

EXCAVATION AND SITE SURVEY IN THE HUAY SAI KHAO BASIN, NORTHEASTERN THAILAND

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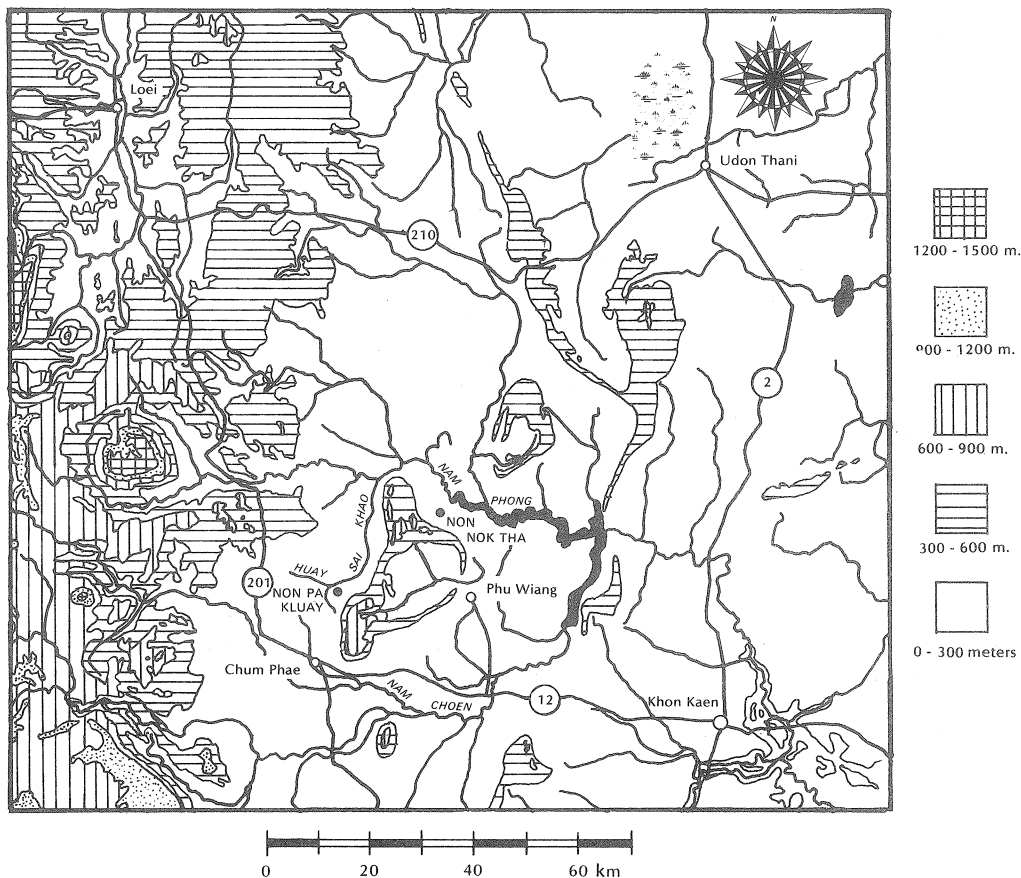


Figure 1. The Nam Phong piedmont zone.

The excavation of Non Nok Tha in the 1960s led archaeologists to place particular focus on the piedmont zone of the Khorat Plateau in their reconstructions of the culture history of Southeast Asia. But, despite its importance, the amount of information available from this area of northeastern Thailand has been limited.

In 1984-85, the Nam Phong Archaeological Project began a new investigation of piedmont prehistory by conducting site survey and excavation in the Huay Sai Khao basin, a tributary of the piedmont's principal river, the Nam Phong (Figure 1). This area is located 20-30 km to the west of Non Nok Tha.

Materials found at archaeological sites in the Huay Sai Khao basin parallel stylistic traditions found not only at Non Nok Tha, but also those found at a number of other sites located in the Nam Phong watershed. Excavations at Non Pa Kluay, one of 25 prehistoric sites in the Huay Sai Khao basin, provided evidence of material culture traditions extending from ca. 1,700 BC through the last centuries BC.

The data collected provide some corroboration for the culture history of Non Nok Tha and serve to tie material remains from across the piedmont into an increasingly coherent pattern.

BACKGROUND

As one of the first and largest excavations on the Khorat Plateau, Non Nok Tha has had much influence on models for the evolution of food production and related developments in Southeast Asia (Bayard 1972, 1980; Higham 1972, 1977, 1979; Gorman 1977; Solheim 1972a,b). However, with time the site's impact has waned.

This is due in part to the continuing debate over interpretation of the site's culture history (eg. Reed 1977; Smith 1979; Macdonald 1980; Higham 1983, 1984; Bayard 1972, 1980, 1984c). It is also a product of the limitations imposed by the hiatus in the site's deposits, which obscured the transition to iron technology and related agricultural developments in piedmont economies.

Unfortunately, the limited follow-up research in the area has not shed much light on the situation. While materials from sites such as Don Klang (Schauffler 1976), Non Nong Chik, Don Khok, Don Klang (Buchan 1973; Bayard 1977), Non Chai (Rutnin 1979; Charoenwongsa and Bayard 1983) Non Khaw Wong, Ban I Loet, Ban Puan Phu (Penny 1982, 1984), Non Muang and Ban Na Koo (Ruangsichai 1984, 1985) have added some tantalizing pieces to fill in the puzzle, on the whole the database has been scanty and inconsistent.

The effect is that there has been little progress in building on the stimulating data produced by Non Nok Tha. This is not surprising given the exploratory nature of most of the research in the piedmont zone.

In returning to the piedmont zone, we sought to begin intensive research which would bring the prehistory of the zone into clearer focus. Our goal is to put the material culture found at Non Nok Tha, and other piedmont sites, more firmly within a context of both regional society and environment.

To understand the development of agriculture, husbandry, bronze and iron technology, and inter-regional trade, we must have some approximation of the context in which these developed. Studying just one site such as Non Nok Tha is clearly not enough. To develop reasonable models of prehistoric events, it is necessary to

reconstruct both the social network formed by prehistoric sites in the piedmont zone and to define the physical environment within which these sites were interacting.

Developing a database for such a contextual approach requires intensive archaeological investigations within a single bounded region. We must move beyond continually shifting exploratory efforts scattered about the region, and concentrate our efforts on one particular area.

Thus the Nam Phong Archaeological Project was begun in an effort to delineate in detail the natural and social environments of a single well-bounded area, the Nam Phong watershed along the eastern margin of the Petchabun Mountains. Most of the Nam Phong watershed is encompassed within a delimited piedmont zone separated from the plains of Khorat Plateau proper by a low ridge known as the Phu Phan.

Within this large watershed system are four major tributary basins, each of which defines a specific environmental unit. One of these, the basin of the Huay Sai Khao, was selected as the initial focus for our research.

THE HUAY SAI KHAO BASIN

Running south to north across the heart of the piedmont zone, the Huay Sai Khao basin is bounded on the west by rugged outliers of the Petchabun Mountains, and on the east by the steep slope of Phu Wiang (Figure 2). A low, rolling middle terrace rise separates the basin from the watershed of the Nam Choen to the south. The Nam Phong forms the northern boundary.

The adjacent mountains are composed largely of sandy siltstones, shales, and quartz or calcareous sandstones (Crujic 1978). Deposits of chert, lignite, jet, and limestone are locally present. In the mountains north and west of the watershed are small deposits of mineralized ores, including tin, iron, lead, and malachite. Iron laterite ores are present in many lowland areas.

Sandy alluvium, derived from the surrounding sandstone rock, forms the principal soil deposits of the area and is an important determinant of soil character. The soils in the basin are generally infertile, being at best only moderately suited to the production of paddy rice and other crops.

Overall water availability is a major limitation on agricultural productivity in the area. The region is largely within the rain shadow of the Petchabun Mountains and receives an average of only 1200 mm of precipitation per year, concentrated in a four month period during the southwest monsoon.

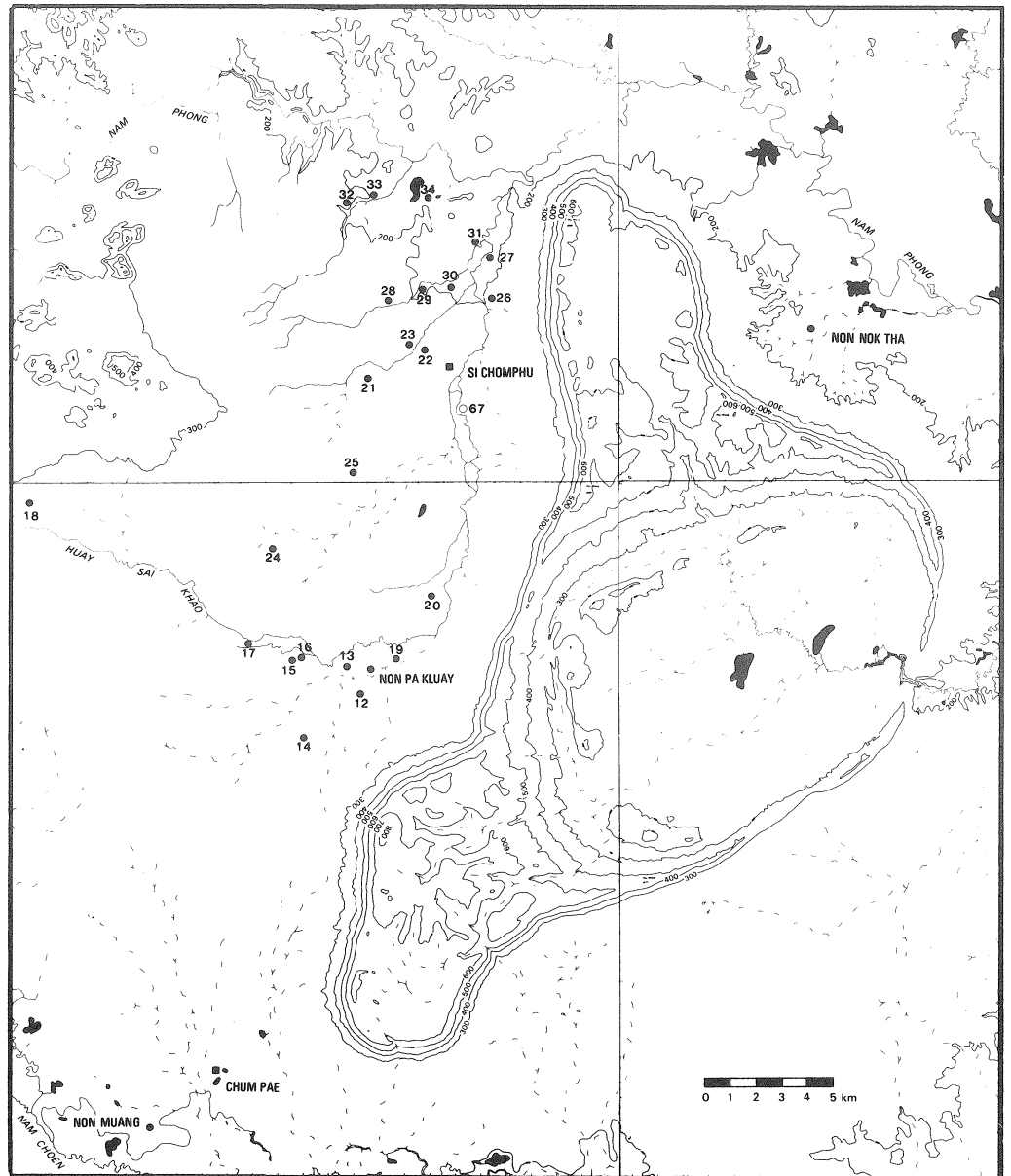


Figure 2. Prehistoric sites in the Huay Sai Khao Basin.

FIELDWORK IN THE 1984-85 SEASON

Fieldwork was conducted in the Huay Sai Khao basin from November 1984 until June 1985, in cooperation with the Archaeology Division of the Royal Thai Fine Arts Department. The research was supported by a grant from the U.S. National Science Foundation.

The staff of the N.E. Thailand Archaeology Project, directed by Mr Staporn Khwanyuen, provided logistical support for which we are especially grateful. Ms Phanita Panthian served as assistant director and Mr Saeng Srisuthau as crew leader. The people of the Huay Sai Khao basin, particularly the residents of Ban Na Chan, gave a tremendous boost to the Project through their abundant hospitality and assistance.

EXCAVATIONS AT NON PA KLUAY

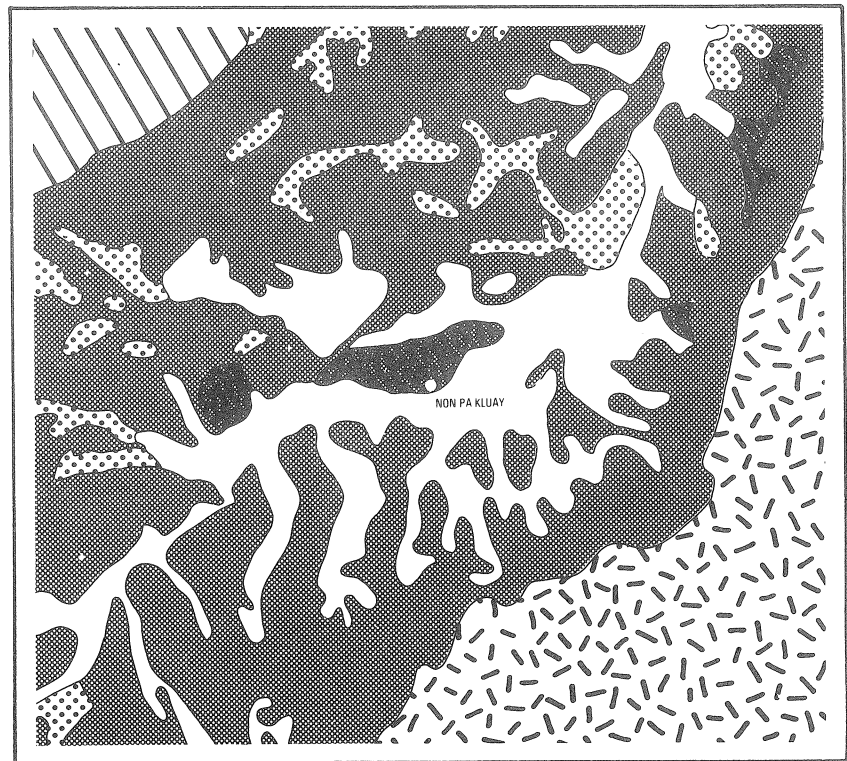
Non Pa Kluay ("Banana Grove Mound") is a small, low mound located adjacent to the Huay Yang, a tributary of the Huay Sai Khao. It is located within Tambon Na Chan, Amphoe Si Chomphu, Khon Kaen Province (UTM coordinates; 48Q-SD-970-464).

At present the site encompasses an oval mound approximately 100 x 150 m. However, the mound appears to have been truncated by agricultural activity. It may have once extended an additional 50 m to the nearby Huay Yang. The site was located during a reconnaissance survey by Mr Khwanyuen and the author on November 28, 1984. Local residents reported encountering a number of inhumation burials in the mound and showed us a wide variety of artifacts collected from the site that clearly paralleled the material found at Non Nok Tha.

Non Pa Kluay is located on a gradual rise of the "low middle terrace", at the edge of a large expanse of flood plains and valley flats associated with the Huay Yang (Figure 3). The mound formed by the site rises about 1.5 m above the flatlands to the south and about 1 m above the higher ground to the north.

The flats south of the site are composed of Phimai type soils. These are considered only moderately suited for paddy land, but are the most fertile in the basin. This expanse of Phimai soils is one of the largest in the Huay Sai Khao watershed. Today this area is completely cultivated as paddy fields.

The rise on which the site is located is composed of less productive Roi Et soils. These soils are poorly suited for paddy land due to unfavorable topography. Under economic pressure, this area has recently been put into cultivation, but the productivity is greatly limited by aridity. This area is typically planted in crops with less water demands than paddy rice, such as mung beans.



0 1 2 3 km

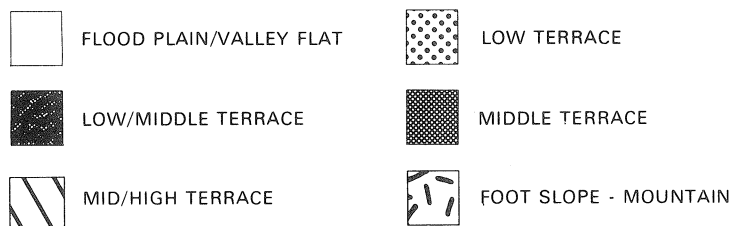


Figure 3. The environment in the vicinity of Non Pa Kluay.

To the west are middle terrace soils recorded as Khorat type. These soils are generally not suited for agriculture and are rarely cultivated.

Non Pa Kluay is located about 4.5 km from the base of Phu Wiang. Although much depleted in modern times, the moist sub-tropical forest of the mountain's western slope and the small plateaus atop the southwest massif was once a productive source of small and medium size game, and forest plant products. The site is 18-25 km from the larger, more rugged outliers of the Petchabun range to the northwest.

In addition to game and forest products, these mountains were a source of lithic materials useful to prehistoric societies, including chert, shale, red siltstone, and sandstone.

Interpretation of Site Use

Excavation at Non Pa Kluay began December 13, 1984 and ended April 1, 1985. The author was joined in the initial organization of the excavation by Mr Khwanyuen and Mr Surapol Natapintu of the FAD Central Thailand Archaeology Project.

The total area excavated was 15 square meters. This was distributed over two pits. Locality 1 (10 square meters) was located at the center of the mound and at the point of greatest height. Locality 2 (5 square meters) was located 35 m to the east at a point some 30-35 cm lower.

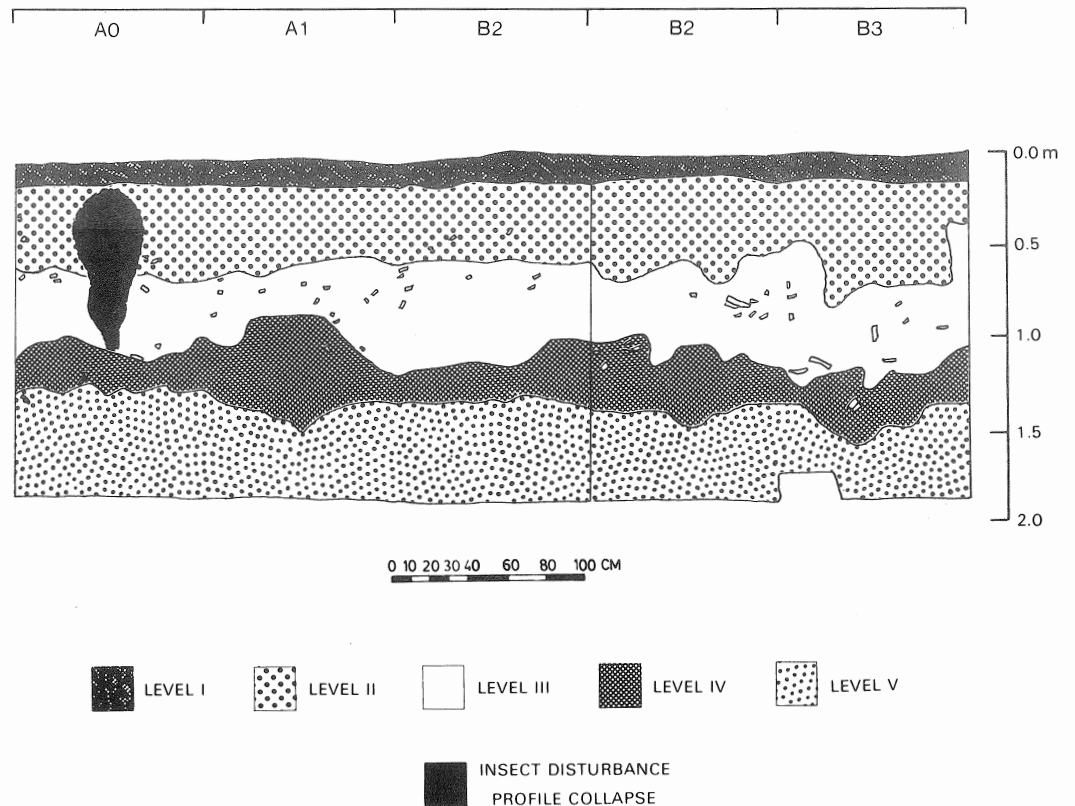


Figure 4. Typical stratigraphy found at Non Pa Kluay.

Both Localities at the site were excavated to a depth of about 2 m. Five major units were discerned, and numbered Levels I - V from top to bottom (Figure 4). The upper two levels are composed of nearly sterile soil deposited after the abandonment of the site. The lower three encompass prehistoric deposits which represent two distinct periods of activity and material tradition at the site.

Level V consisted primarily of 9 burials cut into natural soil. Extremely low sherd and midden density in the fill of these burials, as well as in the non-burial deposits of the upper part of Level V and the lower part of Level IV, suggests that there was little or no occupation activity associated with this phase. Furthermore, the burials of this phase were virtually free of intrusions; such disturbances would be expected were the burials underlying associated occupation deposits. Thus, we surmise that the site was initially used almost exclusively for inhumation burial and mortuary ritual.

In the subsequent phase, the site was used for both habitation and inhumation burial. Level IV contained remains of 10 burials and a number of postholes and trashpits. Level III consisted of thick midden deposits with large amounts of ceramic, iron, bronze and bone refuse. In contrast to those found in Level V, the burials of Level IV were filled with sherds and midden from the overlying occupation deposits. This intermixing indicates that some burials were cut through the midden deposits and hence post-date part of the occupation.

It is likely that there are different periods of use represented within the two broad phases defined at the site. For instance, temporal division of the earlier phase is indicated by the different dates for Level V burials from two separate localities (Table 1). Similarly, the extensive intercutting and overlapping of burials in the later phase indicates different periods of use during that time. However, due to natural leaching and disturbance from occupation and burial activity, it was difficult to identify conclusive stratigraphic evidence for subdivision of the phases.

The Chronology of Non Pa Kluay

Organic material suitable for radiocarbon analysis was not particularly abundant at the site. While a number of charcoal fragments and concentrations were encountered, none were found in well-bounded features, such as sealed hearths or ovens. The material tested was taken from undisturbed burials and unmixed midden deposits. Higham (1983) has noted the difficulty in using such material, and the results obtained are offered with caution.

At the time of writing, five dates based on radiocarbon analysis of excavated charcoal samples have been received. These dates are shown in Table 1.

Sample	Provenience	Level	Locality	Date Adjusted For C12/C13	Calibrated Date (Klein et al. 1982)
NPK-2A	Occupation	III	1	1,865 ± 75 BP	120 BC (240 BC - -1/+1 AD)
NPK- 4	Occupation	III	1	2,155 ± 65 BP	202 BC (390 BC - 15 BC)
NPK-13	Burial NPK-5	V	1	2,860 ± 95 BP	1,080 BC (1,350 BC - 810 BC)
NPK-58	Burial NPK-5	V	1	2,870 ± 110 BP	1,088 BC (1,360 BC - 815 BC)
NPK-47	Burial NPK-13	V	2	3,385 ± 370 BP	1,720 BC (2,310 BC - 1,130 BC)

Table 1. Radiocarbon dates from Non Pa Kluay.

Three of the samples were taken from Level V burials (two from NPK-5 and one from NPK-13). All the charcoal from this level was found within burials; none was encountered in the natural soil outside the burial pits. This suggested that charcoal found in fill deposits from burials of this level would most likely have come from the surface deposits present at the time of interment.

Note that the two samples from NPK-5 yielded almost identical dates for Level V activity at Locality 1. These dates indicate that NPK-5 was interred some time after ca. 1080 BC.

The sample from NPK-13 indicated that this burial was interred some time after ca. 1720 BC. Thus, burial activity at Locality 2 appears to represent an earlier part of the Level V phase.

Based on these dates, mortuary activity in the first phase appears to have occurred from early in the 2nd millennium BC, and lasted into the 1st millennium BC.

Dates for subsequent occupation activity at the site were derived from two large masses of charcoal found in the middle of the midden deposit of Level III. These samples were taken from an area clear of underlying burials, minimizing the likelihood that they had been disturbed by interment activity. While there was a significant amount of charcoal in the area, no specific hearth-type features could be identified, and they appear to be separate pieces incorporated in the general midden deposit through time.

These samples were separated vertically by some 5-8 cm, with the older lying deepest. They indicate that occupation of the site was well underway by at least the 2nd or 3rd century BC.

No samples were submitted from Level IV due to the disturbance in this level from inter-cutting burials and occupation activity.

An effort was made to date burials directly using bone from the human remains, but the bone proved to be too mineralized to produce a reliable date (Tamers, pers.com.).

The Material Culture of Non Pa Kluay

A diverse array of artifacts was recorded from Non Pa Kluay, both from the excavated area and as finds made by local residents. These include pottery and artifacts made from bronze, iron, glass, stone, baked clay, shell, and bone. Analysis of this collection reveals a clear difference in the material traditions associated with the two periods of use at the site.

The earlier phase features an assemblage including the remains of bronze and shell artifacts and a ceramic tradition with close parallels to the Middle Period at Non Nok Tha. The assemblage associated with the later phase is differentiated by the presence of iron remains, glass and agate beads, and painted ceramic traditions not found at Non Nok Tha or in the earlier phase at Non Pa Kluay.

Bronze was found in both phases. The assemblage includes 66 whole or partial artifacts, and 230 fragments. An additional 15 artifacts were recorded as villager finds. The artifacts reflect a rich bronze tradition. The finds include a socketed spearpoint, fishhooks, rings, bracelets, and bells (Figure 5). In addition five pieces of bronze slag were recovered (all from the later phase).

About 75% of the 107 pieces of iron recovered are amorphous fragments. The remainder are almost entirely tools and weapons, including spearpoints, a rectangular axe, and possibly a small sickle (Figure 6). There was also one bracelet fragment. In addition, 12 pieces of iron slag were recovered.

Some 276 glass beads were found in the excavations, including more than 130 beads juxtaposed as if from a necklace. Many more were recorded as villager finds. Most common were small round blue beads (240). Next in frequency were orange discoid and tubular beads (23), green round beads (10), and green carinated beads (3). Yellow round beads were also recorded as villager finds.

Stone artifacts included polished adzes, molds for casting axe-heads, cylindrical agate beads, and flakes. These artifacts were made of many materials, including sandstone, andesite, chert, agate, shale, and tektite. Also found were many pieces of siltstone, both unifacially polished fragments and unmodified nodules, used in the production of the red slip commonly found on pottery.

Artifacts of baked clay included bow pellets, spindle whorls, figurines, and a potter's anvil. The figurines feature the torso and legs of what appear to be standing animals. These figurines are

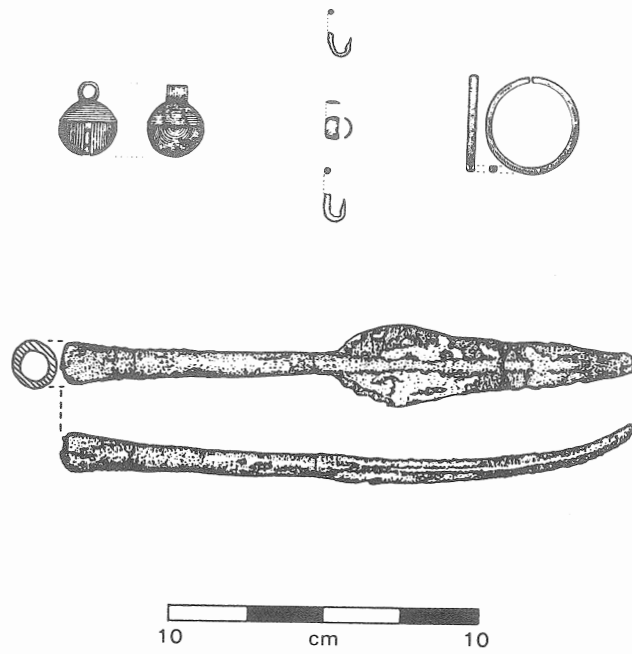


Figure 5. Bronze artifacts from Non Pa Kluay.

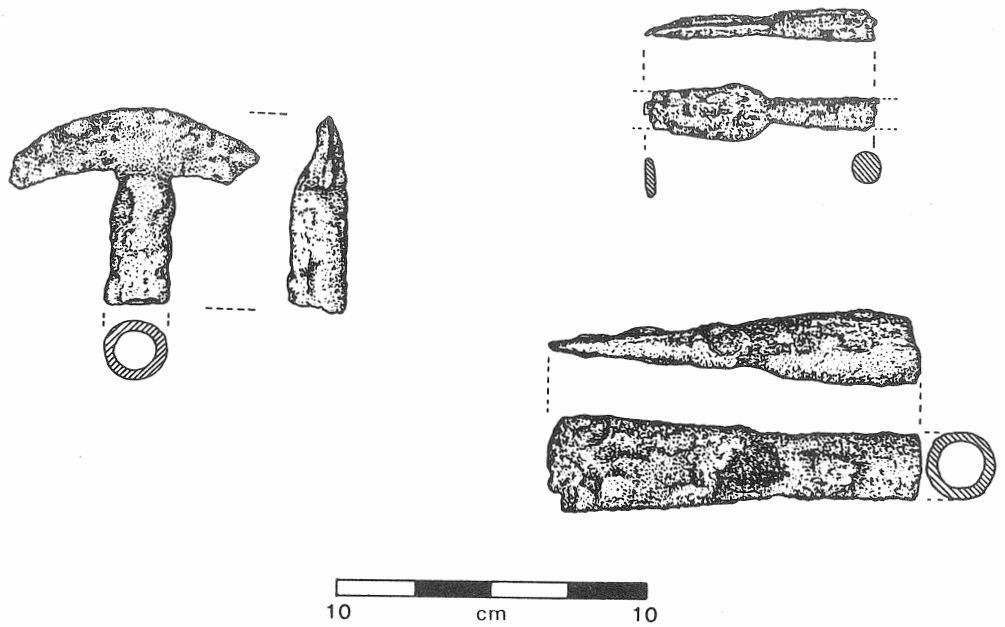


Figure 6. Iron artifacts from Non Pa Kluay.

similar to those found at Ban Chiang (cf. White 1982:70, especially No. 47) and Ban Nadi (Higham and Kijngam 1984). A third fragment appears to be a horn from a bovid figurine.

Ceramic Traditions at Non Pa Kluay

Ceramic remains from Non Pa Kluay include some 66 whole or partial vessels and over 520 kg of pot-sherds. This assemblage provides a wide range of information about utilitarian and funerary ceramic styles in the Huay Sai Khao basin.

The stylistic traditions of the two periods differ most significantly in the decorative treatment of ceramics. Over time, there is a great increase in the manipulation of certain ceramic attributes to create distinctive pottery styles.

In Level V, decorative styles feature manipulation of only a few ceramic attributes. The most common decorative technique is distinguished by application of a thick red slip over exterior surfaces. This decoration appears on at least four types of vessels (Figure 7A-D). Three feature complete coverage of the polished exterior surface (Figure 7A,B,D). The fourth combines a polished and slipped shoulder with a cord-marked body (Figure 7C).

Another decorative tradition of this period features round-bottom pots distinguished by an exterior surface decorated with a unique smoothed-over cord-marking. The vessels are adorned with appliqué "horns" and "rope" appliqué at the shoulder (Figure 7E).

In the subsequent period (Levels IV and III) there was a great increase in stylistic techniques. Most notably, painted decoration was added to the process of ceramic design. The use of red-slip continues, but is limited. During this time there is also a great proliferation of rim forms, paste types, and vessel forms. Among the many painted wares, at least two distinctive decorative traditions can be identified.

The most common features linear and representational designs executed in black paint on a plain or polished background (Figure 8B,D). This style is distinguished by the use of parallel painted bands at the shoulder, neck, and outer surface of the rim. The geometric patterns are often accompanied by free-form artistic renderings. A number of the rims also feature painted decoration on their inside surface. Wares of this style exhibit a great deal of artistic variation in the execution of designs, but they all clearly belong to a single tradition. The sherds of this style are made from a sand-tempered paste of a distinctive orange or buff color. It is a finely made ware exhibiting carefully smoothed and polished interior surfaces.

The second stylistic tradition features a black slip over a polished background. This style is associated with medium to large vessels with short straight everted rims, slipped shoulders with a

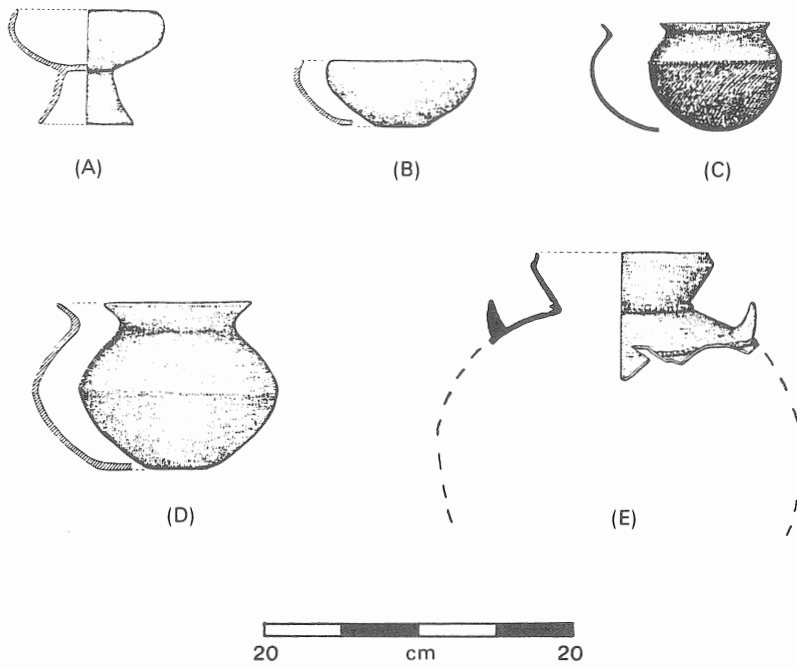


Figure 7. General Period B ceramics from Non Pa Kluay. A-D, exterior red-slipped. E, exterior smoothed-over cord-marking.

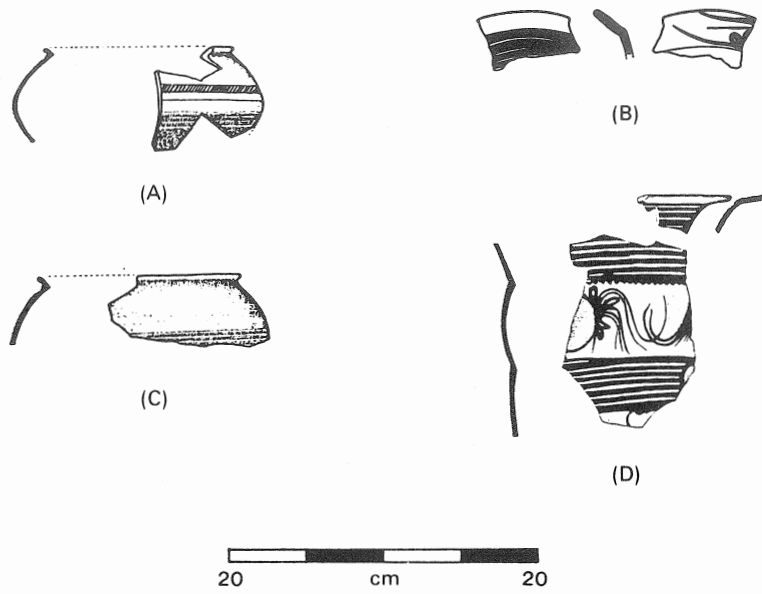


Figure 8. General Period C ceramics from Non Pa Kluay. A, exterior red-on-black, incised. C, exterior plain, incised. B-D, exterior black-on-buff.

marked carination, and ellipsoid cord-marked bodies demarcated by 4-5 incised lines (Figure 8C). The sherds of this style are made from a sand-tempered paste of a distinctive grey color. It too is a finely made ware with carefully smoothed and polished interior surfaces.

Some vessels of this tradition were further adorned with linear designs painted in red on the shoulder (Figure 8A). These designs almost invariably incorporate one to four thin lines drawn around the vessel in concentric parallels, with pairs of lines joined by a continuous band of diagonal strokes.

SITE SURVEY IN THE HUAY SAI KHAO BASIN

An extensive vehicular and foot survey of the Huay Sai Khao basin was conducted in April and May 1985. During the survey all 58 villages in the basin were visited and a number of sparsely populated areas were surveyed by vehicle and on foot. Based on surface collections and informant interviews 25 prehistoric sites were identified in the basin.

Most of the sites recorded were small mound sites located under modern villages, gardens, or rice fields. Many had been subject to casual excavation by local residents, revealing inhumation burials and associated artifacts. In addition to recording villager finds, we made collections of the materials present on the surface and around sub-surface exposures.

Most of the sites produced remains which indicate that they were occupied at some time during the later phase at Non Pa Kluay, perhaps in the latter half of the 1st millennium BC. At the current level of knowledge it is not possible to say conclusively that any of these sites were used prior to that time.

Site Distribution

The distribution of sites in the Huay Sai Khao basin is shown in Figure 2. All are located relatively close to streams. Fully 40% have streams within 100 metres and 84% have streams within 400 meters. All the sites have at least one stream located within 1 km and 75% have two streams located within this area. For the remainder, the second-closest streams all fall within 2 km.

The average distributions of rice soils and landforms found within 1, 2 and 3 km of these sites are shown in Table 2, along with the distributions of these features in the entire basin. The Royal Thai Soil Survey identifies seven types of landforms and three classes of soils, classified according to their suitability for rice production (Table 2). The best soils in the basin are of class PIII (distributed across two subclasses PIII_f and PIII_s). Soils of class PIII are considered moderately suited for rice production, those of class PIV_t are considered poorly suited, and those of class PV_t are considered to be unsuited.

The summary statistics indicate that the sites as a whole do not form a single uniform group. For example, the large standard deviation reflects the great deal of variability in the kinds of soils found around each site. Note that the amount of variation around the mean decreases with distance. At 3 km the sites have a tendency to have much more similar catchment areas than they do at 1 km (reflected by the lower standard deviation). Chi-square tests indicate that the overall group catchment patterns at 1 and 2 km are significantly different from random over all the categories. At 2 km the pattern approaches random. This indicates that there is a strong patterning effect close to sites, but that the pattern deteriorates with distance.

The group means indicate that as a whole the sites have a preference for those soils suited to rice agriculture. For instance, at 1 km, the average catchment area of soils of type PIII (classified as moderately suitable for rice agriculture) is about 45%, while such soils are only about 15% of all soils in the basin (Table 2). Similarly, the three lowland landforms, which are the most suited to construction of rice paddies and management of water resources, account for nearly 50% of the average landforms found within 1 km, while these are only about 15% of the landforms in the basin (Table 2).

Mountainous and higher terrace lands were evidently avoided. On average these lands are rare around sites even though they account for almost 50% of the total environment (Table 2).

A hierarchical cluster analysis (Sneath and Sokal 1973) indicated that the sites could be placed into four basic groups based on the proportional distribution of landforms or soils in each catchment (Wilén 1987). Factor analysis (Kim and Mueller 1978) indicates that the clusters are determined largely by the amount of PIII and PVt soils, with some influence from the amount of PIII_f soils, and the amount of flood plain/valley flat (FPVF), low terrace, and middle terrace lands (Wilén 1987).

These results indicate that sites are located in particular environmental zones. The clusters produced indicate that the sites are located in four types of areas in the basin.

One cluster of sites is distinguished by having catchment areas with high amounts of PIII soils, flood plain and valley flat landforms and either low terrace or low-middle terrace landforms. These sites are associated with the larger areas of fertile soils found in the flood plains and valley flats of the lower Huay Lua drainage, and along the Huay Sai Khao. Clusters 2 and 3 are somewhat similar in having moderate amounts of rice soils and lowland landforms. However, they are differentiated by the type of soils found in their catchment area. Thus, sites of Cluster 2 typically are associated with class PIII_f rice soils and FPVF landforms while those of Cluster 3 feature PIII soils and low terrace landforms. These sites are typically located in the middle reaches of tributary streams or upstream from

LANDFORMS	FPVF	LOWTERR	LOMIDTER	MIDTERR	MIDHITER	FTSLES	FTSLMTN	TOTAL	OUTSIDE
WATERSHED	7.50	8.30	1.00	33.70	20.30	18.70	10.60	100.00	0.00
1KM AVERAGE	25.54	18.78	5.01	43.37	3.25	4.05	0.00	100.00	0.00
STD. DEV.	23.59	18.17	9.32	22.10	8.08	17.85	0.00	0.00	0.00
2KM AVERAGE	22.15	17.28	3.15	45.97	7.32	3.27	0.33	99.47	0.53
STD. DEV.	18.36	13.00	4.41	13.39	12.87	14.89	1.58	2.44	2.44
3KM AVERAGE	19.17	15.67	2.20	47.06	9.62	2.84	1.50	98.06	1.94
STD. DEV.	14.66	10.17	2.51	11.64	14.21	12.04	4.26	4.80	4.80

FPVF = FLOOD PLAIN/VALLEY FLAT
 LOWTERR = LOW TERRACE
 LOMIDTER = LOW/MIDDLE TERRACE
 MIDTERR = MIDDLE TERRACE
 MIDHITER = MIDDLE/HIGH TERRACE
 FTSLES = FT.SLOPE/EROSION SURF.
 FTSLMTN = FT.SLOPE/MOUNTAIN
 TOTAL = AREA WITHIN HSK BASIN
 OUTSIDE = AREA OUTSIDE HSK BASIN

RICE SOILS	PIIIIf	PIIIIs	PIIIIf/s	PIVt	PVt	TOTAL	OUTSIDE
WATERSHED:	7.50	8.30	15.80	1.00	83.30	100.00	0.00
1KM AVERAGE:	25.54	18.78	44.32	5.01	50.66	100.00	0.00
STD:	23.59	18.17	23.03	9.32	26.57	0.00	0.00
2KM AVERAGE:	22.15	17.28	39.43	3.15	56.89	99.47	0.53
STD:	18.37	13.00	18.37	4.41	20.88	2.44	2.44
3KM AVERAGE:	19.17	15.67	34.85	2.20	61.01	98.06	1.94
STD:	14.66	10.12	14.18	2.51	14.52	4.80	4.80

PIIIIf = SOILS MODERATELY SUITED FOR PADDY RICE
 PIIIIs = SOILS MODERATELY SUITED FOR PADDY RICE
 PIVt = SOILS POORLY SUITED FOR PADDY RICE
 PVt = SOILS NOT SUITED FOR PADDY RICE

Table 2. Average distribution of rice soils and landforms for prehistoric sites in the Huay Sai Khao Basin.

the major pockets of flood plains associated with the Huay Sai Khao. The final cluster is formed by sites surrounded by very low amounts of rice soils and lowland landforms. These sites are found on hills or terraces generally lacking in suitable rice soils and away from streams.

The predominance of lowland landforms, suitable rice soils and streams in the area of prehistoric sites in the basin suggests that site location was to a very significant degree a product of an agricultural land use strategy. Only a very few sites deviate from this overall pattern, and in general they are located atop hills. These sites are unlikely locations for normal agricultural villages, and may prove to have had a different function.

CULTURE HISTORY IN THE PIEDMONT ZONE

The materials recovered in recent years from Non Pa Kluay and other prehistoric sites in the Huay Sai Khao basin and beyond provide a substantial addition to our reconstruction of culture history in the piedmont zone. This material allows many of the older data to be seen in a fresh light.

The evidence at hand supports organization of the culture history of the Nam Phong piedmont into two major periods of development which correspond to the General Periods B and C proposed by Bayard (1984a:163). This evidence also suggests that in each Period there were coherent material traditions spread over a wide area within the Nam Phong watershed.

General Period B

Six excavated sites in the Nam Phong watershed may be attributed to a General Period B provenience. These are Non Pa Kluay, Non Nok Tha, Non Nong Chik, Don Klang, Non Muang, and Ban Na Koo. However, dates are available for only the first three.

The current chronological sequence for Non Nok Tha based on some 36 dates (Bayard pers.comm.) places the site's pre-metal levels at ca.3000-2500 BC (EP 1 and 2), and the bronze levels at ca.2500-500 BC (EP 3 and MP 1-8).

There is a close parallel between the ceramics found at Non Nok Tha and Non Pa Kluay. About 75% (18) of the vessels from Level V at Non Pa Kluay can be placed within the Non Nok Tha classification proposed by Bayard (1977, 1984b), along with seven vessels found by villagers. Eleven vessel types from Non Nok Tha are present at Non Pa Kluay, including types 1A/E, 1D, 1F, 1G, 1H, 1R, 2E, 2A/K, 4B, 5B and 6A.

The vessels associated with burials at Locality 2 are generally most frequent in Middle Periods 1-3, while those from Locality 1 burials are most frequent in Middle Periods 4-8. Level V mortuary activity at Locality 2 has been dated to ca. 1720 BC (2310-1130 BC), while that at Locality 1 has been dated to ca. 1080 BC (1350-810 BC).

These dates fit comfortably within the sequence proposed by Bayard, given the attribution of Level V ceramics found in Locality 2 to primarily the earlier part of the Non Nok Tha Middle Period, and those from Locality 1 to the later part.

The only other dates for General Period B remains are from Non Nong Chik. The most reliable date for the basal General Period B layer indicates use of the site ca. 3580 ± 95 BP (2150-1770 BC) (Buchan 1973).

The six General Period B sites in the Nam Phong piedmont share a material tradition common to this phase, including spindle whorls, clay pellets, shell, stone, and bronze artifacts, and utilitarian pottery. A number of the sites are further linked by distinctive decorated vessels. For instance, highly standardised red-slipped bowls are found in burial contexts at Non Nok Tha, Non Pa Kluay, and Non Muang, and Class 2 vessels identified by Bayard (1984b) as possible social markers in the Non Nok Tha burial ritual are found at Non Pa Kluay as well.

General Period C

The General Period C culture in the piedmont was previously ill-defined and much neglected. The material gathered in the last decade has improved the situation significantly.

Ten excavated sites in the Nam Phong watershed can be attributed to General Period C by producing remains of iron. These are Non Pa Kluay, Don Klang, Non Nong Chik, Don Khok, Don Sawan, Non Wat Kao, Non Chai, Non Muang, Non Khaw Wong, and Ban I Loet. At least another 18 sites in the Huay Sai Khao basin can be attributed to this Period on the basis of surface finds and villager reports.

Dates are available for five of the ten excavated sites (Figure 9). These dates indicate that General Period C was well underway by ca. 300-400 BC.

The sites of General Period C share a common material tradition, including spindle whorls, clay pellets, stone, bronze, and iron artifacts, glass and agate beads, and utilitarian pottery. A number of the sites can be further linked by several decorated ceramic styles.

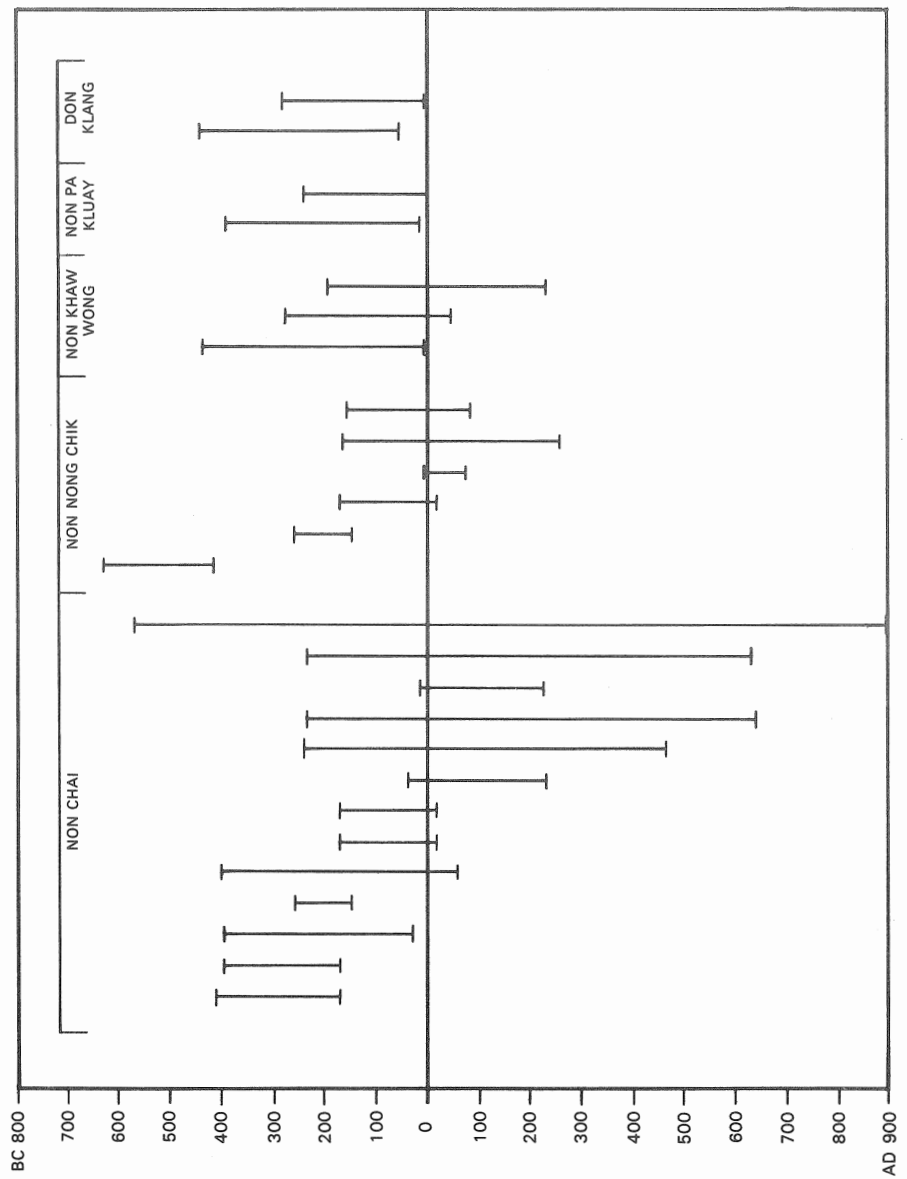


Figure 9. Absolute dates for General Period C in the Nam Phong piedmont zone.

The most widely distributed style is the red-on-black ware. Remains of this ware were found at Non Pa Kluay, Non Ban Rang (NP-14), Ban San Jod (NP-15), Don That (NP-17), Non Kud Suay (NP-24), Non Nong Sat (NP-25), Non Nong Chik (Buchan 1973:159,165) and Don Khok (Buchan 1973:94,161,167).

Remains of the distinctive black-on-buff ware were found at Non Pa Kluay, and Non Ban Rang (NP-14), Don Klang and Non Chai. Schauffler (1976:32) illustrates a nearly whole vessel found at Don Klang which provides the most complete example currently known.

Distinctive pot lids first identified at Don Klang (Schauffler 1976:31) are also found at Non Pa Kluay and at Non Khaw Wong (Penny 1982:69).

CONCLUSION

Many new data from the Nam Phong piedmont zone have accumulated in the last 7-8 years. Less than 20 years ago only two or three sites were known, now there are over 40. With the rise in the number of sites identified we now have some idea of the temporal and areal variation in the distribution of the remains in the area.

There is now good evidence to suggest that during General Period B, Non Nok Tha was one of a number of related sites within a recognizable cultural tradition concentrated in the piedmont zone. At present, six sites have produced material assemblages which appear to be part of this tradition. Although these sites are located far apart, some parallels are so exact that we are led to assume that these sites were indeed part of an interacting network of societies.

Because of the hiatus in the Non Nok Tha deposit, for a long time the material tradition from General Period C was not well defined for the piedmont area. However, recent research has provided evidence of a network of sites concentrated in the piedmont zone during this period linked by a material tradition distinctly different from that of the earlier General Period B culture.

While the two traditions share a few functional similarities, it appears that the latter tradition represents a significant shift in cultural adaptations. The major elements of this shift include the use of iron for tools, the appearance of water buffalo, the importation of new exotic trade goods such as glass and agate beads, and the use of elaborate styles of ceramic decoration. There is also some evidence that suggests that this shift was accompanied by a major change in settlement systems from one period to the other.

Site density in General Period C, based on surveys in the Huay Sai Khao basin and inside Phu Wiang (Higham and Parker 1971; Buchan 1973), appears to have been fairly high. Furthermore, we find that during this time sites were located in areas which are marginal for inundated agriculture.

Site density during General Period B, on the other hand, appears to have been much lower, and all the sites are in relatively favorable agricultural zones. Of the 13 sites tested within the entire piedmont zone, at best only six have produced General Period B remains. At nearly all General Period B sites the deposits appear to be dominated by mortuary remains. Non Nong Chik is the sole exception. This suggests that these locations represent social centers and not habitation sites. On the other hand, sites of General period C clearly encompass both habitation and mortuary deposits.

Finally, we have observed that while sites of General Period C are distributed in clusters throughout the watershed, each of the six sites attributed to General Period B is located in a separate sub-basin within the Nam Phong watershed.

The preponderance of mortuary sites and dearth of habitation sites for General Period B suggests that the settlement strategy operating during this period differed significantly from the nucleated strategy found in General Period C.

The current data suggest that the settlement in General Period B was dispersed rather than nucleated. During that time, residential sites may have been based on extended family homesteads rather than nucleated villages. Such homesteads may have been associated with the shifting requirements of the swidden agriculture commonly postulated for this period (Higham 1977, 1979, 1983; Gorman 1977).

But where then are the residential sites of this Period? Small scale habitations of this type, being smaller and less permanent, would be less likely to be preserved. Where preserved, the relatively shallow deposits would be susceptible to erosion or siltation, and such sites would be extremely difficult to recover. Thus, it may be that the habitation component of this dispersed pattern is as yet hidden by landscape change and site deformation processes.

In this speculative model, the centralized burial sites would have served as the socio-cultural link between the dispersed settlements. The evidence at hand suggests that such sites served rather large areas based on bounded watershed habitats, producing the low density of General Period B sites. Thus, the six sites known at present may represent a number of local social groups organized within specific sub-basin habitats, and inter-related within a larger piedmont social network.

The change in material culture and settlement patterns appears to have occurred in the piedmont zone during the latter half of the 1st millennium BC. The appearance of the new assemblage is generally contemporaneous with similar changes occurring at sites on the plains to the east. The development of nucleated villages may be associated with the development of fixed-field wet rice agriculture during this time.

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