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HOW MANY MONKS? Quantitative and Demographic Archaeological Approaches to Buddhism in Northeast Thailand and Central Laos, Sixth to Eleventh Centuries CE

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INTRODUCTION

This article explores a number of ways in which to reconstruct the possible extent of monastic Buddhism in the Khorat Plateau during the Dvāravatī period. In an attempt to so, it is consequently multidisciplinary in its conception, being primarily archaeological while also drawing on areas of anthropology, art history, demographics and Buddhist studies. In doing so, it attempts to move beyond the sole analysis of archaeological and art historic objects in order to investigate the social, demographic and geographical factors that lie behind the production of these artefacts. It proposes to do so by a number of quantitative means: first, by giving hypothetical population estimates of urban centres/moated sites during the Dvāravatī period and consequently the number of monks these settlements could have supported. These estimates are then used to consider how many monks may have been sustained according to these figures. Second, by carrying out a quantitative analysis of *sema* stone numbers and their

distribution throughout the Khorat Plateau this also provides a method to calculate the number of possible consecrated spaces (viz., *sīma*) in the region and their geographic extent. The analysis shows that institutional, monastic Buddhism primarily spread and settled along the major river systems throughout the region. Third, by plotting the distribution, quantity and quality of Buddhist narrative artwork on *sema* to pinpoint the locations of possible workshops and centres. This also allows for a number of conclusions to be drawn in terms of the socio-economic support needed to develop and maintain workshops and craftsmen and relates directly to population densities.

It should, however, be stated at the outset that this paper proposes nothing more than a possible *scenario* to aid in explaining and understanding the extent and spread of Buddhism during this period. I am here using the term “scenario” in reference to Donn Bayard’s cautionary remarks regarding archaeology and the use of models.¹ As Bayard explains, a model, strictly speaking should be based on reliable datasets which are testable and “ideally consists of a set of relationships between variables to which more or less precise numerical values may be assigned”.² As will become clear in this paper, the assigning of such precise figures to the subject under investigation (viz. Buddhism) is unrealistic given the current incomplete state of the datasets from the region and time period in question. Therefore, I adopt the term “scenario” over “model” to emphasize the fact that what is being proposed here is an interpretive framework as opposed to a testable hypothesis in the strictly scientific sense.

The issue of population growth in archaeological studies has been linked to both cultural change and urbanization.³ The origin of complex societies in Southeast Asia occurs in tandem with the arrival of universal religions such as Buddhism and Brahmanism. The Buddhism that appears in the Dvāravatī period seems to be closely tied to wet-rice growing, settled communities, albeit widely dispersed, which had adequate population densities to sustain it. Surprisingly however, in a Southeast Asian context, particularly in discussions regarding “Indianization”,⁴ analyses of this kind are unfortunately lacking. This absence of the prerequisite demographic data seems all the more problematic when we consider the leading demographic archaeologist, Fekri A. Hassan’s comments on the subject who states, “We can no longer ignore the relationship between population and culture. Questions of human ecology and adaptation, which are central to many of the more recent discussions in archaeology, cannot be answered adequately without examining the role of demographic variables.”⁵

This article, therefore, proposes some initial methods and approaches to this issue and uses early Buddhism in the Khorat Plateau during the Dvāravatī period as a case study. It is hoped that this will stimulate debate and possibly new ways of looking, investigating and consequently understanding the development of early urbanization and the origins of civilizations in the region.

DVĀRAVATĪ AND ITS GEOGRAPHICAL EXTENT

Defining exactly what is meant by the term “Dvāravatī” is a somewhat problematic exercise and much debate and disagreement still surround the use and application of this term. A full analysis of this issue is beyond the scope of this discussion. However the following description is provided to clarify how the term is applied in this paper.

Put simply, Dvāravatī simultaneously refers to the beginnings of history in Thailand and the arrival of religious and cultural influences primarily from the South Asian subcontinent, specifically Buddhism, and to a lesser extent Brahmanism, into the region. The term has been used to describe an art style, a kingdom, an early state, a material culture and a chronological period.⁶ Early scholarship in the late nineteenth and early twentieth century envisioned Dvāravatī as a Buddhist kingdom holding sway over a geographical area that encompassed all of what is today modern Thailand.⁷ A large degree of projecting modern political, national and religious practices back onto the past was present in this definition. This claim was largely arrived at by matching the boundaries of the hypothesized kingdom and the extent of Dvāravatī style art.

In the last two to three decades, however, this view has been largely refuted by continual research into the period, be it archaeological, epigraphic or art historic. Today, there is a general consensus that the Dvāravatī political entity was restricted to central Thailand and spanned the sixth to ninth centuries CE.⁸ The question, however, of what this entity was is still open to debate. Most scholars have moved away from the idea that it was a centralized state and see it more as a loose confederation of urban centres, usually consisting of moated sites on the major river systems.

Dvāravatī art and material culture, however, had a larger geographical and chronological spread, being found throughout the Khorat Plateau and at sites such as ancient Haripunchaiya (modern day Lampun) in northern Thailand. Chronologically they span a period of the sixth to eleventh centuries, some 200 years longer than the evidence for their political

counterpart. The presence of Buddhism is also a key indicator of what can be termed Dvāravatī culture and, therefore, sites possessing Dvāravatī style Buddhist art, religious architecture or other forms of material culture such as fingermarked bricks, pottery or stucco usually become classified as Dvāravatī.

In this paper the term Dvāravatī is used to describe a common art style, material culture and the presence of Buddhism during the sixth to eleventh centuries CE based primarily in central Thailand but also in the Khorat Plateau and to a lesser extent in northern Thailand. By using the term Dvāravatī, it should be emphasized, however, that this paper does not support the idea that there was a central Dvāravatī political entity that held sway over all of the Chao Phraya Basin or the Khorat Plateau. Instead, it sees the political situation somewhat differently. The evidence to date from settlement patterns and the archaeological record points more to the emergence of urban centres located at moated sites along the major river systems or close to the coast. These sites may have exerted varying degrees of control over their surrounding hinterlands and perhaps smaller sites in their direct vicinity. However, it is unlikely that at any stage they controlled large areas of the region. The view of largely independent urban centres also raises the possibility of local rulers actively engaged in the patronage of Buddhism in return for the legitimization of their positions by high-ranking Buddhist monks.

The Khorat Plateau as defined in this paper encompasses the regions of northeast Thailand and Central Laos, the latter location consisting mainly of the lowland areas of Vientiane, Khammoune and Savannakhet provinces (Figure 3.1). This definition is somewhat wider than the more conventional one, which usually refers only to northeast Thailand. It is argued, however, that the definition presented here is valid as the modern political divide centring on the Mekong River distorts the geographical homogeneity of the region.⁹ Buddhism was free to spread along both sides of this river system since before the colonization of the region in the nineteenth and twentieth centuries the Mekong was a vital route of communication, transport and trade as opposed to a modern boundary between nation states.

The Khorat Plateau lies at an average height of about 170 metres above sea level and dominates the physical geography of the area. The Plateau is bordered by the Phetchabun and Dangrek Mountains ranges to the west and south respectively and to the north and east by the course of the Mekong River and the Truong Son Cordillera mountain range in central and southern Laos.

FIGURE 3.1
Map of the Khorat Plateau showing the major river systems
and mountain ranges



PATRONAGE AND DEMOGRAPHIC CONSIDERATIONS RELATING TO BUDDHIST MONASTICISM AND SOCIETY

A primary assumption of this paper is that Buddhism can usually only take hold in areas of sufficient socio-economic and urban development. This may initially seem at odds with certain perceptions of Buddhism which see it primarily as a religion based on the renunciation of society. However, as Greg Bailey and Ian Mabbett have shown, Buddhism as a phenomenon can be understood in at least three different ways: (1) as a religion that rejects the world; (2) as a religion engaged in public and political life; and (3) as a folk religion.¹⁰ All three are plausible definitions and to a certain extent considered together, encompass the concept of Buddhism as a whole. However, for the purpose of this paper I shall focus more on analysing and attempting to reconstruct certain aspects of the second version, that is, Buddhism and its place in the societies it finds itself within.

Looking at the *sangha* as it exists today for instance, it can be observed that it is almost entirely dependent on the communities and societies it finds itself within in regard to not only its daily needs in terms of sustenance and basic necessities such as clothing and utensils, but also in regard to the construction of monasteries and religious monuments. The richer and more developed a society or urban centre it finds itself within, then in theory the more donations and support it can receive from both the local population and the ruling elites.

At times, however, economics are not always the prevailing factor. As Jane Bunnag has shown, sometimes the relative wealth and standing of a monastery can be due to the presence of a charismatic monk who is able to build up not only a large following of lay believers and therefore donations, but is also able to attract new monks to his temple, thus increasing its size and ability to serve the community.¹¹ In fact Bunnag argues that in modern Thai Buddhism (in Ayutthaya at least) pastoral activities and conferring merit on the lay community were seen as much more appropriate roles for a Buddhist monk than the pursuit of personal salvation through meditation which was perceived as “selfish” by the lay community.¹² Louis Gabaude also observed similar perceptions using data from a study carried out in 2008 by the Office of National Statistics.¹³ The results show that of the 67,000 people surveyed over the age of thirteen, only 4 per cent of lay people practised meditation at least once a week, while 90 per cent thought that giving food to the monks was the most important activity.

Another major factor that goes a long way to determining the wealth and size of monasteries is whether or not they are recipients of royal or elite patronage. Tambiah points out that in a modern Thai context *wat luang* (royal temples) are usually famous, large, and also older than *wat raad* (commoner temples) and are under the patronage of aristocrats, top officials, and famous patrons.¹⁴ *Wat raad* on the other hand, are usually more recently established, smaller and tend to be supported by ordinary people, although in some cases they too can have well-to-do patrons. However, if *wat raad* manage to reach a large enough size or gain sufficient enough prestige they can apply to be upgraded to royal wats.¹⁵

The importance of patronage and donation on the one hand and pastoral activities and facilitating the means to gain merit on the other are key aspects in regard to the ability of a monastery to exist, expand and grow. Monks in the Dvāravatī period would have most likely been keenly aware of this dynamic. Therefore, we can envisage a situation where they would have consciously sought to develop these types of social relationships as a means of propagating the religion. Evidence for donative practices

and patronage during this period in the Khorat Plateau can be illustrated by two inscriptions in particular. The first, Inscription K404 from Baan Kaeng in Kaset Sombun district, Chaiyaphum province has been read and translated by Kaeokhlai.¹⁶ In her reading she states that the donor's name was Cudamani, a high-ranking lady or queen, and was a person interested with making beneficial karma and was known for her moral integrity and "dharma-filled wisdom". The second inscription was found on a *sema* stone from Baan Panna in Sakhon Nakhon province.¹⁷ It was discovered in the backyard of a local villager's house and given to the Ban Chiang Museum in 1997 for safe keeping. It is a two-line inscription in post-Pallava script, old Mon language dating to the ninth–tenth centuries and has been read by Weeraprajak.¹⁸ His translation states that members of the Mipa Suraya Family had donated doors and windows to build a new temple.

The practice of patronage and donation is much better attested in an Indian context. As John Guy points out, at times it was not only the elite who were making donations to temples, but merchant guilds, thus highlighting the importance and to a certain extent the incentive for Buddhism to settle in areas linked in to pre-existing and profitable trade routes.¹⁹ In the Khorat Plateau, these would have consisted of the major river systems, such as the Mun, Chi and Middle Mekong as discussed below.

Comparisons from Bharhut, Mathura and Sanchi in India are also informative in this regard. Gregory Schopen in a survey of inscriptions has shown that up to 40 per cent of donations at Bharhut were actually from monks, while at Mathura this figure is over 50 per cent, highlighting the fact that at certain times and locations in its history, the *sangha* possessed considerable wealth and resources.²⁰ Turning back to the Khorat Plateau, one inscription on a *sema* stone also casts light on this practice. The Hin Khon inscription (K388) has been interpreted by Woodward to represent a prince who had become a monk (*rājabhikṣu*). He not only dedicated four *sema* of high-quality stone but had also given large donations as well.²¹ If Woodward's interpretation is correct then we here have a simultaneous example of a member of royalty and the monkhood giving a donation to a monastic community.

In an attempt to gain a greater level of understanding regarding Buddhism during the Dvāravatī period, particularly concerning its extent and density, it is proposed here that modern ethnographic data from Thailand concerning the number of monks in society, or more precisely, the ratio of monks to lay people can be employed as a possible approach to explore this question. For instance Tambiah, using figures from the Manpower Planning Division of the National Economic Development Board of Thailand for

the year 1970, comes up with the following numbers; about 1.8 per cent of the male population were members of the *sangha*.²² Of this figure about 25 per cent were temporary monks as the data was taken during Buddhist lent so the actual figure for permanent members was about 1.35 per cent of the male population or about 0.67 per cent of the entire population. Novices on the other hand represented about 0.3 per cent of the entire population, or about 0.6 per cent of the male population.

More recently Gabaude has looked at this question in more detail using statistical data spanning the years 1927–2008.²³ All in all, his figures roughly correspond with Tambiah's projections. For instance in 1966 he calculates that out of a population of 100,000 people, 0.57 per cent were monks. However, what comes through extremely clearly in his statistics is the sharp drop in the monks to lay person ratio over the ninety-year period. For example, in 1927 the figure was at 1.17 per cent while by 2008 it had dropped to only 0.39 per cent. Alternatively, this can also be expressed as one monk per 85 people in 1927 compared to one monk per 251 people in 2008. The reasons and factors for such a drop are too numerous to be discussed in this article. However, it should be noted that the population of Thailand increased over fivefold during this period.

Further demographic studies have been carried out by Volker Grabowsky who uses a number of censuses from the first quarter of the twentieth century.²⁴ The census of 1904 covered approximately three-fifths of the population since it did not cover north or northeast Thailand, Grabowsky collected provincial censuses from this region instead, dating from 1899 to 1908. From this Grabowsky calculates that in the twelve districts (*monthon*) surveyed there were 3,308,032 people. Of this 51,064 were monks, which means they represented 1.54 per cent of the overall population at this time.

For the purposes of this study, the pre-1950s figures are deemed to represent the most reliable ethnographic comparative data. Post-World War II Thailand experienced rapid economic development and this in turn would have had quite an effect on the *sangha* and society in general. The figures from 1904, 1927 and 1937 on the other hand reflect those of a society that is still more agrarian-based and premodern to a certain degree, which would be particularly true of areas such as the Khorat Plateau. Therefore as a rough rule of thumb, I suggest that the monk to lay person ratio in the nineteenth to early twentieth century could be calculated at 1 per cent of the total population. This estimate also closely matches evidence gathered by Landon between 1932 and 1937, which gives a figure of 150,213 monks for a population of 14.5 million,

or just over 1 per cent.²⁵ Bearing the above factors and statistics in mind, it should be possible to analyse the archaeological record of given regions, sub-regions or specific urban sites in order to give hypothetical estimates for their population levels and consequently their potential to support the Buddhist *sangha*. For instance, an urban centre would need to be producing a sufficiently high surplus in terms of both agricultural produce and raw materials such as wood, brick, stone or even precious metals such as gold and silver. Furthermore, an urban centre would need a sufficiently large enough work force, so that there was the manpower available to commit to large-scale building projects such as stupas and monastery complexes. Another factor to consider is specialization of the work force. Societies and their urban centres need to reach a certain level of development before specialized professions emerge. The bronze casting ability exhibited by the sculpture from Baan Fai (Figures 3.2 and 3.3) and Baan Tanot, for example, both point to an extremely high level of technical and artistic ability. From this we can infer that a certain degree of specialization may have been reached and it is also possible to posit the existence of established workshops.

We now turn to a discussion of population estimates in the Dvāravatī period and in doing so propose approximate figures for numbers of monks present at certain settlements. In the following sections of this chapter I employ the 1 per cent monks to lay person figure proposed above as a guideline for calculating potential numbers of monks in the Dvāravatī period. I am effectively projecting modern statistical data back about ca.1,200 years to be used in conjunction with other plausible indicators for monastic numbers such as settlement size/population levels and quantitative analysis of *sema* stones. As stated at the outset, this methodology has its limitations and it should be noted that these are hypothetical estimates only and do not represent a “model” in the strictest sense of the word. It would therefore be best to understand the figures proposed below as representing possible scenarios for the period in question.

POPULATION LEVELS IN LATE PREHISTORY AND THE DVĀRAVATĪ PERIOD

In order to estimate the possible extent of Buddhist monasticism in regard to issues such as the number of monks present at sites during the Dvāravatī period, it is first necessary to propose population estimates for the regions and urban centres in question within the Khorat Plateau. Increase in population size during the formative stages of the development

FIGURE 3.2
A bronze Buddha image from the moated site of Baan Fai, Buriram
province today housed at the National Museum Bangkok



of civilizations has been highlighted by a number of scholars as extremely influential and more often than not the “prime mover” in regard to urbanization.²⁶

Firstly, a note of caution should be mentioned regarding archaeological methods of estimating populations as they are far from fail-safe and

FIGURE 3.3
A bronze bodhisattva image from the moated side of Baan Fai, Buriram province today housed at the National Museum Bangkok



represent approximations only. Bayard for instance states that these methods can be unreliable but does concede we should still undertake such estimates even with imprecise variables if only to highlight errors in our prior assumptions or the inadequacy of our present datasets.²⁷ Hassan on the other hand is somewhat more positive and points out that, even if accurate figures are not attainable, it is much more preferable to have

rough estimates than nothing at all as these can still be informative.²⁸ Likewise, the works discussed below on this subject do not represent exact figures but are considered reliable enough in their calculations to make this study feasible in regard to drawing conclusions regarding early Buddhist monasticism in the region.

A number of overall estimates regarding population sizes can be drawn from comparative and ethnographic studies which allow for certain “ballpark” figures to be reached. For example, Hassan’s review of the archaeological methods used to calculate site size based on numbers of households present and floor space required, arrives at a figure of 4.55m² of living space per person.²⁹ Another method is to use a formula to estimate the number of inhabitants of a village or town. This can be shown as follows:

$$\text{Number of inhabitants} = \text{constant} \times \text{site area}$$

The constant in this case is the number of persons per unit of a site area determined from modern village or town statistics. Colin Renfrew, using this method, for example, estimates that the population in the late Bronze Age Aegean was about 300 persons per hectare. As will be seen below this estimate is considerably higher than that given for Thailand.³⁰ Some of the best examples, however, of reconstructions of regional population sizes are those from Mexico and Mesopotamia.³¹

Turning our attention back to Southeast Asia, Charles Higham and Rachanie Thosarat have proposed a number of population estimates for areas and sites in the Khorat Plateau during the prehistoric period.³² In discussing sites in the Chi river system they argue that with the coming of the Iron Age there is evidence for a rapid growth in population with settlements proliferating, some of which grew to be up to ten times larger than those in the Bronze Age. Citing the site of Baan Chiang Hian in Mahasarakam province as an example, they suggest that this 38.5 hectare site, with its area clearly defined by multiple moats, had a population of around 2,000 people. This figure is arrived at by assuming a population density of 50 people per hectare which is consistent with the estimates given above by Hassan. Furthermore, Chantaratiyakarn, having surveyed the surrounding landscape and settlement patterns argues that there would have been sufficient availability of rice land to sustain a population of 2,000 people at Baan Chiang Hian.³³

Higham and Thosarat have also argued that the Iron Age site of Non Chai which had an area of over 38.5 hectares, stood 15 metres above the surrounding area and was excavated under the direction of Pisit

Charoenwongsa in 1977–78, may have had a population that “comfortably exceeded a thousand people, considerably larger than any known Bronze Age settlement”.³⁴

David Welch and Judith McNeil in their surveys of the Phimai area arrive at similar figures to Higham and Thosarat.³⁵ The authors looked at the relationship between three mutually dependent factors: population growth, the intensification of the agricultural system and centralization.³⁶ In order to investigate these issues they carried out two field surveys, KBAP1, a 300 square kilometre survey around Phimai in 1979–80 and KBAP2 a 700 square kilometre survey in 1989. They found five phases of occupation stretching from 1,000 BCE–1,300 CE.³⁷

During the Prasat Phase (600–200 BCE) they argue that in the alluvial plains the population density “almost certainly reached 30 to 40 persons/km² and may have reached as high as 50”. Furthermore, using modern yields as estimates, they project that flooded field farming could actually support a population of 75 to 125 persons/km².³⁸ By the classic Phimai phase (200 BCE–300 CE) population levels on the alluvial plain had reached 70 to 80 persons/km² and 30 person/km² on the terraces. The authors argue that the concentration of the population into large settlements of up to 2,000 people during this phase most likely encouraged further intensification of agriculture to produce sufficient yields.³⁹

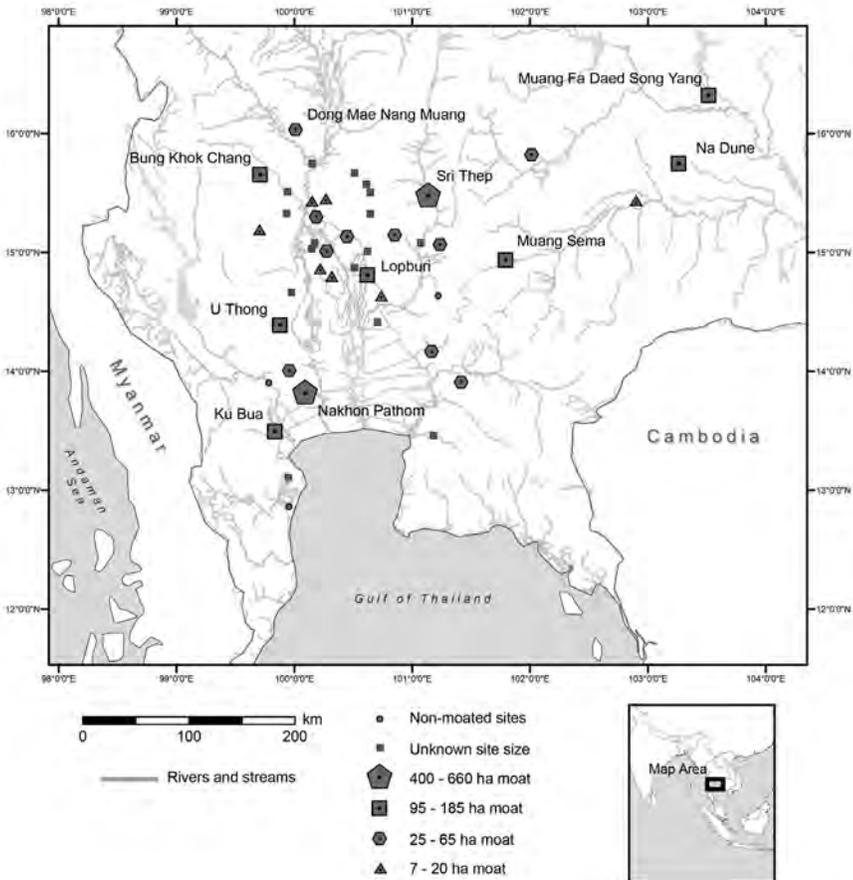
They further state that late prehistoric period farmers transformed the natural environment to a significant degree. Large sections of the floodplain and low terraces were transformed from wild grasslands to banded fields for rice cultivation with the authors concluding that, “The pattern of settlement through all phases reflects the basic dependence of Phimai region settlements on wet rice agriculture”.⁴⁰

The authors estimate that approximately fifty people were living on each hectare of each habitation site.⁴¹ They based this estimate upon village population densities during the period of their surveys (i.e. 1979–89) and assume that the needs of prehistoric villagers would have been similar to those today in terms of utilization of space. A detailed explanation of their population estimate technique is available in Welch’s PhD thesis.⁴²

Both Higham and Thosarat and Welch and McNeil are in agreement that by the late Iron Age/early Dvāravatī period, settlements could have possessed populations of around 2,000 people or more and that the intensification of farming, particularly in alluvial areas would have produced sufficient yield to support these habitations. As a rule of thumb, both also settle on a figure for the occupation of habitation sites at fifty people per hectare. Therefore, a 40 hectare site, the average size of a Dvāravatī moated

settlement (see Figure 3.4) could support up to 2,000 people. Mudar, in her study of Dvāravatī settlements and site hierarchies in Central Thailand, has calculated that a 70 hectare site using transplanted wet rice agriculture would need a 2 kilometre radius catchment area to produce sufficient yield to sustain such a population.⁴³ Therefore a 40 hectare site would need just under a 1 kilometre catchment area to sustain its population. A site such as Muang Sema for example could initially have had a population of about 1,900 people (38 hectares) before it expanded in size probably

FIGURE 3.4
Map showing the major Dvāravatī moated sites in central and northeast Thailand and their size in hectares. Courtesy of Matthew D. Gallon.



in the Khmer period to 150 hectares resulting in its population possibly growing to about 7,500 people.

Similarly Muang Fa Daed, at 170 hectares could have had a population of around 8,500. Sri Thep and Nakhon Pathom, the two largest Dvāravatī period sites both measure just over 600 hectares and would therefore give population estimates of about 30,000 people. However, perhaps only the inner moated area at these two latter sites functioned as the main urban settlement. If so the figures could be considerably less and perhaps more in line with Muang Sema or Muang Fa Daed.⁴⁴

Interestingly in the one example where there is epigraphic evidence for population levels, the figures appear to fit very closely to that of the population estimates proposed above. A twelfth century inscription (K966) discovered at the site of Dong Mae Nang Muang in Nakorn Sawan province, mentions a local king named Sunat, who ruled at the city of Thanya Pura (modern day Dong Mae Nang Muang). Dated to 1167 CE, it states the population of the city was exactly 2,012 people and defines the geographical boundary of the city itself. It is written in Khmer on one face and Pali on the other, and its first translation was published in 1956.⁴⁵ Dong Mae Nang Muang is approximately 40 hectares in size; so using the fifty persons per hectare estimate, this would give a population of 2,000 people, matching almost exactly the number stated in the inscription.⁴⁶

By combining population density figures from a sample of nine moated sites with the modern ethnographic and statistical data on monks to population ratios calculated above at 1 per cent, a number of proposed estimates can be arrived at as illustrated in Table 3.1.⁴⁷

TABLE 3.1
The Size, Proposed Population Density and Estimated Number of Monks at Nine Dvāravatī Moated Sites in the Khorat Plateau

<i>Site</i>	<i>Hectares</i>	<i>Population density</i>	<i>No. of Monks</i>
Muang Sema	150	7,500	75
Muang Fa Daed	170	8,500	85
Roi Et	120	6,000	60
Baan Fai	38.5	1,925	20
Baan Korn Sawan	100	5,000	50
Baan Pa Khiap	70	3,500	35
Khantarawichai	100	5,000	50
Baan Nohn Muang	38	1,900	19
Baan Chiang Haeo	328	16,400	164

On the grounds of these estimates, Dvāravatī moated sites on the Khorat Plateau could hypothetically have a minimum population of around 1,900 people and a maximum of up to 16,400. Subsequently, even the smallest sites such as Baan Nohn Muang could have been able to support at least nineteen monks. Large-scale sites such as Muang Fa Daed or Baan Chiang Haeo could have supported anywhere up to 85–164 monks. Overall the figures illustrate that by the eighth to ninth centuries there could have been large numbers of monks present at the moated sites with the nine settlements discussed above alone potentially totaling 558 monks. Furthermore, I have recorded forty-five Dvāravatī moated sites in the region (Figure 3.5). Allowing for the possibility that monastic Buddhism was present at the majority of them, and taking the average monks per site at an amount averaged out from those in Table 3.1 we arrive at a figure of sixty monks per site or hypothetically approximately 2,700 monks spread out over these forty-five moated sites. This is to say, the region would have had the potential to support a figure in the region of 2,700 monks.

How do these figures compare to the archaeological record in terms of the quantity of artefacts attesting to the presence of Buddhist monasticism? In order to investigate this question, the discussion now turns to Dvāravatī *sema* stones from the Khorat Plateau.

SEMA STONES AND THE DISTRIBUTION OF BUDDHISM IN THE KHORAT PLATEAU

The figures given in Table 3.1 require as a prerequisite the ability to identify clearly defined settlements (in this case almost exclusively moated sites) which in turn allows for the size of the site to be measured. However, in some instances this is not always possible and as a result we need to turn to other forms of evidence in our attempts to calculate and correlate the density of Buddhism.⁴⁸ In the case of the Khorat Plateau this comes in the form of *sema* stones (Figure 3.6).

Sema are monumental stone objects which with 110 sites and over 1,200 of these objects documented to date, provide a unique means of tracking the spread and location of Buddhist monasticism in the Khorat Plateau during the Dvāravatī Period.⁴⁹ Combined with the demographic archaeological approaches above, they provide an additional quantitative dataset with which to analyse the extent and location of monastic Buddhism during the period in question.

The function of *sema* stones are to demarcate Buddhist monastic ritual space, thus creating a boundary (in Pali referred to as a *sīmā*⁵⁰ which is also

FIGURE 3.5

Map showing the distribution of moated sites in the Khorat Plateau in blue and earthen mounds in yellow. Sites mentioned in this article; M1, Baan Korn Sawan; M5, Roi Et; M8, Baan Nohn Muang; M13, Muang Fa Daed; M14, Muang Sema; M19, Kantharawichai; M27, Baan Chiang Haeo; M28, Baan Pra Khiap; M41, Baan Muang Fai; E5 Baan Tat Tong

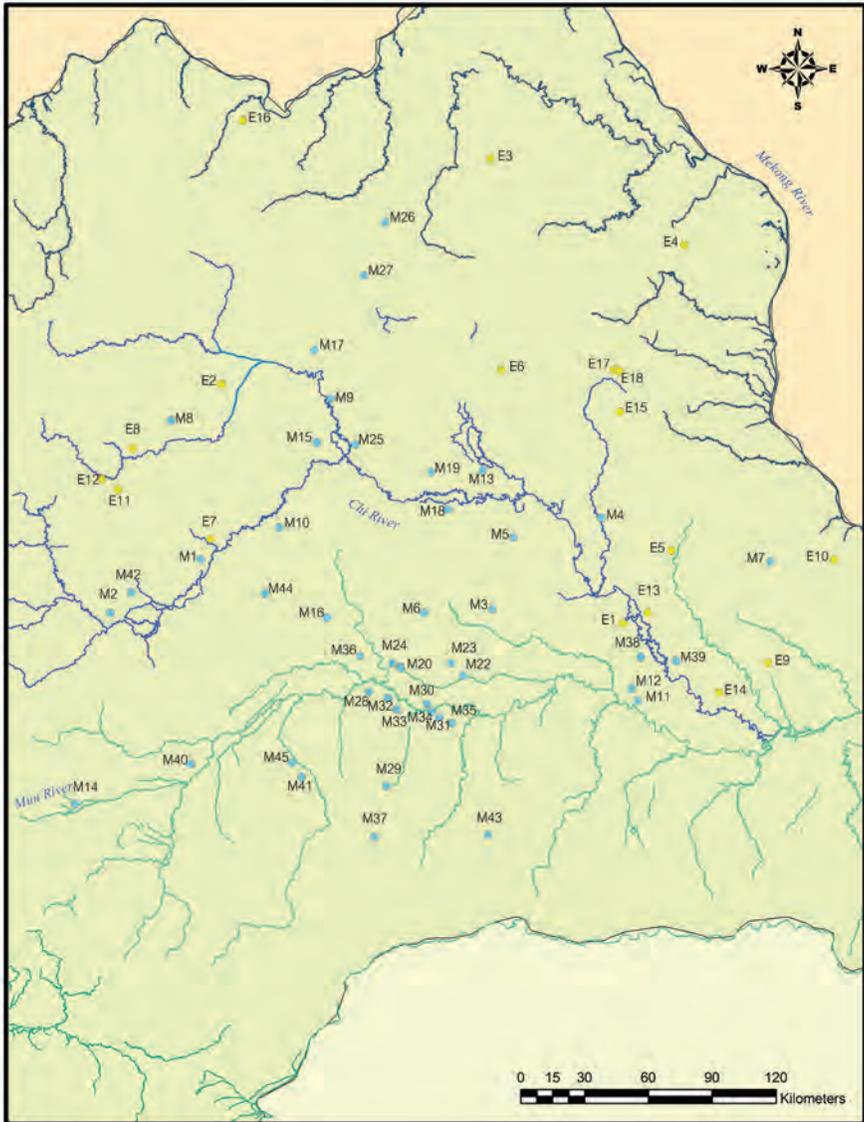


FIGURE 3.6
A slab type Dvāravatī *sema* stone with a stupa-*kumbha* motif
from Yasothon province



the etymological origin of the Thai term *sema*). During the Dvāravatī period they were usually placed around *ubosots*, stupas and sometimes Buddha images.⁵¹ Therefore, the existence of *sema* at a site is a clear indication that during a certain period of time a functioning Buddhist community was located there. Furthermore, in many cases, religious architecture such as *ubosots* and *vihāras* do not survive as they were usually made of perishable material such as bamboo and straw weave.⁵² *Sema*, on the other hand, being made of a durable substance, survive to this day.

We can therefore use the amount of *sema* present to give an approximate indication of the size of a Buddhist community, or more accurately the number of possible consecrated boundaries present. There are a number of problematic variables with such an assumption, however. For example, the proposal that the amounts of *sema* surviving today reflect a close approximation to the amounts present during the Dvāravatī period is far from certain as it is difficult to estimate with any certainty the actual percentage of *sema* that may have existed at that time. This is due to the fact that *sema* can be made from a variety of materials, such as wood or natural features such as rivers, streams, trees or even anthills, all of which are perishable and are therefore undetectable in the archaeological record today. *Sema* can also be placed underground, again making them difficult to detect.⁵³

Another problematic factor is that the numbers used to set up a consecrated boundary can vary from site to site and perhaps even within a site itself. Furthermore, it is probable that not all consecrated boundaries were functioning simultaneously, thus causing additional possible discrepancies when proposing approximate figures. However, despite these issues and when taken into consideration with the above discussion on population densities and monk to layperson ratios, the following proposed figures on possible sizes of Buddhist monastic communities should at least give an approximate indicator of how extensive monasticism could have been in the period in question (Table 3.2).

Firstly, at some sites which consist of only earthen mounds, between eight to fifteen *sema* can be present and can be taken to indicate the existence of a local monastery located within a small rural community. Extensive moated sites such as Muang Fa Daed on the other hand, have over 170 *sema*, indicating that there was a large-scale Buddhist community present (see Table 3.2). Furthermore, the presence or absence of artwork on *sema* may be seen as an important indicator as to the level of Buddhism present. *Sema* carved with high quality Buddhist art, usually *Jātaka* tales or Life of the Buddha stories (Figure 3.7) may represent well developed Buddhist communities receiving active patronage from lay-believers and local rulers. *Semas* lacking art or designs of any considerable artistic merit on the other hand, could be said to represent less well developed Buddhist communities, the theory being that in the Dvāravatī period at least, that they were not receiving patronage sufficient enough to support either an artistic workshop or employ the requisite skilled labour and provide the necessary resources.

FIGURE 3.7

Two fragmentary *sema* from Muang Fa Daed depicting an unidentified *jataka* kept at Wat Po Semaram temple (left) and an episode from the Life of the Buddha housed at Khon Kaen National Museum (right)



Distribution and Groups

Looking at the distribution of *sema* locations throughout the Khorat Plateau, the first clear pattern to emerge is that they can be grouped into three general geographic areas. They are; the Chi river system, the Mun river system and the Middle Mekong.⁵⁴ These river systems dominate the geographical landscape of the Khorat Plateau and it follows that the location of *sema* are closely tied to them (Figure 3.8).

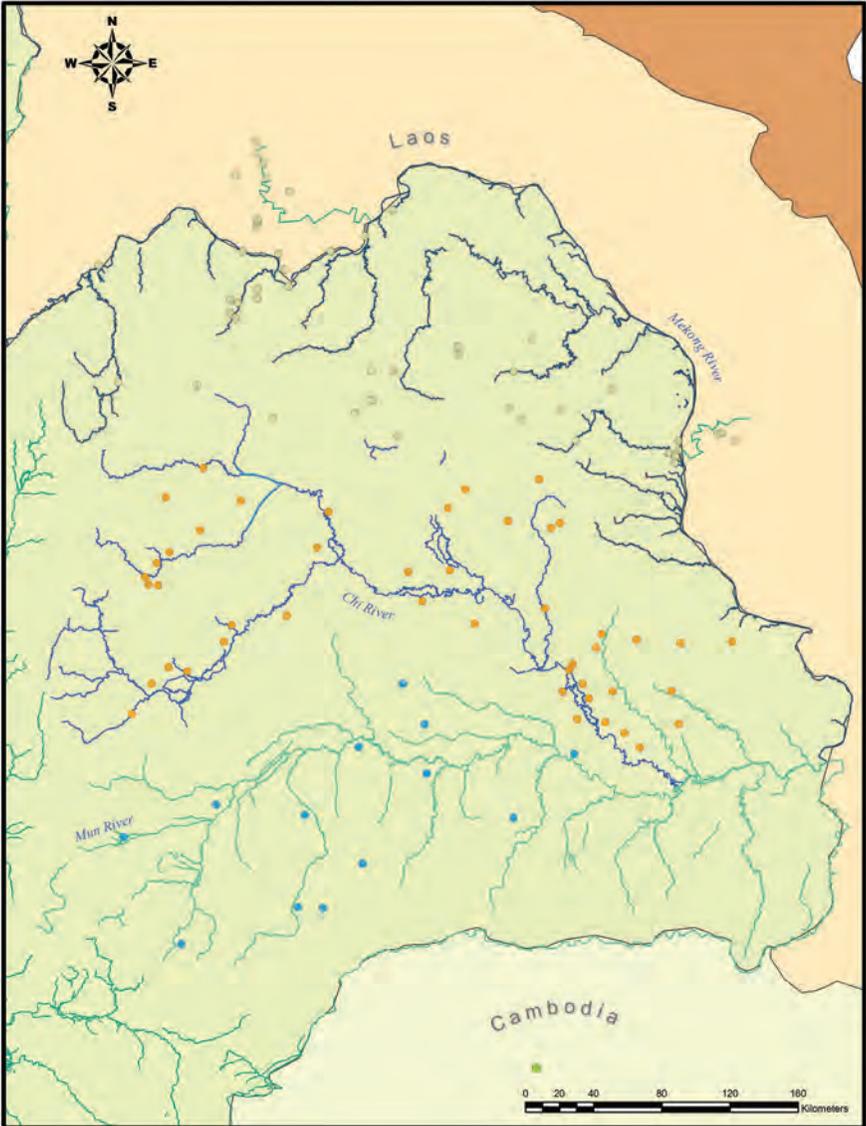
In terms of distribution by amounts, the Chi and Middle Mekong river systems have almost identical proportions of sites. Out of the 110 sites surveyed, 48 are located along the Chi river system, 49 are in the Middle Mekong and 12 are located along the Mun river system.⁵⁵ In percentage terms, the Chi possesses 44 per cent of *sema* locations, the Middle Mekong possesses 45 per cent while the Mun possesses 11 per cent.

The Chi River System

The distribution of sites along the Chi river system spans the entire length of its course from Chaityaphum in the west of the Khorat Plateau to its

FIGURE 3.8

Map showing the distribution of *sema* locations throughout the Khorat Plateau with the Chi river system shown in orange, the Mun river system in blue, the Middle Mekong in grey and Phnom Kulen in green



confluence with the Mun River in Ubon Ratchathani province in the east. The largest concentration of sites is located in the area surrounding the province of Yasothon, however significant amounts of sites are also found in Kalasin, Khon Kaen and Chaiyaphum provinces.

Looking at the distribution of sites along the Chi river system it is clear that the location of *sema* sites follow the course of this river and its tributaries. In Yasothon and Chaiyaphum in particular, sites are seen stretched out along the Chi River in close proximity to each other.

The Mun River System

This group exhibits much fewer sites. However, they are closely tied to and dependent on the Mun River and its tributaries. Apart from one site in Sri Saket province and another in Surin, the majority of sites are in either Buriram or Nakhon Ratchasima province. Sites in this region are located further apart than those found in the other two groups and *sema* are much less prevalent in this area than in the rest of the Khorat Plateau. This could be as a result of the much stronger Khmer or possibly Chenla influence in the region.⁵⁶

The Middle Mekong

The Middle Mekong shows a less uniform distribution pattern. However, most sites are located either close to the Mekong River or on tributaries of it. For instance, the area around Vientiane province shows that sites cluster along the Nam Ngum River while on the southern side of the Mekong there is also a high concentration of sites around the area of Baan Phue district in Udon Thani Province. Sites in the Middle Mekong group stretch from Wang Sapung in the province of Loei in Thailand to three locations in Savannakhet province of Laos.⁵⁷

As with the Chi and Mun Rivers, the majority of *sema* locations in the Middle Mekong closely follow the course of this river and a number of its tributaries, once again emphasizing the important role waterways and pre-existing trade routes played in the dissemination of this tradition.

Sema Clusters

By separating the locations of *sema* into three clear groups we can analyse their distribution patterns and characteristics. It is clear that the Chi river

system in particular played a major role in the transmission and development of the *sema* tradition with many of the largest and most important sites, such as Muang Fa Daed, Baan Tat Tong and Baan Korn Sawan being located along its course.

Having divided *sema* locations into three distinct groupings, a closer analysis of distribution patterns allows for a subdivision into clusters (Figure 3.9). A total of eight clusters have been proposed with four of them being located along the Chi river system, three being located along the Middle Mekong and one along the Mun.⁵⁸ Certain sites, however, do not fit within the clusters and as a result are treated individually.

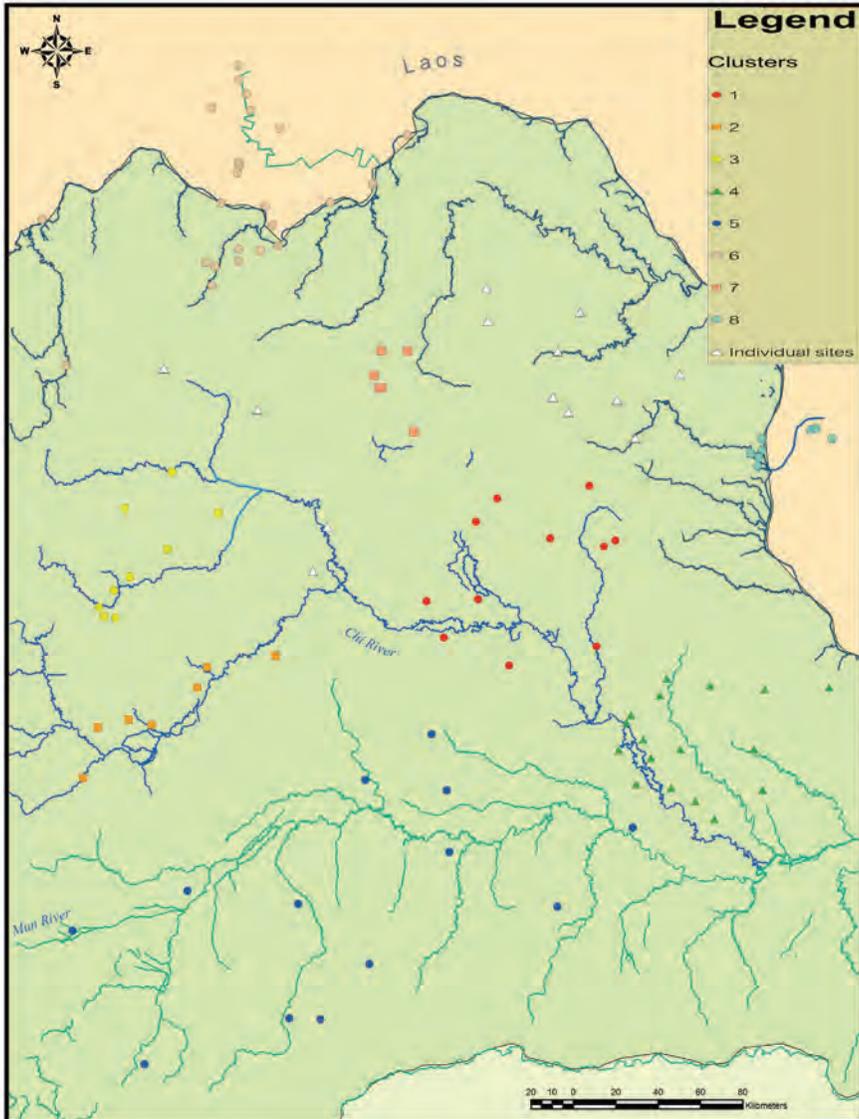
***Sema* Amounts and a Quantitative Analysis of Buddhist Monasticism**

Analysing the amounts of *sema* present at individual sites and at clusters (Table 3.2, Figure 3.10) can allow for certain estimates of the extent and size of Buddhist monastic communities to be made. For example, *sema* were usually set up in pairs of eight or sixteen. It is therefore possible to propose that a site with thirty-two *sema* present may have had either four or two consecrated boundaries, depending on whether we consider *sema* being set up in sets of eight or sixteen.

If we take cluster 1 for example, the total amount of *sema* present is 369. Muang Fa Daed alone has 172, which would give twenty religious buildings or consecrated spaces if eight *sema* per boundary were used, or ten if in sets of sixteen. Taking the cluster as a whole would give a figure of forty-six (for eight) or twenty-five (for sixteen) consecrated spaces, be they stupas, *ubosots*, *vihāras* or open air ritual spaces. This therefore represents a significant Buddhist presence in the area defined by this cluster.

Using similar calculations, cluster 2 would have between eleven and nineteen consecrated spaces, cluster 3, between ten and fifteen, cluster 4 between seventeen to twenty-seven, cluster 5 between eleven and seventeen, cluster 6 between twenty-three and thirty-two, cluster 7 between two to three and cluster 8 about four. Taking *sema* stone numbers as a whole throughout the entire Khorat Plateau would give a figure of between 109 to 170 consecrated spaces. Taking this postulation one step further by taking modern figures into consideration where in one instance it is stated that a consecrated space must be able to accommodate up to twenty-four monks,⁵⁹ then using the above figures we would arrive at between approximately 2,600 to 4,000 monks present in the Khorat Plateau during the Dvāravatī period. This figure, however, not only assumes that all sacred boundaries

FIGURE 3.9
Map showing the distribution of *sema* clusters in the Khorat Plateau



were functioning simultaneously which is most likely not the case but also that there was a set limit to the amount of monks that could be present with the consecrated area. There are too many variables present to take this figure as an accurate indication. However, when compared with the

TABLE 3.2
The Eight Sema Clusters in the Khorat Plateau Showing the Sites,
Number of Sema Present and the Estimated Number of
Consecrated Spaces

<i>Site</i>	<i>No. of sema</i>	<i>No. of boundaries if 8 sema are used</i>	<i>No. of boundaries if 16 sema are used</i>
Cluster 1			
Muang Fa Daed	172	20	10
Baan Sohksai	7	1	1
Baan Nong Hang	23	3	1
Baan Na Ngam	5	1	1
Baan Sangkhom Phathana	4	1	1
Nah Goh	30	4	2
Baan Muang Phrai	37	4	2
Roi Et Town	40	5	2
Khantarakwichai	6	1	1
Mahasarakham Town	38	5	2
Baan Kud Namkin	1	1	1
Baan Non Sala	6	1	1
	Total: 369	47	25
Cluster 2			
Baan Po Chai	39	5	2
Non Sema Fa Rangeum	5	1	1
Baan Kut Ngong	27	3	2
Baan Nong Kai Non	15	2	1
Baan Nong Hin Tang	8	1	1
Muang Gao	6	1	1
Baan Korn Sawan	46	6	3
	Total: 146	19	11
Cluster 3			
Baan Non Muang	19	2	1
Baan Phai Hin	9	1	1
Baan Non Chat	14	2	1
Baan Bua Semaram	14	2	1
Baan Non Song	6	1	1
Baan Hua Kua	3	1	1
Baan Nong Hin Dtang	6	1	1

Baan Pao	2	1	1
Baan Phan Lam	21	3	1
Baan Kaeng	10	1	1
	Total: 104	15	10
Cluster 4			
Yasothon Town	13	1	1
Baan Tat Tong	26	3	1
Baan Song Beuoy	3	1	1
Baan Hua Muang	10	1	1
Baan Beung Gair	6	1	1
Baan Goo Jahn	1	1	1
Baan Nahm Kum Yai	1	1	1
Baan Koom Ngern	19	2	1
Phanom Phrai Town	4	1	1
Baan Puey Huadong	48	6	3
Mung Ngio	9	1	1
Baan Nah Mo Ma	16	2	1
Muang Samsip	23	3	1
Baan Phana	10	1	1
Baan Pai	u/d	0	0
Baan Si Bua	3	2	1
Baan Thung Yai	u/d	0	0
	Total: 192	27	17
Cluster 5			
Na Dun	5	1	1
Baan Salaeng Thon	0	0	0
Baan Brakum	3	1	1
Baan Muang Fai	1	1	1
Baan Pra Khiap	46	6	3
Phu Phra Angkhan	15	2	1
Muang Sema	17	2	1
Baan Nohn Sung	16	2	1
Baan Lopmohk	4	1	1
Baan Muang Dao	u/d	0	0
Baan Nong Pai	u/d	0	0
Baan Thung Wang	u/d	0	0
Baan Truem	8	1	1
	Total: 115	17	11

continued on next page

TABLE 3.2 — *cont'd*

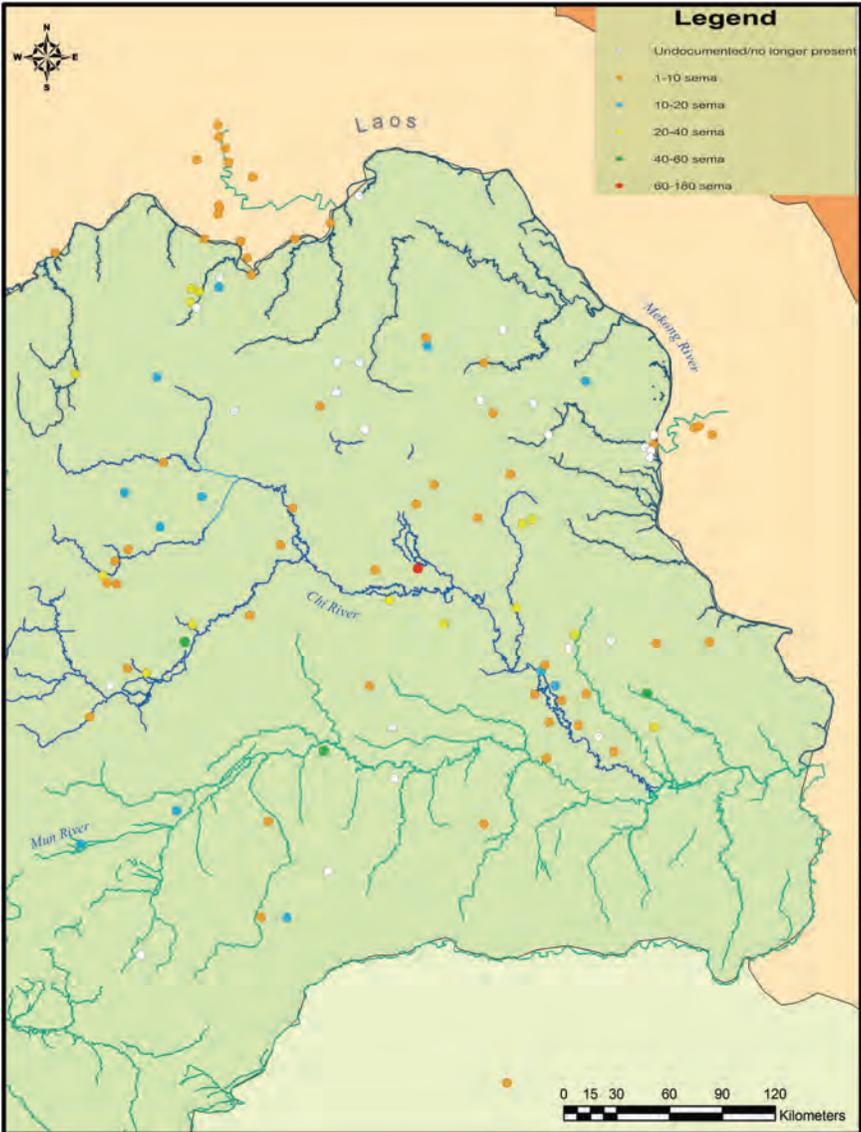
<i>Site</i>	<i>No. of sema</i>	<i>No. of boundaries if 8 sema are used</i>	<i>No. of boundaries if 16 sema are used</i>
Cluster 6			
Baan Nong Kluem	22	3	1
Baan Hin Dtang	12	1	1
Wang Sapung	35	4	2
Phu Phra Baht	37	5	2
Baan Pailom	33	4	2
Baan Podhidtahk	10	1	1
Baan Daeng	u/d	0	0
Baan Na Sone	3	1	1
Baan Nong Khan Khu	2	1	1
Baan Hai	9	1	1
Baan Simano	4	1	1
Baan Thoun Loua	4	1	1
Baan Nong Khon	4	1	1
Baan Nam Pot	4	1	1
Baan Thalut	1	1	1
Baan Muang Kao	1	1	1
Baan Viengkham	4	1	1
Baan Sa Feu	4	1	1
Baan Somsanouk	4	1	1
Vientiane City	9	1	1
Muang Sanakham	1	1	1
Wiang Khuk	1	0	0
Baan Khok Khon	0	0	0
Baan Peng Chan	0	0	0
	Total: 204	32	23
Cluster 7			
Baan Don Kaeo	10	1	1
Baan Chiang	5	1	1
Nong Hahn Town	0	0	0
Phang Khon Sai	u/d	0	0
Baan Cham Pi	u/d	0	0
Baan Khon Sai	u/d	0	0
	Total: 15	2	2

Cluster 8			
That Panom Town	9	1	1
Baan Sikhai	7	1	1
Baan Kang	9	1	1
Baan Na Mouang	8	1	1
Baan Lak Sila	u/d	0	0
Baan Fang Daeng	u/d	0	0
Baan Saphang Thong	u/d	0	0
Baan Na Ngam	u/d	0	0
	Total: 33	4	4
Individual sites			
Baan Ma	16	2	1
Poo Noi	14	2	1
Baan Tah Wat	15	2	1
Baan Tah Krasoem	5	1	1
Baan Sri Than	1	0	0
Baan Na Oi	u/d	0	0
Baan Na-ang	u/d	0	0
Phon Phaeng	u/d	0	0
Baan Panna	u/d	0	0
Phnom Kulen	10	1	2
Baan That	u/d	0	0
Baan Choeng Doi	u/d	0	0
Baan Phu Phek	u/d	0	0
Baan Oop Mong	u/d	0	0
	Total: 51	8	6

Note: “u/d” stands for “undocumented” and represents sites where it was not possible to document exact *sema* numbers.

estimates given in Table 3.1 which outlines the demographics which gives a figure of a 2,700 strong *sangha* averaged out over the forty-five moated sites, the lower value of 2,600 may be plausible. It should, however, be noted once again that this figure reflects just one possible scenario and as has been stressed throughout, there are too many variables to consider this as a hard and fast number. Despite this, it seems fair to say that Buddhism had established a strong and widespread presence by the eighth to ninth centuries CE regardless of what the actual exact figure of monks may in fact have been.

FIGURE 3.10
Map showing the distribution of the amount of *sema* per site.



Looking at the distribution of Buddhist monasticism from this quantitative approach, it becomes clear that cluster 1 has the highest density and points to it being the most prominent centre of monastic activity in the Khorat Plateau. Cluster 6 also shows high numbers of potential consecrated

spaces emphasizing that Buddhism had taken a strong hold along the Middle Mekong region. Also clusters 2, 3 and 4 show mid-range figures in comparison, illustrating that the religion had also settled in these areas, but perhaps not in as high a concentration as clusters 1 and 6.

Narrative Art and Its Distribution

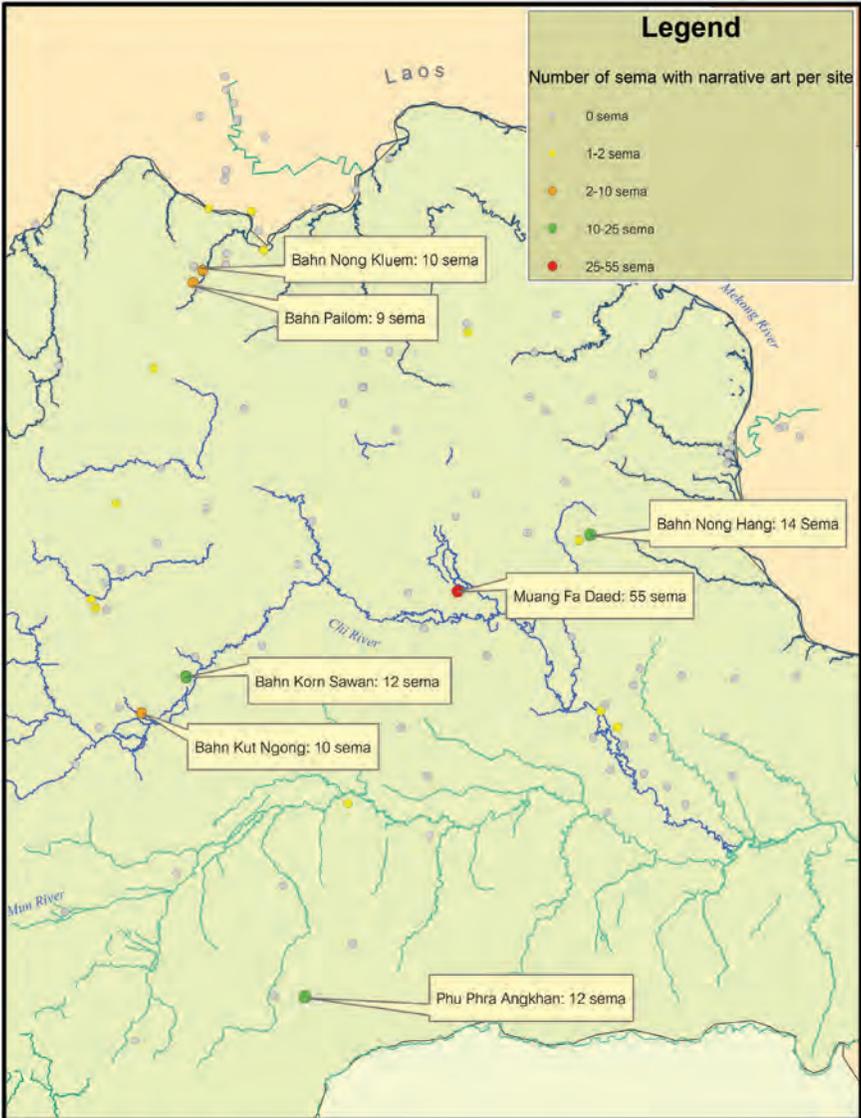
The final aspect of material culture to be quantitatively analysed is the narrative art on *sema* stones. While the majority of previous studies on *sema* have focused on the narrative art carved on these objects from an aesthetic or iconographic point of view, little to no consideration has been given to the distribution of this art, the contexts within which it was produced or the actual number of *sema* that have narrative art in relation to those that do not.⁶⁰ However, upon plotting the locations of narrative art, it becomes immediately apparent that it has a very limited and restricted distribution, being confined to no more than nineteen sites in total. Of these nineteen sites, only six sites have more than ten *sema* with narrative art and only one site, Muang Fa Daed, has more than fifteen (Figure 3.11). Another factor to consider is that plain *sema* and *sema* carved with other motifs such as stupas and stupa-*kumbha* outnumber *sema* with narrative art at a ratio of approximately 10:1. Consequently, *sema* with narrative art should be viewed as the exception not the norm, a perspective that does not always come across in most literature on the subject.

The distribution of narrative art closely follows three clusters in particular. The sites of Muang Fa Daed and Baan Nong Hang in cluster 1 possess the highest number of *sema* of this kind. Muang Fa Daed has fifty-five *sema* with narrative art, Baan Nong Hang, has fourteen and Kunchinarai has one *sema* of this type. This cluster therefore has a total of seventy *sema* with narrative art, by far the highest concentration anywhere in the Khorat Plateau.

The second largest concentration is found in cluster 2. Baan Korn Sawan has twelve *sema* with narrative art while Baan Kut Ngong has ten, giving twenty-two in total. The vast majority of the narrative art on *sema* from clusters 1 and 2 date to the eighth to ninth centuries, with some examples from Muang Fa Daed and Baan Nong Hang also dating to the tenth to eleventh centuries.⁶¹ Therefore, these two clusters, located along the course of the Chi River, clearly reflect the region in which the art of the *sema* tradition reached its apex.

The sites of Baan Nong Kluem and Baan Pailom in cluster 6 reflect a further significant grouping of narrative art. However, they are later in

FIGURE 3.11
Map showing the distribution of narrative art showing
the amount of *sema* present at key sites



date, *circa* tenth to eleventh centuries and are stylistically different from the majority of other examples, being executed in a style similar to Khmer lintel art. The two sites combined have a total of nineteen narrative art *sema*. The narrative art, their close proximity to each other and artistic

style strongly suggests that the same workshop or artists were responsible for the carving at both sites.

The site of Phu Phra Angkhan in cluster 5 is unusual from the point of view that no other sites in its proximity have narrative art. Also, the art depicted, mainly consisting of Buddha and bodhisattva images, is quite unique stylistically. It is therefore somewhat of an outlier in the distribution of narrative art. The remaining eleven sites possess either one or two *sema* with narrative art and therefore do not represent significant clustering of this tradition. However, their distribution is still informative in revealing how far the medium of narrative art spread throughout the Khorat Plateau. Sites such as Baan Podaak and Vientiane City reveal that narrative art had spread as far north as modern day Laos while the site of Baan Kum Ngoen in Yasothon shows that it was also present to a very limited extent in cluster 4.

From the analysis of the distribution of narrative art, it is most probable that this tradition originated in clusters 1 and 2, with perhaps Muang Fa Daed as the centre. It appears to have flourished here from the eighth century onwards and to a very limited extent spread out amongst other sites throughout the Khorat Plateau.

CONCLUSION: TOWARDS A DEMOGRAPHIC UNDERSTANDING OF BUDDHISM DURING THE DVARVATI PERIOD

This article has endeavoured to illustrate that the Khorat Plateau during the Dvāravatī period had the potential to support a comparatively large and well-developed Buddhist *sangha*. By using comparative statistical and ethnographic data on Buddhism in Thailand over the last century combined with techniques derived from demographic archaeology to calculate hypothetical population densities at settlements, it has proposed estimates of the possible size of the *sangha* during this period. The figure arrived at is that there could have been approximately 2,600 monks present during the Dvāravatī period or at the very least the Khorat Plateau had the potential to support this amount.

Approaching early Buddhism in this way also allows for a number of other conclusions to be drawn. In terms of density, it appears that the monks may have been settled primarily in the Chi river system around cluster 1 in particular, but also clusters 2, 3, and 4 to a lesser extent. This is also supported by the artwork on *sema* from these clusters as the majority of narrative art is once again from this region. It seems, therefore, that Buddhist monasticism flourished in the Chi river system during the

Dvāravatī period, based as it was, at large moated sites such as Muang Fa Daed. This site, having a possible population of over 7,000 people, would not only have had sufficient human resources to allow for specialization of crafts and skills, but also would have had a large enough pool of males, assuming there was no female ordination at the time, to allow a certain number of them to enter into the *sangha* without putting too much strain on the population and workforce of the settlement. Other large-scale sites such as Muang Sema in the Mun river system also had the potential to support a large monastic community but while Buddhism flourished at this site, there are only a handful of other sites in this river system that show evidence that the religion developed into more organized administrative units. It may well have been present at other sites to a lesser extent but if so, there is no clear archaeological evidence to illustrate this at present. Buddhism also spread along the Middle Mekong with *sema* being found as far north as Baan Talad in Vientiane province and as far south as Savannakhet province of Laos.

It appears that Buddhism had taken a firm hold in the Khorat Plateau during the Dvāravatī period with moated sites in particular having the potential human and material resources to allow for this religion to flourish. This in turn allowed for the creation of artistic masterpieces such as the *Jātaka* and Life of the Buddha scenes carved on *sema* stones, or the magnificent Buddha and Bodhisattva images cast in bronze. In doing so, they bequeathed us some of the finest Buddhist art to have ever been produced in a region that today makes up large areas of the modern states of Thailand and Lao PDR.⁶²

This paper has explored the potential of approaching Buddhism from a demographic and quantitative angle. In doing so it is hoped that the results and estimates given will in some small way help to add to our understanding of the origins and spread of this religion, while at the same time highlighting a number of possible directions for future research on the subject.

Acknowledgements

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Terwiel, Charles Higham and Angela Chiu for their help in finding source material. As always, however, the opinions, views and any possible errors present in this article are mine and mine alone.

Notes

1. Bayard, “Models, Scenarios, Variables and Supposition; Approaches to the rise of social complexity in Mainland Southeast Asia, 700 BC–AD 500”, pp. 13–16, 30.
2. *Ibid.*, p. 14.
3. Hassan, “Demographic Archaeology”, p. 70.
4. For discussion and debates surrounding the Indianization concept see firstly Mabbett, “The ‘Indianization’ of Southeast Asia: reflections on historical sources”, pp. 143–61, whose observations and conclusions have largely been proved correct by subsequent archaeological research over the past four decades. For further discussion on the subject, see Wolters, *History, Culture, and Region in Southeast Asian Perspectives*, Stark, “Early Mainland Southeast Asian Landscapes in the First Millennium A.D.”, pp. 407–32, and O’Reilly, *Early Civilizations of Southeast Asia*.
5. Hassan, “Demographic Archaeology”, p. 87.
6. For an up-to-date overview of the definitions and debates surrounding the term Dvāravatī, see Skilling, “Dvāravatī: Recent Revelations and Research”, pp. 87–112; for a summary of the archaeological evidence, see Phasook Indrawooth, *Dvāravatī, A Critical Study Based on the Archaeological*; for definitions of the Dvāravatī art style, see Boisselier, *The Heritage of Thai Sculpture*, and Woodward, *The Sacred Sculpture of Thailand*; for issues regarding the dating of the Dvāravatī Period, see Barram and Glover, “Re-thinking Dvāravatī”, pp. 175–82 and Glover, “The Dvāravatī Gap — Linking Prehistory and History in Early Thailand”, pp. 79–86.
7. See in particular Damrong Rajanubhab, *Monuments of the Buddha in Siam*, and Coedès, *The Indianized States of Southeast Asia*.
8. Skilling, “Dvāravatī: Recent Revelations and Research”, pp. 87–112.
9. Murphy, “The Buddhist Boundary Markers of Northeast Thailand and Central Laos, 7th–12th centuries CE: Towards an understanding of the archaeological, religious and artistic landscape of the Khorat Plateau”, pp. 126–30.
10. Bailey and Mabbett, *The Sociology of Early Buddhism*, pp. 8–36.
11. Bunnag, *Buddhist monk, Buddhist layman: A study of urban monastic organization in central Thailand*, pp. 54–55.
12. *Ibid.*, pp. 54–77.
13. Gabaude, “Approche du bouddhisme thaï”, pp. 21–59.
14. Tambiah, *World Conqueror and World Renouncer: A study of Buddhism and polity in Thailand against a Historical Background*, p. 270.
15. *Ibid.*

16. Cha-em Kaeokhlai, "Phu Khio inscription, reading and translation/Sila charuek Phu Khio an lae plae mai", pp. 64–65.
17. Murphy, "The Buddhist Boundary Markers of Northeast Thailand and Central Laos, 7th–12th centuries CE: Towards an understanding of the archaeological, religious and artistic landscape of the Khorat Plateau", p. 93.
18. Kongkaew Weeraprajak, "Sema Inscription at Ban Panna/Charuek Baisema Baan Panna", pp. 53–57.
19. Guy, *Indian Temple Sculpture*, p. 44.
20. Schopen, *Bones, Stones and Buddhist Monks, Collected Papers on the Archaeology, Epigraphy, and Texts of Monastic Buddhism in India*, pp. 30–33; Schopen, *Buddhist Monks and Business Matters, Still More Papers on Monastic Buddhism in India*, pp. 382–94.
21. Woodward, *The Art and Architecture of Thailand, From Prehistoric Times through the Thirteenth Century*, p. 104; see also Filliozat, "Sur le Çivaisme et le Bouddhisme du Cambodge", p. 84.
22. Tambiah, *World Conqueror and World Renouncer: A study of Buddhism and polity in Thailand against a Historical Background*, p. 265.
23. Gabaude, "Approche du bouddhisme thaï", pp. 42–46.
24. Grabowsky, "The Thai Census of 1904: Translation and Analysis", pp. 49–85.
25. Cited in Tambiah, *World Conqueror and World Renouncer: A study of Buddhism and polity in Thailand against a Historical Background*, p. 268.
26. Hassan, "Demographic Archaeology", p. 84.
27. Bayard, "Models, Scenarios, Variables and Supposition; Approaches to the rise of social complexity in Mainland Southeast Asia, 700 BC–AD 500", p. 24.
28. Hassan, "Demographic Archaeology", p. 88.
29. *Ibid.*, pp. 55–58.
30. Renfrew, *The emergence of civilization*.
31. See, for example, MacNeish, "Social implications of changes in population and settlement pattern of the 12,000 years of prehistory in the Tehuacan Valley of Mexico", pp. 215–50; Blanton, "Prehispanic adaptation in the Ixtapalapa region, Mexico", pp. 1317–1326, and McAdams and Nissen, *The Urak countryside: The natural setting of urban societies*.
32. Higham and Thosarat, *Early Thailand: From Prehistory to Sukhothai*, p. 169.
33. Chantaratiyakarn, "The research programme in the Upper Chi," pp. 565–643.
34. Higham and Thosarat, *Early Thailand: From Prehistory to Sukhothai*, pp. 213–15.
35. Welch and McNeill, "Settlement, agriculture and population changes in the Phimai region, Thailand", pp. 210–28.
36. *Ibid.*, p. 222.
37. *Ibid.*, p. 212.
38. *Ibid.*, p. 223.

39. Ibid., p. 224.
40. Ibid. p. 226.
41. Ibid., note 1.
42. Welch, “Adaptation to Environmental Unpredictability: Intensive Agriculture and Regional Exchange at Late Prehistoric Centres in the Phimai Region, Thailand”, pp. 322–25.
43. Mudar, “How Many Dvāravatī Kingdoms? Locational Analysis of the first Millennium A.D. Moated Settlements in Central Thailand”, p. 14.
44. It has been argued, for example, that up to at least 15 per cent of the interior area of moated sites may have been taken up by public monuments; see Mudar, “How Many Dvāravatī Kingdoms? Locational Analysis of the first Millennium A.D. Moated Settlements in Central Thailand”, p.14. Furthermore, survey and excavation work at the Dvāravatī moated site of Dong Mae Nang Muang has shown much higher levels of occupation within the interior moated area; see Murphy and Pimchanok Pongkasetkan, “Fifty Years of Archaeological Research at Dong Mae Nang Muang: An Ancient Gateway to the Upper Chao Phraya Basin”, pp. 63–65.
45. Manit Vallibhotama, “Sri Dharmasokaraja”.
46. Murphy and Pimchanok Pongkasetkan, “Fifty Years of Archaeological Research at Dong Mae Nang Muang: An Ancient Gateway to the Upper Chao Phraya Basin”, p. 57.
47. The nine sites in Table 3.1 were selected on the basis that they have clear evidence of extant moats thus allowing for accurate approximations of their site size to be calculated.
48. Murphy, “The Buddhist Boundary Markers of Northeast Thailand and Central Laos, 7th–12th centuries CE: Towards an understanding of the archaeological, religious and artistic landscape of the Khorat Plateau”, pp. 133–43.
49. Ibid., pp. 125, 202–204, 398–439.
50. Kieffer-Pülz, “Rules for the *śīmā* Regulation in the *Vinaya* and its Commentaries and their Application in Thailand”, pp. 141–53.
51. Ibid., pp. 86–124; Arunsak Kingmanee, “Boundary Stones of the Dvāravatī Period: A preliminary overview”, pp. 67–82.
52. Piriya Krairiksh, “Semas with Scenes from the Mahanipata-Jatakas in the National Museum at Khon Kaen”, p. 42.
53. Kieffer-Pülz, “Rules for the *śīmā* Regulation in the *Vinaya* and its Commentaries and their Application in Thailand”, pp. 145–46. At present, in neighbouring Burma there is little surviving archaeological evidence of *śīmās* dated to the pre-Pagan and Pagan eras, despite numerous references to them in twelfth to fourteenth century inscriptions. The earliest tentative evidence comes from the city of Vesali in Rakhine State where excavators appear to have found fossilized wood *śīmā* markers around a brick structure which they identified as an ordination hall. The site itself has been dated between

- the fifth and ninth centuries making it roughly contemporary with sites in the Khorat Plateau. At Thaton, carved sandstone *sīmā* markers perhaps dated to the eleventh to thirteenth centuries have been found around the site of the later Kalyani ordination hall. Thus in Burma markers may have been primarily, but not exclusively, constructed out of perishable materials. Regarding the Pagan era, Pierre Pichard identifies only eight monuments from this period, distinguished by a rectangular platform, that may have constituted ordination halls. See Murphy, “The Buddhist Boundary Markers of Northeast Thailand and Central Laos, 7th–12th centuries CE: Towards an understanding of the archaeological, religious and artistic landscape of the Khorat Plateau”, pp. 101–102; Luce, *Old Burma: Early Pagan*, Vol. 1, p. 253; Pierre Pichard, *Inventory of Monuments at Pagan*.
54. This division was first proposed by Srisakra Vallibhotama in his article “Sema Isan”, pp. 89–116, who grouped *sema* into the Chi River, the Mun River and Udon Thani-Sakon Nakon Basin. However, as *sema* have now come to light in Laos the last grouping has been re-evaluated in this paper and renamed “Middle Mekong” to reflect that fact that *sema* are located on both sides of this river system.
 55. This gives a total of 109 sites. The remaining site giving a total of 110 is on Phnom Kulen, Cambodia and does not therefore fall in to one of the main three groups.
 56. Srisakra Vallibhotama, *A Northeastern Site of Civilization: new archaeological evidence to change the face of Thai History/Aeng Arayatham Isan Chai lakthan borankadi plik chomna prawatisat Thai*, pp. 114–47.
 57. Lorrillard, “Pour une Géographie Historique du Bouddhisme au Laos”, p. 171.
 58. For a more detailed discussion on what constitutes a cluster, see Murphy, “The Buddhist Boundary Markers of Northeast Thailand and Central Laos, 7th–12th centuries CE: Towards an understanding of the archaeological, religious and artistic landscape of the Khorat Plateau”, pp. 155–84.
 59. Giteau, *Le bornage rituel des temples bouddhiques au Cambodge*, p. 6. Giteau is here quoting from a booklet published by the Buddhist Institute of Phnom Penh, entitled the *Sima-vinichchaya-sankappa* (*Summary of the knowledge on sima*), in 1932 by Brah Visuddhivans Huot That.
 60. For a summary of all literature published on *sema* to date, see Murphy “The Buddhist Boundary Markers of Northeast Thailand and Central Laos, 7th–12th centuries CE: Towards an understanding of the archaeological, religious and artistic landscape of the Khorat Plateau”, pp. 108–22.
 61. *Ibid.*, pp. 213–14.
 62. Buddhist narrative art executed in various mediums continues to thrive to this day in northeast Thailand. See, for example, the *Bun Phra Wet* painted scrolls as discussed by Leedom Lefferts “The *Bun Phra Wet* Painted Scrolls of Northeast Thailand in the Walters Art Museum”, pp. 149–70.

References

- Adams, R. McC. and H.J. Nissen. *The Urak countryside: The natural setting of urban societies*. Chicago: University of Chicago Press, 1972.
- Bailey, Greg and Ian Mabbett. *The Sociology of Early Buddhism*. Cambridge: Cambridge University Press, 2003.
- Barram, Andrew and Ian Glover. "Re-thinking Dvāravatī". In *From Homo Erectus to the living traditions; choice of papers from the 11th International Conference of the European Association of Southeast Asian Archaeologists*, edited by Jean Paul Pautreau et al., pp. 175–82, Chiang Mai: Siam Ratana Ltd., 2008.
- Bayard, Donn. "Models, Scenarios, Variables and Suppositions: Approaches to the Rise of Social Complexity in Mainland Southeast Asia, 700BC–500AD". In *Early Metallurgy, Trade and Urban Centres in Thailand and Southeast Asia*, edited by Ian Glover, Pornchai Suchitta and John Villiers, pp. 13–38. Bangkok: White Lotus, 1992.
- Blanton, R.E. "Prehispanic adaptation in the Ixtapalapa region, Mexico". *Science* 175 (1972): 1317–26.
- Boisselier, Jean. *The Heritage of Thai Sculpture*. Bangkok: Asia Books, 1975.
- Bunnag, Jane. *Buddhist monk, Buddhist layman: A study of urban monastic organization in central Thailand*. Cambridge: Cambridge University Press, 1973.
- Chantaratiyakarn, P. "The research programme in the Upper Chi". In *Prehistoric Investigations in Northeast Thailand*, edited by C.F.W. Higham and A. Kijngam, pp. 565–643. Oxford: British Archaeological Reports (International Series), 231, 1984.
- Coedès, George. *The Indianized States of Southeast Asia*. Honolulu: East-West Centre Press, 1968.
- Filliozat, Jean. "Sur le Çivaisme et le Bouddhisme du Cambodge". *Bulletin de l'Ecole Française d' Extrême-Orient* 70 (1981): 59–99.
- Gabaude, Louis. "Approche du bouddhisme thaï". In *Thailand contemporaine*, edited by Stéphane Dovert and Jacques Ivonoff, pp. 21–59. Paris: Les Indes savantes; Bangkok: IRASEC, 2011.
- Giteau, Madeleine. *Le bornage rituel des temples bouddhiques au Cambodge*. Paris: Ecole Française d' Extrême-Orient, 1969.
- Glover, Ian. "The Dvāravatī Gap — Linking Prehistory and History in Early Thailand". *Bulletin of the Indo-Pacific Prehistory Association* 30 (2010): 79–86.
- Grabowsky, Volker. "The Thai Census of 1904: Translation and Analysis". *Journal of the Siam Society* 84, no. 1 (1996): 49–85.
- Guy, John. *Indian Temple Sculpture*. London: V & A Publications, 2007.
- Hassan, Fekri A. "Demographic Archaeology". In *Advances in Archaeological Method and Theory*, Vol. 1, pp. 49–103. Academic Press, Inc., 1978.
- Higham, Charles and Rachanie Thosarat. *Early Thailand: From Prehistory to Sukhothai*. Bangkok: River Books, 2012.

- Indrawooth, Phasook. *Dvāravatī, A Critical Study Based on the Archaeological Evidence* (in Thai). Bangkok: Silpakorn University, 1999.
- Kaeokhlai, Cha-em. "Sila charuek Phu Khio an lae plae mai". *Silpakorn* 33, no. 2 (1985): 64–65 (in Thai).
- Kieffer-Pülz, Petra. "Rules for the *sīma* Regulation in the *Vinaya* and its Commentaries and their Application in Thailand". *Journal of the International Association of Buddhist Studies* 20, no. 2 (1997): 141–53.
- Kingmanee, Arunsak. "Boundary Stones of the Dvāravatī Period: A preliminary overview". In *Abhinandanamala, Nandana Chutiwongs Felicitation Volume*, edited by Leelananda Prematilleke, pp. 67–82. Bangkok: SPAFA Regional Centre of Archaeology and Fine Arts in collaboration with the Abhinandanamala Committee, Colombo, 2010.
- Krairiksh, Piriya. "Semas with Scenes from the Mahanipata-Jatakas in the National Museum at Khon Kaen". In *Art and Archaeology in Thailand*, pp. 35–100. Bangkok: FAD, 1974.
- Landon, K.P. *Siam in Transition*. Shanghai: Kelly & Walsh, Ltd., 1939.
- Lefferts, Leedom. "The *Bun Phra Wet* Painted Scrolls of Northeast Thailand in the Walters Art Museum". *Journal of the Walters Art Museum A Curator's choice: Essays in honor of Hiram W. Woodward, JR* 64/65 (2006–2007): 149–70.
- Lorrillard, Michel. "Pour une Géographie Historique du Bouddhisme au Laos". In *Recherches Nouvelles sur le Laos/New Research on Laos*, edited by Yves Goudineau and Michel Lorrillard, pp. 113–81. Vientiane-Paris: Ecole française d'Extreme-Orient, 2008.
- Luce, G.H. *Old Burma: Early Pagan*. 3 vols. New York: Artibus Asiae, 1969.
- Mabbett, Ian. W. "The 'Indianization' of Southeast Asia: reflections on historical sources". *Journal of Southeast Asian Studies* 8, no. 2 (1977): 143–61.
- MacNeish, R.S. "Social implications of changes in population and settlement pattern of the 12,000 years of prehistory in the Tehuacan Valley of Mexico". In *Population and economics*, edited by P. Deprez, pp. 215–50. Winnipeg: University of Manitoba Press, 1970.
- Mudar, Karen. "How Many Dvāravatī Kingdoms? Locational Analysis of First Millennium A.D. Moated Settlements in Central Thailand". *Journal of Anthropological Archaeology* 18, no. 1 (1999): 1–28.
- Murphy, Stephen A. "The Buddhist Boundary Markers of Northeast Thailand and Central Laos, 7th–12th centuries CE: Towards an understanding of the archaeological, religious and artistic landscape of the Khorat Plateau". PhD dissertation, Department of Art and Archaeology, School of Oriental and African Studies, University of London. 2010; Ethesis <<http://eprints.soas.ac.uk/12204/>>.
- and Pongkasetkan Pimchanok. "Fifty Years of Archaeological Research at Dong Mae Nang Muang: An Ancient Gateway to the Upper Chao Phraya Basin". *Journal of the Siam Society* 98 (2010): 49–74.

- O'Reilly, Dougald J.W. *Early Civilizations of Southeast Asia*. New York: Alta Mira Press, 2007.
- Pichard, Pierre. *Inventory of Monuments at Pagan*. 8 Volumes. Paris: Unesco; Gartmore: Kiscadale, 1992–2001.
- Rajanubhab, Damrong. *Monuments of the Buddha in Siam*. Translated by Suluk Sivaraksa and A.B. Griswold, 2nd ed. Bangkok: The Siam Society, 1973 [1926].
- Renfrew, Colin. *The emergence of civilization*. London: Methuen, 1972.
- Schopen, Gregory. *Bones, Stones and Buddhist Monks, Collected Papers on the Archaeology, Epigraphy, and Texts of Monastic Buddhism in India*. Honolulu: University of Hawaii Press, 1997.
- . *Buddhist Monks and Business Matters, Still More Papers on Monastic Buddhism in India*. Honolulu: University of Hawaii Press, 2002.
- Skilling, Peter. “Dvāravatī: Recent Revelations and Research”. In *Dedications to Her Royal Highness Princess Galyani Vadhana Krom Luang Naradhiwas Rajanagarindra on her 80th birthday*, edited. C. Baker, pp. 87–112. Bangkok: The Siam Society, 2003.
- Stark, Miriam T. “Early Mainland Southeast Asian Landscapes in the First Millennium A.D.”. *Annual Review of Anthropology* 35 (2006): 407–32.
- Tambiah, Stanley J. *World Conqueror and World Renouncer: A study of Buddhism and polity in Thailand against a Historical Background*. Cambridge: Cambridge University Press, 1976.
- Vallibhotama, Manit. “Sri Dharmasokaraja”. In *Thalang kaan prawatisaat ekasaan Boranakadi*, Year 12, Vol. 1. 1978 (In Thai).
- Vallibhotama, Srisakra. “Sema Isan”. *Muang Boran* 1, no. 2 (1975): 89–116 (in Thai).
- . *A Northeastern Site of Civilization: New archaeological evidence to change the face of Thai History/Aeng Arayatham Isan Chai lakthan borankadi plik chomna prawatisat Thai*. Bangkok: Matichon, 1990 (in Thai).
- Weeraprajak, Kongkaew. “Sema Inscription at Ban Panna/Charuek Baisema Baan Panna”. *Silpakorn* 50, no. 2 (2007): 53–57 (in Thai).
- Welch, D.J. “Adaptation to Environmental Unpredictability: Intensive Agriculture and Regional Exchange at Late Prehistoric Centres in the Phimai Region, Thailand”. PhD Dissertation, University of Hawaii, Honolulu. Ann Arbor: University Microfilms. 1985.
- and McNeill, J.R. “Settlement, agriculture and population changes in the Phimai region, Thailand”. *Bulletin of the Indo-Pacific Prehistory Association* 11 (1991): 210–28.
- Wolters, O.W. *History, Culture, and Region in Southeast Asian Perspectives*. Ithaca, New York: Cornell Southeast Asia Program Publications, 1999.
- Woodward, Hiram. *The Sacred Sculpture of Thailand*. Bangkok: River Books, 1997.
- . *The Art and Architecture of Thailand, From Prehistoric Times through the Thirteenth Century*. Leiden, Boston: Brill. 2005.