding area. According to interview of an owner of ancient kiln (reference building no.1 in Figure 11), the owner had a plan to demolish the kiln and build a shop-house instead.

- Since the settlement of village 1 has scattered, the tourist loop is not continuous. Some kiln situated on minor sidewalk where is narrow and hard to be accessed for tourists.

- Existence of surrounding seems to be untidy and desolated due to its abandonment. This made the impact of visual pollution in both community and tourist attraction.

From the physical conditions and problems on both macro and micro levels as seen above, the solution plans were proposed in this study. Applying convenience sampling technique and statistical assessment on SPSS, the researcher analyzed questionnaires and interviews with descriptive statistics including percentage, means, and standard deviation to estimate the reliability of proposed solution plans. The community's attitude toward problems and solution related to tourism growth was tested for their content and agreement (range of scales 1-5). The result showed that the community mostly agreed with design solutions and priority ranking of problems on both levels; community planning, and vernacular architecture as shown in Tables 2 and 3, respectively.

4. Conclusion: Design Guideline for Conservation and Development Related to Sustainable Tourism

According to the data analysis of physical environment survey and community's opinion survey, the design guideline for community conservation and development related to sustainable tourism, is divided into two levels.

4.1 Design Guideline for Conservation and Development of Koh Kret Community Planning

The research showed that the approaches for conservation and development of the community planning in Koh Kret, including land use, circulation system, and identity development, were as follow:

1. Expanding the area of tourism spots by implementing a various of transportation networks according to each group of tourist interests:

- To restore *Chedi Mon (Chedi Mutao)* which is recognized as Koh Kret landmark by building a new dam and extending a public waterfront area between *Chedi Mutao* to the ferry pier.

Table 2. The ranking of design solutions on community planning issue from the opinion survey.

Ranking No.	Design Solutions on Community Planning
1	To solve the flooding problem by building the new concrete dam on riverfront area and rearranging the sanitary lines in the proposed main circulation. (M = 4.36, SD = 0.69)
2	To restore the areas which related to the tourism promotion, particularly, the plan to expand the tourist spot from villages 1 and 7 to other villages. (M = 4.21, SD = 0.71)
3	To develop the circulation system in Koh Kret by making the network of water transportation: excavating all existing shallow canals and connecting them to pedestrian ways. (M = 4.10, SD = 0.69)
4	To adjust the traffic system by separating motorcycle lane from an existing pedestrian way in pilot area of villages 1, 6 and 7. (M = 3.82, SD = 0.89)

M – Mean, SD – Standard Deviation

Table 3. The ranking of design solutions on vernacular architecture issue from the opinion survey.

Ranking No.	Design Solutions on Vernacular Architecture
1	To develop the facilities and convenient factors for tourist attractions; such as, garbage can, signpost, tour map, as well as other street furniture, especially in garbage management. (M = 4.45, SD = 0.54)
2	To solve the flooding problem in water-based community, especially in village 7 as the way to preserve the vernacular house; by rebuilding a concrete dam and rearranging the sanitary system along this area. (M = 4.41, SD = 0.49)
3	To link the tourist loop into the scattering area of ancient kilns in village 1 by providing signpost and map. (M = 4.40, SD = 0.67)
4	To maintain the identity of Koh Kret community by reviving the ancient kilns and continuing their usages and activities. (M = 4.38, SD = 0.62)
5	To rearrange existing disordered kiosks and scattered food market in Wat Poramiyikavas in order to create beautiful perspective for both community and tourists. (M = 4.17, SD = 0.70)

M – Mean, SD – Standard Deviation

- To determine three leading areas of attractions; Wat Poramiyikavas, Vernacular Shop houses at village 7, and Ancient Pottery Kiln at village 1, as the exemplary models for conservation and development plan.

- To support other tourist attraction areas and develop the ferry yard at Wat Sanam Nua as the gateway to Koh Kret community.

- To expand more green area in the island by reforming the agricultural career with tourism support.

2. Developing the circulation system of community by actions follow:

- To rejuvenate the canal network by excavating all existing shallow canals and linking each canal line in order to create the alternative “loop system for traveling” inside the island (Figure 13). By this way, the agricultural areas of attractions have opportunities to be connected by the nowadays routine loop and be able to be improved on their economic factors.

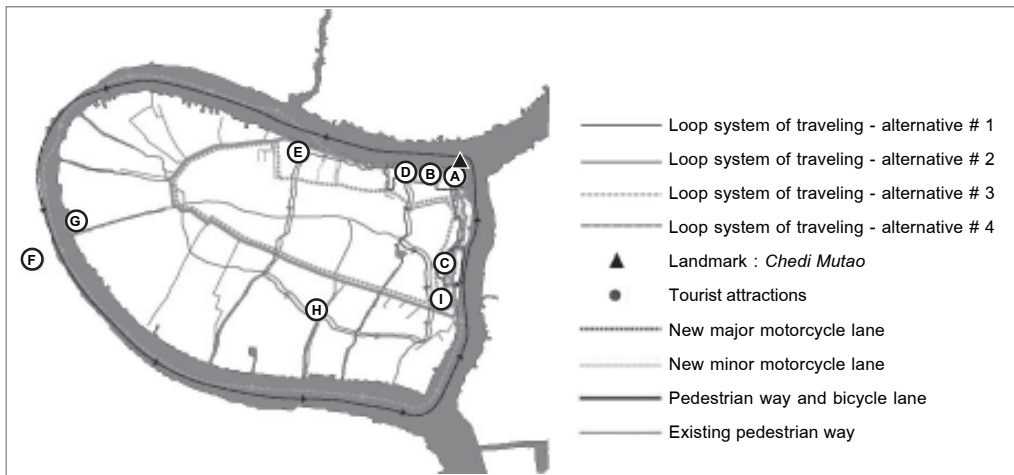


Figure 13. Conceptual Plan for Circulation System Development of Koh Kret Community related to sustainable tourism.

- To separate the traffic line between motorcycle and tourist pedestrian way in three leading areas of attractions.

- To add new nodes as a cultural space for the community, besides act as “magnet” of each village, for example, to create a new public space in ancient kiln at village 1 functioning as a rest area for tourist and also as the cultural space for community themselves. To link the loop of circulation system with each significant node as proposed.

3. Reinforcing the Koh Kret community image by implementing the pilot plans for conservation and development in three leading areas of attractions; Wat Poramaiyikawas area, the vernacular houses/shopping areas in village 7, and the ancient stove area in village 1.

4.2 Design Guideline for Conservation and Development of Koh Kret Vernacular Architecture

The research showed the approaches for conservation and development of the vernacular architecture in Koh Kret as a short term strategy in three leading areas of attractions as follow:

1. Design guideline for conservation and development for Wat Poramaiyikavas:

- To rearrange the kiosk and food stall limited only in the side and the back of Wat Poramaiyikavas, and to link this area to the community of vernacular shop houses at village 7.

- To develop a public waterfront area starting from a ferry pier to Chedi Motao by these following items (Figure 14):

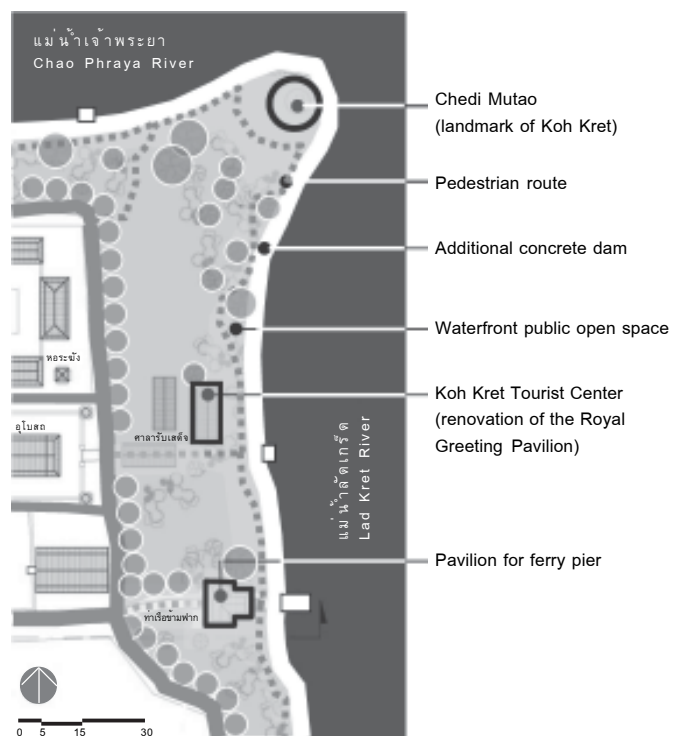


Figure 14. Conceptual plan of public open space at Wat Poramaiyikavas.

- Replacing a vacant area with a green area.

- Building the facilities for tourists such as signs, street furniture, map showing the alternative loop of traveling, drinking fountains, public phones, toilets, and trash cans.

- Reprogramming the unused royal greeting pavilion for a new function such as a tourist center for Koh Kret community due to its efficiency location.

- Restoring the dam along waterfront line.

2. Design guideline for conservation and development for Vernacular Shophouses at village 7

- To restore the dam along waterfront line and develop the drainage system underneath circulation surface, and to replace the pedestrian material from existing plain concrete finish to more natural surface such as terracotta or natural stone so as to characterize the local identity.

- To give the guideline for renovation of shophouses by these following items:

- Using local material and construction technique.

- Controlling the limitation of length canopy to avoid the intrusion of public circulation.

- Controlling the ratio between an open space and a covered area.

3. Design guideline for conservation and development for Ancient Pottery Kiln at village 1

- To revitalize the “cultural open space” of Ancient Pottery Kiln’s village as the community center and at the meantime as new tourist attraction points, since this village has both activity and physical features such as ancient kilns. To revive the ancient kilns is to bring back the cultural identity and the way of life in Koh Kret (Figure 15).

- To promote a campaign for preserving the ancient kilns as one of cultural heritage places by government and also to establish the restriction of ancient kiln renovation for the future adjustment.

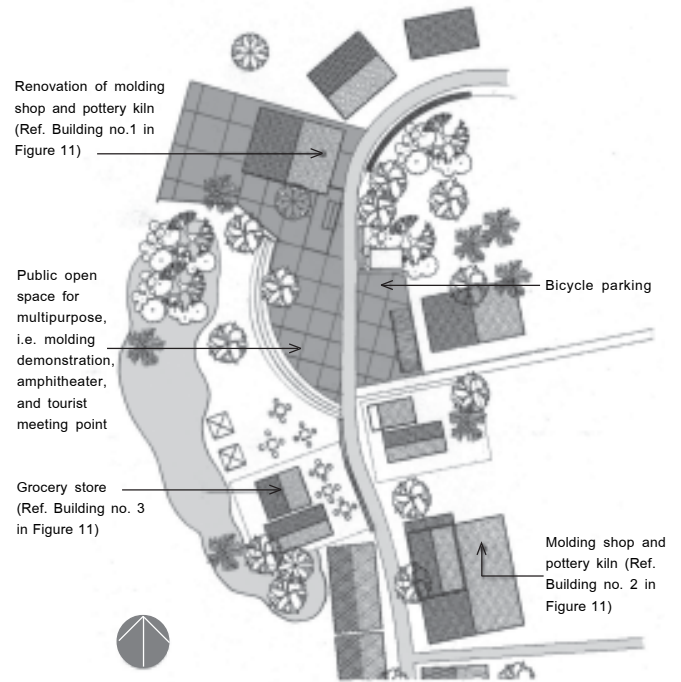


Figure 15. Conceptual plan of “cultural open space” revitalization in the area of Ancient Pottery Kiln at village 1.

The approaches for conservation and development of Koh Kret community environment as shown in this research could be further used to design a policy that can be implemented in practical use for the community. This finding suggested the balance between the vernacular conservation and the community development related to tourism factor in the midst of rapid changes.

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