

# Ceramic Kiln Sites in the Songkhram River Basin

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## Introduction

An initial survey leading to the discovery of ceramic kiln sites in the Songkhram River basin in Northeast Thailand was made by Assistant Professor Samruad Inban of the Faculty of Engineering, Khon Kaen University, in the course of a research program titled “Survey of Ceramic Technology in the Northeast” (1989). That survey located seventeen ancient kilns in an area called Nong Kud Ngong (Kud Ngong swamp), near the village of Ban Dong San, Na Hee subdistrict, Akat Amnuay district, Sakon Nakhon province (Samruad 1989).

Subsequently, Assistant Professor Surat Warangrat, head of the Culture Center at Sakon Nakhon Teachers’ College (now Rajabhat Institute), Sakon Nakhon province, and Professor Nirasai Hinsaw of the Thai Yoi Culture Center located in Akat Amnuay Secondary School, Akat Amnuay district, Sakon Nakhon province, carried out a survey of a kiln group near Ban Tha Rae village, Phon Ngam subdistrict, Akat Amnuay district. They preserved a number of ceramic wares from the Songkhram River basin kiln sites that had been donated by villagers.

Between 1991 and 1994, the Technical Group in the Archaeology Division of the Fine Arts Department, Thailand, surveyed the sites of ancient kilns in the Songkhram River basin. The team excavated one kiln located on the banks of the Songkhram River near Ban Tha Rae and published an official report on the results along with a survey of unearthened ceramics (Rakchonok 1993).

In 1995, a research team led by Associate Professor Srisakra Vallibhotama was formed to study the archaeological, artistic, and cultural impacts on the Songkhram River area. It conducted a further detailed survey of this group of kilns, located additional kilns, and conducted a preliminary analysis as discussed below.

## General Characteristics of the Songkhram River

The Songkhram River encompasses a diverse topography throughout its 420-kilometer length. The winding course of the lower portion of the river results from its traversal of a flood plain before it empties into the Mekong River. The banks of the river lie largely at a level below the river’s flood stage. As a result, widespread flooding occurs almost every year during the rainy season.

The soil in the Songkhram River region developed from original alluvial sediment deposits arising from sedimentary rock belonging to the Khorat rock group, which has a sandstone or powdery sandstone body. In some places one type of rock bears salt accretions. As a result, sediments with various characteristics that arose from the deterioration and disintegration of surface source rock in the Songkhram River area are clearly sediment of the sandstone and powdery sandstone type (Department of Energy Development and Promotion 1992). Soils with these characteristics are particularly suitable for use in the production of ceramics.

## The Songkhram River basin kiln sites

Kilns in the Songkhram River basin were typically excavated into the riverbank, with the firebox facing the river. Over time the rise and fall of the water level in the river eroded the groups of kilns so that all that remain is the framework of the earthen walls. In many cases, virtually nothing more than traces remain to be seen of the floor and roof of the kiln.

Most kilns were identified by the surveyors because the riverbank had eroded to the point where the kiln outlines could be seen. As a result of the same process, the kilns themselves were also eroded. Villagers living in the vicinity of some of the kiln sites reported that remains of these pottery kilns had been seen clearly only in the last few years because of erosion of the riverbank during the period when the river floods.

Surveys to date have recorded ceramics kiln groupings scattered along both banks of the Songkhram River for more than 90 kilometers. They are located between geographic coordinates 103°59' E, 17°46'8" N to 104°17'17" E, 17°40'17" N. At some sites, few kilns remain; at other sites, large numbers remain. Details of the various sites follow.

1. The Nong Kud Ngong kiln group, near Ban Dong San village, Na Hee subdistrict, Akat Amnuay district, Sakon Nakhon province

Seventeen ceramics kilns have been identified near the area called Nong Kud Ngong, about 2.5 kilometers from Ban Dong San village.

The kilns were dug deep into the riverbank, and their fireboxes faced the river. The kilns were covered with an arched roof (similar to that of the plaited roof of a river boat). The kiln floor was paved with river gravel, which has attached itself to the sand floor. This group of kilns has fallen into ruin owing to erosion of the riverbank. As far as can be determined from the intact rear portions of the kilns, they were approximately 2.5 meters wide.

The ceramic sherds encountered at the sites are stoneware fired to a high temperature. They are mainly jars with tall necks. They were shaped using a potter's wheel and glazed using iron sediments that yielded a brown color. Unglazed wares have also been found at the sites. Decorative designs include lines incised with a wooden comb and appliquéd designs molded in the form of coils or pairs of nonfunctional ears. Relief designs take the form of ridges running around the shoulder.

In addition, the survey conducted by Samruad revealed that ceramics with forms and production technology that relate them to these kilns are distributed throughout the provinces of Sakon Nakhon, Nong Khai, Nakhon Phanom, Udorn Thani, Roi Et, Mahasarakham, Yasothon, and Ubon Ratchathani (Samruad 1989). This observation can assist in defining the limits of distribution and dissemination of the wares from the Songkhram River basin kiln sites.

2. The Ban Tha Rae village kiln group, Phon Ngam subdistrict, Akat Amnuay district, Sakon Nakhon province

Surveys located eleven kilns dug into the riverbank near Ban Tha Rae. They are now in such a deteriorated condition that it is difficult to determine their shape, except for the kiln floor. The walls and roofs are broken and scattered.

The Fine Arts Department archaeologists conducted a test excavation to study the structure of one kiln in this area. It was found that the kiln had an arched roof and a firebox facing the river. Its approximate size was five meters long and 2.5 meters wide. The walls of the kiln were made of hard-fired clay and were about ten centimeters thick. The floor of the kiln was solid and composed of river gravel mixed with sand.

Ceramic sherds found at the site include unglazed gray stoneware, brown-glazed stoneware, and earthenware pottery with an orange body (Rakchonok 1993).

The vessel shapes include large jars with tall necks, water jars, dishes, and bowls. Decoration include designs incised with a wooden comb, appliquéd and modeled decoration, and raised ridges running around the shoulder.

3. A group of kilns on the riverbank opposite Ban Tha Rae near Ban Na Thom village, Na Thom subdistrict, Ban Phaeng district, Nakhon Phanom province

The kilns are found both on the riverbank itself and about fifty meters back from the bank. They appear as large earthen mounds covered with vegetation. Two chimneys are located at the top of one mound. This site very likely contains two kilns in good condition. The earthen mound has not yet been damaged because it is located far from the riverbank and is thus not subject to erosion.

4. The Dong Tau Hai (“jar kiln thicket”) kiln group, Na Thom subdistrict, Ban Phaeng district, Nakhon Phanom province

Local villagers call these large and small earthen mounds Dong Tau Hai (“jar kiln thicket”). Located on the riverbank, the mounds are covered by weeds and clumps of bamboo. Very few sherds are found in the area of the earth mounds themselves, but more sherds are encountered in an area further away. These kilns are located not far from the Nong Aw kiln group.

5. The Nong Aw kiln group, near Ban Tha Phan Hong village, Na Thom subdistrict, Ban Phaeng district, Nakhon Phanom province

Traces of a group of twenty-eight kilns are found scattered along the riverbank. They had arched roofs and were dug deep into the bank. Although they have been destroyed by erosion, clear outlines of the shapes of the kilns remain. It was found that rectangular blocks of laterite were placed to both sides of the kiln mouth as if both to form a channel within which the fire could be stoked and to block the heat. The floor of the kiln slopes only slightly. The upper portion of the kiln wall has been so eroded that the shape of the firing chamber appears to be round, creating uncertainty as to how the kilns at the different sites varied in shape.

This area of the riverbank has been so eroded that it has the appearance of a cliff face. There is no shoreline. Local villagers report that they discovered this group of kilns only a few years ago, which suggests that the site was uncovered during the steady erosion of the banks by the river currents.

Most of the sherds found are large. Small sherds have not been found. It appears that the ceramic wares produced at this site were primarily jars with long necks. The sherds are of unglazed and brown-glazed, gray-bodied stoneware and earthenware. Design motifs are the same as those found on wares from other sites.

In addition, clay wedges of various sizes have been found. It is speculated that these were used as supports (“*kee*”) to prop vessels in the kiln so that they would not tilt on the inclined floor during firing.

6. The Bung Eesaw kiln group, near Ban Tha Phan Hong village, Na Thom subdistrict, Ban Phaeng district, Nakhon Phanom province

This group of kilns was found during the construction of an access ramp for trucks to drive down to the river’s edge. As a result of construction, four kilns were plowed up, so that only portions of the outline of the floors and walls remain.

Sherds encountered at this site include a type of gray stoneware, both unglazed and brown glazed, and earthenware.

7. The Pak Sang kiln group, beyond the mouth of the Huay Hee stream, almost at the mouth of the Huay Sang stream, Sang subdistrict, Sekaw district, Nong Khai province

In the Fine Arts Department Archaeology Division report, this group is called the Huay Hee kiln group (Rakchonok 1993). More correctly it should be the Pak Sang (“mouth [of the Huay] Sang [stream]”) kiln group, because no kilns are located at the mouth of the Huay Hee stream. In fact, the structures are closer to the mouth of the Huay Sang stream.

Evidence of a group of thirteen kilns has been found at this site. Because water eroded the riverbank until it collapsed, the outlines of the kilns are visible. In some places kilns have been almost completely destroyed, leaving only pieces of the walls gathered on the bottom of the stream. Sherds encountered at this site include a type

of gray stoneware, both unglazed and brown glazed, and earthenware vessels (Rakchonok 1993).

8. The Pak Bo Khuan kiln group, near Ban Na Wai and Ban Dong Siew villages, Tha Kon subdistrict, Akat Amnuay district, Sakon Nakhon province

This kiln group is located at the point where a tributary stream feeds into the Songkhram River, a distance of five kilometers from Ban Tha Phan Hong village. The site has the appearance of an island, since it is enclosed by streams. Extensive fields of pineapple are planted on the large hills surrounding the site. In general, most of the area has already been plowed. The local villagers report that groups of kilns were located along the banks of the river, but no traces remain. Those kilns that have not been destroyed continue to survive because they are located on a small hill that prevents cultivation.

There are outlines of a group of sixteen kilns in badly deteriorated condition. The collapsed walls of the kilns are scattered along the riverbed. The kilns have the same arched form found in other kiln sites.

Ceramic wares found at this site are, for the most part, large stoneware vessels, both brown glazed and unglazed. Black firing scars are found on the sherds and throughout the bodies of the kilns. Kiln stacking supports (“*keel*”) of various sizes have also been encountered.

9. The Ban Had Phaeng village kiln group, located in the Khum Khao area, Had Phaeng subdistrict, Si Songkhram district, Nakhon Phanom province

This kiln group is located quite far from the other kiln sites already described. It runs beyond Si Songkhram district town all the way to Ban Had Phaeng. The kilns that have been discovered are located in the area called Khum Khao, a place on the banks of the Songkhram River considered sacred by the villagers.

Few traces of the kilns remain. They are characteristically so covered with vines and tree roots that one can hardly discern their outlines. Surveys to date have located only two kilns. It is likely that more would be discovered if the entire area of the riverbank were surveyed. Artifacts include fragments of the kiln floor, blocks of laterite, parts of the kiln walls, and sherds of both glazed and unglazed stoneware vessels. The appearance of these kilns is likely to have been similar to those already surveyed.

With respect to the group of kilns near the monastery called Wat Dong Jaujan (Rakchonok 1993), despite conferring with villagers and conducting a new survey of the riverbank area, no ceramics kilns or sherds of any type were found. The only artifacts were some circular charcoal kilns that had been abandoned on the old riverbank a long time ago.

Nevertheless, monks of Wat Dong Jaujan managed to collect a number of large ceramic sherds and vessels, both glazed and unglazed, from along the edge of the riverbank. It is possible, therefore, that ceramics kilns did exist in the nearby area but have not yet been located by surveys.

## Discussion

No fewer than ninety kilns have been located in the Songkhram River basin to date. Surveys have encountered kilns from the vicinity of Ban Had Phaeng village, Si Songkhram district, Nakhon Phanom province, all the way to Ban Na Wai village, Akat Amnuay district, Sakon Nakhon province—a distance of about ninety kilometers along the winding river. The kilns can be grouped into several large clusters. The Nong Kud Ngong, Ban Tha Rae village, Nong Aw, and Pak Sang groups lie near one another. The Pak Baw Khuan group is situated about five kilometers from the course of the river. Finally, the Ban Had Phaeng village group lies closest to the mouth of the Songkhram River.

To the extent that surveys have identified them so far, kilns located on both banks of the river were found because they had been dug into the riverbank. When subjected to erosion, the remains of the kilns that had collapsed and fallen into the river became visible. Thus, it is possible that there may be additional groups of kilns along the riverbanks that have not yet been revealed as a result of erosion by river currents and remain covered by weeds. Furthermore, it is possible that there may be several places where as-yet-undiscovered kilns lie far from inhabited areas. (The banks of the Songkhram River are not densely populated.) It is also thought likely that more groups of ceramics kilns lie scattered along the banks of the Songkhram River that have not yet been surveyed.

The production of ceramics at the various kiln sites of the Songkhram River basin appears consistent. That is, the basic products of the kilns were large ceramic vessels with stoneware bodies, such as jars in various shapes. They employed relatively few decorative motifs, and they used brown glaze that showed somewhat different colorations at the different kiln sites.

The production of earthenware ceramics is likely to have resulted from the placement of wares in locations within the kiln far from the heat source during firing. It is less likely that the production of earthenware was the sole objective of a firing and more likely that the differences in temperature during a single firing created ceramic products with bodies of different hardnesses. This technique can be seen from the fact that the quantity of earthenware vessels is very limited compared to the number of stoneware ceramics.

## Ceramic shapes from Songkhram River basin kiln sites

Study and comparison of the characteristics of the ceramic wares preserved at the Thai Yoi Culture Center, Akat Amnuay School, and of samples of ceramic sherds collected from the kiln sites show that the wares have the following characteristic shapes (Khajiphan 1994).

1. Jars. These are large vessels with a tall shape. The neck is quite narrow. The body swells out, then tapers to a narrow base. There is no foot ring. Shapes include both short- and long-necked wares. Mouth rims include those with a diameter narrower than the vessel diameter and those roughly equivalent in diameter to the vessel. Bodies of the wares are both brown glazed and unglazed. The gray body has decoration on the shoulder in the form of pairs of false ears or what are called *jib bae* (appliquéd designs) such as coils and other motifs, along with other techniques.

2. Jars with double concentric mouth rims. As discovered so far, these are unglazed stoneware vessels. They are found in small numbers as compared to other types of jars.
3. Bowls and dishes. The mouth rims of these types of ceramics include both everted and inverted shapes. There are both glazed and unglazed varieties. The glazed types include both those glazed on only one side and those glazed both inside and out. The approximate sizes of these wares are as follows:

Dishes: rim diameter of 20–21 centimeters and base diameter of 10 centimeters

Bowls: rim diameter of 10 centimeters and base diameter of 7 centimeters

4. Small pots. The bodies of the medium-sized globular pots are fat and bulging. The neck is narrow. The base is trimmed. The mouth is slightly everted. This type of ceramic is likely to have an unglazed and undecorated stoneware body.

The primary products of the Songkhram River basin ceramics kilns are jars with an elongated neck (or what in some places are called “trumpet-mouthed jars”). The stoneware bodies are very hard. Large vessels are numerous. At some sites, no small vessels were encountered at all, with the exception of the Ban Tha Rae kiln group, where small pots, dishes, and bowls have been found.

The most distinctive vessels of the Songkhram River basin ceramics are the large jars with very hard stoneware bodies, made in both brown glazed and unglazed versions. The clay body is gray in color, and most of the wares encountered are jars with elongated necks. Other types of ceramics represented a secondary body of production.

## Surface decoration and design motifs

1. Decorating the surface of ceramic wares by glazing. Only one glaze color is encountered on Songkhram River basin ceramics—i.e., brown. There are variations in glaze tints among the various kiln sites, such as light brown, dark or burnt brown, reddish brown, and greenish brown. The use of brown glaze is likely due both to the ready availability of iron-oxide compounds and to the fact that the technology and procedures for glazing are not particularly difficult or complicated. This glaze is especially appropriate for use with large ceramic vessels.

Glazing of jars was usually limited to the outside, reaching only to the inside of the mouth rim. The glaze ran in dribbles and did not adhere well to the surface of the vessel. Dishes were glazed on the inside surface only.

2. Embellishment of the vessel’s surface using decorative designs involved several techniques:
  - Use of a comb-shaped instrument to incise or scratch parallel straight or wavy lines, found on the shoulder and torso of jar-shaped vessels
  - Raised ridges formed around the shoulders and torsos of jars and small pots
  - Use of modeled decoration applied onto the vessels. One of the outstanding

characteristics of ceramic wares from the Songkhram River basin kiln sites is their modeled decoration, both in the shape of a coil or a recumbent letter “S” appliquéd onto the shoulder and in the form of “false ears”—modeled and appliquéd forms that have the appearance of being tiny ears used for decoration.

## **Characteristics of the clay bodies of wares from Songkhram River basin kiln sites**

Analysis of the clay bodies of Songkhram River basin kiln site wares has shown that the clay used had a high iron content. The body is fine grained and the iron particles are well distributed. These characteristics demonstrate that good procedures were used to wedge the clay so that it mixed evenly (Rakchonok 1993).

The clay used for potting was likely to have been prepared in the vicinity of the banks of the Songkhram River. The presence of hematite probably means that the clay was obtained from a nearby area such as Langka Mountain. (No detailed survey to locate the source of the iron ore in this area has yet been conducted.) Iron oxides such as laterite are one component of the sedimentary layers in a broad area bordering both banks of the Songkhram River. The stepped high and middle river terrace areas, in particular, consistently contain laterite layers about one to 1.5 meters thick. Accordingly, it was not difficult to find laterite or clay with a high silica or sand content in the area. The area of the Songkhram River was thus a very suitable site for the preparation of raw materials used in the production of high-quality stoneware ceramics.

## **Ceramic production technology**

Good preparation of the potting clay is one important element in producing stoneware ceramics. Studies to date of extant vessels, largely jars, indicate that the production technology involved throwing the pots using a potter’s wheel. The thickness of the vessel walls is, on average, 0.7–0.8 centimeters and very even. It can be clearly seen that a wire was used to cut free the base of each pot. The pots have beautiful proportions, which shows skill specifically in shaping the pots. In addition, decoration was used in the area of the shoulder of the jars and included incised patterns, appliquéd designs, and appliquéd ridges running around the jar shoulders.

Many wares were coated with a glaze containing iron oxide and silica compounds mixed with substances that help the glaze melt and fuse to the ceramic. When fired, the materials combined to make a single substance yielding an opaque brown glaze spreading over the surface of the pot.

## **Characteristics of Songkhram River basin ceramic kilns**

The details of ancient ceramics kilns vary in accordance with the characteristics of their surroundings and varying production technologies. Some of the ceramic kilns in the Songkhram River basin were constructed by digging into the riverbank. The general kiln plan involved a long narrow shape with an arched roof that curved all the way to the chimney.



With respect to the kilns that were not dug into the riverbank, to the extent they have been located to date—that is, the kiln groups across from Ban Tha Rae village and at Dong Tau Hai—it is not yet known what technology was used in constructing them.

From the excavation conducted by the Archaeology Division of the Fine Arts Department in the kiln group at Ban Tha Rae village, it was found that “the kiln has an arched shape and is constructed of clay. It is then fired until the body of the kiln hardens. The chimney is square with round corners. The firebox of the kiln faces the river. The kiln has an approximate size of 2.5 meters wide by five meters long. The walls of the kiln are approximately ten centimeters thick. The floor is paved with river gravel mixed with sandy clay until the floor hardens. Rectangular blocks of laterite are placed on both sides of the mouth of the kiln” (Rakchonok 1993). This latter feature is likely to have been a channel for stoking the fire and for blocking the heat. From excavations and surveys to date, it is not clear whether the firebox and fire wall were built at a lower level than the area where the ceramic wares were placed, as was the case with arched kilns in other regions, because this part of the kiln was likely to be destroyed by water erosion. The question awaits investigation through detailed and thorough excavation. The roofs of the kilns have collapsed onto the floor, and surveys have found that kilns in some places were constructed on top of previous kilns.

The floors of the kilns were slightly inclined in order to distribute heat suitably and were paved with river gravel to roughen the surface so as to prevent the ceramic wares from sliding. In addition, a wedge-shaped device made of clay (“*kee*”) was used to support the vessels in rows.<sup>1</sup> Small wedges were used where the floor was slightly inclined (near the chimney) and larger ones were used to support ceramics where the floor inclined more steeply (near the mouth of the kiln). In addition, the size of the *kee* was likely to vary with the size of the vessels.

The use of *kee* was suitable for propping up large vessels because these types of wares could not be stacked on top of one another in the relatively small kilns. These wedge-shaped supports have not been found in ceramics kilns at other sites in Thailand, such as Sukhothai, Si Satchanalai, Lan Na, or the central region. They have, however, been found in Vientiane, Laos. Thus, the Songkhram River basin kiln sites probably had some sort of connection with kiln sites in Vientiane (Hein et al. 1992).

The Songkhram River basin kilns had certain distinguishing characteristics. These sites used the in-bank method of kiln construction; almost all the kilns were of a similar size; the kiln floors were paved with river gravel in a similar manner; there was a channel constructed of laterite for stoking the fire; wedge-shaped vessel supports were used; and the kilns produced large vessels, primarily jars of various shapes.

In-bank kiln construction is a technology encountered in many places, such as the earliest kiln groups at Si Satchanalai and Lan Na, because it does not require an earthen mound for

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<sup>1</sup> A *kee* is any device used to support a vessel during firing, specifically glazed wares, to prevent the glaze from running and making contact with other vessels. *Kee* have various shapes according to the requirements of their use, such as wads, tubes, and flat-footed supports, as well as *kee* in the shape of the base for a monk’s bowl or a small earthen box.

constructing the kiln. Instead, it makes use of the slope of the riverbank. In the case of kilns located away from waterways, it was necessary to use a naturally occurring earth mound or to construct a mound by piling up the earth (Sayan et al. 1990).

In addition, use of in-bank kiln construction technology is especially appropriate for transporting the finished products by means of waterways. In the case of the Songkhram River, a study of the history of the local communities has found that the most convenient mode of travel was by water (Surat et al. 1987). More specifically, for the area from Ban Tha Kok Daeng village, Sekaw district, Nong Khai province, all the way to the mouth of the Songkhram River at the Mekong, the river was historically the most convenient communication and commercial route. Overland commercial transport under the geographic conditions of this region was extremely difficult. Convenience of commercial transport by water is thus likely to have been one reason for constructing kilns close to the riverbanks, as noted earlier.

Even though the geographic conditions of the Songkhram River resulted in regular flooding during the rainy season—in years that saw heavy rains, the flooding would reach the top of the riverbanks—ease of loading raw materials and transportation requirements likely led potters to continue using the Songkhram riverbanks to build their kilns for producing ceramics. They would fire their wares during certain periods and would stop for the heaviest part of the rainy season, returning to fire pots again during the dry season, when the water level in the Songkhram River was likely to drop almost to the riverbed. Accordingly, ceramics kilns along the banks of the Songkhram River must have had procedures to protect against damage that might occur as a result of storms and floods.

Many scientific details remain to be studied and compared in order to estimate the age of these production sites and to determine the period to which they belong. These details include the characteristics of kiln design and potting techniques, as well as the methods used to excavate and tunnel into the riverbanks; the procedures for constructing the extremely hard kiln walls; the fuels used to achieve the high temperatures (in excess of 1,300 degrees Celsius); the means of controlling the fire; the duration of each firing; and the means by which pots were loaded into and unloaded from kilns that were so small that it was not likely to have been convenient for a person to crawl into them. (In the kilns of northern Thailand, which are of a similar size, it has been speculated that the walls of the kiln must have been broken open in places or that a rectangular hole was cut into the roof in order to place pots into the kiln or take them out. (Sayan et al. 1990).

In terms of the shapes and sizes of the kilns and the fact that they were dug into the riverbank, it has been found that production technology was similar to that used at kiln sites at Si Satchanalai and in Lan Na, sites dating generally to the mid-thirteenth through mid-seventeenth centuries (Charuk 1990). At the same time, the use of devices such as *kee* kiln supports relates these kilns to sites at Vientiane that have been dated approximately to the mid-fourteenth through mid-fifteenth centuries (Hein et al. 1992).

Nearby archaeological sites along the banks of the Songkhram River, as well as those lying farther inland, such as Ban Saw Sat and Ban Ba Ma Klya villages, have yielded numerous ceramic sherds from kiln sites in Lan Na mixed in with sherds of Chinese pots (Samruad 1989). A quantity of ceramic sherds from Lan Na and China was found at Ban Yang Ngoy

village. Excavations at Ban Tha Baw village revealed sherds of Chinese wares dating roughly to the mid-fifteenth through mid-sixteenth centuries, along with a number of Lan Na ceramics. Similarly, an archaeological site in the area near the kiln group at Si Sattanak in Vientiane revealed Lan Na sherds and pieces of Ming dynasty (1368–1644) ceramics (Hein et al. 1992).

The age of the Lan Na kilns is generally estimated as being the mid-fifteenth through mid-seventeenth centuries. The Songkhram River basin kiln sites should be of the same era as those in Lan Na, and are related to kiln sites in Vientiane of a similar era, but are not related to those in Buriram province (Khajiphan 1994). Confusion in this respect has arisen when brown-glazed sherds and brown-glazed jars are found in various archaeological sites.

Production of ceramics on an industrial scale at this level would likely have occurred when communities in this part of the Mekong River basin were united for security. This should date them to sometime between the reigns of the Lan Xang rulers King Chayachetta (1548–72) and King Suriyawongsatthamikarach (1638–95) (Mahasila 1992). The age that can be estimated from all these data is that the Songkhram River basin kiln sites probably date to the mid-fourteenth through the mid-sixteenth centuries. This period coincides with large-scale ceramics production at Sukhothai, Si Satchanalai, Lan Na, and Vientiane.

## Conclusion

The Songkhram River basin kiln sites share a prominent characteristic—the production of brown-glazed stoneware ceramic jars with elongated necks. Many such jars have been encountered by surveys in various ancient communities in the Sakon Nakhon basin, specifically at Lao sites (Srisakara 1982). The ceramics were used as burial jars to inter human bones, sometimes in fields and paddies and sometimes on the edge of groups of hills. There is no clear picture as to why the jars had to be buried in specific places, but they are likely to be discovered accidentally by villagers who are plowing or digging for various purposes. As a result, the mouth rims of most jars are broken.

In addition to finding jars with such characteristics in old communities along the Songkhram River and in the Sakon Nakhon basin, there are also reports that they have been found distributed throughout the provinces of Roi Et, Mahasarakham, Yasothon, and Ubon Ratchathani. This is the eastern portion of Isan (Northeast Thailand), from the Songkhram River along the Chi River to the lower Mun River (Samruad 1989).

Thus, it can be said that products from the Songkhram River area were, for the most part, made for use in funerary rituals. They were valuable ceramics in which bones were placed for burial. Communities that use burial ceramics of this sort are thus from the era and rule of the powerful Lao kingdoms of the mid-fourteenth through mid-sixteenth centuries. Accordingly, we can interpret the spread of civilization during this period from the spread of the cultural practice of using jars produced in the Songkhram River basin kiln sites to inter human bones.

There is a further point to emphasize: The stoneware pots from the Songkhram River kiln sites were valuable ceramics. Excavations at the monastery of Wat Si Songkhram in Ban Tha

Baw village, show that the vessels used in daily life were earthenwares of a low quality that could be produced in the communities themselves.

When comparing these kilns with those in Vientiane, we find that the appearance and shape of the kilns are different. In addition, the pots produced in Vientiane are, for the most part, unglazed vessels, small green-glazed wares such as dishes and bowls, tobacco pipes, fish-net weights, and the like (Hein et al. 1992). These are products used in daily life. Thus, these are kilns that clearly have a different production purpose than the Songkhram River basin kiln sites.

The differing production characteristics just described make it clear that production in each area responded appropriately to local conditions. While the Vientiane kilns basically produced materials for use in daily life, the Songkhram River basin kilns largely produced wares used in funerary rituals. Nevertheless, both of these kiln groups were definitely related to the prosperity of the Lao kingdoms during the mid-fourteenth through mid-sixteenth centuries.

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