

## **LAND-USE AND CHANGE IN KHMER SETTLEMENTS : CULTURAL ENVIRONMENT AND THE “ SALT ROAD ”**

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### **The Land Use and Change in Khmer Settlements**

From the 3<sup>th</sup>-15<sup>th</sup> centuries, historical records (Chinese and later stone inscriptions) indicated the existence of ancient Khmer kingdom (namely Funan, Chenla and Kampuchea with its last capital at Angkor that was abandoned in 1431). During the 7<sup>th</sup>-13<sup>th</sup> centuries, its territory has expanded from the present Cambodia to regions of Thailand and Lao. Settlements in Thailand with an emphasis on Khmer settlements were studied by the author under the perspective of land use and change to settlements.

The birth of settlements in Thailand from the Pre-historic Period was based on the spiritual and geographic consideration in the selection of locations. When the Khmer migrated to Thailand, they occupied the predecessors': pre-historic and Mon (Dvaravati/Thavaravadi) settlements, and also established new ones. Settlement plans were followed Hinduism and God-king beliefs. Cities and settlements had plans corresponding to their hierarchy: regional center, sub-regional center, colonized settlement, and “Arokayasala” (hospital-temple) and Bodhisatava believers' settlement. The symbolized “Sumeru” Mountain (the center of the universe in Hindu cosmology) was designated in regions, sub-regions, and communities. These settlements had mainly geometrical plans with indigenous cultural landscapes of unique water management system; a large pond called “baray” was constructed with network of canals to feed rice fields. Satellite imageries and aerial photographs along with field surveys were used to identify historical land use patterns and changes in Khmer settlements.

Networks of roads linking Angkor, the capital, to every cities and settlements expanded Khmer vast civilization. The greatness of Khmer civilization represented in settlement plans demonstrates the indigenous knowledge in water and land management of which sustained its power and prosperity for centuries. But from the 14<sup>th</sup> century, the decline of Khmer civilization subsided its power from colonized areas due to wars with neighbors namely the Cham kingdom in Southern Vietnam and the newly

flourishing kingdom of Ayutthaya in Thailand. Changes have been occurred to Khmer settlements and their historical environment and landscapes from new cultural migration after the declined Khmer Empire since the 15<sup>th</sup> century. This has made new layers of civilizations over the Khmer-based settlements until today.

### **Spiritual Power Linking with City Forms: Theories of City Forms**

Spiritual power corresponding to city plans is an important issue to be pointed out : whether it exists or was declined. System strength responsive to citizens' mental and physical health is related. Special attention was paid to settlements in northeastern Thailand, to learn about their spiritual power in relation to theories of city forms.

It was found that most historical based settlements in northeastern Thailand have underlined their site selection with spiritual power (Sutthitham 2001). Site selection from physical perspectives is simple to perceive, but from spiritual perspective it was historically the most important criteria for site selection in Asian cities. It was a subject for the ruler and city builder to learn. One can link himself to the universal spiritual power through means: rites and medium. Diversity of settlement patterns were the result from levels of inter-relationship between the natural power and human power at the town/city locations. By considering different level of inter-relationship between powers, I would like to classify 4 theoretical types of city forms. Examples were addressed from cases in Asia and mainly from Thailand.

#### **1 Symbolic or Normatic theory**

It is best known from Chinese and Indian beliefs that circle means heaven and rectangular means earth. A books about ideal cities called “Manasara Silpasastra” was mentioned auspicious forms of cities; such as *patama* or lotus (octagonal plan), *swastika* (buildings are planned perpendicular to each axial), *dandaka* (grid plan) and

nantavarata (central plan) which were able to create "mandala" for city residents. Mandala means sacred area identified by created form. In China location of city facing the water at the foothill was an example of ideal locations. In Thailand, ideal cities followed Indian cosmology. Forms linking to sacredness such as conch: a auspicious vessel of Vishnu god and *sema* (Buddhist marking stone) were also used for city forms during the 8<sup>th</sup>-11<sup>th</sup> centuries (in India the conch shape was noted to be used since 100 BC).

City planning upon this theory tried to draw the universal power into it. Examples are the prehistoric-Mon (200 BC-11<sup>th</sup>) and Khmer (8<sup>th</sup>-13<sup>th</sup>) settlements in Lao, Thailand and Cambodia. To create a mandala, ancient Khmer communities imitated the Hindu cosmology by erecting a temple in the middle of the city to represent Mount Sumeru. The city area then was inside the sacred mandala. The city plan was usually square or rectangular with a baray (reservoir) dug out to represent the ocean around Mount Sumeru. This reservoir helped to solve the problem of water shortage during the dry season.

This theory is the concept of drawing universal energy or power into their city by creating the mandala. City created by this theory formed its sacred space in which linked its physical plan to the universal power. Later, the city was deformed by the following theories. Thus, level of sacred power is expected a declination as the mandala was interrupted or deformed.

## 2 Adaptive theory

Although a symbolic or normative theory was underlined the origin of cultural city. When ideal transfers to location, different constraints created more adaptive city plan. In the high plateau of the sandy northeastern Thai region, cities must be able to collect water during the dry season and divert water away or protect their cities from flood during the heavy monsoon season. In the mountainous area of the northern region, cities are located in the narrow valleys at the foothills, networks of dams and canals were laid out to collect and slow down the running water while provide an irrigation system to farmland. Emerging diversities of city forms are resulted from this theory.

The Tai is the latest cultural tribe migrated to Thailand from the southern China, northern Vietnam and Lao to Thailand since the 13<sup>th</sup> century. Starting from the northern region they migrated to dissolve with local tribes and became present Thai people. They are known for their highland irrigation system in building a small dam at the mountainous elbow and irrigation canal network to their rice fields. When they migrated to the floodplain they live along the rivers in the middle region or by the natural ponds in the

northeastern region.

## 3 Economical theory

Industrialized cities emerged during the past century have paid most attention to the function of roads which aim to transport goods. Time and distance are major factors in laying out city plans. Although Pierre-Charles L'Enfant remarked that diagonal line reduced the boring from industrialized grid city (Rykwert 1989:25). City using this theory neglects the natural power and many cases in Thailand; roads were blocking waterways, the sacred green areas were destroyed, land is exploited with chemicals, rivers and streams are used for sewage. When trees are cut down, the salinity that has been suppressed by them are dispersed throughout the northeastern region of Thailand. As cultural cities were built using either or two previous theories, they are now deformed by the economical theory.

## 4 Decisive or Alternative theory

Sometime rulers by the advice of spiritual media or presently city planners have formed city plans. Fortified cities in star shapes accommodating the canon war during the 18-19 th century were examples. City beautification approach is considered another example of decisive theory. This theory can make use of the three prior theories. As a city planner is a more established profession, more decisive city forms can be emerged. One may explore the integration of previous theories, especially the symbolic and adaptive theories to call upon spiritual power in uplifting mental and physical strength of city inhabitants along with one's own initiative.

## Southeast Asian Cultural Corridor: " The Salt Road "

Cities and communities various in size according to hierarchic status are linked to each other by roads and waterways. The establishment of Khmer settlements at new locations and over the previous ones might have had other underlying reasons than just to demonstrate the great power of Khmer king or the expansion of Hindu belief.

Like the western colonization seek for resources and prosperity to serve its mothers' land, it might not be different from Khmer colonization of Thailand and Lao in the past. What was then the main resource for the Khmer to expand its territory?

Salt is probably the cheapest food seasoning, but it was the valuable good and necessity to human culture. Plentiful fish and meat, fruits and vegetables in tropical climate cannot be preserved without it. This simple gravel has made

value added to raw produces in prolonging their lives to help human survival through dry season as well as enrich human culture from their varieties of tastes and methods of fermentation. Salt could even then create civilization in the following Khmer case.

The northeastern region of Thailand has known for its uplifting plateau where thick beds of rock salt found in the vast middle part of the region. Approximately 50-1,000 meter below the surface, salt layers were identified at the thickness of 20-134 meters. However over 1,000 meters of lower salt layer was encountered in drilled hole (Supajanya et.al.1992:89). Salinity rises to the ground surface when water table is low during the dry season (March-May). It is the time for local salt production in which nowadays has been gradually diminished due to the competitiveness of modern manufacturing methods. Water will be injected into drill holes to dissolve salt, in which is pumped, dried and packed to sell throughout the country and the world under the name like "Prungtip- divined cooking seasoning". There are 2 types of salt produced: marine salt and rock salt. Thailand is the major exporter of rock salt in Southeast Asia. It has a better quality in food preservation to marine salt in terms of smell and belief in traditional food processing techniques. It is inferior to marine salt for it lacks of iodine, but modern manufacturer has added it on.

Salt production sites have been found throughout the northeastern Thailand more than 2,500 years ago along with prehistoric human settlements of the late Neolithic and early Bronze ages in Southeast Asia. Around the 6th century, Mon (Dvaravati/Tavaravadi) settlements were flourished. It adopted Theravada Buddhism and traded with India. Pottery related to fermented foods was founded extensively to most settlements. The northeastern and middle regions of Thailand were the cradle of Dvaravati culture until the areas were occupied by the Khmer from Cambodia probably since the 7th or 8th century.

Unknown to the world, the main reason for the Khmer territorial kingdom's expansion to northeastern Thailand might have been for salt. My research reveals the evidence of the ancient "salt road" in Southeast Asia. Road network extended from Cambodia to Thailand and Lao linking cities and settlements with different hierarchic status. A main road approximately 230 kilometers long mentioned by the 13th inscription as one of the three Khmer highways, linked Angkor to Phimai. I would like to name it the "salt road". Phimai was at the center of the ancient salt land before the Khmer occupation. The establishment of Phimai as the Khmer center in the northeastern Thailand could then be easily controlled over salt production and exported it to Angkor, the Khmer capital.

Settlements along the Phimai-Angkor road and its minor road network were established with stone and brick monuments to bear Khmer occupation. Pottery manufacturing or extensive kiln sites (produced for liquor and fermented fish) were found, especially in Thailand near Cambodia border. Presently, the road between Angkor-Phimai is under an economical study to link Thailand with Cambodia for tourism of Khmer monuments, but has not yet recognized its importance as an "ancient salt road". The half of this road from Thai border to Angkor is still highly gravel and takes about 6 hours to travel.

### **Eco-Cultural Systems and "Eco-Cultural Planning" for Historical Conservation**

Most historically based communities have developed their cultural, ecological systems to make their communities function for hundreds of years. Systems such as reservoir, moat, drainage, flood protection and land use were studied. In Thailand, multiple layers of civilizations left patterns on urban/settlement plans. About 2,500-900 years ago, prehistoric-Mon (Dvaravati/Thavaravadi) settlements in the flood plain were commonly encircled their communities by rings of moats to protect them from flood, while water were collected to use during the dry season. During the 1,300-900 years ago, the Khmer settlement learnt to construct a rectangular pond to collect water diverted from a nearby natural stream. The Khmer learnt the make use of topography for their benefit. Rice fields were patterned in grid corresponding to network of canals.

Changes in historical settlements have been incremental and accelerated during the last century due to modern development e.g. modern city planning, irrigation system and farming. Conservation planning of Khmer heritage is coped not only the preservation of buildings and artifacts but the whole cultural environmental system of each settlement that is linking to each other through road networks along with historical landscapes woven together to make the whole region once the greatest empire of Southeast Asia. To conserve Southeast Asian historical settlements, one has to learnt about their births, plans, hierarchies, networks which includes the "salt road" in its cultural corridor context, and the most importantly their cultural environment that is composed of what I call "eco-cultural" resources. Eco-cultural (EC) resources are identified as nature-based cultural resources or natural elements (e.g. land, water and forest) that have been altered by cultural activities. EC systems such as reservoir, moat, drainage, flood protection and land use are subjects for study.

When modern development came, those systems that have been look down and neglected are re-evaluated. The study of human settlements in the northeastern region of Thailand reveals that EC resources contribute to the self-reliance and sustainability of communities (Sutthitham 2001). EC resources offer water, food, firewood, herb medicine, and materials to meet basic human needs. Farmland has provided and sustained its production for centuries under indigenous practices. Failure to maintain EC resources by the disruption of their systems from the lack of maintenance and recent modern development reduces production or creates difficulties in rural areas and degrades city environment. The “modern” development approach has proven incapable of managing farmland to provide food in a nature-friendly way. The supply of local materials is also depleted or indispensable.

In Thai, main water resources: the river called “mae-nam (mother water)” and the land called “mae-toranee (mother earth)”, express the respect of people to environmental elements. Spiritual ceremonies are communally performed related to “mothers” every year. Individual also gives offering to spirit as often as one wants. To retain the spiritual power and strength, those environment elements linking to spiritual power must be retained by appropriate rules set by communities.

Many countries are now considering a sustainable development paradigm. In response to its concept, this paper proposes a strategic planning called “Eco- Cultural Planning or ECP ” to conservation of cultural heritage in both urban and rural areas. It could revive the fertility of resources along with cultural and natural spirit.

The ECP is an alternative approach to modern development. It emphasizes the conservation of EC system integrity, community-based resource management, and integrated development planning. The revitalization of EC resources under the ECP approach is expected to recall and improve the quality and integrity of the ecosystems, landscapes, and historical and cultural values of communities. To achieve this ECP, four planning challenges have to be fulfilled: legal recognition of EC resources, acquisition of better knowledge, incorporation of community-based resource management, and coordination between resource intervention parties. In human settlements, three related constituents can be classified: physical constituent (e.g. buildings, infrastructure, farmlands, water resources), ecological constituent (e.g. landscape system, ecological system of physical components, human geographical system), and cultural constituent (e.g. traditional practices, beliefs, traditional knowledge). As three constituents are linked, the omission one or another

can make adverse effects to the rest.

## **Conclusion**

Except colonized settlements, Khmer cities followed the ideal Hindu and God-King beliefs to make mainly geometrical plans to incorporate with their indigenous cultural landscapes of unique water management system. Networks of roads linking Angkor, the capital, to every cities and settlements expanded Khmer vast civilization. The main reason for the Khmer territorial expansion to northeastern Thailand might have been for salt. The research reveals the evidence of the ancient “salt road” in Southeast Asia. Changes in Khmer colonies occurred when new cultural migration diffused in the areas after the declined of the Khmer empire from the 15<sup>th</sup> century.

The birth of Southeast Asian settlements demonstrated the link of spiritual power with geographical consideration in the selection of locations. Diversity of settlement patterns were the result from levels of inter-relationship between the natural power and human power. Four theories are classified to explained types of city forms: 1) Symbolic or Normatic, 2) Adaptive, 3) Economical and 4) Decisive or Alternative.

To conserve Southeast Asian historical settlements, one has to learn about their births, plans, hierarchies, networks which includes the “salt road”, and the most importantly the historical, cultural environment that is composed of “eco-cultural” resources. Eco-cultural (EC) resources are identified as nature-based cultural resources. An ECP (Eco-Cultural Planning) approach is proposed for the conservation of monuments along with their cultural environment and landscapes under the sustainable development paradigm.

### Abstract

### References

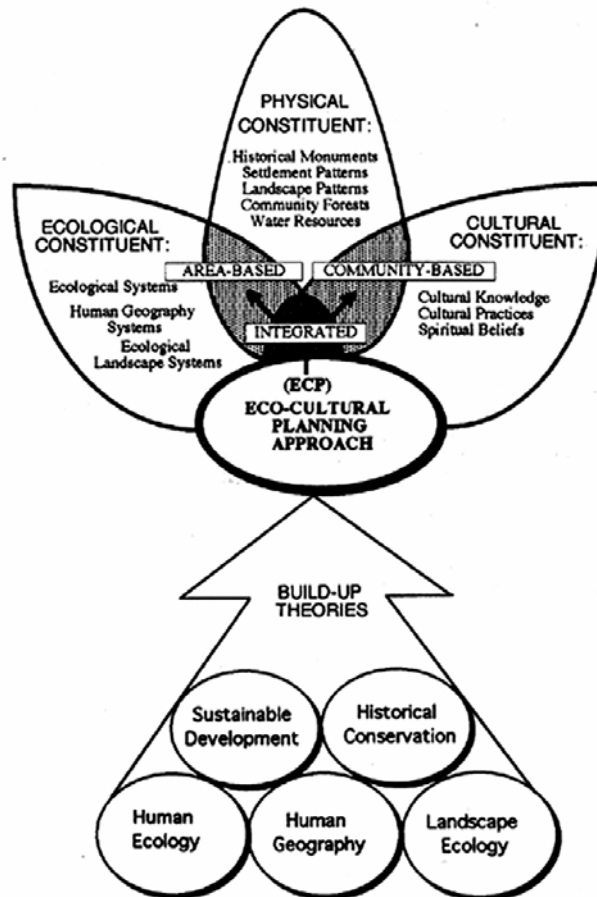
Spiritual and geographical consideration giving birth to Southeast Asian settlements was studied. The incremental and decisive changes from modern development in the 20<sup>th</sup> century have altered historical plans obviously. Among Southeast Asian cultures, Khmer civilization was the most glorious and occupied almost Southeast Asian continent during the 5<sup>th</sup>-13<sup>th</sup> centuries. Road network extended from Cambodia to Thailand and Lao. Satellite imageries and aerial photographs along with field surveys were used to identify land uses and changes to Khmer settlements. The main road approximately 230 kilometers, linking Angkor to Phimai was indicated and named “salt road”. Phimai was the upland and ancient salt manufacturing center. Settlements along the roads were cities with stone and brick monuments and pottery manufacturing sites (produced for liquor and fermented fish). Geometrical city plans and their cultural landscapes with unique water management system were revealed. These cultural environment and landscapes have not either been preserved along with monuments or conserved in their significant cultural corridor context. As the result, an ECP (Eco-Cultural Planning) approach is also proposed for the conservation of monuments along with their cultural environment and landscapes under the sustainable development paradigm.

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**Fig.1** A lotus form, the Buddhist religious flower, symbolizes the “Eco-Cultural (ECP)” approach for historical conservation in both urban and rural areas, especially for Thailand.