SPAFACON2021

Papers from the SEAMEO SPAFA International Conference on

SOUTHEAST ASIAN ARCHAEOLOGY AND FINE ARTS

13 - 17 December 2021

Editor: Noel Hidalgo Tan

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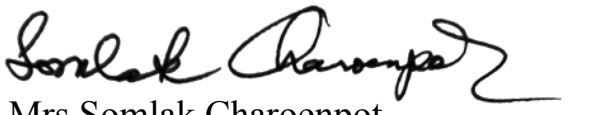
INTRODUCTION

This volume contains the extended abstracts from the papers presented at the SEAMEO SPAFA International Conference on Southeast Asian Archaeology and Fine Arts, which was held online from 13 to 17 December 2021. Also known as the SPAFACON2021, this conference was organised online due to the pandemic. Despite the disruption brought about by Covid-19 to our in-person events, training programmes and field research, it is heartening to see that archaeology and cultural heritage has continued under new modes of communication and collaboration.

This fourth iteration of the SPAFACON is also scheduled a year earlier than our usual triennial cycle to commemorate the 50th anniversary of SEAMEO initiating a centre dedicated towards archaeology and the fine arts. Over the past year, SPAFA has also been highlighting this legacy of international cooperation and capacity-building by sharing our photographic archives on our social media.

I am delighted by the high level of enthusiasm and intellectual curiosity brought by the participants to the conference. During our call for papers we received close to 90 submissions, but owing to the pressures of time and the online format, we were only able to accept 34 papers for the conference. The variety of papers present here, although a small set compared with our usual proceedings, reflects the breadth of the centre's ambit – covering not just archaeology, but also performing arts, visual arts, museum studies, and other aspects of Southeast Asian cultural heritage.

I would like to thank all the participants, without whom this conference would not be possible in its present form, in particular, our Governing Board members who represent every country in Southeast Asia, and to the Ministry of Culture, Thailand and the Ministry of Education, Thailand for their long-standing support of SEAMEO SPAFA and its activities.



Mrs Somlak Charoenpot
Centre Director
SEAMEO SPAFA

A Historiography of Settlement Archaeology in Southeast Asia, with Emphasis on the Pre-industrial State Formations

မြို့ပြမထွန်းကားမီအချက်အလက်များအပေါ်မူတည်လျက် အရှေ့တောင်အာရှရှိ အခြေချနေထိုင်ခြင်းဆိုင်ရာရှေးဟောင်းသုတေသနလေ့လာမရှုသမိုင်း

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Abstract

Although it certainly comes with a unique set of challenges, the small number of projects carried out across Southeast Asia to date have demonstrated the efficacy that settlement archaeology holds for expanding on our traditional understandings of the region's pre-industrial state formations. This discussion presents a brief historiography of the settlement archaeology projects that have focused on the "classical" states of Southeast Asia, and in doing so highlights the theories, methods, applications, and outcomes of these investigations. The need for more excavations to be carried out in the context of commoner habitation sites is underscored.

အခြေချနေထိုင်ခြင်းများလေ့လာလာရာတွင်စိန်ခေါ်မှုများစွာရှိနေမည်ဖြစ်သော်လည်း၊ အရှေ့တောင်အာရှဒေသတွင်ပြုလုပ်ခဲ့ကြသည့် သုတေသနလုပ်ငန်းအနည်းငယ်မှ ထွက်ပေါ်လာသော နှစ်သက်တမ်း တွက်ချက်မှုများသည် မြို့ပြမထွန်းကားမီအကြောင်းအရာများကို ပိုမိုနားလည်သဘောပေါက်လာစေရန် အတွက် အထောက်အကူပြုလျက်ရှိသည်။ ယခုဆွေးနွေးတင်ပြမည့် အခြေချနေထိုင်ခြင်းဆိုင်ရာ ရှေးဟောင်းသုတေသနလေ့လာမှုသမိုင်းအကျဉ်းချုပ်သည် အရှေ့တောင်အာရှဒေသရှိ ဂန္ထဝင်တွင်သော မြို့ပြနိုင်ငံကြီးများကို အဓိကထားလေ့လာထားပြီး၊ သီအိုရီများ၊ နည်းလမ်းများ၊ လက်တွေ့ဆောင်ရွက် ချက်များနှင့် ထွက်ပေါ်လာသည့် ရလဒ်များကို တင်ပြမည်ဖြစ်ပါသည်။ ရှေးခေတ်သာမာန်အရပ်သားများ၏ အိမ်ယာအခြေချနေထိုင်မှုများကို ဖော်ထုတ်နိုင်ရန်အတွက် ထပ်မံလိုအပ်နေမည့် တူးဖော်လေ့လာရေး လုပ်ငန်းများအကြောင်းကို တင်ပြသွားမည်ဖြစ်ပါသည်။

Keywords

settlement archaeology, method and theory, commoners,
အခြေချနေထိုင်ခြင်းဆိုင်ရာရှေးဟောင်းသုတေသနပညာ၊ သီအိုရီနှင့် နည်းလမ်း၊
သာမာန်အရပ်သားများ

Given their potential for enhancing our understanding of past societies, it is surprising that the settlement patterns and residential architecture associated with the "classical" (800-1400 CE) polities of Southeast Asia have rarely received any focused attention (Miksic and Goh 2017:26, 358). Indeed, Charles Higham (2017:369) opens his recent chapter on *The Prehistoric House: A Missing Factor in Southeast Asia*, by lamenting the fact that: "Excavations in Mainland Southeast Asia have yet to reveal a single complete house plan, yet the potential of residential archaeology to illuminate social change…is emphasized by recent research in other parts of the world." Given the title of his chapter, it is obvious that Higham had prehistoric contexts in mind when he made this statement. Nevertheless, his observation rings equally true for places like Angkor and Bagan. Indeed, although archaeologists, epigraphers, and art historians are all aware that the pre-industrial states of Southeast Asia were highly complex social formations, we are often reticent to admit that our efforts to come to terms with this complexity has been hindered by an overreliance on inscriptions, retrospective chronicles, artistic representations, and monumental architecture. These data sets speak almost exclusively about power elites and their economic, political, military, and religious institutions (Miksic and Goh 2017:26; Stark et al. 2015:1439). What is largely left out of the interpretive equation are empirical data sets representing the diverse support populations – the common folk – who were crucial to the daily operation of all archaic states (Higham 2001:134-135; Miksic 2001:91, 103, 2012:173-174; Miksic 2017:548-555; Miksic andGoh 2017:28).

One means to redress this situation is the more consistent application of theories, methods, and interpretative schemes from settlement archaeology. Although many studies from across the region make statements concerning "settlement patterns," one is often left to wonder precisely how these studies articulate with the broader tradition of settlement archaeology as practiced elsewhere in the world. That is not to say that no sophisticated settlement archaeology studies have been carried out in association with the "classical" states of Southeast Asia, but rather that these have been few and far between. In this discussion I highlight some of these research programs and make some observations aimed at encouraging the establishment of new settlement archaeology projects throughout the region, with particular emphasis on the need for more excavations to be carried out in the context of commoner habitation sites.

Settlement Archaeology in Southeast Asia

Whereas settlement archaeology has long been an essential method within the tool kit of most archaeologists trained in the Americas, the same cannot be said for Southeast Asia. To date, traditional settlement surveys using random sampling procedures have rarely been

conducted in the urban zones of Southeast Asian polities (Miksic 2001:101), and residential architecture and settlement patterns in general have seldom received any archaeological attention (Miksic 2017:548-555; Miksic and Goh 2017:26, 358; Kim 2013:222, 239). In terms of the state of the affairs in specific countries, Myanmar has seen little in the way of systematic settlement survey, habitation sites have not been the focus of any excavation programs, and settlement patterns remain poorly understood (Goh 2017:115; Miksic 2001:99), although recent work at Bagan aims to address this shortcoming (see below). The situation is similar in Thailand, where Rasmi Shoocongdej (2017:104) notes that there continues to be little foreign interest in the study of historical centers, such as 13th century CE Sukhothai. That said, Thai scholars have focused considerable attention on the developmental histories of some of the large centers (Thonburi), and their economies (Sukhothai and Ayutthaya), but none of these research programs have incorporated a settlement archaeology component. Elsewhere, neither the Vietnamese capital of Thang Long nor the various Cham citadels have been explored using a settlement archaeology approach, although some comparatively coarse-grained analysis has been carried out for the Red River Plain (Nishamura 2005). In Cambodia there has been a recent shift away from the large political centers and monumental architecture, towards settlement pattern studies, the examination of smaller habitation sites, and the investigation of urban planning (Heng and Phon 2017:85). Angkor, the country's largest pre-industrial capital, remains one of the region's hotbeds for settlement archaeology, at least within the urban center and its walled temple enclosures (e.g., Carter et al. 2018; Stark et al. 2015). In Malaysia and West Java, no habitation sites have been found to date (Miksic 2017:550), and the Central Javanese centers of Borobudur and Prambanan have only seen limited settlement pattern research (Miksic 2017:551). In East Java, by contrast, the 13th century capital of the Majapahit Empire, located at Trowulan, has been subject to a systematic program of settlement archaeology (Miksic 2001:100, 2009:140-144, 2012) – as is discussed below – even though brick architecture has continued to capture most of the scholarly attention (Miksic 2017:556).

One might ask why settlement archaeology has been such a negligible factor in Southeast Asian archaeology? The answer to this question partially lay in the intellectual traditions that drove the development of Southeast Asian studies, which focused almost exclusively on written texts, monumental architecture, and artistic representations. It also reflects the character of traditional Southeast Asian residential structures and outbuildings.

A Challenge for Would-Be Southeast Asian Settlement Archaeologists

A major challenge for Southeast Asian archaeologists is that the domestic architecture of both commoners and the nobility was, for the most part, constructed entirely of perishable materials (Carter et al. 2018:493; Klassen 2021), and many of these constructions also had their wooden living floors raised above the ground on piles/stilts to varying heights (Carter et al. 2018:495-496). Still other structures were built directly on the ground surface, without any raised foundations. In both cases, the previous location of a building may be entirely imperceptible on the landscape once the structural components deteriorate (Carter et al. 2018:493, 495; Junker 2006:229-230; Kim 2013:239).

In some instances, architectural components that were both more durable and visible may have been employed, such as when elevated building platforms (aka "communal mounds") were used to create sustaining surfaces for multiple buildings (e.g., Carter et al. 2018:495), or when perishable superstructures were constructed on top of brick or stone masonry substructures (e.g., Miksic 2012:169-170). If they have not been buried beneath subsequent constructions or natural depositions, these building components will remain observable in the present. Be that as it may, without excavation it is not always clear whether the primary function of the architectural features that once sat atop these sustaining surfaces was residential or not.

In still other instances a structure may have consisted of a combination of different architectural components, such as when verandas and/or front rooms were built on the ground surface and the more private "back" rooms were raised on substructural platforms made of brick masonry, or had elevated floors supported by wooden piles. Such configurations have been witnessed by the author in the traditional villages that surround "Old Bagan" today. In these contexts, only part of a building – namely the substructural foundation for the back room – may be discernible on the surface once all the perishable components disintegrate. This means that the overall size of the structure may be underestimated if no excavation takes place, resulting not only in inaccurate maps, but also undermining efforts to calculate the area of the house floor for comparative purposes, and for measuring inequalities using tools such as gini coefficients. Finally, because a substantial portion of the material culture inventories in pre-industrial Southeast Asia were also made from perishable materials, the search for past habitation sites using surface scatters of artifacts is equally challenging (Junker 2006:219, 222; Kim 2013:239). Thank goodness for the durable potsherd!

Having outlined the challenges facing would-be settlement archaeologists in Southeast Asia, some inspiration can now be provided by briefly summarizing the results of a few of the more successful settlement archaeology projects that have been carried out in and around some of the region's more prominent preindustrial capitals.

Settlement Archaeology at Trowlulan, East Java (Majapahit Empire, ca. 1293-1498 CE)

One of the few places in Southeast Asia that has been subject to a long-term, systematic program of settlement archaeology is Trowulan, the capital of the east Javanese polity of Majapahit (Miksic 2001:100, 2009:140-144, 2012). In 1991 the *Indonesian Field School of Archaeology* set out to determine the boundaries of the Trowulan urban area, and to assess occupation densities inside the city (Miksic 2001:101, 2012:172). The project employed pedestrian survey along randomly selected transects, the surface collection of artifacts, and consideration of finds location in conjunction with contemporary land-use strategies to assess contemporary impacts on material culture distributions (Miksic 2001:101). This settlement survey, which covered 100 km^2, located a series of "discontinuous" settlement clusters, and collected around 100,000 artifacts representing a variety of economic activities (Miksic 2012:173-175). The *Indonesian National Research Centre for Archaeology* also conducted a settlement survey of the 100 km^2 city-scape between 1976 and 1990 (Miksic 2012:168). Large horizontal excavations were also carried out at a variety of locales, although the precise methods employed are not detailed in the available publications (Miksic 2012:169-172). These excavations exposed a range of residential structures, associated features – such as wells and drains – a range of domestic artifacts (i.e., refuse), and some faunal remains. Many of the houses were built on raised brick substructure foundations, and most superstructures were made of perishable materials, although in some instances clay roof tiles were also recovered (Figure 1). Some house lots also had exterior floors made of brick-lined construction pens filled with cobblestones (Figure 2). The combined findings of the two settlement archaeology projects indicated that Trowulan (Miksic 2001:101): 1) was a densely settled urban capital; 2) inhabitants exhibited a wide range of craft specializations; 3) residents had access to a significant level of non-local goods; 4) was not highly defensive in character; and 5) exhibited a complex water management system that was both utilitarian and symbolic.

Fig. 1 Exposed residential architecture at Situs Pemukiman/Segaran Site, Trowulan. Source: Photo by the author.

Fig. 2 Reconstructed house in the Majapahit museum, Trowulan. Source: Photo by the author.

Settlement Archaeology at Angkor, Cambodia (Khmer Empire, ca. 802-1431 CE)

Members of the *Great Angkor Project* (GAP) have generated some preliminary insights into the residential component of this vast urban center. The first direct evidence for Khmer residential units includes the post-holes and ceramics encountered by Pierre Bâty (2005) during the Siem Reap airport expansion project. A range of domestic materials, including roof tiles, pits, hearths, and faunal remains, have also been discovered near the Prasat Tromoung hospital chapel (Pottier and Chhem 2008). In recent years the GAP researchers have combined LiDAR-based remote sensing and archaeological excavations to provide a more systematic understanding of the city's settlement patterns (Stark 2015:1440). The recognition of a patterned association between ponds, clusters of mounds, and small shrines has long been interpreted as evidence for particularly common Angkor settlement type (Fletcher and Evans 2012:52; Gaucher 2003; Pottier 2012:18-20; Stark et al. 2015:1452). This configuration is found in rural areas (Stark et al. 2015:1442) and throughout the urban zone (Carter et al. 2018:493).

Recent settlement archaeology at Angkor has focused primarily on potential "co-residential" occupations inside large temple enclosures, including Angkor Wat (Stark et al. 2015) and Ta Prohm (Carter et al. 2018). LiDAR initially provided some tantalizing images of a series of formally structured (i.e., on an orthogonal grid) "blocks" of presumably residential mounds for stilted houses with adjacent ponds within, and extending outside of, the Angkor Wat religious complex (Carter et al. 2019:3-5; Stark et al. 2015; Pottier 2012:20). These features became the focus for Miriam Stark and her team, who carried out a settlement archaeology study inside Angkor Wat's outer enclosure in 2010 and 2013 (Stark et al. 2015:1444). The researchers focused on the orthogonal grid-like arrangement of mounds and pond depressions, employing a combination of topographic mapping, coring along transects to isolate intact archaeological levels, and stratigraphic excavations (Stark et al. 2015:1444-1446). In total, 25 trenches were excavated in association with the tops and slopes of the mounds, as well as the pond depressions and perimeter walls (Stark et al. 2015:1446). Although it is not explicitly stated, it is assumed that the excavations were carried out using arbitrary levels, or spits, the standard approach employed by the GAP teams. Two of the four levels, encountered in most of the excavation units (Levels 2 and 3), exhibited a range of different ceramics wares, some postholes, a possible earthenware stove, broken pots, some flat stones, and some organic refuse, including faunal remains (Stark et al. 2015:1446). The team concluded that the Angkor Wat outer enclosure exhibited the typical mound-pond configuration, that the mounds were likely surmounted by perishable structures built on stilts, and that there was only evidence for "light habitation," possibly by temporary temple staff or fortnightly work parties (Stark et al. 2015:1450-1452; see also Carter et al. 2019:5).

The Ta Prohm temple enclosure was investigated in a similar way as part of research carried out in 2012 and 2014 (Carter et al. 2018). In total, twenty 1 x 2 m test trenches were excavated in association with mounds and pond depressions (Carter et al. 2018:496). Once again, it is assumed that the excavations were carried out using arbitrary levels, or spits. The excavations produced earthenware and stoneware ceramics, Chinese trade wares, a spice grinding mortar, a hearth, and a trash pit (Carter et al. 2018:496-500). Occupation floors at Ta Prohm exhibited foundations made of stone chips, a building technique not seen in the Angkor Wat complex, where mounds were comprised principally of layers of soil (Carter et al. 2018:502).

Unfortunately, the Ta Prohm excavations did not produce enough data to allow the researchers to suggest who might have utilized the occupation mounds (Carter et al. 2018:500). Nevertheless, they did posit that the larger ceramic assemblage obtained from the Ta Prohm mounds implies that they witnessed more prolonged use, possibly by full-time residents, which differs from the proposed lighter occupation by temporary personnel inferred for Angkor Wat (Carter et al. 2018:502).

Analogous residential patterning to that of Angkor Wat also appears to have existed within the vast walled and moated royal city of Angkor Thom (Gaucher 2003; Pottier 2012:20). These two complexes differ in terms of their size and overall characteristics, the former being more religious in emphasis, the latter serving as a more multifaceted urban-administrative center. Be that as it may, the similarities in their settlement patterns should not be taken to suggest that analogous residential configurations will also characterize the communities within Angkor's adjacent peri-urban (mixed urban-rural) and/or fully rural zones (Klassen et al. 2021:7). The settlement patterns of these zones remain to be explored.

Recent efforts to formulate demographic models for Angkor's urban population have been based largely on remote sensing data (LiDAR) and estimates of house lot occupancy rates – assuming a standard habitation mound area of 600 m^2 for each residential group of 5 individuals – augmented by archaeological excavations of infrastructure features and temple enclosure habitation sites, historical dates and population information from inscriptions, radiocarbon assays, and the application of machine learning algorithms (Carter et al. 2019; Carter et al. 2021; Klassen et al. 2021). The result has been what the authors refer to as a "granular, diachronic, paleodemographic model," one that can be used to guide "future fine-grained analyses in response to many of the grand challenges of archaeology, such as the emergence and decline of social complexity, and the implications

of such analyses for understanding contemporary trajectories of human systems" (Klassen 2021:1).

As explicitly stated by the GAP researchers, such models are aimed at stimulating future "fine-grained" research, and the results should not be treated as an end in-and-of-themselves. Indeed, it is apparent that a great deal remains to be learned when it comes to settlement patterning at the ancient Khmer capital before we can comfortably make conclusions about matters of demography and social complexity. In particular, more attention needs to be given to excavating actual residential contexts (Miksic 2017:552). This fact is readily acknowledged by Miriam Stark and her colleagues (2015:1440), who underscore that, regardless of the vast amount of research carried out within the greater Angkor city-scape, no research program [has] as yet "studied households as an analytical unit."

Settlement Archaeology at Bagan, Myanmar (Burmese Empire, ca. 1044-1300 CE)

Finally, mention can be made of our own *Integrated Socio-Ecological History of Residential Patterning, Agricultural Practices, and Water Management at the "Classical" Burmese (Bamar) Capital of Bagan, Myanmar (11th to 14th Century CE)* project. IRAW@Bagan initiated its research in 2017 at the invitation *UNESCO Myanmar*, and under the auspices of *Myanmar's Department of Archaeology and the Ministry of Religious Affairs and Culture*. We are grateful for their encouragement and support.

Our foray into the settlement archaeology of Bagan is focused on the roughly 80 km^2 peri-urban settlement zone surrounding the walled and moated royal city. We began by carrying out some non-probabilistic ground survey in 2017, aimed at locating areas with significant surface exposures of domestic artifacts – such as earthenware potsherds – which we presumed would indicate the possible location of habitation sites. Four such locales were discovered: Shwe Creek, South Wall, Kiln #4, and Otein Taung. The latter, a well-known ceramic production center, had already been subject to some excavations in association with two large mounds containing significant amounts of ceramic refuse (Hudson et al. 2001). In 2019, following some research on Bagan's water management system in 2018 (Iannone et al. 2019), we began our settlement archaeology study in earnest.

Our settlement survey research began by establishing three 250 m wide transects running between the four possible habitation sites. These are undergoing systematic ground survey in search of additional habitation sites and settlement features. Our initial excavations focused on the Shwe Creek and Otein Taung sites, as they were the furthest away from

contemporary towns and villages, and thus less likely to have been disturbed. We began our investigations at each site by establishing a 100 x 100 m grid block centered on the area with the highest density of surface artifacts. This grid block was then divided into four quadrants, and the research team systematically walked the surface of each quadrant twice, first north-south, then east-west, collecting all the artifacts encountered (Figure 3).

Fig. 3 Systematic surface collection being carried out at the Otein Taung site. Source: Photo by the author.

Subsequently, we established two 1 x 4 m test trenches at each site, near the center of their respective high density artifact scatters. The units were situated 10 m from each other, in a perpendicular arrangement that formed an L-shape. Excavations were carried out using trowels and geological handpicks, and all materials were passed through ¼" screens (Figure 4). We excavated in both natural (e.g., palaesols) and cultural levels. The latter consisted of occupation surfaces that were recognized using a series of criteria: 1) basic matrix or color differences indicative of strata changes; 2) evidence for compaction; 3) the tendency for plant roots to grow down to, and then across, more compact surfaces; 4) the presence of "on-floor" assemblages of artifactual materials exhibiting a consistent depositional "horizontality"; 5) the ability to "peel" artifacts and or other objects off a relatively horizontal surface; 6) the presence of thin veneers of either purposely wet laid materials, or naturally forming "surface crusts," spread across a consistent horizontal plane; and 7) the presence of post holes and/or post piers. In total, 28 individual living floor sections were excavated across the four test trenches at the two sites. Charcoal samples were collected wherever possible for use in radiocarbon dating and chronology building. The excavation levels encountered in 2019 date from Pre-Bagan (600-1044 CE) to Late

Bagan phases (1174-1300 CE), and possibly even later if one includes the disturbed (i.e., plowed) upper levels of the stratigraphic sequences.

Fig. 4 On floor artifact assemblage associated with a "beaten" floor at the Shwe Creek site. Source: Photo by the author.

Two types of floor surfaces were encountered in our excavations: non-constructed/ beaten floors – formed through a combination of trampling, sweeping, sediment and refuse accumulation, and bioturbation (e.g., Butzer 1982:87-88; Milek 2012:119) – and constructed/rammed earth floors, a type of construction that has a long history of use in East, Southeast, and South Asia (e.g., Jaquin et al. 2008:377). The rammed earth floors are the earliest floors, and these were associated with post holes, post piers, a subfloor pit, and an earth oven (Figure 5). The later beaten earth floors rarely exhibited such features. Rammed earth floors also tended to have cleaner surfaces, whereas beaten earth floors usually displayed significant amounts of refuse.

The artifact inventories recovered from within and on the various floor surfaces were largely made up of earthenware sherds and other types of domestic refuse, including animal bones (generally refuse), and objects made from shell, metal, stone, and glass. Some of the more common quotidian activities that can be inferred from the material culture assemblages

relate to different uses of earthenware ceramics – such as cooking, drinking, and storage – along with evidence for food consumption – including the remains of mollusks, fish, birds, rodents, and herbivores – and craft production of ceramics, blacksmithing, and possibly glass manufacture. The mundane nature of the artifact assemblages, evidence for ordinary constructions made entirely from perishable materials, and the fact that we found few ceramic roof tiles to suggest the presence of higher status buildings (Aung-Thwin and Aung-Thwin 2012:91), all support the idea that the locales we investigated were once the settings for commoner habitations.

Fig. 5 Typical rammed earth floor with post hole features at the Shwe Creek site. Source: Photo by the author.

The transition from the comparatively clean rammed earth floors with their various post hole and post pier features, to the comparatively "dirty" beaten earth floors with their paucity of post holes and post piers, occurred during the Pre-Bagan phase at Otein Taung, and the Late Bagan phase at Shwe Creek. This implies that there were at least two settlement pattern shifts at Bagan, where locales that had once been associated with well-maintained, constructed floors and features that one would expect to be directly associated with domestic buildings and residential house lots, were transformed into secondary spaces where occupation surfaces were built up organoculturally – including through the deposition of significant amounts of refuse – and where no domestic architecture seems to have been present. These settlement pattern shifts require further investigation at both Shwe Creek and Otein Taung, as well as at other locales in Bagan's peri-urban zone, before we will be able to understand their significance. Nevertheless, such findings do underscore the types of insights that basic settlement archaeology can generate.

Conclusions

In conclusion, although settlement archaeology continues to be an afterthought in many parts of Southeast Asia, the three projects discussed herein underscore the potential such research holds for augmenting our current understandings of the region's classical states. This is especially true when it comes to our conceptions of the ground plans, demographics, and economic systems of the vast urban centers that have attracted so much scholarly attention (Kim 2013:222; Miksic 2017:555). These cities have regularly been modeled as low-density (Fletcher 2009, 2012) or agro-urban (Carter et al. 2021) communities. Although one can find considerable support for such models in the ethnohistoric literature, independent verification of their efficacy awaits more detailed archaeological knowledge of how and where the commoner segment of the urban citizenry lived, and what the space surrounding individual house lots and larger settlement clusters looked like. This is the raison d'etre of settlement archaeology.

Damian Evan's ongoing LiDAR project will certainly provide us with a better understanding of the basic ground plans of the various large-scale urban centers located across the region. This research initiative, in-and-of-itself, should also stimulate new settlement survey and excavation programs within these settings. Be that as it may, if our goal is to learn more about Southeast Asia's ancient societies, communities, neighborhoods, and households, our approach must be multi-scalar. This means that we will have to gain an understanding of not only the settlement patterns associated with the more densely populated urban city centers – which are often exemplified by their walled and moated regal-ritual-residential enceintes – but also their surrounding peri-urban (mixed-urban rural) zones, where we might assume to find a series of distinct neighborhoods, and especially the outer districts and more remote rural areas, for which we know virtually nothing. The latter will require more labor-intensive settlement surveys and sub-surface testing programs, and necessarily involve the establishment of well-defined sampling units, such as survey grids or transects.

In closing, it should be stressed that settlement archaeology is not meant to replace insights about the past derived from the epigraphic records, retrospective chronicles, art historical corpora, or architectural inventories, but rather to augment, verify, and sometimes challenge these alternative data sets (e.g., Aung-Thwin and Stark 2001:3; Hudson 2004:23). Any archaeological insights resulting from settlement archaeology research must still be considered alongside the historical framework that has been crafted using the inscriptions and chronicles (Miksic 2012:179). As underscored by Michael Aung-Thwin and Miriam Stark (2001:3) "Without the overriding chronological and historical framework (and in certain cases, specific detail) that these chronicles provide, we would not have had a clue where to look, what to look for, or what it all means."

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References

Aung-Thwin, MA, and M Aung-Thwin (2012) A *History of Myanmar Since Ancient Times: Traditions and Transformations*. London: Reaktion Books.

Aung-Thwin, MA, and MT Stark (2001) Recent Developments in The Archaeology of Myanma Pyay (Burma): An Introduction. *Asian Perspectives* 40(1):1-5.

Bâty, P (2005) Extension de l'aéroport de Siem Reap 2004: Rapport de Fouille Archéologique. Siem Reap/Paris: APSARA/ INRAP.

Butzer, KW (1982) *Archaeology as Human Ecology*. New York: Cambridge University Press.

Carter, A, Piphal Heng, MT Stark, Rachna Chhay, and D Evans (2018) Urbanism and Residential Patterning in Angkor. *Journal of Field Archaeology* 43(6):492-506. Carter, AK, MT Stark, S Quintus, Y Zhuang, H Wang, Piphal Heng, and Rachna Chhay (2019) Temple Occupation and the Tempo of Collapse at Angkor Wat, Cambodia. *Proceedings of the National Academy of Sciences* 116(25):12226-12231.

Carter, AK, S Klassen, MT Stark, M Polkinghorne, Piphal Heng, D Evans, Rachna Chhay (2021) The Evolution of Agro-Urbanism: A Case Study from Angkor, Cambodia. *Journal of Anthropological Archaeology* 63:101323.

Fletcher, R (2009) Low-Density, Agrarian-Based Urbanism: A Comparative View. *Insights* 2(4):2-19.

Fletcher, R (2012) Low-Density, Agrarian-Based Urbanism: Scale, Power, and Ecology. In ME Smith (ed) *The Comparative Archaeology of Complex Societies New York*: Cambridge University Press, 285-320.

Fletcher, R, and D Evans (2012) The Dynamics of Angkor and its Landscape: Issues of Scale, Non-Correspondence and Outcome. In A Haendal (ed) *Old Myths and New Approaches: Interpreting Ancient Southeast Asia*. Clayton: Monash University Press, 42-62.

Gaucher, J (2003) New Archaeological Data on the Urban Space of the Capital City of Angkor Thom. In A Karlström and A Källén (eds.) *Fishbones and Glittering Emblems. Southeast Asian Archaeology 2002*. Stockholm: Museum of Far Eastern Antiquities, 233-242.

Goh, GY (2017) The History and Practice of Archaeology in Myanmar. In Junko Habu, Peter V. Lape, and John W. Olsen (ed) *Handbook of East and Southeast Asian Archaeology*. New York: Springer, 111-117.

Higham, CFW (2001) Commentary: Archaeology in Myanmar: Past, Present, and Future. *Asian Perspectives* 40(1):127-138.

Higham, C (2017) The Prehistoric House: A Missing Factor in Southeast Asia. In PJ Piper, H Matsumura, and D Bulbeck (ed) *New Perspectives in Southeast Asian and Pacific Prehistory*. Acton: Australian National University Press, 369-384.

Hudson, B (2004) The Origins of Bagan: The Archaeological Landscape of Upper Burma to AD 1300. PhD Thesis, Archaeology Department, University of Sydney.

Hudson, B, Nyein Lwin, and Win Maung (Tampawady) (2001) The Origins of Bagan: New Dates and Old Inhabitants. *Asian Perspectives* 40(1):48-74.

Iannone, G, Pyiet Phyo Kyaw, S Macrae, Nyein Chan Soe, Saw Tun Lin, and KF Cheong (2019) Water, Ritual, and Prosperity at the Classical Capital of Bagan, Myanmar (11th to 14th Centuries CE): Archaeological Exploration of the Tuyin-Thetso "Water Mountain" and the Nat Yekan Sacred Water Tank. *SPAFA Journal* 3:1-35.

Jaquin, PA, CE Augarde, and CM Gerrard (2008) Chronological Description of the Spatial Development of Rammed Earth Techniques. *International Journal of Architectural Heritage* 2:377-400.

Junker, L (2006) Population Dynamics and Urbanism in Premodern Island Southeast Asia. In Storey, G. (ed.) *Urbanism in the Preindustrial World*. Tuscaloosa: University of Alabama Press, 203–230.

Kim, NC (2013) Lasting Monuments and Durable Institutions: Labor, Urbanism, and Statehood in Northern Vietnam and Beyond. *Journal of Archaeological Research* 21:217–267.

Klassen, S, AK Carter, DH Evans, S Ortman, MT Stark, AA Loyless, M Polkinghorne, Piphal Heng, M Hill, P Wijker, J Niles-Weed, GP Marriner, C Pottier, and RJ Fletcher (2021) Diachronic Modeling of The Population Within the Medieval Greater Angkor Region Settlement Complex. *Science Advances* 7(19)

Miksic, JN (2001) Early Burmese Urbanization: Research and Conservation. *Asian Perspectives* 40(1):88-107.

Miksic, JN (2009) Nail of the World: Mandalas and Axes. *Arts Asiatiques* 64:134-145.

Miksic, JN (2012) Life Among the Ruins: Habitation Sites of Trowulan. In A Haendal (ed) *Old Myths and New Approaches: Interpreting Ancient Southeast Asia*. Clayton: Monash University, 159-179.

Miksic, JN (2017) The Development of Urban Places in Southeast Asia. In Junko Habu, Peter V. Lape, and John W. Olsen (ed) *Handbook of East and Southeast Asian Archaeology*. New York: Springer, 547-557.

Miksic, JN, and Geok Yian Goh (2017) *Ancient Southeast Asia*. New York: Routledge.

Milek, KB (2012) Floor Formation Processes and The Interpretation of Site Activity Areas: An Ethnoarchaeological Study of Turf Buildings at Thverá, Northeast Iceland. *Journal of Anthropological Archaeology* 31:119-137.

Nishimura, M (2005) Settlement Patterns on The Red River Plain from The Late Prehistoric Period to the 10th Century AD. *Indo-Pacific Prehistory Association Bulletin* 25 3:99-107.

Piphal Heng, and Kaseka Phon (2017) The Position of Cambodian Archaeology in Current Sociopolitical Context. In Junko Habu, Peter V. Lape, and John W. Olsen (ed) *Handbook of East and Southeast Asian Archaeology*. New York: Springer, 83-87.

Pottier, C (2012) Beyond the temples: Angkor and its territory. In A Haendel (ed) *Old Myths and New Approaches: Interpreting Ancient Religious Sites in Southeast Asia*. Clayton: Monash University, 12-27.

Pottier, C, and RK Chhem (2008) Á La Découverte D'un Hôpital Angkorien: Résultats Préliminaires D'une Campagne Archéologique Au Prasat Tromoung, Udaya. *Journal of. Khmer Studies* 9:169-182.

Shoocongdej, Rasmi (2017) The History and Practice of Archaeology in Thailand. In Junko Habu, Peter V. Lape, and John W. Olsen (ed) *Handbook of East and Southeast Asian Archaeology*. New York: Springer pp. 97-109.

Stark, MT, D Evans, Chhay Rachna, Heng Piphal, and A Carter (2015) Residential Patterning at Angkor Wat. *Antiquity* 89(348):1439-1455.