ADVANCING SOUTHEAST ASIAN ARCHAEOLOGY 2016

Selected Papers from the Second SEAMEO SPAFA International Conference on Southeast Asian Archaeology

Editor: Noel Hidalgo Tan

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Selected Papers from the Second SEAMEO SPAFA International Conference on Southeast Asian Archaeology, Bangkok, Thailand 2016
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The 2nd SEAMEO SPAFA International Conference on Southeast Asian Archaeology held in Bangkok, 2016 was organised to recognise a growing interest in the archaeology of Southeast Asia, to further advance archaeological research, exchanges of new knowledge and stimulate the growth of fresh generations of students and teachers in archaeology and related fields. The Southeast Asian region is deep in history. It has always been a hub of global exchanges of goods, people, and ideas that still need armies of scholars to unearth hidden knowledge of the past that would become relevant to the present.

This collection of papers from the Bangkok conference represents SEAMEO SPAFA’s continuing commitment to encourage the dissemination of scholarly knowledge on the Archaeology of Southeast Asia. It includes the keynote speeches by Asst. Prof. Saritpong Khunsong (Silpakorn University) and Dr Mahirta (Universitas Gadjah Mada) and the various country reports outlining archaeological activities undertaken between 2013-2015, a unique feature of SEAMEO SPAFA’s conferences. Various other papers included in this volume represent the breadth of research undertaken in the region, that include bio-archaeological analyses, satellite and aerial image analyses and regional investigations into the past. SEAMEO SPAFA continues to support the training in and the sharing of information on underwater archaeology and cultural heritage conservation. Various papers show that archaeologists have vital roles to play in the universal efforts to protect all forms of tangible cultural heritage. The 2016 Conference also included two new features: a lecture by Dr Wannasarn Noonsuk in the Thai language on the international status of Southeast Asian archaeological studies for Thai audience and a post-conference Writers’ Workshop on preparing research for publication.

We would like to thank our colleagues who served on the academic committee for the conference and this publication: Dr Grace Barretto-Tesoro, Mr Kyaw Oo Lwin, Dr Le Thi Lien, Prof. John Miksic, Prof. Mokhtar Saidin, Assoc. Prof. Surapol Natapintu, Mr Phon Kaseka, Prof. Truman Simanjuntak, Prof. Miriam Stark, as well as the numerous anonymous peer reviewers who have provided their comments for the papers herein.

Our final thanks go out to the various supporters of SEAMEO SPAFA and the conference, including the Ministry of Education (Thailand), the Fine Arts Department of Thailand, the Japan Foundation Asia Center, the Thai Khadi Research Institute of Thammasat University, the Institute of History and Philology at Academia Sinica, the School of Oriental and African Studies University of London, McElhanney and Leonard Cox.

We look forward to welcoming scholars of Southeast Asian Archaeology to the Third Conference to be held in 2019.

Dr. M.R. Rujaya Abhakorn
Centre Director, SEAMEO SPAFA
Introduction

This volume presents selected papers from the 2nd SEAMEO SPAFA International Conference on Southeast Asian Archaeology in Bangkok. This first section of this volume consist of invited papers, including our two keynote speakers from Thailand and Indonesia, Dr Saritpong Khunsong (Silpakorn University) and Dr Mahirta (Universitas Gajah Mada) respectively. Khunsong’s paper on infant burials at U-Thong discusses the results of recent excavations at U-Thong; the heartland of the Dvaravati culture and is a nod to the host country of Thailand, while Dr Mahirta’s presentation of the development of archaeology in UGM reflects SPAFA’s interest in education and capacity building in Southeast Asia. To encourage the representative participation of Southeast Asian countries, we invited every country in Southeast Asia to deliver a country report of recent archaeological activities and we are pleased to include the reports of Brunei, Cambodia, Indonesia, Malaysia, Myanmar, Philippines, Singapore, Thailand and Vietnam.

The remaining papers represent a snapshot of the exciting research that has been ongoing in the region. Thailand’s deep past is discussed in several papers such as Celiberti et al. on a possible variation of the Hoabinhian technocomplex from Doi Pha Kan; at the same site Frère et al. discuss animal bone assemblages and their differences between assemblages at other sites in Cambodia and Thailand. Surinlert outlines the possible connections between the famed Pratu Pha site in Lampang province with two similar newly-discovered sites in the same area and their implications for matching habitation periods with rock art. Ward’s proposed project on understanding the impact of social change on health at Non Ban Jak promises to provide new understanding of Iron Age society in Northeast Thailand, the results of which we look forward to hearing in the future. Moving a few millennia forward, Watson’s analysis of clay artefacts from Tap Chumphon indicate a larger extent of Old Mon in central and northeast Thailand in the 9th century than originally thought.

Archaeological research in Myanmar has accelerated in recent years and this volume highlights a growing interest in Myanmar’s past. Tin Maung Nyunt and Nini Khet’s discussion of excavated iron furnaces from the Mount Popa region, while undated, are potentially similar to other iron smelting sites in the region. Win Kyaing outline of hydraulic works in the Bagan area identifies the water management features of the famed temple plain and provides a historical background that will serve as a valuable reference for future research. Finally, Hudson’s paper on fortified villages bring to fore the unexplored potential for historical archaeology in Myanmar.

Because of its size, Singapore has not traditionally been represented in regional archaeology, and thus it is interesting to note the contributions of two papers by Kao, on the ceramic assemblage found at the National Gallery of Singapore site, as well as Latinis’ description of work by the Archaeology Unit at the Nalanda-Sriwijaya Centre in training archaeologists at their highly successful field school in the Koh Ker site at Cambodia.

From Vietnam, Schweyer illustrates the changing landscapes of Vietnam’s central coast, by combining Vietnamese and French topographical sources. A closer resolution of these changes can be seen through Nguyen Van Quang’s examination of the Hoa Chau Citadel in Thua Thien Hue province which began as a military outpost but later became and administrative centre. From a maritime and underwater perspective Le Thi Lien et al. present the results of their latest research at Van Don which highlight the long period of maritime activity in northern Vietnam; while Thorburn speculate a possible location for the port of Oc Eo as a prelude to future research. Carrying on with the theme of underwater archaeology, Tjoa-Bonatz discusses a series of shipwreck sites in the waters of Sumatra and their wider indications of connectivity in the region, while Troa et al. show how underwater cultural heritage in the Natuna Islands can contribute in the construction of a marine-eco park.

Three other papers are more notable for their object of study rather than their geographical location: Schwoerer-Kohl speculates on the discovery of gong chimes from Sukhothai and their possible connection to Chinese court music and highlights an under-studied area of research in this region - the connection between music and archaeology. Savitri presents a landscape study of Surakarta, the capital of the Mataram Kingdom, and underlines the difference in cultural values between what makes an ideal location for a capital, from the Dutch and Javanese perspective. Finally, Chaw et al. present a social dimension to rock art research by analysing what the prehistoric rock art site of Gua Tambun means to visitors and the local population, and the differences of such perceptions from the archaeologists who study it.

Although some 150 papers were presented at this conference, not all could be published here for various reasons, and other papers from this conference will also be published in the SPAFA Journal (www.spafajournal.org). The volume would not be possible without the contribution of the authors, and I also wish to extend my thanks to the academic committee and the peer reviewers who contributed in assessing each paper and for their valuable comments and insight.
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Abstract

U-Thong in Suphan Buri Province is one of the major cities that prospered in the Dvaravati period (circa 6th-11th century CE). However, the noteworthy studies of Chin Yoodi, Jean Boisselier and Phasook Indrawooth also suggested that U-Thong was a key site in the “proto-historic” or “pre-Dvaravati” period and played a significant role in trade networks contemporary with Oc Eo, a major port of Fu Nan in southern Vietnam. Additionally, the recent study of “dating Dvaravati” or “re-thinking Dvaravati” by Andrew Barram and Ian Glover based on some absolute (re-calibrated) dates from the excavation at Ban Tha Muang demonstrated that U-Thong was occupied since the 1st century CE, and suggested the term “early or proto-Dvaravati” for this period. This article presents the result of the archaeological excavation in 2015 conducted by the Department of Archaeology at Ban Noen Phlab Phla. The main objectives of this study were to explain the sequence of Dvaravati cultural layer within the U-Thong moated site. Many evidences were unearthed such as household (domestic) activities and brick monuments from the Dvaravati period that were never found before. The most important data, from the excavation in the lowest cultural layer, is the discovery of an infant skeleton which can be dated by AMS Radiocarbon dating to the second half of the 3rd century CE. This new data is significant evidence to the study of ritual and the socio-cultural development in the “pre-Dvaravati” period at U-Thong and other Dvaravati sites as well.

Keywords: Infant burial; Pre-Dvaravati period; U-Thong

Introduction

The historical and archaeological research of U-Thong, the site of an ancient city located in U-Thong District in Suphan Buri Province, began in 1903 under the patronage of H.R.H. Prince Damrong Rajanubhab during his official visit to Suphan Buri (Rajanubhab 1966: 27-28). Since then, the ancient town has been studied and has revealed many archaeological evidences, especially relating to Dvaravati material culture. It is undeniable that U-Thong is one of the most important sites when it comes to the Dvaravati period – generally dated to about the 7th-11th centuries CE, contemporary with ancient Nakhon Pathom and ancient Ku Bua in Ratchaburi Province.
U-Thong: Location and Geography

U-Thong, literally “the cradle of gold”, was an ancient city surrounded by moats, and its oval-shaped landscape is oriented northeast to southwest. The city spanned 1.56 km² with a 750 m width and a 1,650 m length. U-Thong is situated at the west of the Chorakhey Samphan Canal which ran from the southern to the eastern alluvial plain or the ancient shoreline (Suphajanya 1987: 10; Hutangura 2014). One kilometre to the west of the city was a mountain range, home to natural resources and the origin of many canals passing through the city to Chorakhey Samphan, the main passage way in ancient times (Fig. 1.1).

Moreover, U-Thong was only 70 km away from ancient Nakhon Pathom, the largest moated site from the Dvaravati period, which itself is 40 km away from the ancient city of Ku Bua (Fig. 1.2). The distance was likely conducive to networking, trade, and cultural and political exchange among these communities (Khunsong 2015: 222-223).

“Pre-Dvaravati” at U-Thong: Previous Research

Previous research conducted on U-Thong has put forward several academic presumptions and advantageous knowledge, especially in the study of the Dvaravati period. However, this article aims to focus on the proto-historic or pre-Dvaravati period at this ancient city.

First Archaeological Excavation at U-Thong by Quaritch Wales

Somsak Rattanakul, a senior archaeologist at the Fine Arts Department, reported in 1966 that H. G. Quaritch Wales had excavated some test pits near Stupa no. 3 and found only Sukhothai celadons (Rattanakul 1966: 6, 10). In his famous book on Dvaravati, Wales recorded that in 1936 he had excavated a trench (18 feet in length) but had not found much archaeological evidence. He made a short report on the cultural layer in which potsherds, shell and faunal remains were dispersed in 4 feet 6 inches depth of soil layer. He had also found many carinated potsherds excluding glazed ware (Wales 1969: 6-7).

Furthermore, Wales presumed that the red-painted potsherd with the three-wave pattern that was discovered from the lower cultural layer during the 1936 excavation probably related to the Fu Nan Kingdom. He also suggested that the city of U-Thong was called “Chin-lin”, or “land of gold”, which was mentioned in Chinese records (Wales 1969: 7). Chin-lin was the kingdom (or state) that the famous king of Fu Nan, Fan-Man or Fan-Shih-Man, had conquered in the 3rd century. Chinese records refer to this city as being located 2,000 li west of Fu Nan. Chin-lin was a source of silver, and its people used to hunt elephants for ivory (Wheatley 1961: 15, 116-117). Paul Wheatley, who specialized in Chinese records related to Southeast Asia, indicated that Chin-lin was situated by the upper gulf of Thailand, but most of the silver probably came from the Shan State of Myanmar (Wheatley 1961: 117).

The Study by Professor Chin Yoodi

Chin Yoodi, an expert on the prehistoric archaeology of Thailand, wrote an article on the prehistoric period and beads of U-Thong. There were many polished stone tools found in U-Thong and its vicinity. This means that there was human settlement in the Neolithic period around 3,000 years ago (Yoodi 1966a: 48-50). Moreover, the site was probably occupied successively during the Bronze and Iron Ages because U-Thong beads were similar as the ones found in late prehistoric sites in Lop Buri Province (Yoodi 1966a: 50). By comparing these to some beads from Oc Eo in Southern Vietnam, Kuala Selinsing and Pekalan Bujang in Malaysia, Yoodi (1966b: 53-57) concluded that U-Thong beads, such as semi-precious stone beads, monochrome glass beads, striped beads (usually called Roman beads) and eye-beads, probably date back to around the 2nd-11th centuries.
In 1976, Yoodi mentioned other important artefacts from U-Thong that consisted of double animal-headed and lingling-o earrings made from nephrite. These special finds were similar to the nephrite ornaments of Sa Huynh culture, which flourished in central Vietnam, also found in many island or coastal sites in Hong Kong, Taiwan, the Philippines and Vietnam. This means that ancient peoples some 2,900-2,210 years ago communicated with each other via sea route (Yoodi 1976: 27-30; see also Hung and Bellwood 2010).

The Importance of U-Thong in Professor Jean Boisselier’s Work

According to two interesting articles published by French scholar Jean Boisselier who excavated some monuments at U-Thong in the 1960s, the first one being “Ū-Thòng et son importance pour l’histoire de la Thaïlande”, Boisselier declared that U-Thong developed continuously since prehistoric or proto-historic times up to the 12th-13th century when it was abandoned because of a natural disaster or other reasons for re-establishing a city in the Mueang District of Suphan Buri (Boisselier 1966a: 6).

Boisselier also emphasized that U-Thong communicated with ancient China, India and the West since the 1st century, referring to evidence from the proto-historic period, such as seals, coin, beads, metal ornaments made from gold (Fig. 1.3), tin and bronze which were similar to Oc Eo artefacts (Boisselier 1966a: 7).

The second article written by Boisselier is “Nouvelles données sur l’histoire ancienne de la Thaïlande”. He advanced that the Chaophraya River plain area, especially U-Thong, was once the capital of the Fu Nan Kingdom sometime in the 1st-6th century. Most scholars, however, believe that this kingdom was located in the Mekong Delta region in southern Vietnam and Cambodia (Boisselier 1966b: 11-20). Boisselier proposed that the evidence found in ancient cities in central Thailand continuously from the proto-historic to Dvaravati periods supported the existence of Fu Nan and Dvaravati cultures (Boisselier 1966b: 18).

Moreover, Boisselier presented the discovery of many artefacts from the U-Thong area that could be dated to around 4th-5th century, such as inscribed seals, metal ornaments, Roman or Indian clay lamps, including the most important architectural finds consisting of a terracotta sculpture of three monks with alms-bowls (Fig. 1.4) and the stucco of Buddha protected by Naga, which bear similarities to the Amaravati style of Southeastern India (Boisselier 1966b: 18).

Archaeological Excavation at Ban Tha Muang, U-Thong

W Watson and HE Loofs (1967: 247) conducted excavations at Ban Tha Muang near U-Thong in 1966. However, they only reported soil profile descriptions and some artefacts such as potteries, spindle whorls, polished stone tools, glass beads, iron tools and lead objects. Watson and Loofs (1967: 248) concluded that Ban Tha Muang was probably occupied around the 1st century, in comparison with the Neolithic period of Ban Kao in Kanchanaburi Province and the early Iron Age site of Ban Kok Chareon in Lop Buri Province.

In 1969-1970, Loofs re-excavated at Ban Tha Muang, noticing some artefacts that were similar to Oc Eo ones, including grinding stones, metal rings, candle holders and spouts of kendi (Loofs 1979: 346). Loofs (1979: 349-351) suggested that this traces the existence of human occupation since the pre-Dvaravati period to around the 3rd century and that the site became gradually crowded during the Dvaravati period.

Later, radiocarbon dates from the excavation at Ban Tha Muang were analysed by Andrew Barram for his Master’s degree thesis at the Australian National University. Barram (2003: 60) found that the radiocarbon dates can be re-calibrated to the 1st-6th century. But this does not mean that the archaeological site was necessarily abandoned after the 7th century during the Dvaravati era. The important recommendation
issued by Barram relates to the earthenware potsherds of Dvaravati style, mentioned in the book *Index of Dvaravati Pottery* written by Phasook Indrawooth, that had been found in the pre-Dvaravati layer (Barram 2003: 61).

This brought Barram and Ian Glover, a British archaeologist who excavated at Ban Don Ta Phet near U-Thong in 1984-1985, to extend the result continuously and conclude that Ban Tha Muang had been occupied since the pre-Dvaravati period, suggesting that the term “Early or Proto-Dvaravati” might be a suitable designation for the period before the 6th century, instead of “Proto-Historic” (Barram and Glover 2008; Glover 2010a; Glover 2010b).

"U-Thong’s Role" from the Study of Prof. Dr Phasook Indrawooth

Phasook Indrawooth, an expert in Dvaravati archaeology, declared the result of U-Thong cultural development in her book *Suvarnabhumi Based on Archaeological Evidence* as consisting of two aspects:

1) U-Thong had been a trading port since the pre-Dvaravati period given the existence of important artefacts like double-headed ornaments and semi-precious stone beads, especially etched beads, which were Indian goods of the Maurya-Sunga period (ca. 350-50 BCE). Many glass, striped and eye beads from the Indo-Roman Age (ca. 50 BCE-300 CE) that were produced around the Mediterranean and Persia were found in large numbers at U-Thong. Furthermore, a Roman copper coin of Emperor Victorinus (268-270 CE) was discovered (Fig. 1.5), as in Oc Eo where two gold coins (or pendants) of Emperor Antonius Pius (138-161 CE) and Emperor Marcus Aurelius (161-180 CE) were also found. Thus, U-Thong was developing as an important port up to the Dvaravati period (Indrawooth 2005: 106-109).

2) U-Thong was the oldest religious centre in central Thailand as evidenced in findings of architectural sculptures of monks with alms-bowl and the Buddha protected by Naga, which can be dated to around the 4th-5th century, showing some religious connection to the Buddhist centre in the Amaravati region. Moreover, many Dvaravati monuments and sculptures related to both Buddhism and Brahmanism had been found at U-Thong (Indrawooth 2005: 110-114). According to the book *Dvaravati: A Critical Study Based on Archaeological Evidence*, Indrawooth indicated that U-Thong might have been an early capital of the Dvaravati state around the 4th-8th century, while ancient Nakhon Pathom was a later capital during the 8th-11th century (Indrawooth 1999: 101).

The Result of Archaeological Excavation Works at Ban Noen Phlabphla in U-Thong

It should be noted that most of the artefacts mentioned above are from surface collection, local people or museum donations. As a result, it is difficult to trace the original context, making it difficult to define the dates accurately. Moreover, the final report from Ban Tha Muang’s excavation in 1966 and 1969-1970 has never been published. Therefore the Department of Archaeology and the author re-excavated in 2014-2015 by scoping the area near ancient Stupa no. 3 at Ban Noen Phlabphla, Southwest of U-Thong.

The Result of 2010-2013 Excavation Works at Noen Phlabphla

The Noen Phlabphla site was first studied in 2010 by San Thaiyanont. He excavated two test pits and found that there were human activities from the middle to late Dvaravati period (ca. 9th-10th century). The most important evidences are 868 glass beads, fragments of glass and clumps of beads that represent bead-making activity. Chinese Tang ceramics were also unearthed in this Dvaravati cultural layer. But the settlement trace found that it was not crowded and abandoned in the late of Dvaravati period (Thaiyanont 2011).
In 2013, the Department of Archaeology and Silpakorn University re-excavated at Noen Phlabphla with four trenches measuring 2 × 4 m in order to support the previous excavation of San Thaiyanont. Most of the evidences found relate to Dvaravati material culture. We divided the cultural layer into at least two phases without any absolute dates. The first phase was the activity layer in the trench where potsherds were found. The second phase was an activity layer where many more potsherds were found. In this layer, we also found a spout of kundika, a Srivatsa clay seal, and 129-monochrome glass beads which can be dated back to the 9th-10th century, which is consistent with the 2010 results (Khunsong 2013).

Furthermore, some glass beads from the 2010 and 2013 excavations at Noen Phlabphla were analysed by Putsadee Rodcharoen, Department of Archaeology, using the Electron Probe Micro- Analyser (EPMA). Rodcharoen detected some samples of bead that were probably made in China (Pb-glass) and the Middle East region (v-Na-Ca glass) (Rodcharoen 2014: 576). As a result, it would seem that glass beads and ceramics were some of the imported goods related to the Tang Dynasty and Abbasid Caliphate via the Maritime Silk Road during the 9th-10th century (Khunsong 2015: 197-204).

**The 2014 Excavation at Noen Phlabphla**

This author, who was granted a research fund from the Silpakorn University Research Fund, purposed to find out more about U-Thong’s cultural development in regard to economic growth and how it was affected by maritime trade routes around the 9th-10th century (the final report is currently a work in progress).

According to the 2 × 4 m trenches, evidence was found in many phases. In the last occupational layer, the iron slag discarded layer (15-20 cm in depth with 31.25 kg of slag), was unearthed. Tuyère, which is a part of iron furnace, and 11 fragments of Chinese Tang ceramics from Xinhui Kiln were found. In the middle occupational layer, plenty of Dvaravati pottery, one ox skeleton and many glass beads (83 monochrome glass beads, one striped bead and one semi-precious stone bead) were discovered (Fig. 1.6).

In the first occupational layer, potsherds and faunal remains were found besides some potsherds found in ash and fired clay. The sample charcoal was indicated as 1576 ± 25 BP or 349-399 CE by Accelerator Mass Spectrometry (AMS) at the University of Waikato, New Zealand. Thus, Noen Phlabphla was occupied since the pre-Dvaravati period and was a production area during the Dvaravati time around the 9th-10th century.

**The 2015 Excavation at Noen Phlabphla**

The 2015 excavation undertaken by the Department of Archaeology, Silpakorn University, was granted the fund from Designated Areas for Sustainable Tourism Administration (DASTA), with the purpose of re-excavating Noen Phlabphla in the area of the U-Thong garden project, south of Stupa no. 3, with two trenches of 2 × 8 m (Fig. 1.7).

The ancient cultural layer in Trench 1, measuring approximately 190 cm in depth, revealed Dvaravati potsherds, faunal remains, shells, and other artefacts such as clay lamps, spindle whorls, glass beads and Chinese Tang green wares (Fig. 1.8). Unusual features about domestic behaviour and infant burial were also found (see below). The cultural layer revealed evidence consistent throughout the soil layer, which means that their features were of the same culture from the first occupational period to the last land abandonment.

The second trench (T. 2) revealed a Dvaravati brick monument (Fig. 1.9 and Table 1.1). The deepest layer was a monument’s base structure (about 160 cm deep from the surface), with plenty of dispersed limestone. The next layer was a monument in which lime layer was found, 10 cm deep, which might be
related to the process of construction, as well as many artefacts from the Dvaravati period. The top layer shows traces of abandonment from the monument’s destruction or recent domestic behaviour.

<table>
<thead>
<tr>
<th>Brick No.</th>
<th>Depth (cm dt)</th>
<th>Dates (BP)</th>
<th>Dates (CE)</th>
<th>Period</th>
</tr>
</thead>
<tbody>
<tr>
<td>A1005</td>
<td>125</td>
<td>1314 ± 81</td>
<td>620-782</td>
<td>Dvaravati</td>
</tr>
<tr>
<td>A1007</td>
<td>170-180</td>
<td>1277 ± 79</td>
<td>659-817</td>
<td>Dvaravati</td>
</tr>
<tr>
<td>A1008</td>
<td>170-180</td>
<td>1274 ± 79</td>
<td>662-820</td>
<td>Dvaravati</td>
</tr>
</tbody>
</table>

Table 1.1 Thermoluminescence Dates from Trench 2

It should be noted that one piece of a yellow glazed potsherd was found in the Dvaravati cultural layer of Trench 2. This special potsherd is a piece of earthenware with a floral design stamp that has never been previously reported from any other archaeological excavation in Thailand (Fig. 1.10). Its style of glazed and floral design stamp resembles a yellowish green glazed jar from Phnom Salok in Banteay Meanchey District, northwest of Cambodia (Rooney 2010: 30). Dawn Rooney (2010: 30-31) reported that the glazed jar from Phnom Salok probably dates back to about the 10th-12th century according to thermoluminescence, but she thought it should be dated earlier, to about the 8th century, because the floral stamp design is similar to Dvaravati pottery.

**Chronological Dating of Trench 1 at Noen Phlabphla Site**

The analysis of the chronological sequence of Trench 1 is quite difficult because most of the potsherd and special finds are in Dvaravati style, which has an approximate dating to around the 7th-11th century. The most important artefacts are three stamped potsherds which seem to relate to a diagnostic artefact found at other Dvaravati sites such as Nakhon Pathom (Indrawooth 1983: 30-31, 8). Moreover, Tang greenware from the 9th-10th century were found in the last occupational layer.

Nevertheless, traces of Dvaravati material culture were found from the middle to the deepest cultural layer. Six samples were checked using the AMS Method at the University of Waikato, New Zealand. The data obtained indicates that the samples can be dated to around the first half of the 2nd century to the end of the 5th century (Table 1.2 and Fig. 1.11).

<table>
<thead>
<tr>
<th>No.</th>
<th>Sample</th>
<th>CM DT</th>
<th>Context</th>
<th>AMS (BP)</th>
<th>CE</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Charcoal</td>
<td>113</td>
<td>Feature 2</td>
<td>1521 ± 22</td>
<td>407-451</td>
</tr>
<tr>
<td>2</td>
<td>Shell</td>
<td>130-140</td>
<td>-</td>
<td>1515 ± 20</td>
<td>415-455</td>
</tr>
<tr>
<td>3</td>
<td>Shell</td>
<td>130-140</td>
<td>-</td>
<td>1480 ± 21</td>
<td>449-491</td>
</tr>
<tr>
<td>4</td>
<td>Charcoal</td>
<td>190-200</td>
<td>-</td>
<td>1798 ± 21</td>
<td>131-173</td>
</tr>
<tr>
<td>5</td>
<td>Charcoal</td>
<td>220-230</td>
<td>Infant Burial</td>
<td>1720 ± 23</td>
<td>207-253</td>
</tr>
<tr>
<td>6</td>
<td>Shell</td>
<td>230-240</td>
<td>-</td>
<td>1709 ± 20</td>
<td>221-261</td>
</tr>
</tbody>
</table>

Table 1.2 Accelerator Mass Spectrometry (AMS) Dates of Trench 1
The above table and chart in Fig. 14 show two phases, which are 131-261 CE and 407-491 CE. Hence, Trench 1 at Noen Phlabpha was occupied during two main periods continuously:

1. Pre-Dvaravati period, or proto-historic time, which can itself be divided into two phases:
   - Phase 1: first half of the 2nd century to the second half of the 3rd century
   - Phase 2: approximately early 5th century to the end of the 5th century
2. Dvaravati period, the approximate date of which, from diagnostic potsherds, is about 9th-10th century

**Evidence of Infant Burial in Proto-Historic Times**

East of Trench 1 (T. 1), which is 220-228 cm deep, traces of an infant burial lined southwest to northeast, with the head lying westward and facing north and the knees tied together with turquoise glass beads. Even though the features are almost complete, the bone is quite fragile (Figs. 1.12 - 13).

According to the infant skeleton analysis conducted by Narupol Wangthongchaichareon, Department of Archaeology, 85% of these bones are fragile, as can be seen in the broken skull. The widest rib bone is 25 cm, and the longest bone from the skull to the left tibia is 44.5 cm. Most of the skeleton, especially long bones and ribs, is covered with limestone on the surface due to underwater progression after death.

The analysis for chronological death dating can be indicated in the bone’s growth, and bone measurements help to indicate the infant’s age as being 36-40 weeks in the womb, thus making this a case of “perinatal” death, which is when infant death is more than 28 weeks in the womb until seven days after birth (Fazekas and Kosa 1978; Jeanty 1983; Schaefer et al. 2009). However, the analysis does not indicate the infant’s gender or height (Table 1.3).

In fact, locals of U-Thong often speak of coincidental excavated skeletons inside the ancient city. However, in academic reporting, they are all from outside of U-Thong, such as the skeleton remains from the prehistoric period (about 2,000 years ago) at Ban Na Lao, which was excavated by the Fine Arts Department in 2001 (Thepsuriyanont 2002: 134), and some burials at the outer earthwork excavated by San Thaiyanont in 2011, which can be dated back to the late Dvaravati period around the 10th-11th century (Thaiyanont 2011: 85-87).

However, the infant skeleton from the 2015 excavation could date back to around the first half of the 3rd century from the analysis of ashes above the head. The ashes are 1720±23 BP or 207-253 CE, the results of which were obtained using the AMS Method at the University of Waikato (see Table 2). Moreover, the shell sample near the skeleton also dates back to 1709±20 BP or 221-261 CE. Therefore, this recent excavation uncovered new important data regarding infant burial practice in the pre-Dvaravati period inside a major Dvaravati city.

**Discussion**

Results of all excavations conducted at Noen Phlabpha during the 2010-2015 period revealed important information on the context of U-Thong, which can be summarized into the five following points:

1. Noen Phlabpha is the first archaeological area inside the moat and earthwork of U-Thong in which burial and grave items have been reported from academic excavation.
2. Noen Phlabpha’s traces of human occupation in the pre-Dvaravati period consist of a total of seven absolute dates found using AMS radiocarbon dating.
3. According to the 2015 excavation, it is known that the Dvaravati monument is under a large mound in the area of the U-Thong garden project.
4. Noen Phlabphla is the first archaeological site in Thailand where yellow glazed earthenware with a floral stamp design similar to the glazed jar from Cambodia was discovered.

5. Noen Phlabphla was a small production area of glass beads and iron smelting in the Dvaravati period, c. 9th-10th century, which was not found in other parts of U-Thong.

The above discoveries have a profound impact on the study of U-Thong’s development, as the recent findings relate to previous researchers’ recommendations about U-Thong’s role in the pre-Dvaravati or proto-historic period. Although most of their results are relative dates obtained from comparative artefacts, especially using artefacts from Oc Eo in Southern Vietnam, the works of Watson, Loofs and Barram indicate absolute dates from the Ban Tha Muang archaeological site.

<table>
<thead>
<tr>
<th>No.</th>
<th>Part of Bones</th>
<th>Measure Point</th>
<th>Size (mm)</th>
<th>Average age (weeks)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>occipital: pars basilaris</td>
<td>maximum width</td>
<td>14.0</td>
<td>38-40</td>
</tr>
<tr>
<td></td>
<td></td>
<td>sagittal length</td>
<td>12.0</td>
<td>36-38</td>
</tr>
<tr>
<td>2</td>
<td>occipital: right pars lateralis</td>
<td>maximum width</td>
<td>14.0</td>
<td>38-40</td>
</tr>
<tr>
<td></td>
<td></td>
<td>maximum length</td>
<td>26.0</td>
<td>38-40</td>
</tr>
<tr>
<td>3</td>
<td>right clavicle</td>
<td>maximum length</td>
<td>44.5</td>
<td>38-40</td>
</tr>
<tr>
<td>4</td>
<td>right scapula</td>
<td>scapula width</td>
<td>29.0</td>
<td>38-40</td>
</tr>
<tr>
<td>5</td>
<td>right humerus</td>
<td>maximum length</td>
<td>66.0</td>
<td>40</td>
</tr>
<tr>
<td></td>
<td></td>
<td>distal width</td>
<td>17.0</td>
<td>38-40</td>
</tr>
<tr>
<td></td>
<td></td>
<td>maximum length</td>
<td>66.0</td>
<td>38-40</td>
</tr>
<tr>
<td>6</td>
<td>right radius</td>
<td>maximum length</td>
<td>56.0</td>
<td>40</td>
</tr>
<tr>
<td>7</td>
<td>right ulna</td>
<td>maximum length</td>
<td>64.0</td>
<td>40</td>
</tr>
<tr>
<td>8</td>
<td>right ilium</td>
<td>maximum width</td>
<td>35.0</td>
<td>40</td>
</tr>
<tr>
<td></td>
<td></td>
<td>maximum length</td>
<td>35.0</td>
<td>40</td>
</tr>
<tr>
<td>9</td>
<td>right ischium</td>
<td>maximum width</td>
<td>12.0</td>
<td>40</td>
</tr>
<tr>
<td></td>
<td></td>
<td>maximum length</td>
<td>20.0</td>
<td>40</td>
</tr>
<tr>
<td>10</td>
<td>right pubis</td>
<td>maximum length</td>
<td>16.0</td>
<td>38-40</td>
</tr>
<tr>
<td>11</td>
<td>right femur</td>
<td>maximum length</td>
<td>76.5</td>
<td>40</td>
</tr>
<tr>
<td></td>
<td></td>
<td>distal width</td>
<td>19.0</td>
<td>38-40</td>
</tr>
<tr>
<td></td>
<td></td>
<td>maximum length</td>
<td>76.5</td>
<td>38-40</td>
</tr>
</tbody>
</table>

Table 1.3 Average age of infant burial from trench 1
Hence, the archaeological site at Noen Phlabphla was probably occupied from the pre-Dvaravati period around the first half of the 2nd century to the end of the 5th century. At that time, there were domestic or household activities and infant burial (about 207-253 CE) with imported goods consumption, such as the turquoise glass beads dedicated to the dead infant. The pre-Dvaravati community increasingly became crowded and developed constantly until the religious monument was built in the early to middle Dvaravati period around the first half of the 7th century to the first half of the 9th century. The Dvaravati communities at U-Thong might have had some connection to other sites such as ancient Nakhon Pathom and Cambodia.

In the middle to late Dvaravati period, ca. 9th-10th century, the community’s economic situation may have undergone change, because some Chinese Tang ceramics and glass beads (Pb and v-Na-Ca glass) have been found, as well as traces of the appearance of glass bead making and iron smelting activities, which were probably affected by external trade via the Maritime Silk Road (Khunsong 2015). This interpretation corresponds to the result of the author’s dissertation on the cultural development of ancient Nakhon Pathom (Khunsong 2010), including the important data from the recent discovery of Phanom Surin Arab’s shipwreck in Samut Sakhon Province (Jumprom 2014). However, there is no evidence of post-Dvaravati period or Khmer-Angkorian artefacts found from any of the excavations conducted at the Noen Phlabphla site (see Table 1.4).

<table>
<thead>
<tr>
<th>Period</th>
<th>Phase</th>
<th>Dates</th>
<th>Ancient Activity</th>
<th>Related Site</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pre-Dvaravati</td>
<td>1</td>
<td>first half of the 2nd century to the second half of the 3rd century</td>
<td>Infant burial practice, domestic activity</td>
<td>?</td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>early 5th century to the end of the 5th century</td>
<td>Domestic activity</td>
<td>?</td>
</tr>
<tr>
<td>Dvaravati</td>
<td>1</td>
<td>first half of the 7th century to the first half of the 9th century</td>
<td>Religious monument, domestic activity</td>
<td>Nakhon Pathom, Cambodia?</td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>ca. 9th-10th century</td>
<td>Glass bead making, iron smelting, domestic activity</td>
<td>Nakhon Pathom, Phanom Surin shipwreck, China, Middle East (via Maritime Silk Road)</td>
</tr>
</tbody>
</table>

Table 1.4 The Cultural Sequence of the Noen Phlabphla Site in U-Thong

Conclusion

Excavations at the Noen Phlabphla site reinforce conclusions from previous discoveries on the pre-Dvaravati or proto-historic period at U-Thong around the first half of the 2nd century to the end of the 5th century. However, the recent data has not yet been linked with Chinese records that mention Chin-lin in the 3rd century and Fu Nan. It would be interesting to conduct further in-depth studies on this.

Finally, we have noticed remarkable evidences from every excavation at U-Thong that are not decayed, even from the time of Asoka, the great emperor of the Maurya Dynasty in ancient India, who sent
Buddhist monks to proselytize Buddhism during “Suvarnabhumi” around the 3rd century BCE. Hence, the ancient city of U-Thong is probably not the “land of gold”, or “Suvarnabhumi”, as some Thai researchers (Vallibothama 2006: 76; Chantarachoti 2007: 84) and most local people of U-Thong strongly believe.

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Bibliography


Abstract

The Archaeology Study Program, Universitas Gadjah Mada, was established in 1962 and is the second oldest archaeology programme in Indonesia. Initially operated as part of the historical department, it has now developed as a department that offers three specialities in archaeology, i.e. general archaeology, museology and cultural resource management from undergraduate to post-graduate levels. From our perspectives, although teaching archaeology formally in university is our main obligation, teaching archaeology to the community is also important. This is not an easy task for us, especially in earlier times when resources and facilities were very limited. In this paper, I will share how colleagues from the Archaeology Department of Universitas Gadjah Mada developed internal and external strategies to improve our teaching qualities for students and the community. Together with my colleagues, we have an obligation to design future plans in developing the curriculum and public programme in the Archaeology Department. Grouped as a middle-aged teacher in our department, I had the opportunity to be taught by seniors who were the first generation of archaeologists graduating from our university. Thus, I have been able to see how perspectives from education, research experiences or exchanges of ideas with other scholars in the world have developed over time. With these influences, the content of archaeological teaching to students and the public has become more varied and has shifted from an emphasis on the knowledge of Indonesian archaeological data to more on varied archaeological regional data and its current issues, themes in archaeological methods, approaches and techniques for interpretation, and lately how we present data to the community/public. From our perspectives now, teaching archaeology to the community also includes sharing with them how archaeological data can increase community economic income.

Keywords: Archaeology Universitas Gadja Madah, teaching, perspective, community

Archaeology Department: Historical Background

The Archaeology Department, Universitas Gadjah Mada, Yogyakarta was established in 1962 and is the second oldest Archaeology Department in Indonesia (Fig. 2.1). Our current vision is to become an excellent centre of archaeological education in Southeast Asia based on qualified research, to produce outstanding archaeologists and sustainably inspire society to adjust to the social dynamical challenges in the global era. This vision has then expanded into our department’s missions, with an emphasis on the “Tridharma” functions (education, research and public service), which has been revised several times since its initiation in 1962.
In 1962, Prof. Zoetmulder, a teaching staff in the History Department, saw potential in temples such as the Prambanan compound temples, Borobudur and Plaosan compound temples around Yogyakarta to be studied and also the need for some special expertise to conserve and manage them, and therefore proposed to establish Archaeology Specialisation as part of the History Department. In 1967, it was decided to separate the Archaeology Department from the History Department. The separation was carried out based on two factors: material objects of study and the method of research. Although one of its material objects for research is the same, i.e. written records (inscription, archives), other material objects (artefacts, ecofacts, features) for research were different. Apart from that, archaeology has specific research methods, such as survey, excavation and laboratory work. Historical research tended to use more written source and oral information while archaeology tended to use more material objects, artefacts, ecofacts and features as the main data, although inscriptions are also an important form of data in archaeology, especially for the Hindu-Buddhist period onwards (Mahirta, et al. 2015).

After its separation from the History Department in 1967, the Archaeology Department continued adapting to the current condition and development of archaeology in the world. Now it functions as a department that offers three specialities: General Archaeology, Museology and Cultural Resource Management in undergraduate to post-graduate programmes. We started a Masters Study programme in 2001, and initiated PhD specialization in Archaeology as part of Humaniora Study Program in 2005 (Adrisijanti, personal com, 2016).

Since its beginning, we realized that although teaching is our main concern, teaching archaeology informally to public is also important and teaching cannot be undertaken without qualified and capable teaching staff, funding and continued research. How can we reach that goal? To reach good “Tridharma” function, our department has developed some internal and external strategies:

a. Internal strategies:
   1. Reviewing and improving the curriculum periodically and making revisions according to inputs from alumni, the Association of Indonesian Archaeologists (IAAI), market needs and departmental self-evaluation. Our purpose is to provide a curriculum that would become a trend setter in archaeological teaching in Indonesia.
   2. Being always alert to developments of archaeology paradigms in the world so that we can give more choice of knowledge to students.
   3. Improving teaching staff capabilities by sending staff to study abroad, international seminars and international workshops to widen their perspectives. Teaching based on the curriculum, providing modules for students.
   4. Providing a good facility for studying: classrooms, laboratories and facility for field trips, museum exhibitions (16 field trips per year), serial lectures and workshops.

b. External strategies:
   1. Increasing the number of partnerships with institutions in Indonesia and abroad in the form of teaching and research collaboration so that we have richer exchanges for new knowledge and research.
   2. Carrying out student exchange programmes and initiating teaching staff exchange programmes.
   3. Inviting guest lecturers/experts in certain archaeological specialities, museology and in managing cultural resources management to teach in our department to widen new perspectives.
As a result of both of our internal and external strategies, we revised our curriculum several times to result in better teaching programmes. In the past 10 years we managed to have cooperation with several institutions including Indonesian private institutions, especially the Arsari Foundation to support the Archaeology Department, resulting in some teaching staff going abroad to study for PhD and also helping our faculty to build a new building and laboratory facilities (Figs. 2.1 - 2.3). Currently, we are initiating a double degree in the Master Study programme and continuing our existing collaboration with other institutions especially with The Australian National University.

Below I describe the stages of our experience in teaching archaeology in our department that have been influenced and shaped by the history of our institution, the capability and research interests of our teaching staff but also by development of the general paradigm in archaeology in the world that we absorb and adapt, which we then transfer to students and the community.

Our Experiences in Teaching Archaeology in Indonesia

Since 1967, we experienced several changes in curriculums, as a result of our self-reflection and several inputs, and adjusting to the development of archaeological perspectives in the world. To make it simple, I will present our experiences in teaching archaeology in Indonesia into three periods: until 1970s, between 1980s-1990s, and after 2000s.

Archaeology in Gadjah Mada University up to the 1970s

To present this data I interviewed some seniors, the first generation of archaeologists who graduated from Gadjah Mada, current lecturers and also our former students. I also examined the past curriculums and looked back at our archives of formal and informal academic activities.

In 1967, when the Archaeology Department was just newly separated from the History Department, the curriculum emphasized how students could reconstruct history of the past based on material cultures, especially ruins of temples, and how to determine the “Raja” that built the building or structures. Most of the course in archaeology taught at bachelor level emphasized Hindu-Buddhist archaeology and consequently all BA thesis topics were related to the Hindu-Buddhist period of Indonesia, especially of Java and Sumatra. In the honours (“Sarjana”) level, non-classical Hindu-Buddhist periods were introduced, like the Prehistory of Indonesia, Islamic Period Archaeology including the colonial period and Epigraphy. Archaeological data from Indonesia was the main concern. Since most data we had at that time was from the Hindu-Buddhist period of Java and Sumatra, the regional archaeology course (Archaeology of India and Southeast Asia) focused on the Hindu-Buddhist period.

From the honours theses produced, we know how archaeology was taught at UGM in the 1970s. Several topics can be mentioned, such as the historic and religion background of temples, architectural characters of certain buildings, contents of inscriptions, interpretation of reliefs on temples, and characteristics of megalithic remains. Since there is no theoretical archaeology taught at that time, researches tended to be descriptive (Adrisijanti, 1972).

Archaeology in Gadjah Mada University between 1980s-1990s

This is the period when a number of my colleagues who are currently active as teaching staff and I were students in the Archaeology Department, and can therefore use my own observations on how the teaching of archaeology changed during this period. In the 1980s, two of our teaching staff undertook their master’s degree at the University of Pennsylvania, USA: Prof.Timbul Haryono and the late Ph. Subroto, MSc. They brought new perspectives to our department, especially Processual Archaeology, which had
influenced archaeology works in the west several decades before. Considering the prehistoric character and the use of ethnoarchaeology approach of archaeology in USA, this influence transferred to us. Some prehistoric content was added to enrich previous courses of regional archaeology in Indian and Southeast Asian archaeology that previously emphasized the Hindu-Buddhist period.

The processual perspective with its scientific approach to archaeology in Gadjah Mada University became more pronounced with the coming of Dr John N Miksic, who taught in our department between 1982-1987 and was funded by Ford Foundation. Some new courses that had more scientific content were added, such as Methods of Archaeological Research and Theory of Archaeology, an Environmental Archaeology course which covered themes of human adaptation to the environment and settlement, and methods of data analysis with an emphasis on statistical analysis with introduction to laboratory equipment and procedures for analysing archaeological data. Other courses were added, such as Centre of Civilization, Ceramology and Museology, although the teaching of museum at that time was still superficial.

The impact of processual thought in UGM archaeology and the greater understanding of regional data soon influenced types of research carried out by Gadjah Mada teachers and students as reflected in their theses. Some examples of the thesis topics during this period of development reflected processual influence in our university’s archaeology offerings, such as subsistence strategy or techno-economic system of prehistoric people (Anggraeni, 1989; Sri Sayekti, 1998), adaptation pattern of people living in certain areas during prehistoric times (Piskonata, 1996), interactions and connections of people between sites and the application of statistical theory to the lithic technology or megalithic statues (Mahirta, 1989; Sudarmadi, 1990).

Public Archaeology first entered our curriculum in the 1990s, introduced by Tjahjono Prasodjo, who studied at the University of Mexico. This addition gave significant impact to the teaching staff and also students on how we should approach the community. We did introduce to the community about the variety of archaeology remains and findings as part of our community service in 1980s, so that people were aware of the significance of archaeological remains and did not destroy them. But only in the 1990s we started to communicate our research to the public in by setting up exhibitions and producing documentary films in collaboration with heritage offices and several museums in Indonesia. Together with this programme we carried out several workshops to make documentary films to students.

Trying to keep up with the development of archaeology in other parts of the world and at the same time performing community or public service is not without difficulty. Funding for archaeological teaching from our government was still limited in the 1980s and 1990s, and we needed some laboratory facilities and funding to afford our research and teaching programmes, both for students and to the public. Therefore, we developed cooperation with other faculties in Gadjah Mada University and archaeological institutions around Yogyakarta, so that we could conduct research together and make it possible for teaching staff and students to use laboratory facilities in those institutions, such as the Borobudur Conservation Office and the Yogyakarta Heritage Preservation Office (BPCB Yogyakarta).

 Archaeology in Gadjah Mada University from Late 1990s-2000s

From late 1990s-2000s, five more teaching staffs, including myself, came back from The Australian National University, Australia, and one teaching staff member returned from studying at SOAS, London. Together we contributed to the development of the Archaeology Department. Some examples of contribution are the introduction of micro plant remains analysis, especially phytolith and starch analysis and the addition of regional archaeology such as Archaeology of Australia and Pacific courses in our curriculum as this region is significant in the process of colonization of human migrating from Indonesia.
The late 1990s was also the period in our department when we were more concerned with the development of archaeology paradigms in the world. While some of us were aware of the post-processual perspectives when dealing with our data, we also realized that we could not discard all the ideas from previous trends as suggested by other scholars (Flemming 2006). We also reflected and considered the critique toward the post-processual archaeology and made sure that we informed students to be aware about the critiques, such as the issue of lack of methodology that can deliver insecure knowledge and “fail to provide satisfactory account to judge the credibility of competing issues about the past” (Marciniak 1999: 293). Another example of critical thinking suggested to students is the use the ethnographic analogy for interpretation and discussing the first reactions of some archaeologists in the 1990s about the reluctance of using analogous reasoning applied in ethnoarchaeology.

Archaeological thought in the world is continuing to colour how archaeology is taught in Gadjah Mada University. One example is the idea of the post-processual thought where the voice of local community has become more important in interpreting their own past, and thus the community also has a right to determine how to manage the heritage. This implies that the government institution for heritage is not the only institution that has right to determine the pattern of heritage management, but rather, that the heritage should be managed in close integration with local people.

In the late 1990s, the UGM Archaeology Department also won multi-year research funding for integrated archaeological research in Gunung Kidul from Toyota Foundation and from the Ministry of Education Department of Indonesia for community service in Pacitan. Both regions are part of the karstic area in the southern mountains of Java that are rich with archaeological remains dating back from Late Pleistocene. This research and community service funding made it possible for us to work with the community in the Wonosari District and to conduct research together with our colleagues from the Geography and Geology Department in the karstic area of Gunung Kidul, Java. Our ideal purpose is to work with local people together to conserve the karstic area that contains rich archaeological remains by doing integrated programmes. Another grant that support our department to do community service is Semi Q grant. Funded by this grant, we did an integrated programme in Pacitan where we inspired the local community to make crafts from artificial stone and taught them how to make integrated eco-tourism tracks with the hope that they could change their main dependence of digging cave sediment and karst for fertilizer and cement material, which could destroy the archaeological karstic area, to other economic activities. We are still continuing such a programme in different areas, but our programme has not been fully successful.

The 2000s was when we were made more aware about the variety of thought of archaeology in the world, and that the trends were not uniform. We had to be sure in choosing which one to apply in our department. Tanudirjo (2012) confirmed that there are many perspectives applied in the UGM Archaeology and this development also influences applied archaeology, i.e. in Heritage Management and Museology Study programmes of our department. The Archaeology Department decided to add some more heritage studies and museology in the master study programmes and as a consequence of new perspectives from the world, involved community perspectives in integrated museum and heritage as one of the main ideas shared with students. Although initially museology specialisation was not quickly attract students to enroll in the programme, continuing efforts was carried out such as provided scholarship for students and good curriculum and provide facilities for practices hopefully can increase the number of students. Some examples of practice facilities that we provide for students are for conservation practices (Fig. 2.4) and making exhibitions (Fig. 2.5).

In 2010 some staff joined the internship in teaching new trends in museology in cooperation with Tropen Museum and Rainwart Academy in the Netherlands. Soon the new perspectives that we shared
to students showed results in the development of several museums in Indonesia. Some programmes in museums are arranged so that more public/community-based programme in museums and heritage complexes started to appear. Especially for museums in Java, a new type of museum, popularly called participant museum, started to be introduced. In Trowulan, believed to be the remains of ancient urban heritage of Majapahit kingdom from 13th-14th century, we arranged an integrated community programme and research in collaboration with all of the archaeology departments in Indonesia supported by Arsari Foundation. Together with this foundation we develop “Mandala Majapahit information centre” in Archaeology Department, so that more data, publication about Majapahit can be accessed by public. High school students from many cities in Indonesia visit this facility every year (Fig. 2.6).

Working with the community continues with the additional purpose to inspire the community to work together to increase economic income from heritage preservation. In the last two years, the UGM Archaeology Department has initiated two programmes in Central Java for local people: one programme around Sojiwan Temple to make batik motifs inspired by reliefs available on Sojiwan temples and the other in Kudus, an area with archaeological remains of 16th-19th century, in which students together with local people find more sources of inspiration from other heritage for small industry production to increase economic income (Fig. 2.7). We arrange the programme so that from the beginning the community actively participate, not only as an object but also as a planner. Both programmes are still continuing but need some help to teach them how to market products effectively.

Our Expectations

We admit that some of the funding for collaboration programmes in UGM’s Archaeology Department comes from foreign institutions we collaborate with. Despite some benefits that we can have, the unbalanced resource sometimes can result in unequal access to the data, which are actually our own. In the future we hope to arrange a better collaboration.

To sum up, I close my sharing experiences with the hope that archaeology institutions in SEA can increase cooperation in teaching, research and community service to reach better quality teaching in each of our institutions. If in the world now the trend is to give more attention to the thought from non-west in archaeology and heritage conservation, why don’t we work together on this? To make this happen we ask archaeologists from Southeast Asia to work together and share knowledge. Another expectation is that all archaeology institutions in Southeast Asia, including from UGM, can have mutual exchange opportunities to do research in Southeast Asian countries.

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Bibliography


Abstract

The Brunei Shipwreck was discovered in 1997. Its discovery was the most important in the maritime history of Brunei and provided strong evidence of the role of Brunei as an important trade centre in Southeast Asia, particularly in the 15th to 16th centuries. The Brunei Shipwreck has yielded 12,560 ceramics and 2,665 other artefacts like beads, glass bracelets, metals, stone objects and others. This important discovery has been made into many publications but no complete data is yet available, especially with regards to the ceramics in terms of the total and percentage of the origin country of the ceramics. The writer has analysed the ceramics according to their origin and types. This paper focuses on ceramics while other artefacts will not be discussed. It covers the origin of the ceramics as well as the theory of the origin of the shipwreck. By attending this conference, it will give opportunities for archaeologists in the Southeast Asian region to share information including trade ceramics to determine their origin and the location of where they were produced or kiln sites.

Keywords: Brunei, shipwreck, ceramics, blue and white ware, celadon, Sawankhalok, Sing Buri, Sukhothai, Chu Dau

Introduction

Southeast Asia has a rich maritime history owing to the region’s archipelago nature. Being a region dominated by sea, trade and shipping has been an important feature of political and economic events for centuries. For these reasons, a growing number of shipwrecks have already been found in Southeast Asia. There are reportedly hundreds of ancient shipwrecks found in Southeast Asian waters particularly in Thailand, Malaysia, Philippines, Vietnam, Indonesia and Brunei. These ancient shipwrecks consist of four types: Arabic ships, Southeast Asian ships; Chinese ships; and European ships. The majority of these shipwrecks contain durable items, especially ceramics, and other objects such as metals, glass, stones, beads, etc.

The Importance of the Shipwreck and its Cargoes

Shipwrecks and their associated material remains provide one of the most important sources of archaeological information on early maritime trade. As veritable time capsules, they represent a particular period in which the material evidence constitutes a distinct assemblage at the time of their submergence; thus
are invaluable benchmarks for establishing site chronologies. As a comparative tool, artefact assemblages from underwater sites have been used in conjunction with artefacts from terrestrial recoveries to establish a more accurate artefact typology. The packing and mixture of the cargo items within the ship may give revealing clues about a vessel’s origin, routes and destination.

The ceramics are the most important items found in the shipwrecks. The studies and classification of ceramics found in the shipwrecks can generate a baseline for knowledge and provide information on long distance ceramic trade. The studies of the ceramics may give clues about trade centres in Southeast Asia.

The Discovery of Brunei Shipwreck

The Brunei Shipwreck was first indicated in 1997 during a geophysical survey of a future pipeline when an anomaly 20 by 15 m was recorded on the sea-bed corridor, 32 nautical miles off the coast of Brunei, at the depth of 62 metres. A ROV inspection showed that the anomaly was apparently a mound of ancient ceramics. The company which discovered the site, the ELF Petroleum Asia Brunei Venture, informed the discovery to the Brunei authority as well as the French embassy in Brunei.

Since this shipwreck was the first and only one found in Brunei waters and underwater archaeology was a new field in Brunei, the Brunei authority requested France to lead the salvage work because this country was one of the world leaders in the field of underwater archaeology.

After the various parties involved agreed, the first expedition for the preliminary studies was conducted from 1 to 23 October 1997, led by Michel L’hour, an expert from *Department des Recherches Archeologiques Subaquatiques et Sous-Marins* (DRASSM), France. The main objective of this project was to get a sample of the discovered remains. About 150 artefacts were collected in which 131 of them were ceramics, four iron bars, a fragment of bronze and 14 pieces of beads. All of them dated between 15th and 16th century, originating from China, Vietnam and Siam (Thailand).

The 2nd phase of this project took place from 28 May to 3 August 1998, involving 130 experts from different countries including Brunei. During this project, several professional divers from Australia, New Zealand, France and Singapore were involved. This project was sponsored by Total Fina Elf and uncovered more than 15,225 artefacts, which is one of the largest cargoes found from a shipwreck in this part of the world.

To compare it with other shipwrecks, the Brunei Shipwreck is believed to be contemporaneous with Lena Shoal and Santa Cruz Shipwrecks. By initial stylistics analysis by Crick’s (2001) of Santa Cruz Shipwreck ceramics (Orillaneda 2008), the Chinese ceramics of the Brunei Shipwreck were believed to be produced during the Hongzhi period (1488-1505).

The Cargo of the Brunei Shipwreck

The Brunei Shipwreck yielded a total of 15,225 pieces of archaeological specimens and like other shipwrecks found in Southeast Asia the majority of the cargo was ceramics. Beside ceramics, also found but less in number were glass bracelets, raw glass, glass and stone beads, bronze objects (artillery, wire coils, gongs, rings, ingots, small box and coins), game tokens of white stone, grinding stone, tin ingots, ivories and floral remains. Some of these items like bronze artillery, gongs, small box, game token, cooking pot, braziers, incense burner and earthenware kendi are believed to be part of the ship’s equipment rather than part of the cargo.
Ceramics

The Brunei Shipwreck contained 12,560 (about 82.50%) ceramics of which the majority were high-fired ceramics (porcelain and stoneware) and not less 1% earthenware. The majority of the ceramics were still intact. These ceramics originated from China, Thailand and Vietnam and dated to the late 15th to early 16th century.

Chinese Ceramics

The majority of the ceramic artefacts (7,109 or 56.60%) were manufactured in China and they can be categorized into six groups such as blue and white, white, celadon, cobalt blue, two glazed ware and coarse stoneware. The Chinese ceramics were produced in kilns in the provinces of Jiangxi, Zhejiang and Guangdong, and probably Fujian.

Blue and White Ware

Blue and white wares are the most important parts of the cargo since they appear in large numbers. They were produced in Jingdezhen area in Jiangxi Province. Blue and white wares are 4,711 in number, or 30.94% of the cargo and about 66.30% of the total of Chinese ceramics, and have a variety of form, such as dish, bowl, jar, jarlet, ewer, kendi, covered box, hexagonal container and cup.

Dishes are the most abundant with the total number of 3,772 pieces (about 24.78% of the cargo and about 80.10% of blue and white ceramics). The dishes have different sizes (large, medium and small) and different shape of rims such as straight, flat, foliated and everted. The large dishes have an average size of mouth rim diameter between 31.5 to 32.9 cm (Fig 3.1, nos. 1-3), medium size between 17.4 to 25.5 cm (Fig. 3.1, nos. 4-9) and small size between 11.4 to 14.2 cm (Fig. 3.1, nos. 10-12). The decorations feature a variety of motifs, including animals (deer, peacock, crane, duck, prawn and fish); flower motifs such as lotus, peony, chrysanthemum and aquatic plants; mythical figures such as phoenix, qilin, dragon and lion dog. Other designs include human figures, rock, a garden, pine tree, ribbon, classic scrolls, cross hatching, plantain leaves, wave pattern and fruits.

Bowls are 517 pieces in total number (about 10.97% of total blue and white ceramics) and have four different sizes; very large, large, medium and small. A very large bowl (14 in total) has an average size of mouth rim diameter between 32.3 to 34.1 cm (Fig. 3.2, no. 1); large bowl between 18.9 to 23 cm (Fig. 3.2, nos. 2-6); medium size bowl between 12.1 to 17.1 cm (Fig. 3.2, nos. 7-10) and small bowl an average size of mouth rim diameter below 10 cm (Fig. 3.2, no. 11). Like dishes, bowls also have varieties of decoration such as flower (lotus, peony and chrysanthemum), vajra, dragon, lion dog, fish, butterfly, human figure, fruits, birds, Buddhist emblems, turtle shell pattern, conch and Chinese characters. Two of the very large bowls have reign marks (four characters in two columns) on the base reading “Made during the period of the Great Ming's” (Fig. 3.2, no. 12).

Cups are only 73 pieces in total number (about 1.55% of total blue and white ceramics) with average heights between 3.9 to 4.4 cm (Fig. 3.3). Their decorations include Buddhist emblems (conch, umbrella, lotus, endless point and wheel of the law), floral, cloud scrolls and Sanskrit characters.

Jarlets are 200 pieces in total number (about 4.25% of total blue and white ceramics) with an average height between 5.4-5.75 cm (Fig. 3.4). They are characterized by the globular body and small mouth-rim. Because of their small size, jarlets were found inside the stoneware jar, which was an innovative packing technique in order to save cargo space.
Jars are only 78 pieces in total number (about 1.66% of total blue and white ceramics) and are small in size with an average height between 10 to 15.1 cm (Fig. 3.5) and usually with ovoid body. On the body they are decorated with fruits, floral, mythical animal, aquatic plant and court ladies in a garden; lotus petals on the lower body; cloud collars, clouds and petals on the shoulder; and key frets below the mouth-rim.

Other forms (about 0.19% of the blue and white ceramics) are double gourd bottle (one piece), kendi (four pieces), ewer (two pieces), hexagonal container (one piece) and drum shaped covered box (one piece) (Fig. 3.6). They are considered very rare artefacts because of their unique shapes and only a few in number. Two of these rarest artefacts of blue and white ware (a covered box and an ewer) were dated in the Yuan Dynasty period (1279-1368) and they were believed to belong to the crew rather than for export (Fig. 6, nos. 5 and 6).

10 covered boxes were also found (about 0.21% of total blue and white ceramics) with an average height between 2.4 to 3.3 cm (Fig. 3.7, nos. 1-3) and 53 lids (about 1.13% of total blue and white ceramics) with an average diameter between 3.5 to 6.45 cm (Fig. 3.7, nos. 4-6). These lids could belong to the jars, kendis, ewers and covered boxes.

*White Glazed Ware*

White glazed wares are considered twins of blue and white ware because of their similarities in terms of shape and porcelain body. The exceptional quality of the paste and the glaze of these pieces suggest they were also made in Jingdezhen. Like blue and white ware, the glaze of the white ware is applied with great care and is smooth and homogeneous.

White glazed ware only represents 203 pieces (2.86% of total Chinese ceramics and 1.66% of total ceramics) and their numbers are lesser due to the popularity of blue and white ware. The forms of white glazed ware consist of dishes, bowls, cups and bottle (Fig. 3.8). The dishes (145 pieces) are of medium size with average mouth-rim diameter between 18 to 22 cm and with flared lip. The bowl of white glazed ware is the only 2 found in a cargo; also with a flared lip and opening mouth-rim about 23 cm in diameter. The cups (83 pieces) are shaped like a bell potted in thin porcelain and small in size with an average diameter of mouth-rim about 6 cm and 4.5 cm in height. The single bottle is part of a base and decorated with incised decoration.

*Celadon*

The production of celadon in China can be traced back in the early centuries but reached its peak during the Song Dynasty (960-1279 CE). The major production of celadon during the Song Dynasty period was carried out at Lung Chuan in Zhejiang province and during the peak period, the Lung Chuan kilns produced nearly all of the celadon made at the time.

During the Ming Dynasty period (1368-1644 CE), celadon lost its popularity when blue and white ware took over as the main production of ceramic ware in China at that time. Although its popularity was waning, celadon ware was still produced in China but with declining quality. They are about 20 kilns producing imitation of Lung Chuan celadon during the Ming period, of which the most important were the Jingdezhen and Ji’an kilns in Jiangxi, the Jianyang kiln in Fujian and the Huiyang kiln in Guangdong.

There are 1,121 pieces of Chinese celadon (about 15.76% of total Chinese ceramics and 7.36% of total ceramics) in the Brunei Shipwreck cargo. The celadon ware has been identified as having originated from the major celadon production in China, especially in the Lung Chuan.
area in Zhejiang province and also from Guangdong and Jiangxi province. This type of ware is categorized into 3 groups on the basis of their shape, size and origin.

The first group of celadon ware comes from Guangdong province with a total number of 1,071 pieces (Fig. 3.9). They are small dishes with an average diameter of mouth-rim between 11 and 13 cm. The shape of the dish is highly standardized and with foliated and straight rim. The paste varies in colour from creamy white, chalky to greyish white. The glaze also varies in colour such as pale sea green, turquoise green, olive green and yellow green. Most of these small dishes are undecorated but if decorated, they have a stamped pattern (usually decorated with chrysanthemum flower and diamond pattern) on the inside centre or incised on the cavetto. Some of the dishes are also unglazed on the inside centre. This type of celadon was probably produced in the Huiyang kilns of Guangdong province.

The second group of celadon (18 pieces) was produced in Jiangxi province in the kilns of Jingdezhen and Ji’an. They are dishes with an average mouth-rim diameter of about 20 cm (Fig. 10). The dishes are with foliated rim and covered with sea green glaze but the unglazed base shows chalky coloured biscuit. The cavetto of dishes are usually decorated with carved wave pattern and carved floral on the inside centre. The paste is white and the shape of dishes resembles that of the blue and white ware, and this indicates that they were produced in the kilns of Jingdezhen in Jiangxi rather than Zhejiang province.

The third group of celadon (28 pieces) was produced in the kilns of Longquan in Zhejiang Province (Fig. 3.11). The majority are dishes and only one is a bowl. Although Longquan kilns lost its monopoly of ceramics production during the Ming period, celadon ware were still produced there but lost their qualities and were forced to share the market with other ceramics. There is unglazed ring on the base caused by the supporting ring during firing which turned an orange colour due to the high content of iron oxide in the clay and the reducing atmosphere created by the firing process. The technology of firing and the high iron content of clay are two typical characteristics of Longquan celadon. The Longquan celadon is divided into five groups according to their different characteristics and shapes.

The majority of celadon from Longquan are dishes with large size (33 cm mouth-rim diameter). The dishes are mostly with flattened mouth-rim and scalloped lip; usually with stamped floral motif on the cavetto as well as on the inside centre (26 pieces) (Fig. 3.11, no. 1); and covered with olive green and yellowish green. The second group of dishes (2 pieces) (Fig. 3.11, no. 2) is with straight rim, covered with olive green and decorated with incised cross hatching pattern. The third group of dishes (2 pieces) (Fig. 3.11, no. 3) is with flat upturned rim and covered with dark olive green. They are decorated with carved vertical line on the exterior wall and the mouth-rim diameter is 22.9 cm. The fourth group is a small dish (15 cm in diameter) with a flattened mouth-rim and decorated with stamped floral medallion on the inside centre and vertical line on the cavetto (1 piece) (Fig. 3.11, no. 4). It is covered with greyish green glaze.

The last group of Longquan celadon is a deep bowl with straight mouth-rim and high foot-ring (Fig. 3.11, no. 5).

Cobalt Blue Glaze

This type of ware consists of three ewers with identical shape with one of them still in perfect condition (Fig. 3.12). The blue glaze is a limestone-based glaze with a cobalt oxide pigment. The shape of these ewers are copied from or influenced by Islamic ewer made in metal
(Bing Zhao 2002). These ewers have a pear shaped body but flattened on both sides; an ear shaped handle; S shaped spout; neck funnel shaped; and trumpet shaped mouth-rim. They are made of three separately moulded parts that is body to the mouth-rim, spout and handle. Cobalt blue glaze was made in limited quantities and started being produced at the time of Yuan in Jingdezhen and continued to be made under the Ming and Qing dynasties.

**Iron Spotted ware**

This type of ware is rarest and a unique piece because it is the only one found in the cargo (Fig. 3.13). It was produced in the Yuan Dynasty period (1279-1368) and its age difference from the rest of the whole cargo is more than 100 years. This iron spotted ware is in the shape of double gourd used as a pouring vessel. It is covered with bluish white glaze and decorated with blackish brown spots from upper to the bottom body. Because it is the only one in the cargo, it seems that it was being transported to some antique collector in Brunei or it may have belonged to the crew for utensil use. But because it is too old to be used by the ship’s crew, the first explanation is more accepted than the second one.

**Coarse Stoneware**

The cargo also contained a large number of Chinese coarse stoneware with 1,020 pieces in number (14.35% of total Chinese ceramics and 8.12% of total ceramics). They are one of the most important items for export markets, intended for everyday use. The majority of coarse stoneware is made in the form of large jars and in smaller number as incense burners, basins, lids and ewers. The large number of jars found in the Brunei Shipwreck bears witness to their variety and functions, and also to the size of demand. Because they are coarsely made, these jars were probably produced either in the kiln of Fujian or Guangdong province.

There are 997 Chinese jars and are categorized into seven groups because of their different characteristics. The first group is jars with decoration (Fig. 3.14, no. 1) and there are 859 pieces in total. The decoration motifs are floral applied on the body as well as on the shoulder and petals just above the base. They are potted in creamy stoneware and covered with a thin and shiny glaze and the glaze colour varies from golden brown, yellowish or olive green glaze. The jars have four horizontal rope-like designs on the shoulder and average in height of between 35 to 36.5 cm.

The second group (37 pieces) is jars without decoration but has similar characteristics with the first jar group in terms of glaze, size and shape (Fig. 3.14, no. 2). The third group (20 pieces) also shares many similarities with the jars in the first and second groups, but have no handles and their heights are a little bit shorter (Fig. 3.14, no. 3).

The fourth group (38 pieces) is jars with a sloping and wide shoulder, and flattened globular-bulging body (Fig. 3.14, no. 4). The jars range in height from 33 to 38 cm. The body is beige stoneware and covered in a dark-brown glaze. They also have four vertical handles on the shoulder.

The fifth group comprises a jar with an ovoid body and a thick rolled lip (Fig. 3.14, no. 5). This type of jar is the only one found in the cargo and it is assumed that it belonged to the crew and was used during their journey. The sixth group (3 pieces) is jars with a spout and handles (Fig. 3.14, no. 6). There are five handles on the shoulder, four of which are in horizontal position and one in vertical. The vertical handle is used for pouring. The last group (38 pieces) is jars with an onion shaped body, cylindrical neck, and narrow mouth-rim, covered with dark black glaze (Fig. 3.14, no. 7).
There were also nine incense burners found in the cargo (Fig. 3.15). These incense burners have three short legs, convex base and everted rim. On the exterior wall, they are covered with caramel-brown glaze but unglazed on the interior; the interior part was intentionally unglazed for burning the incenses. Because of their limited number, it is assumed that these incense burners belonged to the crew and were used for rituals or other functions.

There are four basins with mouth-rim diameter ranging from 21.3 to 23.3 cm. The shape is like a dish but the body is rather high (Fig. 3.16). With a flat upturned rim and covered with dark brownish glaze and some are decorated with stamped fish on the inside centre.

There are two dome-shaped lids (Fig. 3.17), which probably belong to the jars. The lids have a lotus bud handle on the top and are covered with brown glaze. The mouth-rim is 22.1 cm in diameter.

The last group of stoneware (eight pieces) is pouring vessels of ewer with oval body, two horizontal and one vertical handle on the shoulder, cylindrical neck and outward mouth-rim and covered with black glaze (Fig. 3.18).

**Thai ceramics**

Thailand has a long history in the production of ceramics. Earthenware has been produced in Thailand since the Neolithic period but glazed ceramics only appeared in the 14th century or possibly as early as the end of the 13th century. The glazed ceramics were produced in central Thailand in the kilns of Sukhothai and Sawankhalok (also known as Si Satchanalai) as well as in the northern part of Thailand called Lanna. Sukhothai and Sawankhalok became the main ceramics production centre for the export market in the 14th to 16th century after Sukhothai was absorbed into the Ayutthaya Kingdom. Sing Buri province also produced for export market, especially in the production of large jars, and operated at the same time as Sukhothai and Sawankhalok. Glazed ceramics produced in northern Thailand are believed to have been only for the domestic market but the discovery of unknown ceramics which were very similar to ceramics produced in Lanna has refuted this theory.

Thai ceramics are the second largest set found with 5,420 pieces in number (about 43.15%) after Chinese ceramics. Thai ceramics in the Brunei Shipwreck were produced in the kilns of Sawankhalok, Sing Buri and Ayutthaya and probably from northern kilns. No Sukhothai ceramics were found.

There were 1,791 pieces of Sawankhalok ware (33% total of Thai ceramics) consisting of three groups: celadon, brown/black glazed and iron painted ware. They are potted in grey stoneware mixed with black grits. Among this group, celadon is the largest in number (1,757 pieces or 32% or Thai ceramics) while the other two only small in number. Celadon is made in the form of dishes, bottles, jar and kendi. Celadon dishes (1,183 pieces) are large in size with an average mouth-rim diameter between 23.5 cm to 31.5 cm; either with straight, flattened, foliated and upturned; base unglazed show either with beige or reddish orange biscuit; heavy and thick body; and covered either with olive green or grey green (Fig. 3.19).

Bottles (571 pieces) have two handles on the shoulder and appear as either with elongated, oval or globular body (Fig. 3.20). One of the rarest Sawankhalok celadon is a kendi in the shape of hamsa or sacred goose (Fig. 3.20, no. 5).

The second group of Sawankhalok ware are brown/black glazed (34 pieces or 0.63% of the total of Thai ceramics) made in the form of small jars, bottles, ewers and water droppers (Fig. 3.21). Most of the brown/black glazed ware have lost part of their glaze due to low resistance in seawater. There are three types of small jars: small jars with wide mouth-rim; small jars with two handles, narrow neck and incised
lines on the shoulder; and small jars with small mouth-rim. The bottles have pear shaped body and trumpet shaped mouth-rim. The ewer has a bent spout and three handles on the shoulder with the one vertical handle used for pouring while the other two small horizontal handles may have probably been used for securing a plug (Dupoizat 2002: 118). Two water droppers are in the shape of an elephant with one of them with a rider (Fig. 3.21 nos. 5 and 6).

For iron painted ware, only one piece was found. It is a small bottle with flattened globular body, cylindrical neck and decorated with a flame motif on the body (Fig. 3.22).

Sing Buri wares are large storage jars (715 pieces or 13.20% of the total Thai ceramics) and they are heavily potted in grey stoneware mixed with black grit and covered in a brownish-black glaze (Fig. 3.23). These jars are divided into five groups based on their shape and size: jars with elongated body; medium jars with ovoid body; large jars with ovoid body; ovoid medium jars with a long neck; and elongated body jars without handle.

There are also 42 pieces (0.77% of total Thai ceramics) of earthenware which are believed to have originated from Thailand. However, the kiln sites of earthenware production in Thailand are not well known because of limited data and they could have been produced in Ayutthaya. They are made in a form of kendi, cooking pot, lid and stoves (Fig. 3.24). They are not part of the cargo but belong to the crew and used during their journey.

The last group of Thai ceramics are bowls with a yellowish glaze (Fig. 3.25). There are about 2,605 (48.10% of total Thai ceramics) of this kind of bowls, and during their discovery, some of the bowls were put inside 13 large Sing Buri jars, which was one of the packing techniques used to save cargo space. The bowls were identified by the French to have been produced in Sawankhalok but they were probably produced somewhere else as their characteristics are different from Sawankhalok ware, especially in terms of the glaze and body paste. Some ceramists believe these ceramics were produced in northern Thailand in the kiln of Phan. Field survey needs to be conducted at the kiln sites in northern Thailand to ascertain the origin of these bowls.

**Vietnamese ware**

Compared with Chinese and Thai ceramics, there were only 31 pieces (or less than 1%) of Vietnamese ceramics in the Brunei Shipwreck. The Vietnamese ceramics are categorized into four groups such as blue and white ware, white ware, polychrome or enameled ware and black/brown coarse stoneware. Among these Vietnamese ceramics, 20 pieces are blue and white; two pieces are white ware; four pieces are polychrome; and five pieces are black/brown coarse stoneware.

Blue and white wares are the finest compared to other types of Vietnamese ceramics (Fig. 3.26). They are made in the form of jar (four pieces), dish (one piece), bowl (three pieces), jarlet (three pieces), jar lid (two pieces), covered box (six pieces) and stem bowl (one piece). This Vietnamese blue and white ware has a lot of similarities with Chinese blue and white ware, especially in terms of decoration and shape. The wares are decorated with floral patterns (peony, chrysanthemum and lotus), fish, key fret pattern, petals, cloud pattern, fish scales or wave pattern and others. This type of ware was produced in northern Vietnam in the kilns of Chu Dau, Hai Hung province. Chu Dau was the most important centre of ceramics production in the 15th to 16th century for the international market, especially Southeast Asia and Japan.

White ware and polychrome ware were also produced in Chu Dau and have similarities with blue and white ware. These two types of ware were produced in smaller quantities due to the greater popularity of blue and white ware. Their forms consist of jar, lid of covered box, jarlet and bowl (Fig. 3.27).
The fourth group of Vietnamese ceramics are three black/brown coarse stoneware jars. Due to their limited numbers, it seems unlikely that they belonged to the ship’s cargo and are believed to have been part of the possessions of one of the ship’s passengers. The jars are with the following characteristics: they have a height of about 23 cm, 40 cm and 62 cm; covered with ochre-brown (two pieces) and black glazed; decorated with incised floral wreath just below the shoulder to the middle of the body and below it with waved lines arranged in separate bands; and with a beige stoneware body paste (Fig. 3.28).

These jars are believed to have been produced in central Vietnam in the kilns located near Vijaya, a former capital of Champs Kingdom in Binh Dinh province. Binh Dinh province was also an important producer of ceramics for international markets although their quality were inferior compared to Chu Dau ceramics. In the context of trade, ceramics from Binh Dinh province have been found at archaeological sites in Southeast Asia including Brunei. Aside from the land, they were also found in shipwrecks like Pandanan Shipwreck, of which 80% of the ceramics were from Binh Dinh province. This type of ware probably also came from northern Vietnam because a similar jar was reportedly found in an excavation in Thanh-hoa province (Dupoizat 2002).

Conclusion

The Brunei Shipwreck is considered the most important discovery in maritime history of Brunei. The discovery of the Brunei Shipwreck provides strong evidence of the role of Brunei as an important trade centre in Southeast Asia particularly in the 15th to 16th century.

So far the origin of the shipwreck is uncertain: Was it from China or from Southeast Asian countries or from Brunei itself? There is a high possibility that the shipwreck originated from China based on the total number of Chinese ceramics (56%) compared to Thai (43%) and Vietnamese ceramics (less than 1%). If the ship was from China, it probably started its journey from the port somewhere either in Zhejiang, Fujian or Guangdong and was sailing through a western route with stopovers in several countries such as Vietnam (northern and central Vietnam), Thailand, Malay Peninsular and Brunei as its last destination.

The shipwreck could also be from Southeast Asian countries based on the cargo which is similar with the cargo of Santa Cruz and Lena Shoal Shipwrecks. In addition, analysis conducted on the wood plank of Santa Cruz and Lena Shoal shipwrecks shows that the wood used to build the ships were sourced from Southeast Asia. Apart from this analysis, it has now been established that the Malays and Javanese were among the earliest shipbuilders and shippers to have plied the South China Sea roads.

However, the result of this analysis cannot be used to conclude that the Brunei Shipwreck originated from Southeast Asia. In 1368, the first emperor of the Ming Dynasty, Hong Wu, imposed restrictions on the building of large ships and on commercial activities abroad and these restrictions were only released in the 16th century. However this restriction had no effect as the government was unable to control the illegal trading activity. For trade activities, the Chinese Government also prohibited the building of large ships and therefore in order to fulfil the need of trade activities, the trading ships were often built or repaired in Southeast Asia for Chinese merchants based in Southern China or living among the growing local community (Manguin 2001).

The Brunei Shipwreck also could probably have been from Brunei although this is a small possibility. The involvement of Brunei traders in international trade has been mentioned in many records (in 13th to 17th centuries) by foreigners such as Portuguese, Spanish, Chinese and others. Foreign records mention that Brunei traders went to several countries in Southeast Asia to conduct trade activities such as Malacca, Philippines, China, Pegu (Myanmar), Pahang, Terengganu, Kelantan, Melaka, Aceh, Sumatra, Molucca,
Manila, Mindanao, Visayas Island, Palawan, Pulau, Ligor (Nakhon Si Thammarat), Java, Ayutthaya, Patani and Siam. The involvement of Brunei traders in international trade mentioned in these records shows that the shipwreck could have originated from Brunei.

Unluckily the vessel of the shipwreck did not survive which means no remains of the ship were left. There are three hypotheses why the ship sunk and the first and most plausible reason is foul weather, i.e. sinking occurred in a storm when the ship was heavily loaded or shattered by breakers in a choppy sea. The second reason is a sudden event such as a fire on board and the third reason is an attack by pirates.

The ship was probably destined for Brunei or other places in Borneo. Based on the location of the wreck at about 32 nautical miles off the coast of Brunei, the ship was most probably on its way to Brunei when it met with disaster. This statement has been proven archaeologically by the discovery of similar types of ceramics in Brunei archaeological sites. One of the sites is Kota Batu, the ancient capital of Brunei in the 14th to 17th centuries. Tons of export ceramic shards, which are very similar to those found in the Brunei Shipwreck, can be seen at Kota Batu.

**Bibliography**


New Approaches and Vision of Cambodia for Enriching Human Resources in Cambodian Archaeology and Cultural Heritage Experts (Cambodia Country Report)

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Abstract

The faculty of the Archaeology, at the Royal University of Fine Arts, was established in 1965 to study, research and preserve Cambodian’s rich cultural heritage. In this report, we would first like to give a brief account of the historical development of the Faculty of Archaeology. Secondly, we will address the influences on the faculties brought by different inputs from many kinds of supporting agencies. Thirdly, we would like to conclude this paper by pleading our urgent needs for a Khmer expert in archaeology and an archaeological laboratory.

Keywords: Cambodia, Royal University of Fine Arts, education, archaeology

Historical Background

It has been well known that the Khmer people of Cambodia today, despite the fact that they have come out from the dreaded war which had inflicted sufferings upon the whole Khmer society for decades, are striving to rebuild their once prestigious Khmer empire. One consequence of the war is that there are quite a number of Khmer people who now live outside their own homeland in many parts of the world, and have adopted the nationality of their host country with dual citizenship, such as Khmer-European, Khmer-French, English, Australian, New Zealanders, etc. Nevertheless, these overseas Khmers and the Khmers living in their homeland, despite their continuing quarrelsome nature, have one thing in common. They all share one soul – a soul that loves and are deeply proud of their Angkor Wat archaeological grandeurs and their Khmer cultural historical heritage.

Therefore, the Faculty of Archaeology stands significantly in our Cambodian society as a unique academic institution that continues to uphold Khmer pride and maintains the sustainability of Cambodia’s once glorious kingdom, which took enormous pride in the thousand-year-old monumental grandeurs, arts and culture. In another word, our archaeology faculty does need to take root and be well-equipped to nurture a pool of talent in the archaeology discipline.

When we talk about the Angkor archaeological site, we cannot ignore the Hindu-Buddhist religious beliefs which truly dictated all the arts and architecture embedded in these monumental constructions. Even when our Khmer present-day religion is Theravada Buddhism similar to that of Thailand and Myanmar, we must acknowledge the grandeur of Hindu arts. Worshipping the main Hindu deities – Brahma, Vishnu and
Shiva – were dominant in Khmer political culture then. Their images were artistically carved divinely into the entrances of those monumental temples. Later on, Buddhist art and architecture emerged, intertwining with the Hindu art and architecture.

There have been some lapses in our country’s history due to a continuous warfare with our neighbours, which caused breaks in our maintenances and operation. Consequently, as time travelled into the 19th century, through the French colonial occupation, one positive thing arose: the rediscovery of our neglected Angkor archaeological sites which revived the Cambodian academic institution and resurrected the academic disciplines related to archaeology.

The Faculty of Archaeology acknowledged that the majority of early archaeological investigations in Cambodia were conducted by the French, who occupied the country from 1863 to 1953. The “discovery” of the magnificent Angkor Wat in 1850 initiated French archaeological interest in Cambodia, which was primarily focused on the classic monumental structures of that historical period. The Ecole Francaise d’Extreme Orient, established in the late 19th century, began a period of intense investigation on the physical remnants of the Khmer Empire. Colonial French cultural historians studied art, architecture and inscriptions, generally addressing stylistic and symbolic issues in the valuable archaeological record provided by monumental architecture, statuary and inscriptions.

Faculty Development Discourses

The Royal University of Fine Arts in Phnom Penh (Fig. 4.1) traces its origins back to the École des Arts Cambodgiens, established in Phnom Penh in 1918 under the directorship of George Groslier (Fig. 4.2). It originally incorporated faculties of traditional drawing, sculptural modelling, bronze casting, silversmithing, furniture making and weaving. In 1965 this institution merged with the National Theatre School to form the Royal University of Fine Arts.

Thereafter its programmes of study also embraced archaeology, architecture, urban planning and design, plus a range of new performing arts subjects including traditional Khmer and western music, Khmer classical dance, folkloric dance, and theatre and modern drama. Prior to 1975, all classes took place at the original campus in the centre of the city. From 1975 to 1980 all classes had to stop and the staff were evacuated to the countryside by the Khmer Rouge. Many academics lost their lives in the devastation of this period.

The institution reopened in 1980 as the School of Fine Arts. In the same year a second campus was established at the site of an old army barracks in the north of Phnom Penh to accommodate classes in performing arts subjects. The teaching of circus arts was added to the curriculum in 1989. The university status was restored in 1988, and the term “Royal” was once again added in 1993 following the restoration of the monarchy.

The Royal University currently has five faculties. The faculties of Archaeology, Architecture and Urbanism, and Plastic Arts can be found at the original central campus behind the National Museum on Street 184, central Phnom Penh, whilst the faculties of Choreographic Arts and Music are now based at the second campus in Russey Keo District, several kilometres from the city. The University’s Secondary School of Fine Arts is also based here. The current student enrolment stands at over 1,600, with 357 teaching staff. The majority of higher education degree-level students are in the two faculties of Archaeology and Architecture.

The Royal University of Fine Arts is a partner of the Mekong Art and Culture Project, a two-year collaborative project spanning six activities, four countries and eight art institutes across the Greater Mekong sub-region.
The University of Fine Arts has five departments (Architecture and Urbanism, Archaeology, Choreographic Arts, Music and Visual Arts) although the majority of higher education degree-level students are in the two faculties of Archaeology and Architecture. The student body numbers approximately 1,400 students.

Since the reopening of the Royal University of Fine Arts, the Faculty of Archaeology has so far produced more than 594 diplomas for successful students. Currently, these graduate students have been working with the Ministry of Culture and Fine Arts, Ministry of Tourism, APSARA Authority, Preah Vihear Authority, and other non-governmental organizations and associations.

In order to promote and assure the quality of the archaeologists as well as other talent in the research fields, the faculty has been working closely with many different institutions as mentioned in the above Historical Background, including national and international universities through formulating collaborative projects and teaching programmes. There are four mechanisms that the Faculty of Archaeology are implementing and refining to improve the quality of human resources:

1. Create a joint teaching or special programme with many international universities, including the collaboration training project between the Royale University of Fine Arts and Institute Nationale des Langues et Civilisation Orientals (INALCO) (Fig. 4.3). With this cooperation, we have currently carried out two programmes, bachelor’s and master’s degrees in Human Sciences under the name Université des Mousson.

Prior to the programme mentioned above, the Faculty of Archaeology had been – and still is – a part of the international efforts to assist Cambodia in reconstructing its social fabric and institutions. The UNESCO/Japan Funds-in-Trust project for the capacity building of RUFA originally began in October 1993 as a training project for the Department of Archaeology. The courses taught during this first phase of the project focused on conservation sciences and museology.

After a one-year break, the project resumed with an additional programme for the Department of Architecture and Urbanism in the 1995-1996 academic year. From October 1995 to September 1998, a new project was conceived and implemented each year. In the 1996-97 academic year, the project saw a new arrangement, involving collaboration from the Toyota Foundation (Japan) and the Japan Foundation Asia Centre (Japan) for recruitment of teaching staff, monitoring and evaluation of the project. In the 1997-1998 academic year, the localization of the project was further promoted by the increasing number of Cambodian teaching staff employed. In 1998, it was felt that a long-term strategy was demanded to achieve significant and sustainable improvements in the academic standards of the University.

2. Send students abroad to pursue higher degrees in archaeology and cultural anthropology. The Faculty of Archaeology has so far sent more than 50 students to Japan, United States of America, Sweden, Thailand and other universities.

With the efforts made by the Faculty of Archaeology, many students have returned from their graduate studies to work in Cambodia and teach younger archaeology students, or work as conservators of the Khmer cultural heritage.

3. Expand and diversify more partnerships with different national and international research institutions, where we can send our undergraduates and graduate students to participate in the training and practice in archaeological research and heritage management. In this field, the Faculty of Archaeology has worked closely with researchers from Kyoto University, Sophia
University, Waseda University, French Universities, the University of Hawaii and other research institutions.

4. Exchange of professors and students with other universities and institutions is also one of the important agendas of the Faculty of Archaeology. The programme is normally implemented during the vacation period. On the other hand, the Faculty of Archaeology has also received visiting scholars and professors from other universities to do research and teach both undergraduates and graduate students.

External Input Review Assessment

In 1994, the faculty had received the following inputs from the East-West Center (co-director: Dr Judy Ledgerwood) and the University of University of Hawai‘i (co-director: Dr P Bion Griffin). That year, several institutions in the United States and Cambodia established an interdisciplinary, international research project that blends archaeology, art history, cultural anthropology, geography and earth sciences. The project represents collaboration between researchers at the University of Hawai‘i (UH), the East-West Center (EWC), and the Royal University of Fine Arts (a division of the Ministry of Culture and the Fine Arts, or RUFA) in Phnom Penh, Cambodia.

The UH/EWC/RUFA Cambodia Project has been made possible to date by grants from the Indochina Initiative Programme (East-West Center), the UH-East West Center Collaborative Research Programme, the East-West Center graduate fellowship programme, the Asian Cultural Council, and the Henry Luce Foundation. The primary goal of the project’s training component is to help rebuild the archaeology programme in Cambodia by providing academic and field training to Cambodian students in the United States (at the University of Hawai‘i and the East-West Center and in Phnom Penh. Outstanding Cambodian students from the Royal Fine Arts University and the Ministry of Culture and the Fine Arts (Phnom Penh) receive training at the University of Hawai‘i in English language competency, archaeology and cultural anthropology.

Research Opportunities through the Lower Mekong Archaeological Project (LOMAP)

Training and research go hand in hand in the Lower Mekong Archaeological Project, which was co-directed by Dr Miriam Stark (University of Hawai‘i-Manoa, USA) and His Excellency Chuch Phoeurn (Secretary of State, Ministry of Culture and Fine Arts, Kingdom of Cambodia).

This international, multidisciplinary project involved American and Cambodian scholars with disciplinary interests in archaeology, geography, art history, historic preservation and environmental studies. The Lower Mekong Archaeological Project began in 1996 to study aspects of early state formation in Cambodia’s Mekong Delta.

This international collaborative archaeological project brought together scholars from several countries to investigate the early historic period of southern Cambodia. The fieldwork was in conjunction with field training for Cambodian students. The work concentrated on the archaeological sites in Angkor Borei region (Takeo province, Cambodia) and at the site of Angkor Borei itself. Interestingly, the Khmer name “Angkor Borei” means “Ancient City”; located in a short distance south of the town in the hill of Phnom Da, where the Khmers’ earliest city is claimed to have begun.

Many pre-historical sites had been discovered and excavated with an interesting outcome: namely Phum Snay, Phum Sophy, and Kok Treas sites in Banteay Meanchey Province; Koh Ta Meas site in Siem
Reap Province; Prohear site in Prey Veng Province; Phum 10.8 and Banteay Kou (Circular Earthwork) sites in Kampong Cham Province (from first millennium BCE until the pre-Angkor period). Besides, we have re-conducted the research on the sites previously studied during the 1960s namely Laang Spean site in Battambang Province, which is known as the oldest prehistoric site in Cambodia dating from around 8000 BCE. These new findings are crucial for Cambodia, as well as Southeast Asia as a whole, as they provide valuable contributions to the previous studies which may be under-researched.

**Problems encountered**

Our deepest gratitude goes to the above inputs from France, Japan and America in resurrecting our contemporary archaeological discourses in the faculty. It has certainly produced a wealth of knowledge among a good number of our students for the last two decades. However, from our present status as the member of the ASEAN community, we still need fully trained Khmer archaeologists who can perform independently and confidently en par with the rest of the world. He or she could be the authority of our knowledge and be totally responsible for our faculty without having foreign experts to make a decision or identifying our needs for us Khmer people.

Our trained archaeologist is expected to analyse the excavation findings, which would be used as testimonies in reflecting the diversities of arts, tradition, culture and technologies used by the people living in different historical period, governed by different political cultures and the changing religious cultures from Hinduism to Buddhism.

Besides our own archaeology expert, our faculty needs to keep building the capacity of the student teachers in archaeology. These student teachers must be recognized as the committed faculty teaching staff, and must be able to continue training many more human resources in archaeology for the future need of our country in this most significant academic field for the sustainability of Khmer cultural heritage.

Lastly, the discipline of field archaeology is a complex process that synthesizes a broad range of methodological and practical processes. The work synergistically encompasses the stratigraphic removal of soils and the recovery and documentation of the strata, cultural features and artefacts at a site to give insight into past human way of life.

Therefore, the faculty is also in full need to have its own archaeology laboratory, which helps teaching our students the practical side of acquiring the archaeological knowledge. Archaeology in practice provides insight into the breadth of modern archaeology, i.e. organized either by material types, such as animal bones, ceramics, stone artefacts and documentary sources, or by themes, such as dating, ethics and report writing.

**Conclusion**

Now that Cambodia has fully become a member of the ASEAN community and despite tremendous attempts to produce human resources and the fact that some graduates are willing to return to share their knowledge, the Department still needs fully trained researchers and professors, who are able to perform independently and confidently en par with the rest of the world. They should be the authority of their own knowledge and to be totally responsible for our department, so we can be less dependent on foreign experts while still be equally benefiting from international collaborations. Unfortunately, some of our best graduates seek better opportunities in other national and international institutions. In order to build strong academic programmes, the Department is in great need of professors in various fields.
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Abstract
Archaeology has played a major role in Indonesia recently, due to globalization and cultural tourism, especially since the demise of the New Order and the introduction of the Reformation period which from 2001 has stressed policies for regional autonomy and greater authority to local governments to maintain their rich local cultures. However, there are still many questions on how, since every region has its own cultural heritage resulting from its history. Western Indonesia was greatly influenced by Hindu and Islamic values while the east has given more scope for Christian influences. This does not mean that there was no local culture before the coming of Hinduism, Islam or Christianity. Therefore, how do the local people and governments maintain their cultural heritage allowing for all the influences? That is: How much of the archaeological evidence can still be seen? What issues have emerged? And how do local governments and people use their cultural heritage to enhance their prosperity? These are the main questions that must be addressed in this paper for a better understanding of the recent archaeological developments in Indonesia.

Keywords: cultural heritage, smart city, sustainable archaeological developments, Eastern Indonesia

Introduction
Archaeological remains indicate that the first hominins in the Indonesian Archipelago, “Nusantara”, were the Homo erectus living more than 1.5 million years ago as noted in Indonesia dalam Arus Sejarah1. There is no exact evidence on how these people lived or were separated from those in other parts of the world. Possibly, during the Pleistocene period the climate fluctuations caused migration to what is now Indonesia. The decreasing temperature during the Glacial times lowered the sea level, changed the palaeography in the Archipelago and opened the land bridge between the mainland and insular Asia over which people came over a long period when there were interactions between those who arrived earlier and resided on the islands and the later arrivals to create various types of culture. In the west, from North Sumatra to Aceh, for instance, there developed the Hoabinhian culture from the mainland of Southeast Asia. In eastern Java, there are bone artefacts as a local adaptation. In Kalimantan, rock art developed as fast as in Australia, Papua New Guinea and other parts of Southeast Asia.

1 Indonesia dalam Arus Sejarah, the latest publication by Indonesian archaeologists and historians (Taufik et al. 2012) differs from the previously produced Sejarah Nasional Indonesia of six parts, published in the New Order era.
Ambra Calo (2009: 140) states that the introduction of metal technology from the mainland of Southeast Asia to insular Southeast Asia had already occurred around the turn of the first millennium (CE) which antedates and overlaps the earliest Indian contacts by trade, when social, religious, and technological ideas were introduced and led to the formation of the “Hinduized” kingdoms. Calo notes that this development was characterized by a syncretic system of beliefs. What is important to understand is that the link between the islands of Southeast Asia and the Western Pacific, which can clearly be traced back for millennia, became less obvious following the introduction of metal technology. In addition to this, Calo claims that:

…..the earlier Austronesian legacy with the Western Pacific is somewhat disrupted in the historical period by new layers of foreign influences in Indonesia, such as from the Southeast Asian mainland and from India. It may follow that motifs appearing on early metal artefacts cast in the islands, especially the ones from eastern Indonesia, would still retain the symbolism of the Austronesian heritage of island Southeast Asia. Indeed, these artefacts could well represent the cultural context that immediately antedates or overlaps with the first Indian influences in the region (Calo 2009: 140).

Archaeological remains indicate that the first Hindu influences in Indonesia were in Kutai (East Kalimantan) in the 4th century. According to the Kutai inscription, Mulawarman, a name believed to be Sanskrit, was the Raja of Kutai. Why the first Hindu kingdom was in East Kalimantan is not known. Some scholars argue that it could be that Hinduization took place from India through Thailand and Malaysia to reach insular Southeast Asia like Kalimantan. The second Hindu kingdom was in Tarumanegara, West Java, in the 5th century. North, Central and South Indian cultures spread to Southeast Asian regions with Brahmanas and Buddhist priests playing a major role interpreting the holy Indic writings as in the emergence of Sriwijaya, a Buddhist kingdom in Sumatra in the 7th century. It is believed that the Indic language was increasingly the lingua franca of the rulers in the Southeast Asian regions when Indian ideas spread peacefully (Villiers 1993: 44; Sardesai 1997: 17). Later, Mataram, a Hindu kingdom, was established in Central Java. Initially all the Hindu scriptures were in Sanskrit and Pali and thus difficult for the common people to understand. However, when translated into the Old Javanese language, Kawi, this was no longer a problem. Today, Indian names and influences can be seen in the inscriptions particularly in the architectural arts of Southeast Asia which mimic Indic regional style arts. Thus Indian influences also provided scientific concepts to the development of Southeast Asia (Ardhana 2015a).

Clearly, Southeast Asia has been much influenced by India. Indeed, almost all of the big ideas like the great religions were imported to Southeast Asia: Hinduism, Buddhism, Islam and Christianity; ideologies which have dominantly strengthened the local cultures and later, somewhat due to this, contributed to Southeast Asian countries becoming known as multicultural societies. Southeast Asian importation of religions does not mean that there are no natural religions remaining, even if only in the high valleys or mountainous areas where animistic natural religions may still be practised. Kulke (1999: 98) claims that although many regions have been influenced by Indic culture, it is unclear to what extent that persists. It is said that the Indian relationship with Southeast Asia already existed in the centuries before Christ, as can be seen in the name Suvarnabhumi or Golden Land used by the traders at that time.
The Religious Influences on the Development of Archaeology in Western Indonesia

In Java, there are archaeological sites like Borobudur, Prambanan and others, and Bali is considered part of the Hindu mosaic in Southeast Asia. However, since the spread of Islam during the 7th to 13th centuries, the people under their local rulers began to ignore some previous influences, particularly in politics. In comparison to the western part of the Indonesian Archipelago, research on the Hindu influences in the eastern parts of Indonesia, particularly in the regions of Nusa Tenggara (Southeastern part of Indonesia) has been rarely done. However, Van Naerssen in *Hindoejavaansche Overblijfselen op Soembawa* (1938) highlights the historical Indic sites in Sumbawa: Taliwang, Dompu, Sapi and Bima – under the influence of Majapahit in East Java. He argues that prior to the Islamization of Bima, it was much influenced by the Hindu or Shiwa religion between 1350 and 1600 as evident in the old Javanese inscriptions. He also indicates that Saivite influences can be seen in the original characters of the Javanese and Balinese wayang. Additionally, J Krom in *Herdenking van Dr G P Rouffaer* (1928) says that the coming of the Hindu or Shiwa influences in Sumbawa particularly in the 14th to 15th centuries, is shown in the Batu Pahat inscription. Henri Chambert-Loir also in *State, City, Commerce: The Case of Bima* (1993) notes that the eastern part of Sumbawa was a political centre in the 14th century, with a significant Javanese influence. His *Syair Kerajaan Bima* (2004) claims that the *Negarakertagama* is the fundamental source discussing the spread of Hinduism in Sumbawa. Meanwhile, Pigeaud in *Java in the 14th century* (1960) writes that 1729 Çaka or 1357 was the year of the Majapahit expedition to Dompu in Sumbawa. This is also described in J Brandes’ *Pararaton (Ken Arok), het Boek der Konin van Tumapel en Majapahit* (1920).

Importantly, not only Sumbawans and Bimans but also others like the Sumbans recognized Majapahit influences in their regions. According to the *Negarakrtagama*, some rajas in Sumba had the title *Hundarangga-Rupatola, Tokunge, Mbitangu or Kandunu* (Kapita 1976: 26-27). In the 15th century a Biman king tried to attack Sumba but the raja of Sumba defeated him and obtained autonomy. However, the Sumbans believe that they have Javanese and Biman ancestors despite this autonomy. The Raja of Sumba was awarded the title *Hanggula Ratu Jawa-Hanganji Ratu Ndima* of the Javanese and Biman rajas implying they were the highest kings (Kapita 1976: 26-27). The raja apart from the title *Maramba* also had *Hanganji* indicating Javanese influences. An ethnological work by Fischer and Rassers, *Katalog des Ethnographischen Reichmuseums* (1942) mentions foreign influences in Sumba and the coming of Hinduism through Bima. However, until now, there is no clear information on why Hinduism did not develop there. The people of Savu believe that their ancestors came from Majapahit as well (van de Wetering 1926: 486-487). In Larantuka, East Flores, the local people know the terminology *Jawa or Jawa Muhang*, meaning Javanese villages (Dietrich 1984: 317-318) and the local prominent person is known as *Sang Adipati* or *Sengaji*, also Javanese (Barnes 1987: 219). The *Negarakrtagama* not only mentions the places under the raja of Majapahit, but also explains how the regions were attacked: Dompu and Sumbawa, then Larantuka in Flores (Barnes 1982: 410) and finally Timor (Heijmering 1847: 12). However, the Majapahit in Nusa Tenggara was not as strong as in Java and Bali where the Hindu influences had particular impact on the traditional bureaucratic system which in Nusa Tenggara was still predominantly based on customary law or *adat*. In Timor Leste there were more opportunities for the influences of the Catholic religion, since the Hindu or Javanese influences were weak.

Even the colonial Dutch paid dominant attention to the western rather than to the eastern part of the Indonesian Archipelago, since they were focused on the economic aspects as shown in Lourens Jeroen Touwen’s: *Extremes in the Archipelago: Trade and Economic Development in the Outer Islands of Indonesia, 1900-1942* (1997), which concentrates on the increasing export and economic income in the
outer islands. Nevertheless, the Dutch were interested in eastern Indonesia, particularly in terms of socio-cultural aspects as shown in some publications like, *Lombok in de 17e Eeuw* (1941) by H J de Graaf and C C Berg and *De Middeljavaansche Historische Traditie* (1927), both focusing on the Balinese political interests in Sumbawa which some chronicles and Balinese babad note was a part of the Gelgel kingdom in eastern Bali. Maribeth Erb in *Contested Time and Place: Constructions of History in Todo, Manggarai (Western Flores, Indonesia)* (1997) discusses the forms of the relationship between Manggarai in West Flores and Bima in East Sumbawa due to the strong Islamic influences. It would appear from the above that it is only in Bali that the influences of Hinduism and Buddhism are still strong.

Nusa Tenggara is multicultural with historical dynamics similar to those in other parts of the region through Hinduization, Islamization and Christianization. However, the foreign influences were not as strong as in Sumatra, Java and Bali. Additionally, the *Negarakrtagama* mentions that some regions in Nusa Tenggara like Sumbawa, Galiyao and Timor were already influenced by Hinduism, (Ardhana 2000; 2005). Meanwhile, Islamization can be seen in Bima, Sumbawa and parts of Flores like Manggarai, and can be read about in J Noorduyn’s *Bima en Sumbawa: Bijdragen Tot de Geschiedenis van de Sultanaten Bima en Sumbawa door A Ligtvoet en G P Rouffaer* (1987); a comprehensive work on the Islamization of Sumbawa in the 17th century by Sultan Karaeng Matoaya from Makassar (South Sulawesi) who attacked several kingdoms in Sumbawa, with the first expedition from Makassar to Bima in April 1618 and the second one year later, when Islam became an important religion in Sumbawa. According to Henri Chambert-Loir in *State, City, Commerce: The Case of Bima* (1993) there is a building in Bima with a Meru or pyramid roof, a symbol of the mausoleum of Nabi Muhammad in Madinah, decorated with flowers and the Al Quran inside.

### The Portuguese and the Churches in the Context of Heritage Cities in Indonesia

The strong relationship between archaeological sites and the development of cultural heritage cities is very significant in the many churches built in the colonial period in Eastern Indonesia. Indeed, talking about cultural heritage cities is actually talking about culture. However, not much is available on this in Nusa Tenggara, which can be understood since globalization processes have brought many complex issues, including that of cultural homogenization, transformation of culture and localization, which can be seen as a paradox in cultural homogenization.

In 2008, Joko Widodo, now the President of Indonesia, intensified the heritage city programme through an international symposium, held by the OWHC (Organization of World Heritage Cities) when Suhadi, a member of the committee, stressed that outstanding universal values should be implemented and preserved. During the meeting, the BPPI (*Balai Pelestarian Pusaka Indonesia*) implemented the JKPI (*Jaringan Kota Pusaka Indonesia*) headed by the Mayor of Sawahlunto with the Deputy, Joko Widodo. The BPPI established in Sawahlunto, aimed to encourage cooperation between the local and central governments. Meanwhile, it was argued that the city is not only the city (kota) itself, but also includes the districts or kabupaten (Ardhana 2013a and 2013b). The reason is that the authority of the autonomy is in the city or kota or at district or kabupaten level, meaning that the mayor and the bupati (head of district) play a major role in the programme and so should work together. The Executive Director of the JKPI was appointed by the Mayor and the First Congress was held in Surakarta, followed by Ternate, then Surabaya, then Singkawang, and most recently Bau-Bau (Sulawesi). In 2015, the Mayor of Gianyar Regency was elected the Head of the JKPI which arranged the programme for cultural heritage.

Currently, the total number of participants in cultural heritage cities is 51 (consisting of 37 cities and 14 districts) as follows:
<table>
<thead>
<tr>
<th>No.</th>
<th>City/ District</th>
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<th>City/ District</th>
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<tr>
<td>1</td>
<td>Kota Surakarta</td>
<td>27</td>
<td>Kota Pontianak</td>
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<td>2</td>
<td>Kota Ternate</td>
<td>28</td>
<td>Kota Semarang</td>
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<td>Kota Sawahlunto</td>
<td>29</td>
<td>Kota Salatiga</td>
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<td>4</td>
<td>Kota Pekalongan</td>
<td>30</td>
<td>Kota Bukit Tinggi</td>
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<td>5</td>
<td>Kota Pangkalpinang</td>
<td>31</td>
<td>Kota Langsa</td>
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<tr>
<td>6</td>
<td>Kota Jogjakarta</td>
<td>32</td>
<td>Kabupaten Bangka Barat</td>
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<tr>
<td>7</td>
<td>Kota Blitar</td>
<td>33</td>
<td>Kota Jakarta Pusat</td>
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<td>8</td>
<td>Kota Palembang</td>
<td>34</td>
<td>Kota Sungaipenuh</td>
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<td>9</td>
<td>Kota Denpasar</td>
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<td>10</td>
<td>Kota Ambon</td>
<td>36</td>
<td>Kabupaten Banjarnegara</td>
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<td>11</td>
<td>Kota Surabaya</td>
<td>37</td>
<td>Kabupaten Brebes</td>
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<td>12</td>
<td>Kota Medan</td>
<td>38</td>
<td>Kabupaten Gianyar</td>
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<td>13</td>
<td>Kota Banda Aceh</td>
<td>39</td>
<td>Kabupaten Ngawi</td>
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<td>14</td>
<td>Kota Bogor</td>
<td>40</td>
<td>Kota Padang</td>
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<td>15</td>
<td>Kota Cirebon</td>
<td>41</td>
<td>Kabupaten Banyumas</td>
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<td>16</td>
<td>Kota Banjarmasin</td>
<td>42</td>
<td>Kabupaten Buleleng</td>
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<td>17</td>
<td>Kota Malang</td>
<td>43</td>
<td>Kabupaten Karangasem</td>
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<td>18</td>
<td>Kota Sibolga</td>
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<td>Kabupaten Purbalingga</td>
</tr>
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<td>19</td>
<td>Kota Lubuk Linggau</td>
<td>45</td>
<td>Kota Singkawang</td>
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<tr>
<td>20</td>
<td>Kota Jakarta Utara</td>
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<td>Kota Tidore Kepulauan</td>
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<td>21</td>
<td>Kota Madiun</td>
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<td>Kota Palopo</td>
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<td>Kabupaten Cilacap</td>
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<td>24</td>
<td>Kota Bengkulu</td>
<td>50</td>
<td>Kabupaten Kepulauan Seribu</td>
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<td>25</td>
<td>Kota Bau-Bau</td>
<td>51</td>
<td>Kabupaten Tegal</td>
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<tr>
<td>26</td>
<td>Kota Bontang</td>
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</table>

Table 5.1 Ardhana and Maunati 2015: 6-7.

The above table shows that there is no city or district in Nusa Tenggara registered as a member of the group, which must be remedied. Local culture can be traced from the archaeological evidence in eastern Indonesia and the people and governments have begun to recognize the extent of the role of archaeological sites in developing prosperity. As Indonesia is a multicultural society based on ethnicities, languages, traditions and religions with a richness of cultural identities, it is important to elaborate and revitalize these to improve the prosperity of the local people based on their local cultures in order to compete with other countries in the context of globalization. Therefore, reciprocal collaboration among all concerned is essential.

Recent research by Indonesian archaeologists like Harry Widianto (2012) focusing on the spread of modern humans in Sumatra, Java, Kalimantan, Sulawesi and Flores, published in the series Indonesia
dalam Arus Sejarah funded by the Indonesian government in 2004, concentrates on the prehistoric period and what is still evident (Bayard 1992: 33-34). Meanwhile, Ardika, (2013: 24) notes that glass beads from prehistoric times have been found in Gilimanuk and Sembiran (Bali), Plawangan (Central Java), Leang Bua (Flores) and Pasemah (South Sumatra) and are very important in understanding the role of those harbours in relation to ancient harbours in Southeast Asia.

Today, all sites from prehistoric times to classical history are very significant in encouraging the local people to promote their cultural richness in the context of tourism and heritage cities because by maintaining their cultural traditions they can improve their prosperity. In the colonial Dutch period, much stress was laid on shrine, monument or temple renovation but in limited numbers. Now, the activities must involve the local community and be not only about the shrines, temples or monuments, but also other heritage areas such as hotels, restaurants, museums, etc. concerning which the local governments need to improve their efforts in terms of promotion, packaging, leaflet and brochure publication to attract tourist visits to the regions.

How can the archaeological and historical sites in the eastern parts the Archipelago dominantly influenced by Christianity and different from the western part dominantly influenced by Islam be revitalized and the cultural heritage that has thrived since the colonial times, particularly in the church development in the regions, be elaborated?

Initially, the European powers in the 16th century – particularly the Portuguese and the Spaniards – carefully considered the local people who had many contacts between one and another community and their many different traditions, religions, languages, customary laws, political systems and ethnicities. Tome Pires’ work, translated by Armando Cortesao (1944), *The Suma Oriental of Tome Pires and the Book of Fransisco Rodrigues*, gives significant information about Sumatra, Java and areas producing spices located in the east. Due to the spread of Islam in the western part of the Indonesian Archipelago, the Portuguese considered developing the eastern part and Tome Pires was the first European to write on the people outside Java. He states that there were many islands with good harbours and very busy trade activities and informs of the trade route between Malacca through the Java Sea to Bima and the Molluccan islands to sell slaves, horses, rice, timber, asam, cinnamon and sugar to Java, and then bring cloths to Banda and the Molluccas.

Research on Christianization has been done both by Indonesian and foreign scholars including Andrea Fleischhauer whose *Larantuka – Der Nabel des Kosmos Solorensis* (1988) discusses the history of East Flores and Solor islands related to the spread of Christianity in the 19th and the 20th centuries. Monika Schlicher’s work, *Portugal in Ost Timor* (1994), mentions the relationship between the Portuguese and Christianity in the region. Though Timor Leste is not included in the region of Nusa Tenggara, the developments there can be compared with the developments in western Timor, a former Dutch colony. Stefan Dietrich in *Kolonialismus und Mission 1900-1942* (1989) shows the role of Christianization in the context of the political, economic and cultural structure during the increasing influences of the Dutch colonial power in the 20th century. Another work on Christianization in Nusa Tenggara is *Die katolische Missionschule in Nusa Tenggara (Südost-Indonesien)* (1964) by P Kurt Piskaty, SVD. Different from Dietrich’s, it tells of the spread of Christianity on the islands of Nusa Tenggara. In addition, there are articles from R A F Paul Webb: *The People of the Book: Christians and Muslims in Indonesia: A Brief Survey of Nusa Tenggara* (1984), *Adat and Christianity in Nusa Tenggara Timur: Reaction and Counteraction: Traditional Custom and Modern Development in Eastern Indonesia* (1986), and *Rural Development and Tradition: The Churches in Bali and Flores* (1990). Other interesting work on Christianization is by van Dalen (1928) in *Van Strijd en Overwinning op Alor*, with some illustrations and photos showing how the struggle and the glory were reached in Alor due to Christianization. It is important to elaborate this further: to package it in terms of
cultural heritage that needs to be preserved and promoted in maintaining sustainable development in the region. The District of Ende in Flores in 2014 published RIPARDA in collaboration with the Centre for Bali Studies, Udayana University, to elaborate and revitalize the local culture and promote it to both domestic and international tourists, particularly in the context of strengthening national identity and also improve the prosperity of people both in Nusa Tenggara and Indonesia in general.

Conclusion

Thus it can be concluded that the western parts of Indonesia like Sumatra, Java and Bali are greatly influenced by Hinduism and Islam and the eastern parts like Nusa Tenggara by Christianity. In the past, the regime paid attention only to the western parts. After the end of the New Order and the beginning of the Reformation period, it is the time to pay more attention to the development of the eastern parts of Indonesia, particularly Nusa Tenggara.

Since the development of the western parts is different from the eastern parts, the local governments need to elaborate their archaeological and historical sites. The Southeastern islands of Indonesia are rich in cultural heritage from prehistoric times as well as in the time of the Portuguese and the Dutch, namely in the development of churches, which should be understood in terms of both tangible and intangible cultures that need to be elaborated to strengthen the local, national and universal cultures. The local governments should cooperate with the local people and entrepreneurs to promote and package the richness of the local traditions to improve the prosperity of the people in Nusa Tenggara.

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Abstract

After 30 years (1987-2017) of archaeological research done by the Centre for Global Archaeological Research, Universiti Sains Malaysia, revealed an evidence that both the Peninsula and Sabah- Sarawak are very important areas during the prehistory and early civilization period. Prior to the excavation of Lenggong Valley in 1987, little was known about how prehistoric man made stone tools in Southeast Asia and it had been assumed that the lithic tradition in this part of the world was under developed. Because Lenggong Valley revealed an undisturbed Palaeolithic stone tool workshop sites, the association of artefacts (raw materials, finished as well as unfinished tools, and tool making debris) is clearly visible. This assemblage of artefacts has revealed and made possible the identification and classification of multiple tool types with specialized functions and is evidence of a Palaeolithic lithic technology in Southeast Asia as sophisticated as anywhere else in the world. Furthermore, this in situ stone tool workshop provides a means to understand the cognitive behaviour of the tool makers. Their choice of raw material, an understanding of lithology, and an efficient method of production reveal a rational and systematic approach to tool making. This has made Lenggong Valley Palaeolithic sites as an important global reference for Palaeolithic stone tool making. Meanwhile, research at Sungai Batu complex revealed an evidence of the earliest civilization of Southeast Asia began at 535 BCE. Present data had proven that the ancient society of Sungai Batu had somehow mastered the pyrotechnology to the extent of having a full-fledged iron industry. Such technology had defined the very character of the Ancient Kedah civilization, as a society which economic substructure basing on iron production. In order to export these commodities, brick wharfs were built on both banks of the ancient river of Sungai Batu. The discovery of administrative buildings suggests the large volume of trade, which requires some sort of complex governing system. This clearly portrays the uniqueness of the Ancient Kedah civilization. More research is currently being done to study the impact of the development of the Ancient Kedah Civilization to other contemporary civilizations such as Egypt, Persia, Greeks, Rome and South America, as well as those in Indochina and Java. Therefore, the archaeological research history from 1840’s until today showed that Malaysia is very important during the prehistory and civilization period.

Keywords: Archaeological History, Palaeolithic, Neolithic, Bronze, Civilization
Archaeological research in Malaysia (formerly Malaya) began with the first excavation by GW Earl at the site of Guar Kepah, Penang, in 1851, followed by Wray, who published *The Cave Dwellers of Perak* in 1897. But it was not until the establishment of the Perak Museum in 1900 that archaeology in Malaysia took hold. There are two important archaeological reports before World War II: the Gua Kajang excavation report by Evans in 1917 titled “Preliminary Report on Cave Exploration, Near Lenggong, Upper Perak” and the Kota Tampan finding report by Collings in 1938 titled “A Pleistocene site in Malay Peninsular”, the latter published in *Nature*. After World War II, more Western archaeologists were involved, namely Sieveking at Gua Cha, Kelantan; Dunn and Lamb in Pahang; and Harrisson in Sarawak. Harrisson worked in Gua Niah, one of the important sites in Malaysia. One of the most important publications before independence in 1957 was *The Stone Age of Malaya* by Tweedie in 1953. In his synthesis, Tweedie proposed that the prehistory culture sequence for Malaya began with Palaeolithic, Hoabinhian, Neolithic and Metal age. In short, of all Southeast Asia nations, Malaya was the most active in archaeology, albeit much of the work during the colonial period was undertaken by amateurs.

In the 1960s, there were not many professional archaeologists and it was not until the following decade that a few Malaysian scholars entered the field of archaeology. In the 1970s, Zuraina Majid began work in the Niah Cave in Sarawak while others such as Adi Hj Taha worked in Gua Cha in Kelantan; Leong Sau Heng in Sungai Lang; Selangor and Nik Hassan Shuhaimi in Bujang Valley, Kedah. All of these were projects under Universiti Sains Malaysia (USM), the Department of Museums and Antiquity, Univerisiti Malaya (UM) and Universiti Kebangsaan (UKM). In the 1980s, Ipoi Datan from Sarawak Museums excavated in Gua Sireh, Sarawak. However, unlike archaeological excavations during the colonial era, Malaysia was not the most active in the region. In 1987, Zuraina Majid established the “Project Archaeology Malaysia” at USM, dedicated to archaeological research and the teaching and training of future archaeologists. Then, after eight years of research and having built a critical mass of scholars, USM established the Centre for Archaeological Research Malaysia in 1995 with its own building, staff and laboratories, offering postgraduate as well as a minor degree in archaeology to undergraduate students in the arts and sciences. This was the first time that the country had its own centre for archaeology.

In 2005, the Malaysian government established the Department of Heritage (with the Heritage Act 2005) to provide for the conservation and preservation of national heritage, natural heritage, tangible and intangible cultural heritage, underwater cultural heritage, treasure trove and related matters. As a result, in 2005, the archaeology unit in the Department of Museums was moved to the Department of Heritage (DH), both under the same ministry. The first director and higher commissioner of this new department was Zuraina Majid until 2015. There are 10 personal works in this unit headed by the current Director of Archaeology, Mr Ruzairy Arbi.

Today, besides the Department of Heritage, there are six universities involved in archaeological research throughout the country: USM, UKM, UM, UPSI, UMS and UnisZA. Nik Hassan Shuhaimi, who is still at UKM working at the Institute of World and Malay Civilisation (ATMA), continues his archaeological research with a new archaeologist, Assoc. Prof. Dr Zuliskandar. The both of them have also nurtured postgraduate students. Their archaeological research focuses on Bujang Valley and Terengganu’s prehistoric sites. At UM, Leong Sau Heng has already retired and archaeological work at this university is continued by Dr Supian Sabtu. He works with the history department and also focuses on the Bujang Valley sites. There are two young archaeologists in the history department of UPSI (Universiti Pendidikan Sultan Idris): Dr Yunus and Dr Adenan Jusoh, both of whom have worked together with UKM. In UMS (Universiti Malaysia Sabah), Mr Bazley Bee, who works in the history department, focuses more on underwater archaeology. It is a similar situation at UnisZA (Universiti Sultan Zainal Abidin), where Prof. Asyaari Muhamad, who has a background in ceramics, works more on underwater archaeology.
At USM, the Centre for Archaeology Malaysia, established in 1995, was officially launched by the Minister of Higher Education in 2009 as the Centre for Global Archaeological Research (CGAR) in recognition of its global contribution. In 2012, CGAR celebrated its 25th year of archaeological research. In conjunction with the event, the USM Archaeological Gallery and the Earth Material Characterisation Laboratory (MPBB) were launched to strengthen the role of the centre as a leader in archaeological scientific research in Malaysia. This MPBB lab is complete with the latest instruments like XRD, XRF and SEM. CGAR is designed for multidisciplinary research through cooperation with local and foreign scientists. Therefore, CGAR has a MOU/MOA with Silpakorn University (Thailand), Universitas Gadja Mada (Indonesia) and University of Philippines since 1998, and in 2013 with University of Peshawar (Pakistan), Universitas Syiah Kuala (Indonesia) and Universitas Sumatera Utara (Indonesia), and with University of Western Australia (Australia) and Jeongok Prehistory Museum (Korea) since 2014. Furthermore, starting from 2012, the book of Inaugural Archaeology Series was published by USM Publisher periodically based on current research evidence. Besides the publications, CGAR also launched the “Sahabat@Arkeologi” (friends@archaeology) programmes in 2012 to cater to public interests in archaeology. Also in 2012, Lenggong Valley – CGAR’s main archaeological research area – was declared a UNESCO World Heritage Site. At the moment, CGAR has eight archaeologists with PhD degrees from different backgrounds and 40 postgraduate students.

Figure 6.1 shows the latest cultural sequence in Malaysia. The systematic research programme has extended the knowledge of prehistory in Malaysia by more than 1.83 Ma through the discovery of Bukit Bunuh in 2009. Another important Palaeolithic site is Mansuli (235Ka), Sabah, which is now the oldest site in Borneo. The oldest pottery dated about 7Ka from Gua Kajang and the earliest bronze is about 4Ka from Gua Harimau. Both sites are located in Lenggong Valley, Perak.

Recent archaeological research in Bujang Valley on the Sungai Batu sites has revealed many significant discoveries since 2007, varying from monuments of ritual, river jetty or the port and the port administrative building, to the iron-smelting workshop. The oldest iron smelting dated 535 BCE by radiocarbon and the oldest monument dated 478 BCE by OSL dating.

In short, the most recent archaeological evidence in Malaysia demonstrates the importance of this region in prehistory and world civilization. Archaeological cultural sequence in Malaysia is now far more complete and holistic.
Abstract

Culture represents the most important basis for the existence of nation and it plays an important role to build the nation. Every country has her own culture, and culture is life of the country. The movable and immovable cultural properties, traditions and customs, and the related cultural planning and management play not only important role in cultural heritage preservation but also reflect the civilization and development of nations. Myanmar is rich in cultural heritage. To study and explore the preservation of Myanmar culture and to carry out various cultural affairs, the Ministry of Culture was established in 1952, and it is responsible for promoting, preserving and planning the development of Myanmar culture. The Department of Archaeology and National Museum is under the Ministry of Religious Affairs and Culture, and responsible for the preservation and presentation of Myanmar cultural heritage and studying the culture and customs of nationalities. This paper attempts to meet the objectives of the 2nd SEAMEO SPAFA International Conference on Southeast Asian Archaeology, and to develop more cultural cooperation programmes.

Keywords: Myanmar, archaeology, overview

The Role of ministry of Religious Affairs and Culture

In 1952, the Ministry of Culture was established to study and explore the preservation of Myanmar culture and to carry out various cultural affairs. The Ministry of Culture is responsible for promoting, preserving and planning the development of Myanmar culture. On 1 April 2016, the Ministry of Religious Affairs and Culture was organized by the combination of the Ministry of Religious Affairs and the Ministry of Culture.

Vision

“To fulfil social objectives of Myanmar by uplifting the morale and morality of the entire nation, national prestige and integrity, and preservation and safeguarding of cultural heritage and national character, and dynamism of patriotic spirit”.

Mission

“To love and cherish the country and the people by taking pride on own good tradition as well as by preserving, exposing and propagating Myanmar cultural heritage”.

The main responsibilities undertaken by the Ministry are:
1. To preserve the cultural heritage of Myanmar with a view to the emergence and prevalence of Myanmar style and culture.
2. To produce works of fine arts which support the progress of the state and the public.
3. To enable the artists and artistes to recognize that works of fine arts are not for entertainment only, but to promote knowledge.
4. To educate the public to be fully imbued with the prevalent ideas.
5. To help develop unity, nationalistic spirit and patriotism among the people.
6. To help with the elimination of decadent culture.
7. To support the promotion of morale and morality of the public.
8. To help develop the spirit of unity in exposing culture.
9. To make endeavours in promoting the development and standard of culture.

The Department of Archaeology and National Museum is responsible for the preservation and presentation of Myanmar cultural heritage and studying the culture and customs of the nation’s ethnicities.

Main Functions

- To reveal historical sites and ancient cities by exploration and excavation.
- To preserve Myanmar cultural heritage monuments.
- To preserve and promote Myanmar cultural properties.
- To establish archaeological museums.
- To preserve inscriptions, ancient mural paintings and published books.
- To establish the National Museum, archaeological site museums and cultural museums of State and Divisions and collect Myanmar cultural heritage materials for preservation and display.


The department carried out preservation, conservation and protection of Myanmar cultural heritage by enacting laws, rules and regulations. The Ministry of Religious Affairs and Culture designated 47 cultural heritage zones in order to enforce the 1998 cultural heritage preservation law more effectively.

Enacting laws, rules and regulations

In Myanmar, all the moveable cultural properties made or existing prior to the 19th century (the end of the last Myanmar dynasty) are classified as “antiquities” and protected by the law for illicit trafficking.

There are archaeological laws enacted for preservation and protection of Myanmar cultural heritage such as:

- Rules and Regulation of Protection and Preservation of Cultural Heritage Regions Law (2011)

Excavation and Exploration

Excavation

The Department of Archaeology and National Museum carries out tasks such as revealing Myanmar cultural heritage, historical sites and ancient sites, preserving Myanmar cultural heritage monuments and preserving and protecting Myanmar cultural heritage properties:

1. Inwa Ancient City (29 August-15 December 2015): Excavated exposed structures, which are four brick palace walls.
2. Tagaung Ancient City (15 August-30 August 2015): Excavated findings, which are the city wall (TG-44).
3. Pyu Ancient Cities (Beikthano, Halin and Sriksetra).
Pyu ancient cities (Beikthano, Halin and Sriksetra) are one of the 47 cultural heritage zones. Excavation and conservation of these three ancient cities, which have the earliest urban civilization formations in Myanmar, stand at high cultural value. The Ministry of Religious Affairs and Culture has demarcated Ancient Monument Zone (MZ), Protected and Preserved Zone (PZ) and Ancient Site Zone (AZ) as Core Zones for these three ancient cities/sites.

Archaeological investigation in Sriksetra started in 1897. Intensive excavation and preservation were carried out from 1964 onwards. Following on-going excavation progress, excavation of Sriksetra was last carried out from 1 October to 5 December 2015. Excavated findings include high fortification city wall, religious buildings and an arm of a gateway. Excavation of the Beikthano ancient city has been carried out since 24 November 2015 till now, and excavated findings include religious building (BTO-41) and the hydraulic system.

1. Pawrithat (or Kawthambi) ancient city, located in Shwe Nyaung, Shan State (18 December 2015 - 2 January 2016): Excavated findings include the city gate, the brick of the same size as the Pyu brick (the late Pyu period) and a bronze Buddha image contemporary with the Pyu period.
2. Thagara ancient city in Dawei, Thanantharyi Region (28 December-18 February 2016): Excavated findings include a religious building (SGR-3) and a burial site (32 burial urns) (SGR-4).
3. Suvarnabumi ancient city, located in Winka Village, Beelin Township, Mon State (24 November 2015 to 29 February 2016): Excavated explored structure includes a residential building (WK-10), a stupa (WK-11), residential buildings (WK-12, 13, 14) and a religious building (KKT MLG-1).

Exploration
- Wadi ancient city, Nwar Hto Gyi Township, Mandalay Region
- Sakkyar Taung, Rock arts caves, Myingyan, Mandalay region
- Mrauk-U area, Rakhine State
- Dala ancient city, Tontay, Yangon Region
- Gabarni rock art exploration, Shan State

Conservation and Preservation

There are many conservation and preservation works carried out by the department across Myanmar, some of which are listed as follows:

1. Conservation in Mrauk-U Heritage Zone
   a. Lay Myat Hnar pagoda conservation
   b. Koe Thaung pagoda conservation
   c. Palace site, walls
   d. Outer city walls
   e. Some monuments

2. Conservation in Pyu Cities (Halin, Beikthano, Sri Ksetra)
   a. Regular conservation work
   b. Shelter construction
   c. Protection for burial sites

3. Conservation in Bagan Heritage Zone
   a. Monument conservation (12 pagodas)
   b. Mural painting preservation (five pagodas)
   c. Protection of river erosion (three pagodas)
   d. Regular maintenance (more than 50)
4. Conservation in Mandalay Heritage Zone
   a. Zone demarcation for three ancient cities (Inwa, Pinle, Maimao), and Pinya ancient cities
   b. Conservation and preservation at Mandalay city walls, pavilions and palace
   c. Conservation work for wooden monasteries (three monasteries: Salay, Salin and Hpar Wut monasteries)

5. Conservation in Htanawaddy Palace Building

6. Constructing shelters for protection of stone inscriptions of the Mon period in Bago Region and Mon State

7. Conservation of ancient monuments in Sagaing Region (A Naint, A Myint, Nyaungkan)

8. Preservation of mural paintings at Salingyi Township (three pagodas), Sagaing Region

9. Preservation of mural paintings at Ma-U, Magwe Region

**International Cultural Cooperation**

**Research and Excavation**

The Department of Archaeology and National Museum is conducting research on archaeological and historical fields by organizing teams and joint research with international associations, such as National Research Institute for Cultural Properties and The National Center for Scientific Research to fill up the spaces of historical links through collaborative research and also excavation of cultural sites.

1) Bronze and Iron Age Excavation with CNRS team in Nyaungkan and Oakei Excavated findings include stone implements, beads, stone ring and bronze implements, and skeleton
2) Research and preliminary survey of rock art mural paintings of Kambarnei (Gabarni) with Dr Noel Hidalgo Tan of SEAMEO SPAFA Findings include pebbles, axe, scraper, strong ring and red ochre
3) Excavation at Sriksetra (HMA-58.59), jointly done with Cambridge University Team Excavated findings include potsherds, beads and silver coin
4) Exploration and non-invasive survey at Beikthano site, jointly done with Lerici Foundation, Italy (SK-007, 054) Findings include a rectangular brick wall hidden underground (SK-007) and a double rectangular brick wall hidden underground (SK-054)
5) Inventory in Bagan Region with UNESCO (1375 pagodas) (on-going project)
6) Excavation of glazed kiln with the cooperation of Japan
7) Research on bronze bell with the cooperation of Israel
8) Research on Tile roof with the cooperation of Japan
9) Research on the East-West Corridor with the cooperation of Thailand
10) Research on the Thargara ancient city with the cooperation of Prof. Elizabeth Moore
11) Workshop on Heritage and Community: Methodology for the Management of Cultural Properties in Myanmar, with the cooperation of Colombia

**Conservation**

1) Conservation of Shwe Nan Daw Monastery in Mandalay with the cooperation of United States of America (World Monument Fund)
2) Conservation of Ananda Temple in Bagan, with the cooperation of the Government of India (ASI) A MOU between the Government of the Republic of India and the Government of the Union of Myanmar was signed in July 2010 for the conservation of Ananda Temple in Bagan. An expert team from India responsible for the archaeological survey visited Myanmar for a preliminary survey of Ananda Temple in November 2010. Conservation work such as chemical conservation for mural paintings, stone figurines, wooden figurines and structural conservation were carried out
3) Conservation of burial sites in Pyu ancient cities (Sri Ksetra, Beikthano and Halin), with the cooperation of Lerici Foundation
4) Conservation of Kuthodaw stone inscription, with the cooperation of Sydney University, Australia
5) Conservation work such as cleaning stone slabs (733 in total) and refilling the ink were carried out

Museum

Exhibition, catalogue publication and conservation were carried out with the cooperation of international organizations:

National Museum (Nay Pyi Taw)
Exhibition, with the cooperation of a French architect, Mr Christopher Green Conservation, with the cooperation of Mr Mitsuri Hiorisawa, JICA

National Museum (Yangon)
Museum Exhibition (Buddha Images Showroom, Natural History Showroom, ASEAN Corner Showroom, Showroom for the Culture of National Races, Myanmar Performing Arts Showroom, Myanmar Traditional Folk Art Showroom, Royal Regalia Showroom), with a budget allocated from the government

Bagan Archaeological Museum
Training on preservation and conservation of museum objects with the cooperation of NRICH, Korea
  • 23-25 December 2013
  • 24-28 November 2014
  • 1-14 November 2015

Museums in Pyu Ancient Cities
(Sriksetra Museum, Beikthano Museum and Halin Museum)
  • Making museum catalogues with the cooperation of Dr Charlotte Galloway, Australia
  • Establishing the laboratories in museums in Pyu ancient cities for the conservation of museum objects, setting up laboratory materials and giving laboratory training, with the cooperation of Lerici Foundation, Italy

Myanmar and the UNESCO Conventions

In terms of cultural awareness and adopting strategies for protecting and promoting cultural values, Myanmar has ratified the following Conventions:
1) Convention concerning the Protection of World Cultural and Natural Heritage (1972)
4) 2003 Convention for the Safeguarding of Intangible Cultural Heritage

Implementation for Inscription on the World Heritage List

In 2010, the Department of Archaeology and National Museum, Ministry of Culture started to prepare the nomination dossier of three Pyu ancient cities (Beikthano, Halin and Sriksetra) for inscription on the World Heritage List. The Nomination Dossier (Draft) of three Pyu ancient cities was submitted to the World Heritage Committee on 30 September 2012. On 23 January, the Nomination Dossier (Completed) of three Pyu Ancient Cities was submitted to the World Heritage Committee.
ICOMOS Technical Evaluation Mission, Advisory Committee of UNESCO World Heritage Committee, visited Myanmar to carry out the evaluation of the three Pyu ancient cities and inspected their integrity, authenticity, state of conservation, the properties management system and adequacy of boundaries, and met the local people and interviewed them in October 2013.

Three Pyu Ancient Cities inscribed to World Heritage List

Three Pyu Ancient Cities (Beikthano, Halin and Sriksetra) was inscribed on the World Heritage List during the 38th Session of the World Heritage Committee held in Doha, Qatar, in June 2014.

This inscription is the first entry onto the World Heritage List for Myanmar. According to the statement from UNESCO, three Pyu ancient cities (Beikthano, Halin and Sriksetra) prove and reflect that Buddhism flourished and spread to the Southeast Asia region over 2,000 years ago. The socio-economy, culture and politics flourished and developed in the Pyu period and Pyu cities existed as high cultural standard cities in the region. During the Pyu period, the Pyus developed a water management system, an irrigation system and techniques for agriculture, baking brick, blacksmithing, etc. Also, urban planning was developed and used as a model in Southeast Asia. Therefore, it has become our pride. Myanmar people can take pride that the three Pyu ancient cities (Beikthano, Halin and Sriksetra) of Myanmar are now on the World Heritage List.

Although the Pyu ancient cities (Beikthano, Halin and Sriksetra) have been inscribed on the World Heritage List, their preservation and conservation are still a challenge. Effective management and disaster management plans together with follow-up activities, especially on natural disaster management, need to be drawn up, and capacity building for the conservation of the three Pyu ancient cities needs to be strengthened.

To overcome these challenges, the department is implementing activities such as an awareness programme and capacity building for the preservation of the three Pyu ancient cities with the support of the Italian government and cooperation of UNESCO. It includes implementation of the following project: Capacity Building for Safeguarding Cultural Heritage in Myanmar with the aim of strengthening the capacity of Myanmar to safeguard cultural heritage within the international framework, and to raise conservation standard through demonstration and restoration projects.

Memory of the World Programme (MOW)

Documentary heritage are housed in national and cultural libraries and museums, and the archive sections under the Ministry of Religious Affairs and Culture. Some documentary heritage such as mural paintings, stone inscriptions, bell inscriptions and ink inscriptions are in pagodas and temples.

In terms of cultural awareness and adopting strategies for the protection and promotion of cultural values, Myanmar submitted its documentary heritage to UNESCO for inscription on the Memory of the World Register.

Maha Lawkamarazein or Kuthodaw Inscription Shrines

Year of Submission: 2012
Year of Inscription: 2013

Myanmar is one of the long lasting and rare nations in the world to believe in Buddhism. Theravada Buddhism flourished and influenced the daily life of people and community since the early days in Myanmar.

The Kuthodaw Inscriptions, a collection of 729 stone slabs, were inscribed with the whole of Buddhist scriptures in 1868. Each stone slab is housed in a masonry shrine within the precincts of the Kuthodaw Pagoda and stands to this day.
In 1871, King Mindon convened the Fifth Great Synod and the entire Tipitaka inscribed on 729 stone slabs was approved by the council.

In 1900, a print copy of the text came out in a set of 38 volumes. It claimed to be “true copies of the Pitaka inscribed on stone slabs.”

This collection is unique in the Buddhist world and is highly prized by all Oriental scholars. It is considered a major documentary heritage of world significance because it gives valuable information on several major themes of 19th-century Myanmar as well as Buddhist religion in world history and culture. In addition to the rare documentary on religious teaching, these complex stone slab inscriptions also reveal the history and the community of Myanmar. These inscriptions brought into light the aspects of socio-economic, socio-political, global communication and religious morality in Buddhism and Buddhist community. They also bolster the long tradition of human being and Buddhist devotees in the world.

Till now, the Buddhist canon inscribed on the 729 stone slabs, which was approved by the 5th Buddhist Synod, is still being used for religious purposes in Myanmar.

Myazedi Quadrilingual Stone Inscription

Year of Submission: 2014
Year of Inscription: 2015

In Myanmar, stone inscriptions inscribed with Pyu, Mon and Myanmar languages have been found all over the country since proto-historic time. Inscriptions flourished and were constantly refined in Bagan. A lot of stone inscriptions with various language mediums of the Bagan Era have been discovered. These inscriptions have documented what those people recorded, wished and cursed, and what they donated for Buddhist religious merit and deed since 800 years ago in Myanmar and her neighbouring areas.

The Myazedi Quadrilingual Stone Inscription, located in the Bagan Historic City, is a unique and significant written document on Myanmar history, religion and culture in the 12th century. The inscription was inscribed in 1113 CE in four languages – Pyu, Mon, Myanmar and Pali – on each of the four faces. Myazedi stone inscription is the earliest Myanmar language document with chronological date. It is also a very rare quadrilingual inscription in the region. It is firmly identified as an authentic and intact writing document from the 12th century CE.

The stone inscription was discovered at Myazedi Pagoda near Myingaba village in Ancient Bagan City in 1886-87 and is therefore also known as the Myazedi Inscription.

Conclusion

Preservation and conservation of cultural heritage and research play an important role in the cultural sector, not only for an individual country, but also for countries worldwide in order to transfer our cultural heritage to the next generation, and this calls for cultural cooperation. Adoption of International Conventions and participation in cultural events, seminars, workshops and conferences have fostered harmony with other countries and inspires understanding and respect for one another’s culture to achieve a more peaceful coexistence. Allowing more communication and cooperation among different countries can help overcome the present challenges. Therefore, we need to promote cultural exchange and cooperation in all cultural fields among countries.

At the end of this conference, Myanmar would like to seek cultural cooperation programmes such as joint excavations, joint researches, preservation and conservation of Myanmar cultural heritage.
Abstract

The National Museum of the Philippines is one of the cultural agencies of the Philippine government. It is a scientific and educational institution as well as a cultural center. It was established in 1901 as part of the Bureau of Non-Christian tribes. It has been attached, transferred and/or separated from other government agencies until 1998, when it finally became an independent government agency with the passage of Republic Act 8492. To carry out its mandate, it is guided by other laws such as Republic Act 4846 and Presidential Decree 374 and recently with Republic Act 10066 or the National Heritage Act. It has 7 scientific divisions carrying out primary researches in various fields including land and underwater archaeology supported by 13 administrative and coordinating divisions. The National Museum is the only agency mandated by the government to issue permits for all archaeological surveys and excavations around the country. The Archaeology and Maritime and Underwater Cultural Heritage divisions are the major divisions doing terrestrial and underwater archaeology. National Museum archaeologists have also been actively involved in collaborative researches with colleagues from Southeast Asia, USA, France and Australia to name a few.

Keywords: National Museum of the Philippines, Philippine Prehistory and Archaeology

Thanks to the organizers for the invitation to participate in the 2nd SEAMEO SPAFA International Conference on Southeast Asian Archaeology. The National Museum of the Philippines is one of the first members of SEAMEO SPAFA and through the years, it has supported and participated in various conferences, training and workshops that the latter has organized.

The history of the National Museum of the Philippines is a long one, having been established by the Americans in 1901 as part of the Bureau of Non-Christian tribes. After more than 100 years of existence, the museum has been attached, removed and separated from other agencies of the Philippine government before finally becoming an independent agency through the Republic Act 8492 or the National Museum Act of 1998: “Establishing the National Museum, providing for its permanent home and for other purposes”. Its official name is National Museum. Earlier Philippine laws that support the National Museum’s work include Presidential Decree 374 amending Republic Act 4846, which is also known as “The Cultural Properties Preservation and Protection Act”. The most recent law that helps the National Museum in its work is Republic Act 10066 or the National Heritage Act giving more power to the museum to implement its mandate.
Being one of the lead cultural agencies of the Philippine government, the National Museum is a Trust of the Government; it is a permanent institution in the service of the Filipino community and its development, accessible to the public, and not intended for profit. Its general mission is to obtain, keep, study and present material evidences of humans and their environment. Specifically, the National Museum is an educational and scientific institution and a cultural centre (Republic Act 8492, 1998).

Through the years of its existence, the National Museum has been in the forefront conducting primary researches on the different aspects of Philippine culture as well as its natural resources. It has spearheaded scientific research, not only in the fields of archaeology and prehistory, but also in anthropology, botany, geology and zoology. Through the scientists and specialists in its various divisions, the museum is able to undertake disciplinal researches and in some instances, multi-disciplinal ones in collaboration with other researchers from the same discipline from other agencies.

One of the earliest divisions of the National Museum is the Anthropology Division, which the present Archaeology Division was once a part of. As this section grew in importance and in staff numbers, it was finally given a division status in 1988. At present, the division is comprised of 32 archaeologists/researchers and support staff. Since the Archaeology Division became an independent division, research in the fields of prehistory and archaeology has been conducted with more focus as more researchers are able to concentrate their efforts on the topics. To date, the Archaeology Division of the National Museum has been conducting research all over the archipelago from Batanes in the north and Mindanao in the south and on terrestrial and underwater sites too.

Archaeological work in the country goes back to the early 19th century, done by foreigners like Fyodor Jagor and Alfred Marche, and in the early 20th century by Carl Guthe, and later on by H Otley Beyer, Wilhelm Solheim and Robert Fox. Later on, Filipino anthropologists/archaeologists like F Landa Jocano, Jesus Peralta, Wilfredo Ronquillo and Eusebio Dizon, who were trained abroad, became the leading archaeologists. At present, Filipino archaeologists educated and trained in Philippine universities are doing archaeological work around the country together with those trained abroad. Almost two decades ago, the Archaeological Studies Programme at the University of the Philippines (UP) was established offering graduate-level studies in archaeology in order to further attract students to pursue the subject.

Prior to the establishment of the Archaeological Studies Programme in UP, all archaeological surveys and excavations around the country were led by archaeologists and researchers from the National Museum. Through their efforts, reconstruction of early life in the archipelago was started including contributions to efforts to understand the peopling of Southeast Asia. The National Museum research activities in the early 1970s established the presence of early humans in the archipelago as early as the mid-Pleistocene in Cagayan Valley with the recovery of stone tools associated with megafauna fossil remains (Bondoc 1979; Peralta 1981).

The discovery of human remains in Tabon, Quezon, Palawan (Fox 1970) was another contribution of the National Museum to the reconstruction of early life in the archipelago. These two major researches became the rallying point for future researches of the National Museum with other archaeologists from the University of the Philippines and from other universities abroad. Evidences of human presence in the archipelago have further been established with the new dates obtained for the Tabon human remains in Quezon, Palawan (Detroit et al. 2004) and the discovery of a human metatarsal in Callao Cave, Penablanca, Cagayan (Mijares et al. 2010). Other researches by PhD students are going on in these two sites.

Aside from these celebrated discoveries, the National Museum archaeologists and researchers have been conducting other researches in other areas like the Butuan Archaeological Project in northeastern Mindanao: Age of Contact (10th-13th century); Kamhantik Project in Quezon Province: Age of Contact Site (10th century); Nagrebcan Research Project in Ilocos Norte: a Spanish Period site (19th century); and the Tigayon Hill Cave Research in Aklan.
We also have other collaborative researches with French, Indonesian, American colleagues as well as Filipino archaeologists either from the University of the Philippines’ Archaeological Studies Programme or from other universities abroad. These collaborative researches include the PREHSEA or Prehistoric Heritage in Southeast Asia, the Human Patrimony Project: Cagayan Valley Archaeology, the Ifugao Archaeological Project and the Bacong Archaeological Project.

The Butuan archaeological research is one of the oldest researches of the National Museum that is still going on. Since the early 1970s when the first water-logged boat was discovered, surveys and excavation have been conducted within Butuan and the immediate vicinities to find out more about the prehistory of northeastern Mindanao. The continued research in Butuan resulted in the discovery of the biggest water-logged boat. This brings to five the actual excavated boats and nine documented. This latest boat has a length of approximately 15m at midpoint. We still have to excavate the other half this year and in the succeeding years. These newly excavated boats have been left in situ for better preservation and conservation until we find better or best practices to preserve and conserve water-logged artefacts. Associated with the boats are again some of the earliest ceramic pieces brought by the traders to the country. While the majority of the artefacts belong to the Song Period, there were also Tang and Five Centuries ceramics aside from those coming from the Middle East. My own research on the area has brought me to conclude that Butuan was an important centre of trade during the 10th-13th centuries. One of our museum researchers who is finishing her PhD at Flinders University in Australia has obtained new dates for the five boats that have been excavated (Lacsina and Duivenvoorde 2014).

The Kamhantik project in Quezon province in the island of Luzon deals with the analysis of another burial practice, that of using sarcophagi for burying the dead. Initial survey and excavation was conducted in 2011-2012. Excavations resumed in 2015, resulting in the recovery of human remains still in the sarcophagi, earthenware and tradeware ceramic sherds, iron implements, gold artefacts, a bronze bell, glass beads and a stone adze as part of the funerary offerings. A C-14 date was obtained placing the age of the site at 950 BP or 10th century. (Dizon 2016, pers. comm.).

One of our more recent archaeological projects is the Tigayon Hill Cave project in coordination with the local government of Kalibo. In the excavation done in Caves 2 and 3, different types of artefacts were recovered including tradeware ceramic sherds, lithics, and shell and bone fragments. Relative dating was established based on the designs found on the tradeware ceramics at 13th-14th centuries CE (Orogo 2015).

Another new project of the division is the Nagrebcan research in Ilocos Norte. For two consecutive years now, survey and excavation have been conducted resulting in the recovery of 19th century artefacts like Spanish period wall-like masonry and clay tiles with religious relief images. There is also a brick mound found on the site that is being analysed at the moment.

The National Museum together with its French and Indonesian counterparts formed the PREHSEA Project, “Managing Prehistoric Heritage in Southeast Asia”, in June 2012, which was to last until 31 May 2015, but was extended until May of 2016. This project is financed by the European Commission’s programme “Investing in People and Eastern Partnership Culture Programme: Strengthening Capacities in the Cultural Sector”. Since its inception, the partner countries have exchanged specialists and scientists as well as students and other stakeholders to come to the partner countries to visit the archaeological sites included in the project: Tabon Cave Complex in the Philippines and Sangiran in Indonesia. To cap the project, an exhibition of the important finds will be launched at the National Museum in Manila and later in Indonesia before the project ends in May 2016.

The Human Patrimony Project: Cagayan Valley Archaeology started in the early 1970s by a joint Filipino-American team of geologists and archaeologists. Through their efforts, fossil remains of elephas
and stegodon were found in the open sites in Cagayan associated with stone tools. In 2013, the National Museum with its French counterpart from the Museum national d’histoire naturelle (MNHN) collaborated to conduct an archaeological survey and excavation in one of the open sites in the shared boundaries of Cagayan and Kalinga. Fossil remains associated with stone tools were again found. At the moment, we are awaiting the results to determine the age of the fossilized remains of the rhinoceros.

In 2015, a team from the Archaeology Division together with Australian National University-based Dr Hung resumed the excavation of the Magapit Hilltop Shell Midden. This is a very important site as far as the Neolithic Period of the Philippines is concerned because of the immensity of the shell deposit found on the hill. It is also the objective of this research to understand the deposition process through archaeobotany by inferring on the diet of the prehistoric peoples that lived in the area. Recovered artefacts from the site include earthenware sherds, stone tools, stone and clay ornaments and animal remains. Dr Hung is waiting for the results of the phytolith analysis being conducted on the collected samples.

Another collaborative project that the National Museum is involved in is the Ifugao Archaeological Project. It is a project being done with Filipino archaeologists based at the University of California Los Angeles, a non-government organization: Save the Ifugao Movement and the local communities in Ifugao. Research started in 2012 and has been going on every year with another season coming up this June-July 2016. Every field season, a group of students, mostly from the United States, joins Dr Acabado and his team for a month-long fieldwork. The project aims to answer issues regarding the age of the rice terraces which are a UNESCO World Heritage Site, the response to Spanish colonialism in the past and to understand the effects of climate change. Results of the surveys and excavations in Kiyyang suggest a younger date for the terraced wet-rice cultivation to around the 17th and 19th century (National Museum Journal of Cultural Heritage 2015).

Aside from full archaeological research projects, the Archaeology Division also does rescue archaeology in urban areas like Manila and in rural areas where sites are threatened by real-estate development and road constructions. Archaeologists from the National Museum either conduct the rescue archaeology work or supervise other non-museum archaeologists in conducting rescue archaeology. One of these rescue archaeological works was conducted in the Quezon peninsula. The work was carried out because the coastal site is on the verge of permanent destruction due to the conversion of the lot into a mixed-use real estate development. The excavation resulted in the recovery of more than 20 heavily damaged burial jars with some still containing human remains within a 76 sq.m lot. Aside from the burial jars, recovered were decorated pottery sherds, worked shells, Indo-Pacific beads and animal and molluscan remains. The site has yielded one of the biggest concentrations of burial jars in an archaeological site (Orogo 2015).

Archaeological surveys and excavations in central Philippines have been conducted for the past two years in Panay and Negros Oriental islands only, unlike in the previous years, where research included the islands of Bohol and Cebu. The Bacong Research Project in Negros Oriental is a research project in collaboration with American archaeologist Dr Junker from the University of Illinois Urbana-Champagna. The sites are classified under the Metal Age Period. The Bacong sites fall in the range of 5-320 CE (Dizon 2016, pers. comm.). The burial sites have yielded some of the best examples of earthenware burial coffins found in the archipelago. Philippine Metal Age sites are hard to find in the country.

Aside from land archaeology, the Archaeology Division of the National Museum has an underwater section whose work is to conduct survey and underwater excavations in areas where shipwrecks have been pinpointed. The endeavour usually involves a foreign partner because of the huge expense involved in conducting the project. These collaborative projects have yielded some of the most important discoveries underwater: the Galleon San Diego, Pandanan and Griffin. Last year, the Underwater Archaeology Section decided to embark on a purely Filipino underwater research project in Marinduque Island. The objective was
to investigate an identified shipwreck and have an all Filipino crew undertake the survey and excavation. The work resulted in the recovery of earthenware ceramics, nail and metal sheathings and wood samples, which are now being identified in another laboratory.

The Archaeology Division has also been involved in urban archaeology. Among these projects are the excavations in and outside of the walled area or Intramuros. Through the museum’s efforts, old and buried structures dating to the Spanish colonial period (ca. 1571-1815) have been exposed while associated artefacts have been collected and curated (Bautista et al. 2014). Several of these structures belong to religious groups that occupied the walled city. Rescue archaeology has also been conducted outside of the walls of Intramuros, like in Mehan Garden and Arroceros Forest Park.

In June 2015 and early 2016, archaeologists of the National Museum had to conduct rescue archaeology in two of its buildings when human remains and artefacts were recovered during diggings made by the contractors. Based on the analysis of the recovered teeth and associated artefacts, the remains belong to Asian individuals because of the shovel shaped incisors while the artefacts are associated to World War II paraphernalia.

While the National Museum is active in doing primary research in archaeology and prehistory, it is also extending technical assistance to other government agencies including local government units and state universities and colleges. The technical assistance that has been extended includes inspection of sites for archaeological surveys and excavations as well as conservation of movable and immovable heritage. Our work brings us to the farthest islands in the north-Batanes, all the way to the south in Tawi-tawi and Saranggani. In 2013, after the double tragic events that hit the country (a very strong earthquake in October 2013 and a super typhoon in November 2013), the National Museum organized teams to help in the rescue and recovery activities that devastated churches, belfries, watchtowers and government buildings in the islands of Bohol and Samar. Archaeologists and other museum personnel worked hard the whole year of 2014 and part of 2015 to recover movable artefacts that are mostly religious objects because of the National Museum’s commitment to these churches which have been declared as National Cultural Treasures. To date, the National Museum of the Philippines has declared more than 100 NCTs and ICPs, including a site museum reservation and four archaeological/anthropological sites and reservations and three heritage zones.

We are also helping other cultural agencies in our aspirations to have some of our intangible and tangible cultural heritage enshrined in the UNESCO World Heritage List. The Archaeology Division is directly documenting, collecting and collating information about Philippine boat culture, particularly the traditional boat-building techniques, to have it listed in the UNESCO Intangible Cultural Heritage for Safeguarding List. In 2015, the National Museum sponsored a seminar-workshop on Philippine boat culture in collaboration with the Department of Foreign Affairs. Ivatan, Visayan, Sama-Bajau and Manobo traditional boat-builders were invited to come to Manila to share their indigenous knowledge of boat-building and the various processes and rituals associated with building traditional boats. This is in relation with the expanded Butuan Project of the museum. Another component of the Butuan Project is the acquisition of the properties where the water-logged boats were recovered and where other boats are still buried. The National Museum would like to establish a maritime heritage park from these private and government lands. Negotiations and payments have just been concluded and we are now waiting for the turn-over of the documents of ownership.

To further reach a wider audience, not only in the city of Manila, but also people from all over the country, the National Museum is undertaking renovations, expansions and site development of our existing office buildings in Manila and in the branch museums around the country. Likewise, we are opening new branch museums in Batanes and Iloilo. We are also gearing up for the mounting of new archaeological and
prehistoric exhibitions in the Manila building and in some of our branch museums. We hope to have more visitors visit our museums this year.

Exhibits only show a small portion of what we recover from our archaeological surveys and excavations. The bigger part is kept in our collections holdings rooms. To date, we have five terrestrial National Repository Rooms containing our Beyer collections, 1950s-1970s collections, collections from ongoing projects, zooarchaeological remains and ceramics. We also have three collections rooms for our underwater specimens. We also have some of our collections deposited in places where we have branch museums like in Palawan, Cagayan, Butuan, Bicol, Ifugao, Ilocos and Zamboanga. While many researchers use our collections found in Manila, there are also others who go to Palawan, Cagayan and Butuan to use the collections found there.

While we already have several repository rooms for our collections, we still need more space for our laboratories and analysis areas. We hope that with the opening of our new building which will house our natural history divisions, more space will be given to us. Aside from space problems, we also need to acquire new analytical tools to help us in our quantitative analysis of our specimens as well as technical know-how on the operation of these analytical tools. It is good to know that training is also being sponsored by SEAMEO SPFA like in underwater, ceramic identification and conservation. We hope that more will be forthcoming. We also look forward to more collaborative projects with some of our colleagues in the region for more regional comparative researches. We are always looking forward to be in the loop.

We hope not only to be a passive participant but also to be active in keeping the tradition of collegiality and camaraderie alive in the region.

Bibliography


Republic Act 8492. Philippines.

Abstract

The following report is a summary of archaeological research and capacity building, as well as other archaeology-related activities that have taken place in Singapore, and by Singapore-based archaeology teams and units, in the period 2013 to 2015. The activities are categorized under four headings: 1) state support for archaeological research and archaeological excavations in Singapore; 2) archaeological scholarship in Singapore; 3) archaeological projects in Singapore; and 4) archaeological projects outside of Singapore undertaken by Singapore-based teams.

Keywords: Singapore archaeology, colonial archaeology, Nalanda-Sriwijaya Centre Archaeology Unit, National Heritage Board

Between 2013 and 2015, archaeological research and archaeological training in Singapore has progressed at a fast pace and intensity. The combination of state support, development and growth of academic units, and field research opportunities outside of Singapore, have led to a sustained growth in the practice and training of students and practitioners who are based in Singapore.

State Support for Archaeological Research and Archaeological Excavations in Singapore

Since 2013, archaeology has been receiving more attention and support from the National Heritage Board (NHB), a statutory board under the Ministry of Culture, Community and Youth, which is the government agency that is responsible for heritage matters in Singapore. The agency has been central to the provision of grants and funding for archaeology-related projects, including test excavations, rescue excavations, and post-excavation processing and analyses.
In conjunction with a concerted effort to develop cross-governmental agency collaboration and cooperation, NHB has been working more closely with the Urban Redevelopment Authority in Singapore (the governmental agency responsible for land use and land planning) and the National Parks Board (N Parks), in order for the challenges of heritage preservation, conservation and mitigation – particularly of archaeologically sensitive sites – to be adequately addressed.

Additionally, the National Heritage Board has undertaken responsibility to liaise between governmental agencies and the ISEAS – Yusof Ishak Institute (ISEAS), which houses the only archaeology unit in Singapore, so that impact assessments of sites and excavations may be facilitated. The Empress Place Excavation (2014 and 2015) was a good case study of how such a collaborative effort, spearheaded by NHB, may lead to optimal outcomes for all stakeholders (refer to section 3 below).

In addition to supporting archaeology excavations, NHB has also been looking into ways of promoting greater awareness on archaeology activities and recovered artefacts. Some of the items from earlier archaeology excavations are on display in the museums. The exhibit entitled “Archaeology in Singapore: 30 years of uncovering the past” was a good partnership between ISEAS and the National Museum of Singapore to showcase how archaeologists have helped piece together a deeper understanding of Singapore’s ancient and colonial past through excavations conducted over the past three decades.

Finally, archaeology and the history of pre-modern Singapore are now featured as a substantial portion of the Ministry of Education’s history curriculum at national schools, with a focus on the interpretation of historical and textual data.

Archaeological scholarship in Singapore

Archaeology Eco-System in Singapore

A growing number of archaeologists and archaeological historians have taken up residency in Singapore between 2013 and 2015. Institutions of higher learning and research that have resident archaeologists and historians well-versed in archaeological research include the National University of Singapore, Yale-NUS College, Nanyang Technological University and ISEAS. Institutions of higher learning with archaeology-related, heritage-management and conservation-technologies programmes include Singapore Management University and the Singapore University of Technology and Design. In addition, the NHB counts several archaeologists by training amongst its ranks of museum curators and conservators. Finally, Singapore continues to maintain only one archaeology unit, which is presently housed under the Nalanda-Sriwijaya Centre, ISEAS (Nalanda-Sriwijaya Centre-Archaeology Unit; NSC-AU).

The growing eco-system of archaeologists and related expertise has resulted in a number of scholarly activities initiated between 2013 and 2015, of which two are highlighted here in the present report.

Archaeology Archiving Workshop (November 2014)

A workshop on archaeological archiving was organized by NSC-AU in conjunction with the National Heritage Board (Singapore), in an effort to develop preliminary understanding and basis for developing legislative amendments and to begin setting up a framework for the management of archaeological materials recovered from Singapore territories by the State. The workshop included practitioners from Singapore and the United Kingdom, and included participation from the National Trust (UK), National University of Singapore, Yale-NUS College, Institute of Southeast Asian Studies – Yusof Ishak Institute and Singapore Management University.
NSC-AU Archaeology Report Series (2015-present)

The Nalanda-Sriwijaya Centre-Archaeology Unit (NSC-AU) at the Institute of Southeast Asian Studies – Yusof Ishak Institute launched a new digital publication series entitled *Archaeology Report Series* in 2015. The series has been established to provide an avenue for publishing and disseminating archaeological and related research conducted or presented, both within the Centre. This also includes research conducted in partnership with the Centre, as well as outside submissions from fields of enquiry relevant to the Centre’s goals. The overall intent is to benefit communities of interest and to augment on-going and future research.

Archaeological Projects in Singapore

Between 2013 and 2015, three major archaeological projects were conducted in Singapore. Below are the key projects undertaken during the period in question:

**Excavation Projects:**

**Empress Place Excavation (2015)**

At the invitation of the National Heritage Board (Singapore), a two-month rescue excavation was conducted by the NSC-AU on the north bank of the Singapore River Basin, adjacent to the Asian Civilisations Museum and in front of the Victoria Theatre and Concert Hall in downtown Singapore. The excavation involved collaboration between the URA, NHB, NParks and ISEAS.

The site was approximately 1,000 square metres and dates between the late 13th to 20th century. Particular attention was paid to the 14th to 17th century layers. Materials recovered included ceramics, numismatic finds, precious metal objects, organic fauna remains and more than 12 large wood fragments exhibiting shipbuilding works. A total of 2.5 tons of material finds were recovered during the excavation.

A detailed site report is scheduled to be published at the end of 2016 in the Archaeology Unit Report Series.

**Archaeology at the Singapore Botanical Gardens (UNESCO World Heritage Site since 2015)**

In 2014 and 2015, prior to the inscription of the Singapore Botanical Gardens as a UNESCO World Heritage Site, archaeological surveys were conducted at the Jacob Ballas Children’s Garden and at a piece of land at Adam Park, located near the Gardens. Both sites are colonial period sites, yielding artefacts from the 19th and 20th centuries, with particular emphasis on artefacts from the World War II.

The preliminary site report will be published in the Archaeology Unit Report Series in September 2016.


Between 2014 and 2015, a major archaeological salvage project was undertaken by the NSC-AU and the Cultural Studies Cluster (ISEAS) to retrieve and document material cultural remains exhumed from the Bukit Brown cemetery. Documentation work of the site began earlier, in 2012, and lasted for approximately two years. Opened as a municipal cemetery in 1922, Bukit Brown also contains tombs dated to the early 19th century, which were relocated from an older cemetery located at the Outram vicinity near the western extremity of Chinatown. The project included aerial photography, landscape mapping of the site, detailed drawings of the tombstones and stone epitaphs, and the exhumed burial material cultural remains.
The project has so far resulted in a public exhibition of the project finds and field survey images. The information has also been used to create an online repository and information portal about the cemetery and the notable personalities buried in Bukit Brown. The recovered materials and associated site documentation are currently being compiled as a full report.

*Post-Excavation Projects*

*National Art Gallery Excavation Post-Excavation Processing and Analyses (2013-2015)*

In 2009 and 2010, excavations were conducted within the premises of Singapore’s City Hall and former Supreme Court house in downtown Singapore, which were to be refurbished and repurposed as the National Art Gallery. Three hundred kilograms of archaeological finds from the 14th to 20th centuries were recovered during that process.

Between 2013 and 2015, the finds were systematically processed. This included cleaning of artefacts, classifying the artefacts and compiling of a digital archive through photography and database development.

Preliminary research findings on the greenware and earthenware from the National Art Gallery excavation is being presented at the second SEAMEO SPAFA conference under the panel entitled, *The Lion City and Beyond: Singapore’s Archaeological Efforts Within and Without The Island.* The aim is to develop scholarly competencies in post-excitation analysis work conducted by members of archaeological teams based in Singapore.

*Post-Excavation Cataloguing Work, Fort Canning Hill Collection (2015)*

A small collection of archaeological materials recovered from various sites on Fort Canning Hill, under the custodianship of the National Parks Board (Singapore), was classified and catalogued by the archaeology team from the NSC-AU Archaeology Unit (ISEAS).

*Post-Excavation Cataloguing Work, National University of Singapore*

Additionally, on-going post-excitation work is being conducted on a collection of materials excavated from Singapore sites, and under the management of the Southeast Asia Programme, National University of Singapore.

*Archaeological Watch Briefs*

The pace of development in Singapore, particular in the downtown area, has necessitated a series of archaeological watch briefs as a mitigating effort at identifying potential loss of heritage and material cultural remains at archaeologically sensitive sites. To date, these watch briefs have been conducted by the NSC-AU teams. Where the watch briefs indicate that sites of archaeological significance were affected, these sites have been excavated as well. Sites where such briefs and resultant excavations have taken place are as follows:

2013
- Cathedral of the Good Shepherd Evaluation

2014
- Singapore Management University Evaluation
- Cathedral of the Good Shepherd Watching Brief
- Singapore River Diversion Watching Brief
Archaeological Projects outside of Singapore Undertaken by Singapore-Based Teams

The purpose of developing and engaging in international projects is to develop opportunities to undertake archaeological research, and to generate opportunities to conduct excavation in rural sites and sites with monumental architectural remains that have been relatively untouched by urban and economic development. Such contexts are not available in Singapore and the need to develop sustained training programmes to train Singaporeans in field archaeological practices – from techniques, to project and site management, to the production of high quality reports – is of concern. These considerations for the training of archaeological competencies and capacity-building has necessitated the signing of MOUs with our ASEAN neighbours that would provide for predictable circumstances for long-term planning and training programmes.

Collaborations with APSARA Authority, Cambodia

Memoranda of Understanding to undertake archaeological research at Angkor period sites in Cambodia were undertaken by NSC-AU (ISEAS) and APSARA Authority in Cambodia. Two MOUs have so far been signed for work to be undertaken in Phnom Kulen and Koh Ker. These MOUs are for a period of five years beginning in 2014 and 2015, respectively.

The MOUs have been very warmly supported by the Cambodian Government and APSARA Authority. The MOUs allow NSC-AU teams to conduct both research fieldwork as well as field schools at the stipulated Cambodian sites. Funding for the field schools undertaken through the MOUs has been provided by the Ministry of Foreign Affairs (Singapore) under the East Asian Summit programme, in an effort to encourage mutual learning and training opportunities between citizens of East Asia Summit member countries.

The projects in Cambodia between 2013 and 2015 are as follows:

Archaeological Field Schools Undertaken in Cambodia

NSC-AU Field School at Cheung Ek, Cambodia (2013)

Held between 30 May and 17 July 2013, and in conjunction with the Royal Academy of Cambodia, the NSC-AU field school involved the excavation of an ancient kiln site at Cheung Ek, near the capital city of Phnom Penh. A total of twelve applicants from Cambodia, Indonesia, Singapore, Vietnam, the United States, China and Japan were selected for the field school. The curriculum included lectures, excavation, field trips and laboratory training. Lectures incorporated broad topics – having to do with the historical, economic and cultural impact of intra-Asian interactions – as well as specific instructions about the analysis and interpretation of Chinese and Southeast Asian ceramics. In Singapore, students visited local museums and participated in a photography workshop. The teaching staff for the training programme included prominent researchers from Cambodia, Singapore and the United States.
**NSC-AU Field School at Koh Ker, Cambodia (2015)**

The NSC-AU conducted an archaeological Field School between 2 and 22 December 2015 at Koh Ker, Cambodia. This was in collaboration with Cambodia’s APSARA Authority and was the third Field School conducted by NSC-AU in Cambodia. Other supporting partners included the Ministry of Culture and Fine Arts (Cambodia), the Royal University of Fine Arts (Cambodia), The Royal Academy of Cambodia, the National Museum of Cambodia, the Hungarian Southeast Asian Research Institute and Ecole Francaise d’Extreme-Orient. A total of 12 students participated in the field school, representing Cambodia, Indonesia, Laos, Vietnam, Philippines, Myanmar, Hong Kong, New Zealand and Singapore.

The field school involved training sessions involving the complex socio-political and economic evolution of Cambodia. Topics also included urbanization, exchange dynamics, cultural influence, and multi-directional agency among pan-Asian networks. The main fieldwork training included coordinated archaeological and anthropological operations at multiple sites within the 10th-century Angkorian capital of Koh Ker associated with the reign of Jayavarman IV. Participants lived on-site (in the forest), working with professional staff and local community members. They trained at three excavation locales to cover a diverse range of approaches, techniques and research questions.

The final Field School leg in Singapore provided an important comparative component, added training opportunities, facilitated library access and allowed participants to finalize and present team projects.

The detailed report from this project will be published alongside the report from the second field school season at Koh Ker, currently scheduled to take place in 2017.

**Archaeological Research Projects undertaken in Cambodia**

**Sema Don Meas Site and Sema Peam Kre Sites, Phnom Kulen, Cambodia (2015)**

In collaboration with APSARA Authority (Cambodia), NSC-AU conducted a three-week excavation of two Dvaravati sites on Phnom Kulen (3-22 June 2015). The project was augmented by the involvement of an archaeologist and art historian from the Asian Civilisations Museum (NHB, Singapore).

The preliminary findings of the project have been presented to a public audience (NHB Malay Heritage Centre, 25 August 2015). A full report is scheduled to be published under the NSC-AU Archaeology Report Series, with a second imprint under APSARA Authority.

**Preliminary Excavation, Banteay Site, Phnom Kulen (2014)**

A preliminary archaeological investigation was conducted at the Banteay site on Phnom Kulen from 26 April to 8 May 2014 as a joint cooperation project between the Institute of Southeast Asian Studies and APSARA.

This initial phase of research involved a survey of the area and the excavation of six trench units. The research at the Banteay site was meant to try to locate habitation sites and to understand the structure of the terraces. The excavations revealed what may be a staircase accessway made from bricks, earthenware pottery sherds, and burnt clay features. Soil profiles from excavated trench units also revealed how compound’s terraces may have been constructed and reinforced differently from later periods.

The results of the excavation were presented at the Technical Session of the International Coordinating Committee for the Safeguarding and Development of the Historic Site of Angkor (ICC-Angkor) meeting in June 2015.
Abstract

The Fine Arts Department operates the work of national cultural heritage in Thailand, and its mission is to protect, conserve and maintain the value and identity of Thai nationality. The Division of Archaeology and Group of Archaeology in the 1st -15th Regional Office of Fine Arts Department are responsible for archaeological work throughout the country. New evidences have been unearthed every year and most important one is the ancient Arabian shipwreck near the Gulf of Siam. A successful Underwater Archaeological Training Centre also has been established and a project on the Ancient Trade Route between the Arabian Sea and the South China Sea is a hot researching issue. Moreover, many artefacts found in southern provinces show the religious influences from India sub-continent to Malay Peninsula, also trade from China. With these evidences found from north to south, east to west, Thailand is always hub of ASEAN in many aspects since prehistoric time.

Keywords: The Fine Arts Department, Silpakorn Journal, National Museums

Supporting National Strategies

In 2013, the Royal Thai Government set out national strategies to generate income among the Thai people in the aim to improve well-being on the basis of equality by taking into account the benefits of a good social environment, which are directly connected to cultural missions even in social and economic areas. In order to support national strategies and the government’s cultural policies, the Ministry of Culture therefore adjusted its roles in three keys aspects: a) cultural administration, b) cultural economic promotion and c) restructuring and administrative adjustment. This adjustment of the Ministry of Culture’s role has caused the adjustment of its planning and strategies in accordance with the altered roles of the Ministry. This is considered as an opportunity for the Fine Arts Department to take works resulting from its maintenance, conservation and restoration missions to be promoted, developed and extended, in order to maximize the economic value of cultural heritage to communities. The key pilot project of the Fine Arts Department for the year 2014 was the “Development of Cultural Cities for Tourism Project”, which involved work plans that were consistent with national strategies by enhancing the competitiveness of cultural cities to directly impact the economy, especially in World Heritage Sites, with two projects being the “Project in Sukhothai, Si Satchanalai and Kamphaeng Phet” and the “Project on Phra Nakhon Si Ayutthaya Historical Park Development”.
The Fine Arts Department is a key government agency responsible for maintaining and creating national arts and wisdom over time. Although some fields in the arts and wisdom have been decreasingly utilized for the Fine Arts Department’s social benefit, the Fine Arts Department persistently intends to pass such arts and wisdom onto the responsible following generations in order to create accountability for the department to make it become a key player in society in the creation of national works of art, religions and the royal court.

The development and extension of knowledge base where academic standards are concerned has been one of the significant factors as to why the Fine Arts Department has been conducting surveys, studies and in-depth research in various fields that fall under the department’s missions. As a result, such areas of work have been promoted and supported at all levels. Examples of key projects implemented by the Office of Archaeology and the Office of National Museums are as follows:


Krom Phra Rajawang Bovorn Sathan Mongkol or Wang Na is a title, the prestige of which is equivalent to that of the Crown Prince. This status of authority is immediately one echelon under His Majesty the King. This prestige has existed since the Ayutthaya Period. During the Rattanakosin Period, after His Majesty King Rama I was enthroned as the first king of the Chakri Dynasty, he relocated the royal capital to the east of the Chao Phraya River in 1782, which is when Phra Bovorn Palace was built as the residence of Krom Phra Rajawang Bovorn Sathan Mongkol to the north of the Royal Grand Palace.

Presently, three bodies under the Ministry of Culture – the National Museum, the National Theatre and the Bunditpatanasilpa Institute – are part of the Bovorn Sathan Mongkol Palace area, around which there are many significant buildings and structures, including wreckage considered an archaeological site, ancient landscapes and other sites underground. On the occasion of the 84th Birthday of His Majesty King Rama IX and the 60th Birthday of H.R.H. Crown Prince Maha Vajiralongkorn, the Fine Arts Department emphasized its awareness of the importance of this site as an historical site related to the historical development of the Rattanakosin Period and the Kingdom of Thailand, and has underlined the value of this site’s conservation for the development of the area itself and for appropriate activities.


The Fine Arts Department developed a policy to satisfy the aforementioned royal event by constructing a central storage space for national museums (Central Storage) at Khlong 5 Sub-District, Klong Luang District, Pathum Thani Province, as a place or a hall to collect and maintain museum artefacts that remain after exhibitions and which are not in use for any other exhibition by the national museums that are under the supervision of the Fine Arts Department throughout the country. Such artefacts could be rotated for exhibitions or special and temporary events for further study, analysis and research, as well as to provide educational services that all bodies under the umbrella of the Fine Arts Department and the general public can utilize. At present, there are over 70,000 pieces of archaeological findings, artefacts and replicas of ancient artefacts collected at the Central Storage of the National Museums. According to statistics covering the past ten years (2004-2014), it has been found that archaeological findings, artefacts
and replicas have been increasing at an average of 300-500 pieces per year. As a result, the current central storage is insufficient in accommodating the increasing number of objects.

**Project on the Conservation and Development of the Archaeological Site of Tung Kula Rong Hai Culture in the Central Mun River Basin in Roi Et Province.**

This project aims to survey, study and research the Muang Bua Archaeological Site in Roi Et Province, which is one of the significant archaeological sites of Tung Kula Rong Hai Culture, where evidence of a unique jar burial was found. According to the archaeological evidence found, it has been presumed that Northeastern Thailand was occupied for over 4,000 years. The Fine Arts Department plans to employ and apply the knowledge on prehistoric culture acquired from the research on Tung Kula Rong Hai Culture, and then compare it with evidence found in neighbouring countries, including ASEAN countries. In addition, in 2015, the Fine Arts Department also applied for a large budget for the establishment of an ASEAN Archaeological Training Centre.

**Project on the Establishment of Underwater Archaeological Training Centre**

Between 2007 and 2011, the Fine Arts Department, in cooperation with UNESCO Bangkok Office and with the financial support of the Norwegian government, organized an underwater archaeological training programme for countries of the Asia-Pacific region. This programme was organized successfully, and it became apparent that countries in the Asia-Pacific region have been increasing works of this kind by organizing exhibitions, seminars, symposiums and other activities. The Fine Arts Department has been providing guidance for the establishment of the Underwater Archaeological Training Centre as a regional training centre, particularly for ASEAN member states, in order to collect, develop and promote knowledge in the field of underwater archaeology, and to promote public awareness on cooperation in conserving underwater archaeological sites connectedly.

In 2014, the Fine Arts Department established a new body called Division of Underwater Archaeology, with special concerns over underwater archaeological works. The construction of the necessary buildings and structures for the centre began, as well as the organizing of an international seminar concerning underwater archaeological works to enhance and exchange information and experience among experts and other relevant organizations.

**Project on the Research of the Ancient Trade Route between the Arabian Sea and the South China Sea**

According to the study of a huge ancient vessel found in a shrimp farm located in Phantai Norasing Sub-District, Samut Sakhon Province, the vessel form has a two-layer gunwale bound with rope, which is a vessel-building technique similar to that of antique Arabian vessels known as Dhow. Archaeological findings found in the vessel include porcelains manufactured by kiln sites in China and earthenware manufactured by kiln sites in Thailand. Various kinds of organic remains were found in many containers, including coconut fruit, palm fruit, rice, gum, coconut shell and basketwork. In addition, from a comparative study of shape, it was found that there were some containers that look similar to Amphora containers, which were mostly found in shipwreck sites abroad. This container was designed for the use of sea freight. Importantly, part of a container had alphabet carvings, which represents that this vessel may be important for the study of cross-regional commercial and sea navigation history. This discovery is very important for the study of maritime trade about 1,000 years ago. The Fine Arts Department therefore assigned the 1st Regional Office of the Fine Arts, Ratchaburi Province, to implement a project researching the ancient trade route between the Arabian Sea and the South China Sea in order to enhance knowledge in the study of this regional sea navigation.
history concerning ancient commerce and sea trade route in ancient times, as well as to conserve this as a learning resource and as a cultural tourism site, and promote such information among the general public.

Important Archaeological Evidences Found in Thailand

The Phanomsurin Shipwreck

An ancient shipwreck was discovered in the coastal plain of the Gulf of Thailand in Samut Sakhon Province. The ship was found in the paddy field, now turned into a shrimp farm, approximately 8 km from the present shoreline and about 12 km from Tha Chin River in the Phantai Norasing Sub-District of Samut Sakhon Province. Geomorphological data suggests that the former coastline about 5,000 years ago was further north in the areas of the modern provinces of Suphan Buri, Ayutthaya and Prachin Buri. Later the sea level dropped and retreated to the current shoreline about 1,000 years ago.

The ship was named “Phanomsurin” after the owners of the land. A recent study of the shipwreck has found that the ship was built of wood, with planks stitched with ropes, in similar manner to Arab ships. The ship is about 35 m long, equipped with at least two masts. It carried a number of Dvaravati pottery vessels and amphorae, a kind of vessel used to contain liquid stuffs and plant seeds commonly found in India, the Middle East and Europe. No other ship of this type has ever been unearthed in Thailand or Southeast Asia, and therefore the Phanomsurin ship is regarded as the earliest ship in Thailand, shedding light on the maritime trade network between countries along the Arabian Sea, the Indian Ocean and the China Sea, with Southeast Asia as a major link (Preechapechacupt 2014).

Ancient Gold Ornaments: The National Properties from Khao Chaison District, Phatthalung Province

In the middle of 2014, the Fine Arts Department received a number of archaeological objects and artistic objects made of gold, which were found in an agricultural zone in the Khao Chaison District of Phatthalung Province, from nine local people. There were 25 items, including 14 gold plates engraved with Chinese characters, five gold pieces of jewellery and five gold cubes (Sukpramoon 2015).

Inscription on Gold Plate Regarding Jin Ye Chue, Bai Nan Song Gold:

1. Name

During the Southern Song Dynasty, there was a usage of gold exchange currency called “Jinyezhi” or Southern Song Gold Leaf. It is described as thin rectangular overlapped gold sheets that were used among the Chinese noblemen.

2. Characteristics

There are two major features of Jinyezhi

2.1 The form of the Jinyezhi is similar to a folded and pleated pamphlet, or in other words, leaflets of gold sheets overlapping one another.

2.2 There are three noticeable markings imprinted on the surface of the Jinyezhi.

1. Location of Production: The imprinted character located on all four corners of the Jinyezhi indicates that the location was possibly a gold shop, a house or a royal official residence.

2. Name Identification: The imprinted character located at the very centre of the Jinyezhi indicates the name, possibly the shopkeeper, owner or the goldsmith.

3. Value Indication: The imprinted character located right below the name identification character indicates the weight and purity of the gold leaf.
3. The Application of Jinyezhi as a Monetary Exchanging Medium during the Southern Song Dynasty

Due to the shortage of gold during the period of the Southern Song Dynasty, the royal court had to take over gold trading. All the gold had to be guaranteed by the royal court. Every aspect such as the name of the gold shop, the shopkeeper or owner, the goldsmith, the weight and purity of the gold, as well as the origin of the gold had to be approved by the royal court.

At that time, the gold leaf currency held a very valuable high exchange rate. The thin gold leaflets were convenient to carry around and could be easily divided into small pieces when making purchases or trade.

Jinyezhi was not only a domestic currency but also foreign. Evidence of foreign trading using the Jinyezhi can be found from China to southern Siam. In the book entitled Zhu Fangshi by Zha Rushi, the author mentions that when sailing to Tampornling and Langkasuga, the use of gold currency was highly important for trade.

After the Southern Song Dynasty, further evidence of the use of Jinyezhi as a monetary exchange medium could no longer be found (Jantasaro 2015).

Four Gold Miniature Sivalingas Found at Pli Muang Cave of Sichon District of Nakhon Si Thammarat Province

After the discovery of four miniature gold Sivalingas in the cave of the Pli Muang Mount of Sichon District, Nakhon Si Thammarat Province, southern Thailand, two of these were given to the National Museum of Nakhon Si Thammarat by Mr Seksan Nakklat, who was one of the finders. This was an important event for the Fine Arts Department in 2014.

According to Mr Nakklat, four caskets, each enclosed by a set of bricks, were found interred in the same line but at three different levels of depth. The first casket was interred at a fairly deep level. It was stored in a square brick (15.5 × 15.5 cm and 15.5 cm in height) container which held inside a round silver covered box (diameter = 6.6 cm and weight = 19.53 gm) in which a gold linga (2 cm in height and 12.7 gm in weight) was placed horizontally. It also contained a small amount of tiny bone fragments and grains of sandy soil. The second casket was buried at a depth greater than the first, under a thick layer of ash. This round limestone casket (diameter = 22 cm) contained a round silver covered box (diameter = 3.2 cm and weight = 8.4 gm) in which a gold linga (2 cm in height and 15 gm in weight) was placed vertically on a square sheet (0.7 × 0.7 cm) inside the hole of a square silver pedestal (2.3 × 2.3 cm in width and 1.1 cm in height), flanked by semi-circular and triangular sheets. There was a small amount of tiny fragments of bone and grains of sandy soil present as well. The third and fourth caskets interred side by side were deposited at the deepest level. Each was made of limestone, was round (diameter = 23.5 cm and 25.5 cm, respectively) and contained a round silver covered box with handles in which a gold linga was kept.

The following findings were obtained as a result of the study: At some point between the 6th to 7th century CE, a group of Pasupata Brahmins came to the Pli Muang limestone mount. Situated on the bank of the Tha Wang Phai canal, the mount was regarded a representation of Mount Kailasa, the abode of Lord Siva, and the Tha Wang Phai canal represented the heavenly river, the Ganges. The sacredness of the site begins with the mount close to the holy river, the Tirtha. In this case, it was specially marked because the site was located in a cave. The cave of the mount was supposed to be the shrine devoted to the Lord. The underground cave was likely the main garbha griha (the womb) of the Hindu temple. The four miniature gold lingas, each of which was held in a silver covered box, were likely carried by the Pasupata yogis to
form a sacred deposit interred in the cave. Four caskets for four gold lingas were systematically placed on the ground of the cave and were enclosed by a set of bricks and likely a diagram of vastupurusamandala, which were used as the foundation of a Hindu temple according to the Hindu treatises, the Vastusatra and the Jyotisatra. That is to say, the first casket was likely the head of the vastupurusa (the manifestation of god on earth), the second one his body (representing the womb) and the third and the fourth placed side by side, representing his feet.

The Brahmins performed the sacred ritual of these gold lingas in the cave to send the souls of dead yogis who were probably the owners of the gold lingas. The ritual was performed so that they could attain the highest state of emancipation and could merge into the Supreme Soul (Brahman, in this case, Siva). On the other hand, the lingas were tools of concentration of the mind during meditation. It is believed that yogis were transformed into lingas by the power of their austerities. Finally, they likely had a solemn wish to promote the site as a Hindu Tirtha, literally “sacred spot for Hindu pilgrimage” during their own time and in the future as well (Srisuchat 2015).

A Group of Archaeological Objects with Inscriptions Found at the Archaeological Site of Khao Nui Cave in Trang Province

Clay votive tablets of small Buddhist icons that were made in accordance with Mahayana Buddhism from the Srivijaya period (8th-13th century CE) were found. Most of them were discovered in limestone caves (or partially found in stupas) in southern Thailand throughout the Malay Peninsula. The discovery of clay votive tables was more prevalent around 100 years ago. Significant sites such as Wat Kiriviharn and Wat Phu Khao Sai are located on both sides of the Trang River in Huai Yot District, Trang Province. These are not exhibited at the Bangkok National Museum as most belong to private collections; no artefacts or evidence remains on the site.

Recently, more sites have been found containing votive tablets storage at Khao Nui, Khao Kob Sub-District, Huai Yot District, Trang Province. Although the site was looted and destroyed, fortunately some parts were left undisturbed. Therefore, the 15th Regional Office of Fine Arts, Phuket, urgently conducted an excavation to preserve artefacts and archaeological evidence. We found that these votive tablets had been positioned in an orderly manner with multi-layer. It is very important because it is in pristine condition (in situ), which is useful for further study and analysis (Ueasaman 2015). A number of inscribed clay votive tablets with the least damage have been recently selected for deciphering by epigraphers at the Division of Characters and Inscription, Office of the National Library. All votive tablets are in rectangular shape with bas-relief figures and were made out of the same mould. They could be divided into the three following groups:

1. Clay votive tablets depicting an image of the Lord Buddha sitting in meditation posture and Bodhisattvas

There are six votive tablets with a line of inscription carved in the low border area. The inscribed part is damaged and the characters are unclear and illegible. However, it is assumed that they were inscribed with the same text, as there is the same Thai character “ม” (Moh Mar) in Pallava style at the Lord Buddha’s ankle on each votive tablet.

2. Votive tablets depicting an image of the Lord Buddha sitting with hanging legs and Bodhisattvas: There are two sub-types of this group as follows:

2.1 Votive tablets with an image of Lord Buddha sitting with hanging legs and Bodhisattvas:

There are three votive tablets (registration numbers TN.1/1 TN.1/2 and TN.1/3) in this
sub-group depicting on the upper line a figure of the Wheel of the Law, a flying man and an image of the meditating Buddha. On the back side of the tablets, there are four inscribed lines written in post-Pallava scripts in Sanskrit language representing the Buddhist Four Noble Truths.

2.2 Votive tablets with an image of the Lord Buddha sitting with hanging legs and Bodhisattvas:

There are eight votive tablets in this sub-group, depicting a row of three images of the Buddha in the top line, and there is a line of inscribed text in the lower part. Among these eight votive tablets, three tablets (registration numbers B32, B228, and B275 respectively) show the least damage and reveal three characters located in the middle of the tablets close to the left foot of the Lord Buddha that are visible but illegible.

3. Votive tablets depicting a stupa:

There are three pieces of this sub-group, made in rectangular shape with a figure of a stupa in the middle and an inscription on each side of the tablets and below the stupa. Though the inscribed characters are waned, they are decipherable. The inscribed text represents the Buddhist prayer “Ye Dhamma” in Pallava and Pali scripts. This inscription has been registered as Khao Nui Clay Votive Tablet with Stupa TN.1.4 (Chindarak 2015).

Archaeometallurgy Information Implying a Relationship between Ancient Cultures in Mainland Southeast Asia

Archaeometallurgical studies conducted in Thailand over the past few decades up to the present were conducted within the framework of various research projects, four of which are recently operated projects supported by the Thailand Research Fund (TRF). These are the “Living Angkor Road Project”, “Research Project for Developing Database on the Past to Present Cultures and Civilizations in the Greater Mekong Sub-region and Malay Peninsula”, “Cultural Relationship in Mainland Southeast Asia Project”, and “Research Project on the Distribution of Prehistoric Communities in the Pasak River Valley of the Lower Central Thailand”. They have added much information and knowledge about ancient metal production and use in Thailand. Moreover, based on the information derived from comparing the characteristics of special metal artefacts and from analyses of some archaeological findings related to archaeometallurgy obtained through the researches mentioned earlier, the cultural relationship between ancient communities in mainland Southeast Asia can be more substantially delineated (Natapintu 2014).

Non Nong Hor: the Production Site of Bronze Drum in Thailand

At least 35 bronze drums were found and distributed to all regions in Thailand, but evidence of production processes have never been found. In the past decades, most Thai archaeologists believed in the concept that all bronze drums in Thailand had been made in and imported from southern China and northern Vietnam only. Until 2008-2009, an archaeological survey and excavation at Non Nong Hor site in Na-Udom Village, Nikhom Kham Soi District, Mukdahan Province, Northeast of Thailand, revealed many importance evidences about bronze drums. Some clay figures were found from Non Nong Hor, which can be compared with the bronze drum at Khamcha-i District, Thailand. The stripe design is similar but different in size. Moreover, the copper cube is similar to that of the Sepon mine in Lao PDR. Therefore, we believe that the raw materials from Non Nong Hor had possibly been imported from Lao. This implies inter-relations between the peoples of the Mekong River basin. With the assistance from Associate Professor Surapol Natapintu, Silpakorn University, Thailand, a sample was submitted to the laboratory of the University of Waikato, New Zealand. The Accelerator Mass Spectrometry dates the sample back to 2105 ± 25 BP.
Non Nong Hor is an archaeological site from the late prehistoric period of Thailand. The site holds an important implication for ancient metallurgy technology including the casting of bronze drums and other bronze ornaments. Some bronze drums that have been discovered in Thailand were produced from the Non Nong Hor site. Therefore, there were bronze drum production sites other than those found in southern China and northern Vietnam, and the drums were widely distributed in Southeast Asia around 2,000-2,500 years ago (Baonoed 2015).

**Cultural Route: Phimai and Associated Religious Monuments, Phanom Rung and Muang Tham Sanctuaries**

The joint project between the Chulachomklao Royal Military Academy, the Fine Arts Department and the APSARA Authority funded by the Thailand Research Fund (TRF) was established to present the detailed importance of this historical road, monuments and functions of this route, in accordance with the identification of the exact location of this route and the communities that existed along the route in previous times. The cultural route of Prasat Phimai and associated religious sites of Phanom Rung and Muang Tham Sanctuaries have been tentatively registered on the list of UNESCO’s World Heritage sites since 2004 because this route represents an outstanding universal value, showing the exchange of architectural knowledge, metallurgical technology, divine system of governance and unique creation of art and architecture during the 11th-12th CE, as well as the relationship between the inscriptive evidence and current regional traditions and beliefs (Sampaongern 2015).

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Fine Arts Department (2014) *Nhung Roi Sam Pi Haeng Kan Sathapana Krom Silpakorn [103 Years of the Fine Arts Department]*. Bangkok: Fine Arts Department, Thailand.
Abstract

The growing up in strength of various archaeological institutions in Vietnam contributes greatly in researches and protection of archaeological heritages of the country in recent years. Institute of Archaeology of VASS is the major unit which responds to several important projects. This paper refers to some major projects during 2013-2016, including the discovery of early Palaeolithic sites in An Khe (Gia Lai province); projects conducted for re-evaluation of the archaeological sites of Metal Age in the northern provinces and the Dong Nai province of Vietnam; Archaeological researches at the World Heritage sites in Vietnam; and the effort of IA in collaboration with international institutions and researchers for the development of Underwater Archaeology in Vietnam. Current challenges and perspectives in academic researches, management and protection of archaeological sites are also referred to.

Keywords: Vietnamese archaeology, An Khe Palaeolithic sites, Metal Age sites, World Heritage Sites, Underwater Archaeology

Introduction

After more than fifty years of development from a small archaeological team in the 1950s, there are now several institutions that take part in archaeological field works and research activities in Vietnam. Belonging to the Vietnamese Academy of Social Sciences, the Institute of Archaeology (IA) plays a leading role as a national research institute in the study of humankind from the earliest history (Palaeolithic Age) to the 19th century (Nguyen Dynasty). Having the largest number of archaeologists, including leading experts in various fields of archaeology, the IA has conducted major excavations and research programmes and cooperates with other institutions, provincial cultural agencies, and international institutions and researchers in many projects and activities. Since 2013, in addition to the major branches of archaeology (Prehistory, Historical Archaeology, Palaeo-anthropology and Environment), the Department of Underwater Archaeology was established to play a central role in the development of this new field in Vietnam. IA researchers play an essential role in the Department of Archaeology of the Institute of Social Sciences (under VASS), which provides postgraduate and higher education opportunities for the young researchers from IA and provincial museums.
The Centre for Archaeological Studies is another strong institution under the Southern Institute of Social Sciences which is based in Ho Chi Minh City. Its research activities are focused on sites in Southern Vietnam, and partly in the Central and Highland areas. This Centre’s great achievements include studies on Prehistoric sites in Southeastern Vietnam, including circular earthworks, the archaeology of Oc Eo culture in Southern Vietnam, and Champa culture in Central Vietnam.

Archaeologists in the Departments of History of the two major Universities of Social Sciences in Hanoi and Ho Chi Minh City contribute greatly to the education of young archaeologists. They also have conducted major research projects, mainly in Central and Southern Vietnam, during recent years. The Anthropology Museums of these universities are useful addresses for not only students in archaeology but also other fields.

The number and capacity of archaeologists at the Vietnam National Museum of History in Hanoi has increased in recent years. Their research projects aim to enlarge the scale, matter and style of the museum. The Museum developed several research programmes with provincial cultural agencies as well as international institutions, such as the excavation at Luy Lau ancient citadel, Bac Ninh Province (2013), in cooperation with the East Asian University of Japan, and the excavation of Bai Coi, Ha Tinh Province, in cooperation with Korean National University (2013-2015).

During the national conference “New Discoveries in Archaeology” held annually and organized by the IA, there are dozens of excavations, numerous surveys and discoveries being reported, which provides a very rich and colourful picture of Vietnamese archaeology. The following part will present an introduction to the main activities of the IA from 2013 to early 2016.

**Remarkable Excavations and Research Programmes of the Institute of Archaeology**

There are many archaeological surveys and excavations conducted every year by the IA for various purposes: answering the major questions of Vietnamese history, developing the management plan and promotion of cultural heritage, and clearing land for economic and social development. These result in many important discoveries and provide a bulk of data for Vietnamese and regional archaeology.

**Early Palaeolithic sites discovered from An Khe (Gia Lai Province)**

In 2014, within the framework of a project to study the Palaeolithic period in Gia Lai Province, IA conducted a survey along the Ba river (in An Khe, Dak Po and Krong Cho districts of Gia Lai Province), which resulted in the discoveries of several Palaeolithic sites in the Pleistocene stratigraphy. This is the first discovery of this kind found in the Highland region of Vietnam, which makes it an important finding. An international research programme (2015-2019) has been set up by IA (Vietnam Academy of Social Sciences) and the Institute of Archaeology and Ethnography (Russian Academy of Sciences, Novosibirsk Branch) for the next step of this project.

Following the excavation in 2014, another excavation was conducted in early 2016, for which several excavated trenches were opened in Go Da and Roc Tung sites. At the Go Da site, 58 stone artefacts and 21 tektite fragments were unearthed. The artefacts were found from the cultural layer of 10-25 cm in thickness, which is a type of granite aluvi. In some areas, the deluvi phenomenon has also been observed. Typologically, stone tools include points, choppers, scrapers, hammer percussion, flake tools, core tools, flakes and cores. Whitish quartz is the main material. The choppers made from large-sized pebbles, big points made of quartz and scrapers made from the flakes are the typical stone tools of this site. They are somewhat monotonous in comparison with other sites in An Khe.
Roc Tung is another area that is 7-8 km from Go Da site and about 1 km from the Ba River. Fourteen archaeological sites have been found in this area, among which Roc Tung No.1 and Roc Tung No.4 have been excavated. In the 48 m² of Roc Tung No.1, 46 stone artefacts and 102 fragments of tektites have been unearthed from the excavated trench in the cultural layer at the depth of 0.8-1.1 m. The stone artefacts include 1 uniface, 7 points, 1 chopper, 17 pebbles with processing traces, 4 flakes and 13 cores. In the 20 m² of Roc Tung No.4, 77 stone tools were unearthed, including 1 point, 4 scrapers, 1 hammer-stone, 1 chopper, 14 cores, 23 flakes and 33 stone fragments with percussion traces. The stone material includes mainly quartz, denaturized quartzite and silica. Twenty-five tektite fragments were also found.

Although fauna and human remains have yet to be unearthed, An Khe has been considered a seasonal living area of the *Homo erectus* during the late Pleistocene period, based on the evidence of cultural stratigraphy, typology of stone tools and the presence of a large number of tektite fragments. The typology of stone tools from An Khe represents an earlier date as well as differences from those found at the Nui Do (Thanh Hoa) and Xuan Loc (Dong Nai River) sites. The technology of the stone tools also represents the mix of chopper – chopping tool with biface technique. From the evidence and distribution of the tektite fragments, a date of 770,000-800,000 year BP has been suggested by the excavators. More research works will be continued for a clearer conclusion on the exact time chronology of the An Khe Palaeolithic site (Nguyen Gia Doi 2016).

In addition to the mentioned sites, the research works conducted in the upper Ba River also resulted in the discovery of several sites which are datable to the early-middle Palaeolithic, late Palaeolithic and late Neolithic-early Metal Age periods. At least five settlement sites and six workshop sites for manufacturingopal axes have been discovered (Nguyen Khac Su et al. 2015: 25-27).

**Research and evaluation of the Archaeological sites of Metal Age in Dien Bien, Son La and Lai Chau provinces (Northern Vietnam)**

This is a major research programme of the IA aimed at the evaluation of the historical and cultural values of Metal Age sites in the Northern provinces of Vietnam. Eighty-seven sites and a large number of artefacts have been discovered and studied. It resulted in the awareness of the distribution of the settlement sites, both inside the caves and in the open area. However, there are very rare sites that have a thick cultural layer, which indicate that the people settled shortly in one area: in the caves (such as the Nam Kha rock shelter and Dan Lon cave) or on the terraces of the river bank (such as Doi Cao, Go Nang Ua, Sap Viet sites). Several stone workshops have been discovered. These include the Ban Mon site (Thuan Chau District, Son La Province), Thoc Kim site, Cha Dai (or Doi Mo) site, and Ta Vai I site (Than Uyen District, Lai Chau Province). Stone axes and bangles were the main products of these sites. Traces of the graves have been unearthed in several sites. Bronze artefacts, including axes, vase, and *ko* are common grave goods found in the graves, together with potteries and stone beads. These graves are datable to Dong Son and late Dong Son periods, based on the characteristics of the grave goods.

The concentration of the sites along the Da River, in Tua Chua District (Dien Bien Province) and Sin Ho District (Lai Chau Province), and along its branches in Son La Province, indicates that the Da River played an important role during the late Neolithic-early Metal Age.

Pre-Dong Son and Dong Son bronze artefacts found from these provinces are noteworthy. Bronze axes and spears of Pre-Dong Son types still existed in the Dong Son period. Some stone bangles represent close relationships with the stone workshop in Hong Da (Phu Tho Province), which is datable to the Phung Nguyen period (2000-1500 BCE). Four bronze drums and other types of bronze artefacts, such as slanting axes, large size knives, spades and spears represent the typical Dong Son style.
The results of the research programme prove that from about 3300 years BP, the region of Dien Bien, Son La and Lai Chau provinces was a stronghold of people that might have belonged to the Tan Hung tribe of the Hung King. They were in close contact with other regions, including Phu Tho Province via the Da River and Southern China.

**Research and evaluation of the Archaeological sites of Metal Age in Dong Nai Province (Southern Vietnam)**

This is a two-year project (2014-2015) of the IA in the area that is located in between the Tay Nguyen Highland and the Mekong River Delta. Favourable natural conditions made this area convenient for the livelihoods of pre-historical communities.

Hundreds of sites datable to the Metal Age have been discovered since the 19th century in this area. Several sites have now disappeared due to several reasons, including the process of economic development. The research programme resulted in re-examining 39 sites that are datable to the transition period between the late Neolithic Age to the early Bronze Age, up to the appearance of iron tools. By studying the distribution of the sites in various types of topography, the characteristics of the stratigraphy and artefacts, and the chronological sequence of each site, it was realized that in the early period (4000-3000 BP), the local people were spreading out to occupy the whole mountainous area of the basalt reddish soils of the Dong Nai region. From 3000 years BP, they went further to occupy the swampy and salt-marsh areas of the river mouth and along the coast. Thus it created great chances for the local people to make contact and exchange with outsiders. This would have resulted in bringing about great changes to the local societies and economies, which led to the formation of the early state in the early first Millennium CE.

**Archaeological researches in World Cultural Heritage sites**

In recent years, the IA has been playing a major role in archaeological research programmes concerning World Cultural Heritage sites. Excavations and research activities have been conducted annually at the two World Heritage sites: the Central Sector of the Thang Long Imperial City in Hanoi and the Citadel of the Ho Dynasty in Thanh Hoa Province.

In the central axis of the Thang Long Imperial City, a part of which is between the Doan Mon Gate and Kinh Thien Palace, the excavated trenches have been opened systematically since 2011 for the study of the changes of the function of this area. It was realized that the architectural components of the Tran Dynasty (13th-14th centuries) were densely constructed before this area was rebuilt to serve its function under the Great Royal Court in the Le So period (15th century). A large-sized water inlet sluice built with bricks and wood stakes found in this area also indicates a nearby sizeable architectural complex of the Ly Dynasty (11th-12th centuries) (Nguyen Van Manh et al. 2013: 230-235).

Since 2012, the archaeology of the Citadel of the Ho Dynasty has been focused on understanding the structure and building techniques of the royal road running from the South Gate to the Dun secret mountain in the south and the outer moat of the citadel. The excavations trenches opened in front of the Southern Gate also unearthed remains of a defensive structure, which prove that after the fall of the Ho Dynasty, the Ho citadel was still used for defensive purposes for several periods (Do Quang Trong et al. 2014: 266-267).

The most remarkable contribution of Vietnamese and international archaeologists has been the discovery of more than 30 prehistoric sites in the Trang An limestone massif, which covers an area of 6,712 ha in Ninh Binh Province. Fourteen cave sites have been excavated and exposed evidence of human occupation from about 30000 years BP to recently. It is most essential that these sites existed in various
circumstances of environmental changes, marine transgression and fluctuation, and contain well preserved evidence of how people adapted to changes in the environment and ecological system (Nguyen Khac Su and Nguyen Cao Tan 2014). This contributed remarkably to the OUV of the Trang An Landscape Complex (Dossier 2013) and made it possible to be recognized by UNESCO in 2014 as the first World Cultural and Natural Heritage of Vietnam.

**Underwater Archaeology**

In July 2013, the Department of Underwater Archaeology was formally established. This is the result of IA’s various cooperation agreements in research and training activities with international researchers from Australia, USA, Japan, and other countries since 2008. Since then, annual activities have been set up for both research projects and capacity building programmes. In 2014, the first international conference on “Underwater Archaeology in Vietnam and Southeast Asia: Cooperation for Development” was held in Quang Ngai, a coastal province in Central Vietnam. Several major findings in this field were presented at the conference (Staniforth and Le Thi Lien 2014). This was an opportunity for Vietnamese as well as international researchers to raise awareness on the value of underwater cultural heritage and to discuss how to overcome challenges in various aspects of this field. Following several training courses applying the NAS programme conducted in Hanoi, Vinh and Hoi An since 2012, the first international field school on “Vietnam Underwater Archaeology Training” was organized in 2015 by IA and ICOMOS-ICUCH experts in Hoi An City, which was supported by SEAMEO SPAFA, UNESCO, RCE and CEEVN (Staniforth et al. 2016). This created a good opportunity for young researchers to acquire further experience, and to work together and identify their research interests. In early 2016, members of the Vietnamese Maritime Archaeology Programme (VMAP), which developed from the earlier Bach Dang-Van Don International Research Team, conducted a survey in Son Hao, an old village in the Van Don ancient port and Dam Lai site, which is on the upper section of the Bach Dang River site. Wood remains of the Tang shipwreck in Lam Du Xenh’s collection (Quang Ngai Province) are also being documented, applying the 3D model method with a view to rescue the remains that are at risk of quick deterioration. To apply this method and the metal detecting method, young archaeologists of IA were provided with training during this fieldwork season, with a metal detector donated to IA by Minelab.

**Challenges and Perspectives**

Nowadays, archaeology in Vietnam is facing various challenges. Increasing social and economic development is creating high pressure in terms of land clearance. On the one hand, several archaeological sites have been discovered in areas assigned for the development of highways or hydroelectric dams in the mountainous areas, along the coast and underwater. On the other hand, the lack of human resources, new technology and equipment makes the state of Vietnam’s archaeology several years behind in comparison with other countries in the region. The lack of experience in the methodology of conservation and protection, financial constraints and the lack of comprehensive measures among institutions and individuals create many difficulties in the protection, management and promotion of the archaeological sites and artefacts.

Experiences from recent cooperation activities indicate that it is possible to develop a multi-directional strategy for the building of human resources in both archaeological methods and conservation sciences. Sharing experiences, learning from and teaching each other, working in a team and involving others in the IA’s academic network are among the lessons learned from these archaeological activities and projects.
In the next two years (2017-2018), several projects at different levels will be conducted by the IA. Updated information, experiences and lessons from the 2nd SEAMEO SPAFA International Conference in Archaeology will be very useful for the participating Vietnamese archaeologists.

References


Abstract
The waterways of the Western Archipelago of Indonesia were of high importance for early intra-Asian sea trade. Maritime crossroads in Sumatran waters, particularly the Straits of Bangka, Gaspar and Karimata formed the most frequented sea lanes. Trading ships coming from the Straits of Melaka, the Gulf of Siam and the South China Sea entered the Java Sea through these water passages. By presenting unpublished survey reports on shipwreck sites conducted in this area, I wish to investigate the connective function of these maritime passages in the history of commerce and communication. The archaeological finds portray the various functions of these major sea straits in Asia. Discovered from 2007 to 2010, the wreck sites from the 10th to the 19th century were found partly furnished with large cargos, but most of them had already been disturbed or looted. This large number of archaeological discoveries highlights the fact that the official count of shipwrecks is far too small. There is an urgent need for establishing a find distribution map for historic wreck sites in order to protect these sites.

Keywords: maritime cultural heritage, Sumatra, sea routes, shipwrecks, Indonesia

The Importance of Asia’s Sea Straits
Since the “Mediterranean Model” of Fernand Braudel (e.g. 2002), who tried to classify the longue durée phenomenon in maritime regions, others have also linked maritime entities as zones of exchange which are characterized by a certain homogeneity and framed by long-lasting features such as the geographical setting, seafaring routes and trading pattern (Laffan 2005; Ptak and Kauz 2013). Following this perspective, maritime segments – straits, passages or channels (selat in Bahasa Indonesia and Malaysia) – are identified as key elements for the understanding of continuities and transformation. The historian Roderich Ptak (2013: 23) has developed a “selat-oriented concept” in which these knots or narrow links are associated with a connective function, e.g. to the adjacent lands or other maritime spheres, and are therefore particularly meaningful in the history of communication, commerce and shipping. Metaphorically well described as bottlenecks, they served different functions such as transitional zones, borders, gates or “mini fringes” (Ptak 2013: 9).
Historians have investigated Sumatra’s sea straits by looking at the harbours, their networks and dependencies, at the commodity flows along the East-West traffic or at itinerant merchants, pilgrims and other socio-cultural links within the Asian seas (e.g. Heng 2009; Manguin et al. 2011; Miksic 2013; Miksic and Goh 2013). The discussion of the function of early international ports and coastal networks fuelled theories about the rise and fall of emporium or urbanization processes such as the Malayu-Srivijaya trading empire of the 7th to the 14th century in Southeast Sumatra (Fig. 12.1). Lately the ocean-centred focus also revealed vibrant maritime connections of inland sites far away from the sea (Tjoa-Bonatz forthcoming). This view changed the understanding of Sumatra’s geography in the way that the crossing of the land mass allowed connecting two major maritime zones in the East and the West.

Apart from the importance of the Straits of Melaka as the oldest and major seafaring route, scholars have different opinions on other sea passages in Sumatran waters. Following GR Tibbetts (1971: 495), Anthony Reid (1993: Map 4) favours the waterways on the west coast of Sumatra and the Strait of Bangka as important routes between 1450-1680, whereas John Miksic (2013: Fig. 1.03) included the Strait of Gaspar among the main sailing routes along the silk road of the sea between 1300 and 1800. In early modern times between 1750 and 1860, Robert J Antony (2013: Fig. 1) considers the Straits of Gaspar and Karimata as major interim zones. The Dutch map of 1893 gives more details on the routes branching from Batavia and passing Sumatra’s waters during the late colonial times. International steamship traffic went to Europe via the Sunda Strait and Padang, passing Sumatra’s west coast. The Strait of Bangka is served by regional traffic to the Sumatran west coast. The Strait of Gaspar is the most frequented way to Singapore from where the major international routes lead to Europe and China. From Singapore, ships entered the Java Sea via the Strait of Karimata heading to Surabaya in East Java (Wittkamp 1893).

The surveys presented in the following on historic wrecks in the Straits of Bangka, Gaspar and Karimata are therefore crucial to investigating local changes or continuities. These new archaeological finds in Sumatra’s waterways allow a new look at commercial shipping in interim zones of the Southeast Asian seas.

Shipwreck Documentation

Indonesia is characterized by both a large number of shipwreck sites and a rich diversity of different types of wrecks. The official count made by six different governmental bodies and surveys conducted by commercial companies identifies only 463 shipwrecks of different origins and dates in the Indonesian sea: 89 sites off Sumatra, 231 sites off Java, 11 sites off Sulawesi, 101 sites around the Sunda Islands and 31 sites off Papua (Marbun 2011: Table 1; Tjoa-Bonatz 2016: 92). There is a clear concentration along the ancient maritime routes in the western part of the archipelago. In total, 245 sunken ships are mentioned in Dutch colonial records according to the Indonesian National Archive; what still has to be added are the numbers of shipwrecks found in records of other foreign countries (PANNAS BMKT 2010). Therefore, the estimation of up to 1,234 sunken ships, as suggested by Judi Wahjudin (2011) is more likely but still far too small. According to the official count given in Johannes Marbun (2011: Table 1), 24 historic wrecks are

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2 I am most indebted to Graf Nikolaus von Sandizell, who has given access to the unpublished reports and the photo documentation. I am also grateful for inspiring discussion with Flecker who has read a first draft of this paper during my Visiting Fellowship at the Nalanda Srivijaya Center of ISEAS–Yusuf Ishak Institute in 2016. Special thanks go to Horst Liebner, who is always most helpful providing literature and recommendations.

3 The governmental institutions that have compiled these data are: the Directorate of Safeguarding Underwater Remains (Direktorat Perlindungan Peninggalan Bawah Air) under the Ministry of Culture and Tourism, the Agency for Marine and Fisheries Research under the Ministry of Marine Affairs and Fisheries, Research and Technology on Oceanography (Litbang Oceanologi) under the Indonesian Institute of Sciences (LIPI) of the Ministry of Research and Technology and the Hydro-Oceanographic Office of the Indonesian navy (Dishidros TNI AL).
located around the islands of Belitung (9) and Bangka (7), the Strait of Gaspar and South Sumatra (5) and the Karimata Strait (3). Horst Liebner (2005) suggested 4,000 wrecks in Indonesian waters if assumed that at least two ships foundered per year during the last 2,000 years. This estimate is based on the correlation of 600 lost ships during the 200 years of the Dutch colonial rule until the first two decades of the 19th century. After that, a much larger number of ships is attested what is not representative for earlier times.

Two factors explain why Indonesia’s submerged cultural material is far more extensive than the official numbers indicate. First, considering that territorial seas make up some 62 percent of Indonesia’s sovereign boundaries, the official number put forward by the government is too conservative. Counting the length of the coastlines of its 17,508 islands gives an impressive figure of around 81,000 km². The largest part of its territorial seas covers an ocean area of 3.1 million km², followed by the archipelagic area of 2.8 million km² and the internal waters of 0.3 million km² (Wahjudin 2011).

Second, in maritime history, Indonesia has always played an important and strategic role in the international seafaring economy of Asia. Maritime mobility has been attested since Palaeolithic times at least 40,000 years ago. Various theories about migration waves and the developments of boat constructions were proposed (see references in Mahdi 2016; Miksic and Goh 2017: 85). The oldest archaeological find of a shipwreck encountered so far, which is connected to the Indo-Pacific route, is from Sri Lanka dated to the first century BCE and the first century CE (Carlson et al. 2015). Of similar time is an image of a ship depicted on a sherd from Tissamaharama on Sri Lanka dating to the first century BCE (Fig. 12.2). The side view of the ship is rather schematic so that it is difficult to decide if it represents a small ship or a larger vessel serving on the inner-Asian routes. It has a single sail, neither rudder nor outrigger. Direct trading contacts between Indonesia and India or West Asia are documented by archaeometric and stylistic analyses of gold artefacts excavated at Sembiran and Pacung on Bali dating to the first century BCE (Calo et al. 2014). Finds of Indo-Roman rouletted ceramics originated from the Ganges River in North India are also attested in Bali, North and Southeast Sumatra and Java (Schenk 2006).

The earliest remains of boats found in Indonesian waters are reported from the 5th to 7th century horizons at a number of sites in Palembang, the location of the major Srivijaya harbour: at Kolam Pinisi dated to 434-631 CE, and some 10 km further at Sambirejo from the 7th or 8th century (Manguin 1996: 185; 2009: 7; Liebner 2014: 355). Their lash-lugged and stitched-plank constructions point to Southeast Asian boat-building techniques. The same tradition is also observed at the earliest presently known wreck at Pontian in Malaysia which yielded a 14C-date of 293±60 CE, followed by the Nanhan/ Cirebon wreck of the 9th century and the vessel at Punjulharjo near Rembang in Central Java, dated to 1290±40 BP by 14C-measurements (Manguin 2009; Liebner 2014: 354, 356-359, 422-423). Local and foreign vessels used Indonesian waterways on their sailing routes between China, India, Africa and West Asia. Ships carried gold, spices and forest products from Southeast Asia in one direction, for which manufactured goods such as ceramics, glasswares, silk and other commodities were exchanged and shipped in the other direction. Among the early European visitors to Southeast Asia, the Venetian traveller Marco Polo stopped at the Northern Sumatran coast at the end of the 13th century and passed Sumatran waters by the Straits of Melaka. In the early 16th century the Europeans entered the Asian sea trade.

**Legendary Tales of Sunken Treasures**

Legendary tales of treasures found in Indonesian waters have a long continuity in the region. In particular, gold treasure is connected with an image of prosperity rendering the imagination and curiosity of submerged treasure. A legend is told by the Arab writer, Ibn Khurdâdhbih, in the second half of the 9th century about a Malay or Sumatran king who daily threw golden ingots in the form of bricks into a pool
of water as a ceremonial deposit or a way of saving valuables. The gold was covered by the water but “at ebb-tide when the sea withdrew the ingots reappeared shining in the sun” (Reid 1995: 3; Laffan 2005: 28). After he passed away, the ingots were recovered, counted, melted down and redistributed. To ensure that he and his noble reign would be forever remembered, the king’s treasure was given to his family, his courtiers and his loyal subjects, rich or poor. In this tale, the recovery of sunken treasure is associated with the archetypes of wealth, hoarding and valuable possession that is lost, found and finally shared. Similarly, the ship metaphor fully laden with rich cargo appears in myths of origin of many coastal and even highland societies of Island Southeast Asia, joining with local tales of treasure-bearing seafarers (Manguin 1991: 42-47).

In more recent times some wrecks in Sumatran waters have attained much publicity. There are many speculations about the location and property claims of the Flor de la Mar, which sank off the Aceh coast in 1511 (Nayati 1995: 6-7). It was captained by Alfonso de Albuquerque, who returned from his conquest of Melaka and carried a large treasure for the Portuguese king. This ship has not yet been found but it is said that it sank in the shallows of the Tamiang River estuary at the east coast of North Sumatra in the Aceh Province and was thereafter extensively looted by the local ruler.

Another ship called Fame has also not yet been located. In 1824, the ship caught fire and sank off Bengkulu on the west coast of Sumatra with the whole property of Thomas Stamford Raffles, the governor of Bengkulu and founder of Singapore, including his valuable collections of natural history and Malay manuscripts. Numerous wrecks are said to be found at the mouth of the Pase River, south of Lhokseumawe in Aceh. Others are located in East Sumatra, south of Medan, e.g. a small boat (sampan sudur itik) in the Padang River; Tebing Tinggi, supposed to date to the 15th or 16th century; the hull of a ship of the 19th century in the village Bogak, the regency of Batubara; or another one in Terjun in Medan Marelan, dated to the 13th or 14th centuries (Media Indonesia 2008; Koestoro 2014: 160, 163, 172-173). Archaeological remains are also to be found in lakes and rivers, but so far Sumatra’s rivers have not been surveyed systematically. The rivers of the Musi and Batang Hari in Southeast Sumatra bear rich finds from the Srivijaya period of the 7th to 14th centuries. A hoard find of golden Buddha statuettes discovered near the Musi River was sold to antiquity dealers in the 1980s (Kompas 2009, 2011; Miksic 2011).

### Sumatra’s Waters Connect the South China Sea and the Indian Ocean

On their way between the South China Sea and the Indian Oceans, ships entered the archipelago into Sumatra’s waters. Here, they halted and awaited the change of the monsoon winds. Excavations at early ports such as at Karangagung in Southeast Sumatra, for the early Srivijaya period between 1 BCE and 500 CE, or at Barus, famous for its camphor trade, at the northwest coast of Sumatra brought more light on the international exchange from the 10th through 14th centuries.

Most seafarers took the Straits of Melaka, which offered the most trading possibilities along its way, and not the alternative route along the west coast of Sumatra. On this island beside in the southeast other polities and cities in the northern and northwestern coast of Sumatra gained international importance: Kota Cina south of Medan during the 10th and 15th centuries, the polity of Aru in the 16th century in northeast of Sumatra and Aceh in North Sumatra by the 17th century (McKinnon et al. 2012; Damanik and McKinnon 2012; Miksic 2013: 121-128).

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4 Pires (1944: 145-146); I am indebted to Ed Edwards McKinnon and Horst Liebner (pers. comm. 10 November 2016 and 9 March 2017) for this information.

Strong currents, hidden rocks and dangerous reefs demanded advanced navigational skills in the Straits of Melaka. This as well as sea nomads often engaged in sea raiding and slaving, particularly in the Riau archipelago, were reasons to avoid the Straits of Melaka. Sources from the first millennium onwards reported that merchant vessels were threatened by sea-robbery (e.g. Laffan 2005: 27, 83; 37; Anthony 2013: 35-36; Liebner 2014: 14). By contrast, the navigation along the west coast of Sumatra is less difficult. The sea is not discoloured by rivers and reefs are visible, but the passing took more time. Long-established contacts were maintained to the west coast by South-Indian, Persian and Arab seafarers and also later by the Portuguese attested in written records of the early 16th century (e.g. Pires 1944: 45). An inscription of the last Hindu-Buddhist king Adityawarman in the highlands of West Sumatra, the Minangkabau area, refers to the importance of the harbour of Pariaman probably due to the gold trade during his reign from ca. 1347-1375 (Tjoa-Bonatz forthcoming). In a Chinese map of 1405-1433, published in an encyclopaedia in the 17th century, various islands and a few ports at the west coast were included, which highlights that the Chinese were well aware of the geography of the west sea route passing Barus, Pariaman and the Sunda Strait to Java (cf. Wade 2005: Fig. 1).

However, the western route was less favoured. Only since the 17th century did this sea passage gain more importance when the pepper trade attracted the colonial powers. When India was by-passed, the sailing ships of the East India Company (VOC) from Sweden or England took the west winds, which are prevailing in the Southern Indic Ocean, and entered ‘East-India’ by the Sunda Strait. The few archaeological finds from shipwrecks are of later times. In 2012, a small amount of blue-and-white plates of European origin, probably of the 19th century, was reported at the coast of Mentawai Island.

Coming from the North, Northeast or West on their seafaring route to Indonesia, three passages lead into the Java Sea: first, the Strait of Bangka between Sumatra and the Bangka Island; second, the Strait of Gaspar (also referred to as Gelasa Strait) between the islands of Bangka and Belitung passing the smaller Liat Island; and third, the Strait of Karimata between Belitung and Kalimantan (Fig. 12.1). From there, these three straits were the shortest ways to the Indian Ocean through the Sunda Strait. The north-east monsoon from November to March allowed the sailing from the South China Sea into Indonesia’s waters whereas the south-west monsoon from November to March its return. The sailors in the Straits of Melaka and the Western part of the Java Sea used the south-east versus north-west winds for their journeys. The islands of Bangka and Belitung provided important resources such as metal and later pepper. In early times, iron from Belitung was worked on Bangka which supplied tin. On Bangka, French-Indonesian excavations yielded artefacts of the 5th to 7th centuries (Koestoro et al. 1998). By the end of the late 7th century Chinese Buddhist pilgrims voyaged to He-Ling on Java and either took the Bangka Strait from Malayu Jambi and Srivijaya/Palembang on Southeast Sumatra or the Gaspar Strait from Langkasuka/Yarang on the Thai Peninsula, whereas the Karimata Strait was taken to reach Banjarmasssin on Borneo island (Miksic 2013: Fig. 2.04). In the first quarter of the 15th century, Chinese and Arabian navigators recorded numerous harbours along the Strait of Bangka and various islands at the entrance into the Java Sea including Belitung Island Ma-li-tung shan (Tibbetts 1971: 495; Wade 2005: Fig. 1).

6 Horst Liebner (pers. comm. 9 March 2017).
7 The location of two wrecks, one of the Southern Sung Dynasty (1127-1279) and the other of the Qing Dynasty (1644-1912), about 30 sea miles off Padang is not confirmed (Baron Nicolai von Uexküll-Güldenband, pers. comm. 24 November 2016). Two wreck sites included in the official counting by the Indonesian government are also not confirmed. One could represent the Fame. In West Sumatra two World War II wrecks were surveyed by the Direktorat Pelestarian Cagar Budaya dan Permuseuman under the Education Ministry: one in 2007 at Pesisir Selatan at a depth of 22-28 m and the other at the seashore at Ampyang Perak (Teguh Hidayat 2012: 48-49).
8 Direktorat Pelestarian Cagar Budaya dan Museumuan (2013), but the find of three VOC wrecks of the 16th century is not confirmed (Malau 2011).
In the late 1990s, only two shipwreck sites were known around Belitung Island. In 1998, an Arab dhow called *Tang, Belitung* or *Batu Hitam* wreck was excavated with its large Chinese cargo of the 9th century north of this island (Krahl et al. 2011; Chong and Murphy 2017). It was either heading to Java or wrecked on its return voyage to West Asia through the Sunda Strait. If we follow the second interpretation raised by Michael Flecker (2001a: 353), this would suggest that the route along the west coast of Sumatra was taken by ships from the Western Indian Ocean, which undertook direct trade with China. At the Western Karimata Strait, the Chinese ship called *Bakau or Maranei* was wrecked with its predominant Southeast Asian cargo in 1420-1430, which was bound from southern China to Indonesia via a Thai entrépot (Flecker 2001b).

Two non-intrusive remote sensing and visual surveys commissioned by the Ministry of Culture and Tourism through its Department of Underwater Archaeology (BUDPAR) and LIPI were carried out in the waters of Bangka and Belitung (BABEL) in 2007 and from 2009 to 2010. These surveys were organized by Arqueonautas Worldwide SA as a non-commercial, fact-finding expedition in cooperation with the two ministries and two Indonesian companies, PT Bangun Bahari Nusantara and PT Maresearch Indonesia (Figs. 12.3-4). The purpose of the operation was to map shipwreck sites to establish a first risk assessment of underwater cultural heritage in the Straits of Bangka, Gaspar and Karimata. During this survey, Arqueonautas conducted a training programme for national maritime archaeologists appointed by BUDPAR in magnetometer survey, reconnaissance, site mapping and artefact documentation. Visual exploration, magnetometer and side scan surveys were pursued. Each shipwreck discovered was documented with a site-sketch, video and photos aiming to identify the age and country of origin of the ship and its cargo as well as the grade of disturbance of the wreck sites. At the end of the archaeological prospection, all samples of cultural material taken for documentation purposes were returned to their original place, carefully covered with sediment. In total, 19 new sites from the 10th to the 19th centuries were assessed, of which 11 were heavily disturbed, in addition to five modern wrecks and two reported but not inspected sites (Mirabal 2008a, 2008b, 2011).

**The Straits of Bangka and Gaspar**

In the Strait of Bangka, a late Ming Dynasty wreck of 1620-1650 was located at a depth of between 13-15 m on the seabed (Figs. 12.3-4: BST-001, Fig. 12.8). The large number of 128 survey samples of late blue-and-white Ming porcelain consists of big plates, bottles, dishes of various sizes and types with floral decorations. The figurative design of some of the bowls point to a Jingdezhen origin of around 1610 (Mirabal 2008a: 6). The diversity of the dishes, some of which were still stacked, and the depth of accumulated debris of up to 0.5 m under the surface, suggests a large ceramic cargo of trade ware. Seven copper trays, of which one is incised with a lotus and a swastika, were found in a stack where the density of porcelain finds was the highest. It has since been reported that all cultural material has been pillaged. The whole site had been looted and destroyed with very little cultural material left.

At the Strait of Gaspar, a total of 13 shipwrecks were assessed, including one from the Song period (960-1279, Fig. 12.3: GAS-008), two from the Yuan Dynasty (1271-1368) with scarce ceramic evidence (Fig. 12.3: GAS-001, Fig. 12.4: GAS-014), three of the second half of the 15th or early 16th centuries (Fig. 12.3: GAS-002, -003, -005) and seven of the 19th century (Fig. 12.3: GAS-004, -006, -007, -009, Fig. 12.4: GAS-012 and GAS-013 on Fig. 12.4 are situated in the Java Sea and are therefore not discussed here. The location GAS-013 is the *Java Sea* wreck of the 13th century, see Flecker (1997). Graf Nikolaus von Sandizell (pers. comm. 23 November 2016).
The strait is named after the Spanish captain who passed through it in 1702. The Liat Island separates this strait into two principal branches: that to the eastward is called Strait of Clemens, after a captain of this name who went through it in 1781, and that to the westward is called the Strait of Macclesfield, which is wider and was preferred by ships from China in the early season when north-west winds prevailed (Horsburgh 1852: 193). A ship of the 10th to early 11th century, probably originating from China, wrecked south of the island of Liat at a depth between 18-23 m (Fig. 12.3: GAS-008; Mirabal 2008b; Fig. 12.6). Although the site has been heavily disturbed by recent illegal salvages, cultural remains are still found within an area of 15 × 7 m, which might be 50 per cent of the original dimension of the ship. Apart from agglomerated metal like swords and knives, several neatly placed rows of copper coins of probably ten thousand pieces were found next to the wood of the decks or bulkheads, which suggests that the coins were kept in storage. Their date of minting falls within the period of “The Ten Kingdoms”, the second half of the 10th century. Ceramic material such as dark brown-glazed storage jars, one of which was decorated with stars and another one was found together with resin, as well as celadon vessels, some of which were still organized in stacks, indicates that the ship was loaded with a larger cargo.

Two shipwrecks of the Yuan Dynasty lie in the vicinity of the Baginda reef12. The first, at a medium depth of 19 m, is located in a channel between two reefs (Fig. 12.3: GAS-001). The date of 1250-1350 has been proposed on the basis of a broken Chinese copper coin and a celadon dish from the Zhejiang Province with fluted cavetto and an incised lotus (Mirabal 2008a: 7-10). The second shipwreck found at a depth of 21 m was heavily disturbed and only few sherds of celadon ware and storage jars have been identified (Mirabal 2011: 11-13; Fig. 12.4: GAS-014).

An early 15th century wreck lies in a tide channel between two reefs and the coast at a depth of about 23 m at Tanjung Labu (Fig. 12.3: GAS-002). Apart from ivory tusks, a bronze gong and a fragment of a smoking pipe with a dragon, the ceramic cargo includes three different types of spouted vessels of brown coarse ware (of possible Thai origin): white, green and blue-and-white ware. Due to a fragment of a white-glazed cover from the Dehua kilns, the dating of the ship could be advanced even to the 14th century in my opinion. In total, medium sized stoneware storage jars lay almost completely exposed in a relatively small area of approximately 20 m². The concentration of the archaeological debris and the lack of a tumulus lead to the assumption that the ship was of smaller size and mainly trading in local and utilitarian items (Mirabal 2008a: 11-14). In the vicinity, only 100 m from the beach, another wreck site indicated by scattered wooden remains in an area of 15 m² is located at a depth of 10-11 m (Fig. 12.3: GAS-005). Although disturbed by unsuccessful looting attempts, it still offered in 2007 fully preserved items such as brown-glazed storage jars, a blue-and-white bowl and a Southeast Asian spouted vessel of dark colour suggesting a date of the second half of the 15th or the first half of the 16th century (Mirabal 2008a: 14). A rather large site of 30 m² with archaeological debris of probably the second half of the 16th century is located in the reefs of Belvedere, at a depth of up to 18 m (Fig. 12.3: GAS-003). Coarse ware jars, celadon and white wares, partly bevelled, originate from China (Fig. 12.7). The site is heavily disturbed due to natural or human destruction (Mirabal 2008a: 15-17).

Six ships of the 19th century attest that the Strait of Gaspar was continuously used by Chinese and European ships13. At the Belvedere reef, the Chinese ship called Teck Sing with a huge ceramic cargo and nearly 2,000 people on board sank in 1822. A careless salvage in 1999 left a field of devastation on the seabed. As a result, more than 350,000 sherds of the Qing Dynasty (1644-1912) porcelain are scattered on the seabed (Tjoa-Bonatz 2016: Figs. 4.1-4.2; Fig. 12.3: GAS-006). At the northern tip of Liat Island at a

12 The reef is also called “Sittart reef” or “Karang delapan” on the marine charts.
13 The steamship Andrew Jackson was lost on 4 December 1868 after going shore on a reef in the Gaspar Strait.
depth of 18 m, at least five different wrecks have been found but looted. Among them, a European ship is assumed to be the *Alceste*, which sank in 1817. This assumption is made on the basis of fragments of the wooden hull with copper sheeting, copper bolts and scattered blue-and-white sherds (Mirabal 2008b: 27-28; Fig. 12.3: GAS-007). Around the Liat Island, three ships with steam engine were assessed, which had all been heavily looted: the one at the northeast coast is at a depth of 23 m and the two others at the northwest coast are each at a depth of 18 m (Mirabal 2011: 13-15; Fig. 12.4: GAS-015, -016, -017). South of Gaspar Island, a ship called the “bottle wreck” among divers, had been found at a depth of 28–30 m. It offers a good insight into the material culture on board of a ship of English origin of the late 19th century (Mirabal 2008b: 18-20; Fig. 12.3: GAS-004). The survey material includes numerous remains of the ship equipment and its construction like ballast stones, copper sheeted wooden structures, brass bolts, anchors, chains as well as artefacts including five types of bottles, stoneware bottles, polychrome and blue-and-white British stoneware (Mirabal 2008b: 18-20; Sofian 2013). Animal bones were detected. The sheeted, copper-fastened hull, the use of industrial made copper and zinc bolts, which were introduced into Britain’s ship building technology in the late 18th century, gives the *terminus post quem*. Some of the retrieved items are marked, such as a dark green glass bottle stamped with “Woolfall Manchester Percival”, a stoneware jar stamped with “Davenport” and some pottery sherds showing the inscriptions “Muleteers”, “Ruins” or “Genova”. At the Warren Hastings reef the site (GAS-009) is assumed to be the American ship Fingal which sank in 1816 with a Chinese porcelain cargo (Mirabal 2009).

The documented finds in the Strait of Gaspar reveal that this water channel was continuously used for intra-Asian shipping from the 7th to the 19th century. The fact that only one wreck was discovered in the Strait of Bangka compared to 13 in the Strait of Gaspar should not be taken as proof for the more frequent use of the latter during all times. Navigators preferred the channel of Gaspar to that of Bangka, “particularly when returning to China late in the season as the route by them is shorter and the water much deeper [...], with generally more wind” (Horsburgh 1852: 180). Although the Strait of Gaspar is the shortest passage from the North into the Java Sea, it is dangerous due to the presence of numerous reefs, which resulted in the sinking of many ships. By contrast, the Strait of Bangka is a narrow waterway with shoal mud banks in its southern part, where ships grounded and ran a high risk of encountering pirates (Horsburgh 1852: 165, 180). The passage took longer but allowed trade with the important entrepôt Palembang.

**The Strait of Karimata**

The Karimata Strait connects Kalimantan to the Java Sea and also represents an important eastwards bound maritime passage. Here in total, six wrecks were identified: one of pre-17th century and the others of the 19th century (Fig. 12.3: BEL-002, -003, Fig. 12.4: BEL-004, -005, -006, GAS-018). Two ships on their way into the Karimata Strait wrecked north of Belitung: one was at a depth of 45 m pre-dating the 17th century, and the other was a clipper of the 19th century (Mirabal 2008a: 29-32). Sparse finds of the first wreck such as storage jars and coarse ceramics, a mortar and soft-edged squared ballast stones of 0.25 × 0.45 m in diameter only allows the rough dating of the wreck to the pre-17th century (Fig. 12.3: BEL-002). Due to the distribution of the stones, the ship might have reached the dimensions of 15 × 8 m in width. The wooden remains of the second wreck, a clipper of the 19th century, extend to 45 m in length and 14 m in width, and were found at a depth of 38 m at Buding (Fig. 12.3: BEL-003). An iron cannon (2.2 × 0.45 m) was discovered at the western side of a steel framed wooden structure in addition to finds of cooper nails, bolts and pins. Other artefacts include a storage jar, bottles of stoneware and glass of European origin. Due to traces of charring on the wooden planks, it is speculated that a fire broke out on board of the ship and caused its wreckage (Mirabal 2008b: 32). East of Belitung, a ship of the early 19th century was recorded at a depth of 26-33 m (Mirabal 2011: 16-19; Fig. 12.4 and 12.9: BEL-004). Three silver coins with Arabic
characters of which one bears the date 1800, and a small Spanish coin of 22 reales that was minted in Seville, helped to date the site more precisely. The debris points to trade goods from West Asian, European and Chinese origins such as coarse ceramics in addition to Chinese whiteware and blue-and-white sherds of dishes and a cover from the Qing Dynasty, a hexagonal-shaped covered box of copper alloy and two bottles from Europe of which one is squarish and made from stoneware and the other made from glass. The weapons found include two small iron cannons, three muskets and a pistol. Wooden remains, iron nails and a relatively small iron rudder gudgeon suggest a local ship of relatively small size.

Three ships of the 19th century were identified further southeast along this sea passage. Among them, two were found in the southeast of Belitung at the reef of Mampango (Mirabal 2011: 28-31). The first ship at a depth of only 6 m is dated to the late 19th century, of which a big part of the wooden structure and an anchor of 3.7 m length, are well preserved (Fig. 12.4: BEL-005). The second ship found at a depth of up to 27 m is from the early 19th century (Fig. 12.4: BEL-006). It has been fully exploited by an unknown salvage company. However, piled ballast stones were left in its central part. One of the two silver coins found was minted in Mexico and denoting the value of eight reales and bears the date 1799. The location of the ship and these sparse remains corroborate with the record of the British-owned ship Forbes, which sank on 11 September 1806 on its way to Calcutta. It carried silver coins which they had owned from selling opium and merchandise in the East (Liebner and van Dyke 2016). Due to the relative depth of the wreck at 52-56 m, the third ship was still untouched (Mirabal 2011: 32-39; Fig. 12.4: GAS-018). The concentration of archaeological finds within an area of only 15 × 12 m points to a relatively small ship. Various types of dark green and translucent glass vessels originate from Europe as indicated by their marks: “London”, “Worcestershire sauce” of the Lea & Perrins brand or “Powel Bristol, Regº Margh, 1849”. Both ceramics and the artefact group of blown and pressed glass add to the cargo and utilitarian wares from Europe and China. A stoneware plate is marked “Ironstone, Shanghai” on its base. A bronze swivel gun Lantaka measuring 1.48 m in length was probably made in Southeast Asia, judging from the cylindrical cascabel and the octagonal section of the breech. It could have been used as a weapon, represent personal property or a trading good due to its refined workmanship.

**Conclusion**

The Straits of Melaka served as a major waterway and connected Sumatra’s north and east coasts to the Indo-Pacific maritime trade, whereas the western route which entered the Java Sea through the Sunda Strait was known by seafarers in the late first Millennium but was less frequented. The extent and diversity of the 20 documented historic wrecks in the presented survey areas of the Straits of Gaspar, Bangka and Karimata suggest that all three water passages were highly used for local and long-distance shipping. These sea channels connected the Java Sea to the Straits of Melaka, the Gulf of Siam and the South China Sea routes, which were major routes in the Asian-Pacific trade. Some of the sunken ships participated in the Chinese commodity trade and were loaded with large cargo. The highest amount of wreckage in the Strait of Gaspar attests to continuous international seafaring from the 10th until the 19th centuries. One wreck of the late Ming Dynasty was located in the Strait of Bangka and others at the eastbound water passage of the Strait of Karimata from the 15th to the 19th centuries.

The surveys also attest to extensive looting and pillage. Eleven sites mentioned in the reports were already disturbed by the time the surveys were conducted in 2007 and 2010. Others have been looted thereafter for monetary profit by fishermen and divers often in direct cooperation with an established network of illegal treasure hunters. At numerous sites, the absence of complete porcelain dishes contrasts with the huge amount of larger intact coarse ware of storage jars, which clearly indicates a selective salvage. Intact porcelain fetches much higher prices at the antique market than coarse wares even when they are larger.
in size. In addition, the latter are difficult to lift and to conceal during transportation. The destruction of archaeological sites by the trawling of fishing nets has not been observed during the surveys; otherwise, the artefacts would be scattered over a larger area. At one site (Fig. 12.3: GAS-001), the loose sediment, a small number of intact artefacts and remains of diving equipment indicate large scale looting interventions and the use of dynamite (Mirabal 2008a: 10). Most looters dive with poor, even dangerous equipment: without an air compressed tank, often without a regulator or diving suit (Fig. 12.5). They are only connected by a simple hose bent around their waist in which air, polluted by oil, is pumped by a compressor. Fatal injuries happen, especially working on deeper sites.

The site recording of artefacts and hull remains during archaeological surveys is most important to evaluate the cultural and archaeological potential of wreck sites as a basis to take decisions on how to best safeguard the maritime heritage of Indonesia. There is an urgent requirement to proactively act to locate, survey and record shipwrecks and submerged areas with cultural material in Indonesian waters. Only an official heritage listing would provide official recognition of such locations as maritime cultural heritage sites and would allow the government to take adequate measures to slow down the on-going plundering of underwater cultural heritage in Indonesia.

References


Abstract

The archaeological site of Doi Pha Kan, located near the famous rock art painting site of Phratu Pha (district of Ban Dong, Mae Mo, Province of Lampang in the North of Thailand), is a rock-shelter set at the eastern wall of the Doi Pha Kan mountain. Several red-ochre painted figures of hands, zoomorphic associated to anthropomorphic forms, as well as geometrics are present. The excavation was undertaken in collaboration with the Department of Archaeology of Silpakorn University of Bangkok and the 8th office of Fine Arts Department of Nan. The deposits of Doi Pha Kan, made of dusty eolian sediments, preserve a rich archaeological field data, that was excavated by a trench system with a thickness of less than 90 cm. At the top of stratigraphic sequence, some burials have been dug on the site. A total of 2,113 lithic artefacts and more than 31,000 faunal remains were collected in the archaeological layer older than the burials. This paper focuses on the lithic artefacts uncovered during the first stage of our excavation but present a regional interest for the definition of Hoabinhian. The lithic assemblage shows that most of these objects were knapped by using blocks of flint or of chert of local origin, collected in the environments close to the site, and some sandstone with fine grains, exploited essentially in the form of pebble. Other raw materials as the limestone, the silicified limestone and more rarely, the quartz were also used. Several chaînes opératoires, bound essentially to the shaping and to the débitage are dependent on types of morphologies and on the quality of the raw material. An important production of flakes obtained by direct percussion is the dominant chaîne opératoire in this assemblage. The shaping, quasi-exclusively on cobble, is represented in lesser proportion than in the Hoabinhian assemblages more commonly present in South-east Asia. All the elements of the lithic production of débitage are present: the flakes, the chunks, the nucleus as well as the appreciable amount of manuports and tested cobbles. The methods of knapping are rather “opportunist” on a technological point of view, with in particular, an alternated exploitation of the surfaces without predefined or standardized algorithms. Levallois or discoid chaîne opératoire are absent in
the site. If the lithic industry of the Doi Pha Kan can be likened to the Hoabinhian techno-complex, the lack of homogeneity of materials and supports, the poor number of typical tools (unifaces and tools on split of cobbles), as well as the presence of composite tools associated to asymmetric pieces or to limaces suggest a regional variant of Hoabinhian.

**Keywords:** Hoabinhian, Thailand, hunter-gatherer, lithic assemblage, typo-technological variability

### Introduction

Many prehistoric “cultures” have been defined in Southeast Asia (for example, the Anyathian, the Lannatian, the Nguomian, the Sonviian), but most of these “cultures” were poorly characterized and lacked sound typo-technological definitions so they finally fell into oblivion (Zeitoun et al. 2008). Only the Hoabinhian, which encompasses several tens of thousands of years (30000 to 3000 years BP), is still considered today as it has been recognized at a number of well-known sites, including caves and open-air sites. The Hoabinhian has drawn the attention of researchers who have attempted to demonstrate the typological and geographic consistency of this original form of lithic assemblages on cobbles. The term Hoabinhian appeared for the first time in the 1920s, following the work of Madeleine Colani in the caves of Northern Vietnam (Colani 1927, 1929, 1930, 1939). The Far-East congress of 1932 formally endorsed Hoabinhian in a first typological definition:

> instruments generally knapped with types quite varied and fashioned in a primitive way. They are characterised by tools which have often been knapped on one face, with strikers, pieces with large sub-triangular sections, discs, short hatchets and amygdaloidal instruments with a more or less large number of bone instruments (Collectif 1932: 11)

Since that time the Hoabinhian concept remains the most representative lithic technocomplex of Southeast Asian prehistory associated with modern human behaviour. Although Reynolds (1993) restricted the geographic extension of the Hoabinhian to the single region of continental Southeast Asia, the Hoabinhian is also known in West Indonesia (Forestier et al. 2005a), in North-eastern India (Mohanty et al. 1997; Sharma 2010), possibly in the Philippines (Moser 2001) and even – in many other forms – in Papua New Guinea (White and O’Connell 1982; Groube et al. 1986; Gorecki and Gillieson 1989; Pavlides and Gosden 1994; Swadling 1997) and probably in Australia (McCarthy 1941; Matthews 1966; Bowdler 1994).

Hoabinhian is also present in several sites of China in the Yangtze basin, dated between 40000 and 7000 years BCE; indeed “pebble cultures” such as that of the Boaizitou site or of the caves of Luoshayan and Huanyan include typically Hoabinhian lithic material (Zhang 1993; Moser 2001). Actually, the site of Xiaodong cave in Yunnan is the oldest Hoabinhian level dating around 41,500 years BCE (Ji et al. 2016) while the site of Huai Hin in Thailand, which is the youngest, dates around 1750 BCE (Forestier et al. 2013).

The dispersion area of the cobble-pebble assemblages we call “Hoabinhian” is actually very large in time and space and corresponds to a form of universal human making during modern human colonization in Asia-Pacific (Forestier 2003).

Several sites are known in Thailand belonging to this chronological range. In Northern Thailand, numerous Hoabinhian caves and rock-shelters were uncovered in the region of Mae Hong Son (Forestier et al. 2005b). Notably, the deposits of Ban Rai and Tham Lod were recently dated from around 7050 and 24000 years BCE, respectively (Shoocongdej 2006). Belonging to this chronological range several sites were uncovered: Obłuang (Santoni et al. 1990), Spirit Cave (Gorman 1972), Tham Pha Chan (Bronson and White 1992), Banyan Caves (Reynolds 1992), Ong Bah (Sørensen 1988), Khao Talu and Head Caves (Pookajorn 1984), Pak Om and Buang Baeb (Srisuchat 1987), and Tham Kao Khi (Reynolds 1989). In
Southern Thailand, the Lang Rongrien site presents an original assemblage of flakes and nuclei dated between 36000 and 25000 years BCE overlain by a “classical Hoabinhian” level with sumatraliths, and another level dated from around 4050 years BCE containing Neolithic pottery (Anderson 1987, 1990). The rock-shelter of Moh Khiew also revealed a level dating to 24,000 years BCE where flakes associated with polyhedral nuclei were found together with large Hoabinhian sumatraliths (Pookajorn 1992; Pookajorn et al. 1994). This is of particular interest as it  

\[i\] raises the question of the variability of lithic technical systems within Hoabinhian lithic assemblages, and  

\[ii\] allows a reconstitution of the relation between débitage and shaping sequences (Auetrakulvit et al. 2012). The discovery of a new site at Doi Pha Kan in Northern Thailand provides us the opportunity to discuss the variability among Hoabinhian assemblages with a technical common base (classical pebble tool) and some amazing new type of tool hitherto unknown.

**The Doi Pha Kan site**

The archaeological site of Doi Pha Kan (N18° 26.95’ E 99° 46.62’; Fig. 13.1) is located 7 km south of the rock art painting site of Phratu Pha (district of Ban Dong, Mae Mo, province of Lampang) (Doy Asa et al. 2001, Sroongsiri and Sangchan 1997) and 3 km north of the Ban Tha Si archaeological site (Zeitoun et al. 2013). The site is a rock shelter with several red-ochre painted figures of hand, carnivores, proboscideans, bovids and a gallinacea associated to anthropomorphic forms, as well as geometric figures (Surinlert et al., this volume). Three exceptional burials were uncovered at the bottom of the painted wall similar to the neighbouring localities at Phratu Pha and Ban Tha Si but with different funereal practices. The burials of Doi Pha Kan were dug in deposits (Winyalai 1998; Kongsuwan 2001) bearing both stone artefacts and faunal remains (Imdirakphol et al. 2017), which are logically older than the tombs themselves. With 1,285 lithic artefacts and 31,716 faunal remains (Frère et al., this volume), the mean density of the material is high, at 3,109 archaeological objects per cubic metre.

Doi Pha Kan deposits are dusty, loamy sediments accumulated to a depth of at least two metres. The loose nature of the deposits prevent the undertaking of large excavations without disturbing sediments and the embedded archaeological remains, thus no distinctive layer can be identified during excavation. Due to the intrusive position of the burials and because of the refilling of the tomb, at this step of the fieldwork, it is not yet possible to provide significant dating of the lithic artefacts nor faunal remains. For this reason we focus our purpose to the technological analysis of the lithic assemblages.

**The Lithic Remains**

The material included 1,285 lithic pieces (Fig. 13.2). Most of these items were knapped using blocks of locally sourced flint or chert collected in the immediate environment of the site, and fine-grained sandstone worked mostly as pebble. Other raw materials such as limestone and silicified limestone were also used and, quite rarely, quartz.

The lithic assemblage of Doi Pha Kan demonstrates the use of several chaînes opératoires, primarily related to the shaping and knapping but obviously dependent on morphology and quality of the raw material. A major production of flakes obtained by direct percussion and hard hammer indicates that the activity of débitage is the dominant operating system in this assemblage. Shaping, almost exclusively on pebble, is obviously represented but in lesser proportion, which is unusual in a Hoabinhian industrial context in Northern Thailand. It is a feature of Doi Pha Kan lithic assemblage and originality of the Hoabinhian in Thailand.

All elements of the lithic knapping production are present in the assemblage of Doi Pha Kan: flakes (strongly represented), chunks, nuclei and a significant amount of manuports and tested pebble (Fig. 13.2).
The main knapping method diagnosed from cores and flakes does not have any Levallois characteristics and it is not discoid. The Doi Pha Kan débitage is both simple and opportunistic in a technological perspective because it relies on a type of “orthogonal” knapping (alternating operating surfaces, i.e. striking platform surface versus flaking surface) to frontal or semi turning character.

The peculiarity of this fairly basic method of production shows poor control of blank products, explaining the low morphometric standardization of all débitage products. This is explained by the absence of shaping the strict sense of the nucleus to which short knapping sequences are added, marked by scarce fracturing control and resulting in a heterogeneous morphology of cores and flakes from which frequent accidents are recorded (i.e. Siret, mesial and proximal fracture).

Lots of whole, fractured and tested pebbles are present. A total of 68 items, mostly sandstone and silicified sandstone and, to a lesser extent, limestone and flint, were used as manuports by Doi Pha Kan hunter-gatherers, which could correspond to a supply of raw material in the preferred context of a knapping site.

Fractured pebbles and pebble chunks (1/4, 1/3 or 1/2 pebble) counted in this typological class often have striking marks on their cortical surface (Fig. 13.3, no. 27). Their fracture is usually related to violent percussion without coordination in technical fettering, i.e. no “logic” apparent (and/or identifiable by us) which may sometimes suggest (re-)employment as a hammer shortly before discarding. Therefore, either these pebbles were split voluntarily or they were accidentally broken into several fragments during the knapping process.

Only three hammers in pebble (two of sandstone and the third in flint) are present in the sample, clearly bearing large residual areas with clear percussion marks on polar ends. And even on both plains for one of them. It is nevertheless a surprising find that in a lithic assemblage of the Hoabinhian, pebble tools are poorly represented, with only 10 objects in total. These pebble tools are for most massive tools which obviously would, in this sample, be complementary tools or associated with other smaller ones.

The Doi Pha Kan lithic sample shows very few macro-tools which makes it “atypical” in quantitative terms compared to the vast majority of sites classified as “Hoabinhian” in Southeast Asia, where generally over 60 percent of lithic tools in the assemblages are pebble tools (Forestier 2003; Forestier et al. 2015). In the Doi Pha Kan toolkit (Fig. 13.4), half of these are in fine-grained sandstone while the others are in flint and limestone. These tools are mainly primary choppers (single removal with limited and opportunistic sharp edge) and linear choppers without point (fitted with a larger series of removal) (Fig. 13.4, no. 2) but also convergent or “pointed chopper”, sometimes shaped by deep and invasive retouching (unifacial or bifacial). Chopping tools are rare.

A techno-morpho-functional study of these macro-pebble tools on cobble and sheet better highlights standardized functional behaviours and characterizes the relationships between angles and sharp cutting edges of the active edges of these tools as well as the sequence of hunter-gatherer gestures of Doi Pha Kan (Fig. 13.5). Thus, it appears that the cutting angles of active functional units vary between 60 and 90 degrees, although these angles are mostly around 70°. Such variety could indicate a fairly wide range of use and employment of these cutting tools on different materials with hardness and working time, but obviously with the current state of the study these early observations are waiting to be validated by the constitution of experimental referential and consequent experimental activities. Nevertheless, it seems to have a right alternation between edge grip and edge and used in a lot of portions where function appears to change the implementation of a new way of cutting or sharp reground. Therefore, these tools on solid blank, sometimes composites (Fig. 13.5), are on cobble, sheet or blocks of limestone and have several active units on their periphery reflecting an extended use. Moreover, for these fairly thick pieces, a natural edge is
often a prerequisite represented by a fracture or a cleft plan with a cutting angle close to 65° and therefore
suitable for subsequent modifications without the cutting edge process. This ability of predetermination in
the selection of the raw material in order to quickly obtain an active edge is a constant in Doi Pha Kan lithic
assemblage.

The cores are well represented in the site, but weakly present in the sample with only 9 items made
in limestone, and a smaller proportion in raw materials such as sandstone and flint. They are characterized by
a low degree of exploitation and a high frequency of cortical striking platforms. These nuclei are generally
polyhedral shape and were sometimes reworked in tool, modifying or retouching one or sometimes more
edges; this allows us to name them “core-tool”. These “core-tools” can be treated as objects of “horse hoof”
type, beneath Australian lithic terminology.

Flakes are strongly represented in the study sample with 941 items (or 73 per cent of the total
material) and are mainly raw size, that is to say that it has not been used as a tool holder and rarely
presenting irregular alterations of use (Fig. 13.2 and 13.3). Most of these flakes were produced from cores
in fine-grained sandstone and flint, and rarely siliceous limestone or sandstone. Many of them have the
débitage axis offset from the morphological axis (Fig. 13.3, no. 2, 4, 6, 10, 12 and 18) showing opportunism
in knapping in relation to other products. The vast majority of flake blanks do not exceed 50 mm long and
have an average dimension of 30 mm, a width of 25 mm and a thickness of 8 mm. Fully cortical or rare
previous removal flakes dominate with residual cortical area residue, while flakes of full débitage are less
common (Fig. 13.3).

For all the flakes, negative previous removal is usually unipolar longitudinal, rarely orthogonal,
transecting, unipolar transverse or longitudinal bipolar. Rare are the centripetal negative of previous
removals, which denote random and opportunistic knapping process. The association between their striking
platform, that is to say plain, cortical and subcortical (Fig. 13.3 and 6, no. 1, 2) with residual cortical areas
reflects a very “short” production (operating system) on raw material blocks of various dimensions.

The typological analysis of flake tools counted a total of 84 pieces in the lithic sample (9 per cent
of flakes total and 6.5 per cent of sample total), that is to say, the flakes where in which one or more edges
have been transformed, had been retouched to change the characters of the cutting edge (sharpening or
regularization) (Figs. 13.2-4). For flakes with fine use, retouch of use have not been recognized in the typology
group of Doi Pha Kan flakes tools. Indeed, the typological group assembled only the blanks retouched with
specific criteria: standardized morphology, nature, quality and position of retouch (intentional) as in the
case of the scrapers (single and double), denticulates, notches, multiple tools and rarely borers (Figs. 13.4
and 13.6, no. 3, 4).

The Doi Pha Kan toolkit comes to add two new types of special tools of a typological point of view
because they are not well-known in the context of Northern Thailand Hoabinhian:

The “limace” of large size (150 mm in length for the larger), which are however, sparsely present
(less than 1 per cent on all tools). These kinds of unifacial double scrapers that have the peculiarity of
being convergent at both ends and present a very high resharpening of edges, become abrupt, which has
sometimes even depleted the proximal and distal part of the item (Figs. 13.4, no. 6),

Forms of asymmetric multi-edged tools including geometry vaguely depicting a “star” (Fig. 13.7,
3 per cent of tool total and only 0.2 per cent of sample total). Unknown to date in the region or in other
contemporary sites, this “star” tool is a clean original lithic component to Doi Pha Kan lithic assemblage,
renewing the classic range of Hoabinhian pebble tools in Northern Thailand and Southeast Asia. The
peculiarity of these quadrangles unifacial lithic item, close trapezoids, is that they have 3-4 separate and
contiguous active parts on a single blank consecutively being a sharp edge, a convex or concave linear cutting as a side scraper type or denticulate (Fig. 13.7).

These lithic objects we were unknown to date and are heterogeneous tools with composite and complementary active areas that make us question the poly-functional nature of their use compared to other tools in the Hoabinhian toolkit.

Discussion and conclusion

The definition of the Hoabinhian is currently restricted to a typological definition of knapped cobbles (Matthews 1964, 1966; Gouedo 1987; Reynolds 1989; Moser 2001; Marwick 2007, 2008) and Pookajorn’s (1991, 1996) assessment of the Hoabinhian “techno-complex” was based on the artefacts of Moh Khiew, which are made from both cobbles and blocks, introducing some technical variabilities (Auetrakulvit et al. 2012). Recent works (Forestier et al. 2005b, 2013, 2015; Zeitoun et al. 2008) suggest that it is more appropriate to reconsider the Hoabinhian as a functional techno-complex and three different components are recognized to define assemblages as pertaining to the Hoabinhian:

- the classic unifacial shaping on long cobbles to produce Sumatraliths;
- the shaping of thick ovoid cobbles for the production of choppers or chopping-tools; and
- the débitage + shaping associated in a unique chaîne opératoire to produce half-cobbles that are then shaped into different tools (scraper, denticulated, notch).

The Doi Pha Kan site in Northern Thailand, like the Moh Khiew site in Southern Thailand (Auetrakulvit et al. 2012), where the collecting of raw materials are moving more towards the blocks and sheet rather than pebble, allow today to re-evaluate and rethink the Hoabinhian in its broadest sense: a greater variety of technical behaviour. That is to say not as a techno-complex focused on the exclusive process of pebble and as macro tools centralized around the uniface or “sumatralith” but as a larger technical system, more diverse, being therefore more evolutionary and, in a way, more complex than it seems.

In the case of Doi Pha Kan and also of Moh Khiew, variability is obviously to be found in the component of the débitage, associated with one or more chaînes opératoires strictly oriented on pebble and/or block and sheet. The diversity is reflected in the research of all kinds of tools and on all blanks, i.e. the general purpose of the raw material that is based on a maximum possible: block (choppers), sheet (asymmetric tools, Fig. 13.7), pebbles (uniface) or flakes from the knapping of cores (flake tools, limaces, etc.).

These “recent” Hoabinhian assemblages date to the final Upper Pleistocene-Early Holocene (like Doi Pha Kan dates to at least 11,000 BCE) and have an apparent greater diversity in support of tools that lithic assemblages corresponding to the initial-old stage of the Hoabinhian settlement known in Northern Thailand, such as in Tham Lod at least 24,000 BCE (Shoocongdej 2006) or in the Yunnan, region of supposed Homeland to 41,500 BCE (Ji et al. 2016).

The variability of the toolkit is demonstrated by the presence of débitage and also by the types of “peculiar” tools as atypical bifacial pieces that are neither true bifacial nor unifacial (cf. Moh Khiew; Auetrakulvit et al. 2012), the very thick and keeled limaces reaching over 100 mm in length, or with “star” asymmetric tools. Many questions remain due to scarce unifacial pebble in Doi Pha Kan and Moh Khiew, which could be explained by the presence of replacement tools: Were they easier to make from flakes as the limace? A techno-economic approach should be also considered in this regard.
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Doi Pha Kan (Thailand), Ban Tha Si (Thailand) and Laang Spean (Cambodia) Animal Bone Assemblages: A New Perception of Meat Supply Strategies for Early Holocene Mainland Southeast Asia?

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Abstract

Due to recent archaeozoological developments in mainland Southeast Asia, the meat diet of Late Palaeolithic populations is now better understood. Nevertheless, since the pioneering work that had been done between the 1930s and the 1970s, little work has been carried out on factors such as taphonomy, the importance of scavengers, the preservation of bones, or hunter-gatherer bone selection and transport. All of these can influence our perception of faunal assemblages, as different ways of archaeological bone quantification can lead to very different interpretations of the same samples. In this paper, two recent archaeozoological studies of two northern Thai sites, namely Ban Tha Si and Doi Pha Kan in Lampang province, and the Laang Spean cave in Battambang province, Cambodia, are used to illustrate such difficulties and to highlight particular food supply strategies for the Hoabinhian populations.

Keywords: archaeozoology, Thailand, Cambodia, methodology, Bone Weight quantification, meat diet, Hoabinhian

Introduction

Since Madeleine Colani’s first description of the Hoa Binh Palaeolithic settlement in north Vietnam in the 1920s (Colani 1927) and the works of Chester Gorman in northern Thailand in the 1970s (Gorman 1971), no more than 50 excavations on mainland Southeast Asia have documented meat supply strategies practised by the Late Pleistocene or Early Holocene hunter-foragers. Archaeological activities undertaken in the region have mostly been concerned with the Thai-Malaysian peninsula and non-peninsular Thailand.
Elsewhere in this large geographical zone, heavily influenced by the Hoabinhian culture and characterized by similar chronologies and lithic assemblages, faunal studies are less numerous.

During the past two decades, however, due to an increase of archaeozoological studies in the region, several authors (Auetrakulvit 2004a; Higham 2013; Piper and Rabett 2014; Conrad 2015; Conrad et al. 2016) have proposed a synthetic view of the meat-diet supply concerning Late Palaeolithic populations in mainland Southeast Asia. Unfortunately, as described in recent studies (Conrad 2015), archaeozoological methodological choices can fluctuate depending on the authors and the periods of activity – from the simple presence/absence of data, to descriptive texts or numeric quantification, which means that the interpretation of the dataset can vary dramatically.

Analysis of the first synthetic results, especially from northern Thailand and the Thai-Malaysian peninsula, both of which are located in high faunal biodiversity zones, a distinction between the abundance of large-sized prey (i.e. grazers) and small-sized prey (e.g. turtles/tortoises, molluscs, and crabs) is noticeable. Moreover, and possibly due to ecological habitat availability, a partition between a southern “wild boar zone” and a northern “deer zone” has also been suggested (Conrad 2015:17). However, the relative representation of these groups depends partly on the quantitative tools employed, the mesh size used to collect the bones and the bone preservation conditions. As such, interpreting fluctuations in counting varies from one archaeological site to another and depends on an understanding of the complex and various elements involved. In addition, as the dataset is so small it is difficult to distinguish local environmental influences from specific anthropogenic choices.

It is difficult to estimate how many bones the complete assemblage would have originally contained due to the taphonomic biases, including the numerous items – not necessarily human – that have accumulated there (e.g. left by porcupines). In addition, the type of screening mesh used to collect the bones is specific to each site and can potentially alter the original assemblage. Moreover, the specificities of the bones themselves (e.g. Do they break easily?) or the specific total number of bones for each species, make the results extremely difficult to interpret. For example, there are normally 281 wild boar bone elements to 215 for wild cattle among the skeletal elements usually preserved in archaeological layers (Barone 1986).

In this paper, we will focus on new archaeozoological data from three sites associated with Hoabinhian lithic assemblages which are still under investigation: two are located in northern Thailand (Ban Tha Si and Doi Pha Kan rock-shelters) and one in western Cambodia (Laang Spean cave) (Fig. 14.1). However, it is important to note that there are differences in their chronology and variations in their geography and ecology (e.g. topographical relief, vegetation and local fauna). Therefore, the availability of local resources probably partly influenced which prey was preferred. As these areas are still under investigation, our main purpose is to discuss the most appropriate method with which to quantify the bone remains and to evaluate the meat supply strategies at each site.

The sites of Ban Tha Si and Doi Pha Kan

The archaeological site of Ban Tha Si is located 10 km south of the rock-art painting site of Phratu Pha in Lampang province (N18° 26.55’ E 99° 45.98’), 418 m above sea level. It consists of a rock shelter covered in red ochre paintings (Surinlert et al. this volume) and was occupied sporadically between 5723 ± 25 and 9443 ± 35 BCE (Zeitoun et al. 2013). Unfortunately, due to erosion, there are few preserved archaeological deposits on the calcareous bedrock. The site has been carefully excavated with all artefacts of at least one side exceeding 1 cm long being localized in three dimensions; smaller objects were collected by sieving 5 cm thick sediment layers taken from 1 m² plots (sieving mesh 1 mm).
Animal bones are not numerous, with a faunal remains density of 233 parts/m\(^3\). Among the 259 Number of Recovered Specimens (NRSP) collected, the Number of Identified Specimens (NISP) is 78, assigned to 12 taxonomic ranks. The identification ratio (NISP/NRSP), which can be considered as an indicator of bone preservation quality, is 0.301 (Table 14.1). Rodent and/or carnivore gnawing marks were absent. As the current faunal remains dataset is limited, the NISP cannot be considered as an indubitable numeric parameter but only as a rough indicator of size for each taxon. In terms of NISP (Table 14.2), artiodactyls (i.e. bovids and cervids) and reptiles (i.e. turtle/tortoise, monitor lizards and snakes) predominate. But because of the limited number of bone samples, the Minimum Number of Individuals (MNI) does not appear to be an appropriate quantification method for this site (Poplin 1976a).

The Doi Pha Kan rock shelter is located 3 km south of the Ban Tha Si archaeological site (N18° 26.95’ E 99° 46.62’), at the bottom of a karst cliff similar to Ban Tha Si. The wall of the rock shelter is covered with red ochre hand paintings, as well as paintings of wild and domesticated animals associated with anthropomorphic forms and geometric figures (Surinlert et al. this volume). This site was also carefully excavated, with all artefacts of at least one side exceeding 1 cm long being localized in three dimensions: smaller objects were collected by sieving from 5 cm thick sediment layers taken from 1 m\(^2\) plots (sieving mesh 1 mm). Several burials dating from around 11000 BCE were discovered in archaeological layers bearing both stone artefacts (Celiberti et al. this volume) and faunal remains, which are older than the tombs themselves. With 31,699 faunal remains, the mean density of the material is high: 2910 part/m\(^3\) (Table 14.1). However, as the excavation is still in progress and the investigated volume is still limited, we are deliberately focusing on the faunal remains quantification in order to illustrate the best adapted possibilities to document food supply strategies. The average weight of NISP is only 2.2 g, and 0.8 g for unidentified bones. As most of the bones were highly fragmented, no cutting marks were observed. However, some phalanges (18% bovid and 15% cervid) were completely or partially burnt. These results suggest an anthropogenic origin for this bone accumulation. Moreover, there is limited evidence (0.12% of NISP) of a non-anthropogenic origin (i.e. gnawing marks of carnivores or large rodents, such as porcupines). Considering the degree of fragmentation of this assemblage (i.e. the prevalence of bone splinters and the low number of teeth), the taxonomical diagnosis rarely achieves identification of the species.

The Number of Identified Specimens (NISP) is only 4256 out of 31,699 of the total Number of Specimens (NRSP). These fragments were successfully attributed to 52 different taxonomical ranks (Table 14.3), which includes the gaur (Bos frontalis), the banteng (Bos javanicus), the sambar deer (Cervus unicolor), Eld’s deer (Cervus eldi) and the red muntjac (Muntiacus muntjak). To improve the identification rate and show the nature of the bone remains in the assemblages as precisely as possible, we created three additional groups: “Very small cervids” with a shoulder height lower than 45 cm, a category to which Tragulus and Moschidae belong; “Middle size cervids” with a shoulder height of between 45 and 100 cm, a category grouping big Moschidae and Axis porcinus; and “Large cervids” with a shoulder height of more than 100 cm, which includes Cervus eldi, Cervus scombrugki and Cervus unicolor. The presence of suids was rare in the Doi Pha Kan assemblage, though numerous carnivores were present, such as the hog badger (Arctonyx collaris); the leopard cat (Prionailurus bengalensis); the leopard (Panthera pardus); the sun bear (Helarctos malayanus); and two kinds of civets, one of which belongs to the genus Paradoxurus. A fragment from the tibial plate of a rhinoceros was also identified, though, with regards to specific anatomical criteria, it is not possible to specify whether this fragment belongs to Rhinoceros sondaicus or Dicerorhinus sumatrensis. Among primates, several langurs (Trachypithecus sp.) were identified, together with macaques (Macaca sp.), loris (Nycticebus sp.) and gibbons (Hylobates sp.). Among the small mammals, two rodents, namely porcupines (Hystrix sp.) and bamboo rats (Cannomys badius), were found, as was a red giant flying squirrel (Petaurista sp.) and a Burmese hare (Lepus puguensis). Herpetofauna includes
two types of varanidae (*Varanus bengalensis* and *Varanus salvator*), numerous tortoise parts (*Indotestudo* sp.) and various snakes such as the king cobra (*Ophiophagus hannah*), the reticulated python (*Python reticulatus*) and two different tree snakes (*Colubridae* family). Freshwater crabs, land snails (*Cyclophorus* and *Neoradina* sp.) and freshwater mussels (*Unionidae*) were gathered in large amounts at Doi Pha Kan. In terms of the NISP quantification (NISP=4256), large-sized prey constitutes slightly more than a quarter of the assemblage – bovids and cervids are prevalent, while wild boar and rhinoceros were rare. Turtles and/or tortoises represent 22% of NISP, freshwater crabs 19.9%, snails 12.9%, and reptiles 8%. Small-sized prey were also prevalent and can be considered as an “easy-to-hunt species” (i.e. monitor lizards, freshwater crabs and tortoises); though capturing turtles could also be defined as gathering. Because MNI results mainly depend on how the contributor decides to aggregate the stratigraphical units before proceeding to the actual calculation, MNI quantification will not be highly significant at this rock shelter until a precise stratigraphical chronology is established.

### The site of Laang Spean

Laang Spean cave is located on the top of a karst mountain in the province of Battambang, northwest Cambodia (E 102°55′ N 12°51′), 100 m above sea level. The excavation undertaken by a Franco-Cambodian prehistoric team has been ongoing since 2009, and archaeozoological data specifically concerning the Hoabinhian layers has already been collected. The Hoabinhian stratigraphical units containing faunal remains range from 3050 to 9050 BCE (Forestier et al. 2015; Sophady et al. 2016). As the cave roof offers excellent protection against vegetation development, vegetal cover and roots have not damaged the remaining bones. Moreover, a limestone water dissolution has created a thin mineral gangue on most of the bones which offers excellent protection against environmental disturbances, though sometimes it prevents clear taxa identification. Most of the accumulation is of an anthropogenic origin (17% of grazer bones were partly or totally burnt) and gnawing marks are not numerous. Porcupine and other rodent teeth marks concern less than 2% of NRSP. To date, 19,832 bone fragments have been discovered and 5,880 specimens have been identified (Table 14.4) from 42 species or taxonomic ranks, amounting to 735 part/m³ for the Hoabinhian layer (Table 14.1).

On the basis of NISP, four main taxonomic ranks (i.e. wild cattle, deer, tortoises/turtles and rodents) represent 88.3% of identified bones. Turtles and tortoises predominate, though tortoises were the most prevalent. Large-sized prey bones, especially from wild cattle and deer, were common. Rhinoceros bone remains (at least *Rhinoceros sondaicus*) were also observed. Rodents were also numerous but their spatial distribution is limited, and as they are exempt from cutting or burning marks, were probably not eaten by humans. Their origin could, however, be linked to the presence of birds of prey in the cave, but we were unable to distinguish any digestive marks. Other species such as primates, small and large carnivores, molluscs and squamates were uncommon or rare. They appear to have been only occasionally or rarely hunted and were obviously not subjected to a specific or specialized hunting activity. Some identifications demonstrate the presence of a species which are currently absent from this region, such as rhinoceros (*Rhinoceros sondaicus*) or tigers (*Panthera tigris*). Nevertheless, their presence here has been confirmed up until the middle of the 20th century. The identification of douc (*Pygathrix* sp.) from the Cercopithecidae family is very interesting as we have not found any evidence of this species outside of Laos or Vietnam. As in Doi Pha Kan, MNI quantification does not appear to be appropriate here because of the extended time span under study (6,000 years), among other arguments.
Comparison and discussion

Alterations

The three faunal assemblages include a large number of burnt bones, mainly resulting from anthropogenic activities. The average weight of the identified bone fragments from Laang Spean (9.3 g) is almost four times higher than at Doi Pha Kan (2.5 g). In contrast, the average weight of non-identified remains from Doi Pha Kan is four times higher than at Laang Spean (2.9 g vs 0.8 g). The limited dataset from Ban Tha Si falls into an intermediate category between the other two, suggesting that the bone preservation conditions were different across all three archaeological sites. The increase in the average weight of both bone categories indicates potential differences in supply, cutting strategies and consumption, and testifies to better preservation conditions. For example, some particularly fragile anatomical parts (Valensi 2000) such as costal cartilage, have only been preserved at Laang Spean (Forestier et al. 2015), whose cave context offers better protection against the sun and root development than the more exposed rock shelters. Moreover, the water flow into this karst mountain promotes the creation of a protective gangue. Taphonomic biases were recorded at all three sites. Some modifications in the original assemblage occurred during the biostratinomic, diagenetic and sullegic stages (O’Connor 2014), but they do not appear as major changes. Main indicators such as weathering, exposure or chemical dissolution traces, gnawing and digestion marks, spiral fractures, tooth separation from mandibles or maxillae, rare occurrences of shafts, or frequent occurrences of teeth are rare. In Doi Pha Kan, where the fragmentation level of bones is high, the initial assemblage does not appear to have been strongly modified.

Quantification choices

Taking these tendencies into account, recording strategies and quantification tools must be chosen carefully in order to minimize biases and enable specific research questions to be answered. Among replicable measures, employing NISP – a comparative tool often used by archaeozoologists in Southeast Asia (Conrad 2015) and indeed worldwide – to count fragments is essential. However, NISP can also generate important biases concerning specific identification. On small-sized fragments, the probability to observe diagnostic anatomical details is much higher for small- and medium-sized taxa than for large ones. Moreover, some small taxa, such as turtles and tortoises, which are easy to identify from very small splinters due to the peculiar structure of their shells, are readily overestimated. In contrast, it is almost impossible to identify large grazers with bones fragments of a similar size.

The resistance of bones to damage during the taphonomic process depends on the nature of the body parts and the taxa (Binford 1981): bivalve shells, the distal ends of crab claws, tortoises, turtles and snail shells can be considered as highly resistant and are probably overestimated in our accounts. Using a method to quantify the derived data could help to minimize this bias. However, as previously mentioned, MNI does not appear to be relevant for the analysis of these assemblages for three reasons: firstly, it requires complete skeletons, which we do not have, as bone fragments with a very low weight are not suitable for MNI estimations (Poplin 1976a); secondly, MNI favours taxa that occur in moderate abundance (Poplin 1976b) so MNI is not the best choice when rare or uncommon species are numerous and bone selection and fragmentation level is high, as in these three assemblages; and thirdly, MNI calculations fluctuate according to aggregation levels (i.e. stratigraphical units, phases or entire sites).

Therefore, in an attempt to minimize NISP biases and to document specific questions as to the meat diet of these three ancient populations, a Bone Weight (mass) quantification approach has been favoured, with results expressed in grams. Bone Weight quantification allows investigators to define the quantity of
meat from each species that was eaten. It is correlated with the fragment count (Lyman 2008) and can also be employed indirectly as an indicator of bone biomass. It appears as a more faithful indicator of meat diet than the abundance of each taxon, as shown with NISP. However, although this parameter is a replicable measure commonly employed in European archaeozoological studies to discuss population diets, such an approach has not frequently been used in Southeast Asian studies and the advantages and weaknesses of doing so (e.g. mineralizing level of bones) have been largely debated (Chaplin 1971; Casteel 1977). Other biomass methods, such as the Meat and Offal Weight method (MOW method; see Vigne 1992) are more precise than the Bone Weight approach. However, their calculations need to correlate each bone with its MNI and require an estimate of the age and sex of each individual. This calculation is not possible at any of the three Hoabinhian sites as the majority of bone fragments are too small.

**Meat diet procurement**

Bone identification indicates the presence of numerous species, even though each species delivered few bones. The majority of bones belong to a limited taxonomic list which can be aggregated into large-size prey (i.e. wild cattle and deer) and small-size prey (i.e. turtle/tortoises, crabs, monitor lizards, bivalves and gastropods). At each of the three sites, small-sized prey fragments were more abundant. This is similar to the most southern Thailand Hoabinhian sites (Auetrakulvit 2004a; Mudar and Anderson 2007; Higham 2013; Conrad 2015; Conrad et al. 2016), such as the contemporary rock shelter at Moh Khiew (Krabi province, southern Thailand), where the majority of faunal remains were from small-sized animals (e.g. turtles, monkeys and langurs, monitor lizards, squirrels, etc.) weighing up to 10 kg (Auetrakulvit 2004a, 2004b). These were interpreted, in line with other regional archaeozoological studies, as the results of a hunting strategy based on small-sized prey. This hypothesis was further strengthened with evidence from the ethnological observations of the last Southeast Asian “hunter-gatherer” populations (Auetrakulvit 2004a, 2004b, Hongo and Auetrakulvit 2011). At the three Hoabinhian sites studied, Bone Weight quantification appears to be the best indicator with which to estimate the quantity of consumed meat per species; the results and interpretations obtained using other quantitative choices are significantly different.

At Doi Pha Kan, more than two-thirds of the meat consumed came from bovids (45.5% of Bone Weight) and cervids (25.4% of Bone Weight). Tortoises and turtles also represent a substantial share of the meat diet (13.7% of Bone Weight), exceeding that of monitor lizards (3.4%) and suids (2.7%) (Fig. 14.2). Other taxa testify to varied hunting strategies, allowing for some diversification in the meat diet. Nevertheless, their relative contribution to the protein supply was low.

At Ban Tha Si (Fig. 14.2), despite the imprecise quantification due to the small size of the assemblage, the proportion of large-sized prey was quite similar; wild cattle and deer composed more than three-quarters of the meat, while turtle and tortoise comprised 5%.

At the Laang Spean cave, large grazers also predominated (Fig. 14.2). The proportion of deer was moderate (8.5% of Bone Weight) as was that of the rhino (6% of Bone Weight) – more often hunted in the Battambang region than in the north of the Thailand – but the rate of wild cattle was high (63.8% of Bone Weight). Combined, these large ruminants provided more than three-quarters of the meat. Turtles and tortoises (15.5% of Bone Weight) appeared to be the main additional resource. The combined impact of the other species was low (5.8% of Bone Weight). It is possible that the predominance of large ruminants could be overestimated due to the high rate of bone preservation. Conversely, and in accordance with skeletal elements distribution, it appears that only a few elements of their skeletons were brought back to the rock shelters or cave. The selection of bones among large grazers was high.
At Doi Pha Khan, feet, ankles/wrists and metapodial bones, specifically phalanges and sesamoids, predominated (60% of bovids NISP, N=395; and 63.2% of cervids NISP, N=536). Other body parts were deficient, particularly skulls, scapular belts, pelvic girdles, vertebrae and ribs. The iterative character of the anatomical distribution among *Cervus* and *Bos* suggests that butchering was consistently carried out away from the rock shelter, with only a few body parts being moved from the hunting scene to the habitat. Evidence of similar practices has been found at the Laang Spean cave in Cambodia (Forestier et al. 2015). As a large number of the phalanges were burnt, it suggests that fire was used to extract them from their surrounding ligaments in order to reach the bone and cook the marrow (Marean and Cleghorn 2003). A meat diet focusing on large grazers was primarily based on the consumption of muscle and offal; tongue was probably eaten as suggested by the presence of bovid hyoid bones. The phalanx accumulation and the long bone diaphysis high fragmentation level suggest bone marrow consumption. Moreover, ligaments, tendons, skin and bones can be used for many non-food applications. As tortoises are relatively easy to catch, some authors have suggested that ancient populations might have used them as a regular food supply. This would have limited the risk of malnutrition associated with the hunting of larger prey, which were part of a more random meat supply strategy. Such a choice could represent an early attempt at natural resource management (Piper and Rabett 2014).

**Conclusion**

Though the excavations and archaeozoological studies are still in progress at Doi Pha Kan and Laang Spean, the frequency fluctuation of rhino and deer, as well as the frequency modification of freshwater crab and monitor lizard, already appear as potential major research topics. What is left to define is whether frequency changes result from the availability of local resources, environmental or chronological fluctuations, or from an anthroponomic choice. It stands to reason that current biodiversity differs to that of the past, but a more detailed evaluation of the Hoabinhian biocultural environment is absolutely necessary to distinguish anthropogenic from non-anthropogenic influences. In accordance with current archaeology practices in Africa, archaeozoological studies concerning the local accumulations of burrowers (e.g. porcupines) could be employed to deliver a more precise representation of past biodiversity; porcupines bring defatted bones to gnaw back to their dens. Therefore, as their selection of species and anatomical parts is considered to be limited, so the taxonomic list issue from dens could reflect the local biodiversity of vertebrates. According to the initial archaeozoological results, the three Hoabinhian hunter-gatherer groups primarily hunted or trapped land species, sometimes tree-dwelling species, and very rarely birds. They also exploited rivers and river banks, caught turtles and (occasionally) fish, and collected freshwater mussels (Unionidae).

Were these populations just opportunists or did they act according to a defined procurement strategy? As shown in this paper, different quantification choices can lead to different interpretations concerning the regional procurement strategies of the Hoabinhian populations. In our opinion, NISP is essential to estimate the variety of species brought back to rock shelters or caves, however, it is not the best index with which to discuss meat diets. According to stratigraphical data, which are not adequate for MNI accounts or the specific conditions of bone preservation in these tropical environments, weight quantitative numeration appears to be a more appropriate choice to document predation. It is a parameter which is both easy to collect and replicable and should be better employed, when appropriate, during bone assemblage recording. According to Bone Weight, large-sized ruminants provided most of the meat. Their contribution fluctuated between two-thirds and three-quarters of the entire meat-diet. Among these large ruminants, wild cattle meat was the most common, and large cervid meat significantly more numerous than middle sized or very small. Aside from large ruminants, tortoises and turtles were the only animals from
the assemblages that delivered important masses of meat. Tortoises are an easy-to-catch species and were probably used as a regular food supply. Other species were numerous, but their participation in the protein intake was moderate. Considering the Bone Weight data, the meat supply seemed to be specialized and specifically based on large grazers. This procurement strategy is very different from current ethnological data and also from most of the Southeast Asia archaeozoological studies. Nevertheless, these differences do not highlight specific bone accumulations at the three new archaeological sites but are the result of specific methodological choices which suggest a new perception of meat supply strategies.

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Was the Gong Chime, Yun Luo, Played in the Court Music of Sukhothai in Thailand During the 13th or 14th Century?

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Abstract

Four puzzling gongs were excavated in Thailand in the area of the former capital of Sukhothai (established in 1238). All four round flat bowls with narrow retracted rims have nearly the same diameter of about 10 cm, but differ in thickness, weight and pitch. Each one shows four small loops in the cardinal directions. No references of this type of musical instruments have been found so far in any book on gongs from Southeast Asia. It is closest to the Han Chinese yun luo (yun = cloud; luo = generic term for gongs), a set of 3-10 small bronze gongs in a portable frame. Even though there is not much research on the Chinese yun luo, it is known from depictions since the 14th century and there is evidence that it was played in Buddhist, Taoist and Confucian rituals, as well as in court ceremonies. The excavated pieces will be compared to related instruments in Chinese court music with the question in mind as to whether the gong chime could have been played in Sukhothai court rituals, as they were found in the old capital.

Keywords: gong chimes, Sukhothai court music, Chinese court music, court rituals

Introduction

In 2011 a farmer in his rice field during the rainy season found four bronze plates. The field was situated in the area of the former Thai capital of the Sukhothai kingdom that was founded in 1238. The man was wondering what the bronze objects could have been used for. Puzzling were the four loops in the four cardinal directions on each of the plates, which suggested that they had been fixed to something. Then the farmer noticed that the four plates had different sounds and he started to consider whether he had found musical instruments as the four round plates resembled four gongs. Now they are kept in a private collection in Bangkok.

Description of the excavated instruments

Tuning, measurement and weight of the four gongs are as follows:

- Pitch f'', diameter 9.9 cm, weight 90 g (small fracture, about 12 mm long)
- Pitch g'', diameter 10.2 cm, 100 g (Fig. 15.1)
- Pitch d''', diameter 10.4 cm, 122 g
- No clear pitch, diameter 10.7 (some material deteriorated, oblong hole with a length of 3.8 cm on the outer rim of the upper surface)

All four gongs are close to 10 cm in diameter, but different in weight. So the difference in thickness of the bronze plates gives the difference in sound. As in tuning, thicker and heavier dimensions give higher pitches while thinner and lighter ones give lower tones.
Unfortunately, the weights of the four gongs cannot be used here for accurate calculations in acoustics as there is still some earth sticking to them, and one piece even has a hole. Furthermore the thickness of the patina would have to be considered.

The four loops in the four cardinal directions on each of the gongs have the form of circles. They are made of a round bronze thread, about 3 mm thick. The diameter of each circle is 9 mm, about one third of it is fixed to the small gong.

The first part of the rim that is bending with an angle of around 85 degrees measures 7 mm, and the second part that is bending again with an angle of about 95 degrees is about 4 mm long and running parallel to the part that is beaten.

Together with the four small gongs unfortunately no hammers or mallets have been found. So we only may wonder what they might have looked like. Possibly the chime was played with a small hammer with an ivory head, similar to the one described by Kaufmann (1976: 138), as the gongs may have belonged to a court ensemble, like we will see further on and so may have been struck with a precious hammer.

So far I could not find any related instrument in Thailand. The small gongs are not included in the detailed book on musical instruments by Dhanit Yupho (1971, first edition 1960 in Bangkok). David Morton (1976) does not mention it, nor does Terry Miller (1998) in any of his writings on Thai music. I also did not see it in any collections of musical instruments, and neither in those of any monasteries nor the musical instruments of the royal household. So far also no example has been discovered on any of the mural paintings.

Related instruments in neighbouring countries

**China**

Among the instruments in neighbouring countries, the gong chime from Sukhothai is closest to the Chinese *yun luo* (*yun* = cloud; *luo* = generic term for gongs), which is played by the Han people in China. This set of small bronze gongs, in which all gongs have the same diameter like in our example from Thailand, vary in thickness and follow the same acoustic rules in tuning (thicker dimensions give higher pitches, thinner dimensions lower ones).

Today in the Chinese *yun luo*, usually 10 gongs are fixed in a portable frame. They are arranged in three rows of three gongs each and one single gong at the top. Each gong is attached to an individual cubicle within the frame. Usually there are four cords (top, bottom, left, right). These pass through holes at its circular edge. There are also examples in which the gongs are only fixed with three threads (Reinhard 1956). The gongs look like plates with a small rim. They are basin-shaped and do not have central raised bosses. Their rim bends in an angle of 90 degrees and shows holes for the threads by help of which the gongs are fixed in the wooden structure. The gongs are tuned diatonically.

**Vietnam**

In Vietnam, we have the *tam am la* (*tam* = 3; *am* = sound; *la* = gong), a set of 3 small gongs fixed in a wooden frame; two in the lower and one in the upper row. The player holds the wooden frame in the left hand, while the right hand is beating the gongs with a slightly curved stick. It is used in the *dai nhac* and the *nha nhac*, the great and the elegant music of the *cai nhac*-court orchestra.

Although it also shows only a small number of gongs, it is more closely related to the Chinese instrument than to the old example from Thailand because the gongs do not have loops but the same plate shape like the Chinese gongs and holes in the rim to fix the plates in the wooden frame. Thus its function in court music relates to the Thai instrument.

**Korea**

In Korea, a similar instrument also with 10 gongs is called *ulla* (*ul* = cloud; *la* = gong), actually introduced from China. Their tuning is *gis ais c cis dis f g gis ais c’*.
History and function of the yun luo in China

There is not much detailed research on the yun luo yet. In Western literature, we read that in China it is first mentioned in the early 14th. During that time it also appears on the first paintings. Here we see it used in imperial processions and in religious functions. According to current research, it was played in Confucian services at least since the beginning of the Ming Dynasty (1368-1644). However, possibly it was played in earlier centuries, as this ceremonial music has been established at least since the 4th century BCE. But we do not know exactly when the gong chime was introduced in the service. However, we know that it was not played on one of the terraces in the temple but during the morning procession, to lead the emperor to the temple, after the large drum had been beaten and the large bell had been rung. Then after the sovereign had arrived in his sedan chair at the second gate of the temple compound, he would get down from his chair and walk to the temple, succeeding the procession with 14 musicians including two yün-lo. The musical instruments had the following order: two sheng (mouth organs), two di (transverse flutes), two xiao (endblown flutes), two yun-luo (gong chimes), two guan (oboes), two gu (drums) and two pai ban (pairs of wooden clappers). They were playing the tao-yin, the “Guiding March”, in a slow and dignified manner until the emperor had entered the temple. Outside the temple, the yun luo was played in processions and at joyful occasions.

During further research I recently found depictions of some yun luo that might date back to the T’ang Dynasty. This yun luo with only one gong can be found in the Kai Yuan temple in Quan Zhou, Fujian province. An original Buddha statue from the early T’ang period is surrounded by celestial musicians that carry different kinds of musical instruments, among these a yun luo with one gong played with a hammer that shows a cylindrical head, and one gong chime with three gongs. Here the head of the beater is nearly round. All the gongs are fixed in the frame on four sides. For the dating of the instruments, we have to consider that the woodcarvings have been restored several times, the last time in 1637. But it is not likely that they changed the musical instruments.

During the Yüan Dynasty (1268-1368), 13 gongs are arranged in rows with 4-5-4 pieces. In the Ming period (1368-1644), we have five tiny gongs for example on the Coromandel Screen in the Philadelphia University Museum.

On the fine carved wooden screen decorated with lacquer and colours, we recognize scenes of court life. Ladies of the palace are grouping around the empress doing all different kinds of work for her. Most interesting in our context are the 10 female musicians in the court music ensemble that accompanies female dancers. It includes a gong chime yun luo with five tiny gongs, clappers with four flat slabs paiban, a three stringed lute sanxian, a four stringed lute pipa, a transverse flute di, a vertical flute xiao, the half-tube plucked zither zheng (played by one lady, held by a second one), a mouth organ sheng, a tambourine in an octagonal frame ba fang gu.

During the Qing period (1644-1911), the yun luo mainly has 10 gongs (3-4-3 pieces). However, a chime with only four gongs has also been found, depicted on a pair of palace jars of the Kangxi period (1662-1722) in the Philadelphia University Museum. It is closest to our example from Thailand. On each of the two large jars delicately outlined are six lady musicians playing for a dancer, who is performing in front of the empress or some royal highness. The court ladies play one flute vertically and one horizontally, and there are two types of cymbals (the small, thick bell type and the large dinner plate like), one yun luo with four gongs, and a clapper with two slabs. The lady playing the yun luo is holding the instrument with her left hand. The handle supporting the instrument is rather short. We just see four circles floating in four squares and cannot recognize how they are fixed and whether the gongs have loops or just holes bored into the frame like in some of the big yun luos. The right arm of the lady and her hand that is supposed to play the gongs cannot be seen, as the musician is portrayed from the side. She is standing in between the player of the vertical flute to her left and the player of the clapper, of which we only can see two slabs, on her right side.
In both of the examples from the museum in Philadelphia, the *yun luo* is positioned close to the transverse flute and to the clappers. In both cases, the *yun luo* is ported on a stick in the left hand. The stick or most likely a hammer for striking the gongs is held in the right hand. The five gongs *yun luo* is beaten with a stick, whereas for the four gongs *yun luo*, it cannot be distinctly recognized as to how it was beaten and with what device.

In all examples, the gongs are carried on a supporting stick held in the left hand. The beater or most likely a hammer for striking the gongs is held in the right hand and the instrument is only played by elegant, well-dressed ladies.

With what kind of instruments is the gong chime combined? Telling from the material that is available so far, the four pieces gong chime is played together with instruments for chamber music and not music for processions.

By the end of the 18th and 19th centuries, it was quite commonly used in wedding and funeral processions in Beijing (Reinhard 1956: 153) and was often associated with Buddhist music (range: an octave and a third).

Nowadays, the lowest pitch in performance has the rhythmic effect of emphasizing melodic afterbeats, adding an essential element to the overall musical texture in ritual ensembles.

In the 1950s, the *yun luo* was redesigned for the new and growing concert repertoire. Small portable frames turned into huge stands. The number of gongs has increased to 13 or even 29. Two mallets are used for special orchestral effects.

**Conclusion**

The chime with the four gongs on the palace jar in the Philadelphia University Museum is closest to the chime found in Thailand. Played by an elegantly dressed lady in a court music ensemble, the question may be raised whether the four gongs found in Thailand were also played in court music as they were found in the area of the former royal town of Sukhothai.

Whether this musical instrument had crossed the Chinese border or was manufactured in Thailand, we cannot yet tell. Whether it was played by Thai or Chinese musicians, we also do not know. If it was brought to Thailand, who carried it: travelling merchants, diplomats or musicians? Was Chinese court music en vogue in the royal palace of Sukhothai? Were court musicians from China invited to perform at the court in Sukhothai or did Thai court musicians play in the Chinese style?

Was it only the musical instrument that migrated, or did the musicians travel, too? Did the playing patterns of the *yun luo* migrate, or did the entire style of Chinese chamber music migrate? How long was it in fashion? Was Chinese music influencing Thai court music, and did a kind of fusion style develop? An additional possibility is that the musical instrument was brought from China through Vietnam. Finally, why did the instrument not survive on a grand scale? Maybe it could still be found in some remote place. The description of these four tiny gongs raise many interesting questions for the future.

**References**


Abstract

Several villages in the Kabaw/Kale valley system, on Myanmar’s border with India, are surrounded by earth banks and deep ditches. These are the remains of stockades that were used in the 19th century in an attempt to keep out marauding Chin tribesmen. They stand as evidence of a local conflict that was only resolved after a major military effort by the British colonial authorities to pacify the Chin. The archaeological remnants of the stockades provide an opportunity to reflect on a period of Myanmar history when the lowland inhabitants tried to survive on a truly wild frontier.

Keywords: Myanmar; historical archaeology; Kabaw; Kale valley; stockades; Chin wars

Introduction

Historical archaeology is something of a new field in Myanmar. The discipline has been overshadowed by research programmes that are shared with the broader Southeast Asian region: the spread of modern Homo sapiens, the development of complex societies, the introduction of metals and the origins of urbanism. Architecture from ancient to colonial times has occupied historians, antiquarians, archaeologists and conservators within Myanmar, as has the country’s wealth of largely, though not exclusively, Buddhist art and artefacts.

Now some more recent historical eras are beginning to call for attention. What might be found at the early British colonial administrative centre at Fort Stedman, on the banks of Inle Lake, beyond a couple of vandalized graves and a still-functioning mosque built for the Bengali soldiers? What may be seen of the fortifications of villages and towns in the Shan Hills and the “Wild Wa” country on Burma’s border with China that the colonial author, JG. Scott, described as he worked on border demarcation in the late 19th century? What evidence remains of the battles of World War II, fought from Moulmein to Myitkyina, from the Salween to Arakan? What deeper archaeological past of Yangon may be found below the foundations of the colonial buildings that have been under repair since Cyclone Nargis?

In the Kabaw and Kale (also spelt as Kalay) Valleys, on the Myanmar-India border (Fig. 16.1), there are several villages (Fig. 16.2) surrounded by ditches and earth embankments, which local people generally refer to as ancient “moats” or “city walls”. It would be a pity to leave these structures so inaccurately described. They are the remains of stockades, used with varying degrees of success to keep out Chin hill tribesmen who raided the lowlands, often returning home with slaves, cattle and sometimes the heads
of their victims which they displayed on poles outside their own settlements. This paper examines the archaeological evidence of a conflict that spanned the late Konbaung and early colonial periods, in a region where help from the central authorities was a long way away, and danger was very near.

Fieldwork

When the great Burma scholar GH Luce was part of the 1942 exodus through the Kabaw valley from Burma to India ahead of the invading Japanese, he noted ruefully in his diary that he had hoped to visit the old “walled city” of Yazagyo, which was along the way, but the owner of the car he was travelling in refused to take a side trip. This was “one more city left to a future archaeologist”, wrote Luce. His biographer, Pamela Gutman, found the fleeting reference to Yazagyo among his personal papers in the National Library of Australia. The remoteness of the site and more pressing excavations in central Burma had until recently prevented archaeologists from paying much attention to Yazagyo and its neighbours.

We took the challenge and explored the Myanmar-India border area for 160 kilometres north from Kalaymyo, the regional capital. We located three sites enclosed by ruined fortifications: Khampat (E 94.18668° N 23.78142°), Myothit (E 94.51522 N 24.511957°) and Yazagyo (E 94.08648° N 23.49943°). While not exactly lost – the local people, of course, knew they were there – the function and history of the mounds and ditches had been pretty much forgotten. To our local hosts, they were *myo yo*, city walls, a common feature of settlements from the first millennium Pyu cities (Aung Thaw 1972) to fortified towns of the 18th-19th century Konbaung period, such as Shwebo (Hudson 2011). When we saw that the “walls” were earth ramparts, we were quickly disabused of any notion that we were searching for brick cities of the type and structure of Kalaymyo (see below), where we had started our explorations. We walked the earth ramparts with a GPS (Global Positioning System) receiver to make a digital plan of each site. We interviewed abbots about their monastery collections of historical artefacts to determine whether reliquary objects, which were frequently recovered from ruined pagodas, might suggest a timescale. At this stage, we had no idea as to why the fortifications had existed, except for a broad assumption that they would have been constructed in the face of some real or anticipated threat. A significant architectural link between the three sites was that each used a natural river escarpment as one side of the defences (Fig. 16.4-8).

When the field data was reconciled with historical information, the evidence pointed strongly to the stockades functioning in the 19th century as a defence against Chin raiders. The earth banks that can still be seen surrounding the lowland villages provided bases for timber stockades. The ditches or “moats” would have been the source of the earth for the banks, and once excavated, made accessing the walls more difficult. Apart from Yazagyo, Khampat and Myothit, several other villages in the valley system – Indaing, Atet-ywa, Kangyi and Hitinzin (Fig. 16.2) – were recorded in the 19th century as being fortified with stockades (Carey and Tuck 1895). Following the pacification of the Chin by the British, the fortifications became redundant. Maintenance ceased. The superstructure materials were recycled, but the archaeological footprints remain.

Geography

The Kabaw-Kale Valley system seems to have been sparsely inhabited prior to the middle of the 18th century. The geographer Joseph Castelli (1988) points out that the name of the more northerly valley, Kabaw, is a Manipur word for Shan, and so reflects the presence of different cultures, which also included Burmese and Chin. In 1753, the Burmese king Alaungpaya oversaw the building of a somewhat meandering trail and a series of Buddhist pagodas and villages in the Kabaw valley. The trail, which never carried more than horses and elephants before World War II, was the avenue of retreat for the British – including GH Luce and many Indians who had been part of the British colonial administration – from Burma to India in 1942. In 1945, British military engineers built a new, much straighter road to serve as a supply route during the reconquest of Upper Burma. We had to depart from this modern road, now upgraded and called the India-Myanmar Friendship Highway, to locate two of our stockaded villages, which were on the old route.
Kalaymyo

The most substantial urban centre in the border area, Kalaymyo, has remnants of a brick city wall and moat. Local tradition has it that the main pagoda, the Yadanabon Shwebontha, dates to around 250 BCE, the time when the Indian emperor Asoka is said to have had thousands of relic-bearing stupas, including this one, constructed throughout the Buddhist world. Subsequent repairs are attributed to the 12th century Bagan king Alaungsithu (Ashin Baduma 1966). In terms of hard archaeological evidence, a votary tablet of the Bagan period attributable to the 11th century King Anawratha (Aniruddha) has been found at Kalaymyo (Nai Pan Hla 1985). We were shown a headless stone sculpture (Fig. 16.3) strongly resembling the “fat monk” of the Bagan period (Luce 1969: 206-208 Vol 1) that was kept at Myogyigon (“big mound town”), seven kilometres southwest of Kalaymyo. Two loosely provenanced artefacts may be insufficient evidence to claim Kalaymyo as a significant outlier of the 11th to 13th century Bagan Empire. However, artefacts and stone inscriptions do place Kalaymyo firmly as a frontier settlement related to the Ava kingdom from the 14th century CE (Aung Myint 1999), and this is the likeliest period for the construction of Kalaymyo’s brick walls and moat.

The central administration of the Burmese kingdom that was based around the Mandalay area after Bagan declined in the 14th century did not always control the periphery. Indigenous history mentions warfare involving Kalay and Ava in the 15th century (Phaye 1883: 82-83; Harvey 1925: 296-297). In the mid-16th century, the Burman king Bayinnaung engaged in campaigns against Manipur, with the Kabaw Valley caught in the middle of the conflict. The valley remained in dispute between Burma and Manipur until the 19th century, a “disturbed, partially empty frontier” (Lehman 1963: 24). The geopolitical disorder was further exacerbated by conflicts among the tribal groups in the hills, and between the tribal groups and the local Shan sawbwas or chieftains (Vumson 1986: 84-105).

The Chin, their guns and the British

The descendants of the Chin raiders of the 19th century still live in the Kabaw-Kale valleys, and of course in neighbouring Chin State. Kalaymyo has a majority Chin population. The Chin are considered to be one of Myanmar’s “national races”. The ethno-politics of the Chin, where there are controversies ranging from what these people prefer to be named, to their participation or non-participation in national life, involves a vigorous discourse on the internet, at academic conferences and in the Myanmar parliament, but is not within the scope of this paper. Missionaries converted the Chin several generations ago to Christianity (Carson 1927) and since then they have been predominantly Baptist. However, many of the Chin people we met while researching the stockaded villages were both aware and rather proud of their ferocious ancestors.

The British annexed Upper Burma in 1885. In 1887, as the new colonial administration was extending its control over the frontier areas, there were incursions by Chin groups from their fortified hill villages into the Kale-Kabaw lowlands. Even Kalaymyo, with its brick walls, was not safe. Part of the settlement was burnt, three people were killed and 40 were carried off as slaves. Khampat was raided in the same year, with several deaths. The Chief Commissioner was given a free hand to punish “these unruly mountaineers” (Crosthwaite 1912: 287-336)

Both British negligence and Chin initiative helped supply the “unruly mountaineers” with weaponry. The Chin were often armed with flintlock rifles, over 6,000 of which were eventually confiscated. A majority of these were English made, many stamped with King George’s “G. R. Tower” and crown symbol of the Tower of London Armoury, or with the “VEIC” bale mark of the East India Company. As flintlocks were replaced with percussion cap rifles in the British units in India, it appears that someone could not resist turning a profit on the unneeded weapons, and they had found willing buyers in the hills. Ammunition was no problem for the Chin warriors. They extracted nitrates from latrines and pig pens, sulphur from fermented beans, and for bullets used lead, brass stolen from Buddhist pagodas, copper from telegraph wires, or pebbles.
The stockaded Chin villages eventually proved to be no match for the cannon the Indian and Nepalese Ghurkha soldiers of the British army lugged over the mountains. Villagers were fined for raiding and kidnapping as the British political officers gradually negotiated a peace. At times if a gun was not handed in, the house of the putative gun owner was burnt down. By 1894, 600 slaves had been released, and cattle stealing and headhunting ceased to be a menace to the valley population (Newland 1894; Carey and Tuck 1895).

**Yazagyo**

Yazagyo seems to have been continually occupied since at least the 18th century. In 1878, the town provided 160 soldiers as a levy to the Burmese forces. This gives an indication of the human resources available at the time. In 1896, when the British reported on its condition, they described a principal market town, whose strong stockade had never been breached (Carey and Tuck 1895: clxvii, 133, 215).

A ruined brick pagoda was being repaired when we visited, and the contents of reliquaries from this and other ruined shrines were held in the local monastery. These comprised hundreds of bronze sculptures portraying events in Buddha’s life; images which throw light on the religious beliefs and practices of the period. The reliquary deposits included a silver scroll, bearing a prayer, and dated the equivalent of 1883 CE, two years before the British annexation. The relatively large number of Konbaung period pagodas in Yazagyo provides further evidence of its importance and prosperity during the late 18th and 19th century (Hudson, “Tampawaddy” Win Maung et al. 2017, forthcoming).

**Khampat**

Each of the three fortified villages was built overlooking a river, high on a natural escarpment which formed part of the defences. Khampat, the “village of the gold ring”, still has a central pagoda cluster (Fig. 16.7), most likely built by King Alaungpaya as he established his frontier outposts along the road to Manipur. In the period of Burmese control of the valleys, Khampat was important enough to provide a regional military commander, the Khampat wun (Grant Brown 1911: 11). But it was raided in 1887, with seven killed and 27 abducted (Crosthwaite 1912: 296). The present village of Khampat lies to the west of the ruins of the stockade. The inauspicious event of 1887 may have been enough to keep the residents from directly reoccupying the site.

**Myothit**

Myothit, “new town”, is a settlement built on the ruins of a stockade, and the very name is a clue that it probably postdates the fortified site (Figs. 16.2 and 16.8). The ruins follow the same pattern of construction as Yazagyo and Khampat, with a river escarpment forming one side of the settlement and a stockade and ditch encircling some Konbaung-era pagodas. The stockade at Myothit follows a unique pattern, comprising a triple embankment, each of which would have supported a palisade, with two ditches in between them. The village of Myothit does not appear in any of the colonial gazetteers nor on maps until 1944. Structurally, the village is built along either side of the road. This suggests that the present village and the road that crosses the ruins of the stockade appeared after the fortified site ceased to function. Myothit was far to the north of the zone that was raided by the Chin, so the defences may relate to border issues involving other tribal groups or Manipur, and the various Burmese administrations. Old Myothit, as GH Luce said of Yazagyo, remains “one more city left to a future archaeologist”. For now, we do not even know its original name.
Conclusion

Whether deserted like Khampat, reoccupied like Myothit or continually occupied like Yazagyo, the lowland villages in this study have Buddhist pagodas in their centre. Most of the pagodas have undergone repairs, and reliquary deposits recovered from them point to their construction from the late 18th century onward. This supports the notion that they were established as King Alaungpaya built his road into Manipur. Alaungpaya had built his capital, Shwebo, within a stockade on an earth bank, surrounded by an extensive ditch/moat (Hudson 2011), so the principle of defending a settlement with a stockade was well established at that time. The Kabaw-Kale stockades proved valuable, though not in every case, as defence against 19th century raids by the Chin warriors.

This study has looked at one small area, and at one period of relatively recent history. But we hope it might be taken as an example, if not a model, for historical archaeology in Myanmar, combining field survey, historical research, art history and interviews with local informants to illuminate an almost forgotten architectural feature. Local and international postgraduates and doctoral candidates in search of research topics in Myanmar might find great value in the archaeology of the historical period.

Acknowledgements

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Bibliography

This article will present a group of baked clay artefacts which are today scattered across various locations in Thailand, and which can be argued as all originating from the archaeological site at Tap Chumphon in Nakhon Sawan Province. Of the sixteen artefacts identified, eight bear similar, bilingual inscriptions written in Pali and Old Mon. These inscriptions are written in the commonly labelled “Post-Pallava” script, and based on palaeographic evidence have been dated roughly to the 8th-9th centuries CE. The Pali portion is the Ye Dhammā verse, which is often inscribed on artefacts in Southeast Asia. The Mon portion states that merit was accrued by a donor for the supposed construction of a temple building, probably a pavilion or resthouse. This article will provide readings and translations for these inscriptions and will discuss the implications of this find, which show Tap Chumphon to be a unique settlement and indicate for contact with other communities in northeastern Thailand and with the Khmer culture.

**Keywords**: inscription, Old Mon, Ye Dhammā verse, Tap Chumphon, Dvaravati

This article will discuss a group of similar clay artefacts bearing bilingual inscriptions in Pali and Old Mon. These artefacts were discovered half a century ago, yet relatively little academic attention has been drawn to this find, and several of the inscriptions have never been properly published. Multiple sources have labelled them as being replica stūpas (Phumathon and Na Nakhon 1981: 33; Wiraprachak 1986a: 245; 1986b: 95; Bauer 1991b: 65; Wimonkasem and Santithai 1999: 143). However, others debate the intended purpose. Revire states a preference not to label them as stūpas, which are usually associated with burials. He suggests the possibility of having an architectural function and refers to them variously as “earthenwares”, “miniature earthenwares”, “terracotta fragments” and “hollow terracotta fragments” (Revire 2014: 245-247, 250, 256, 257, 264-267). As the purpose of this article is to study the messages inscribed on these artefacts and not the originally intended purpose, I have chosen to refer to these artefacts throughout this article as simply “the artefacts”.

In this article, I propose amended readings for the inscriptions which have been studied, and I propose original readings for those which have not been published. The improvement of earlier readings is possible due to two reasons. First, I studied from the actual artefacts and photographs of the artefacts whereas earlier scholars usually studied from ink rubbings of the inscriptions. Second, after recognizing that all the artefacts were inscribed with the exact same message, I was able to confirm the readings on
otherwise less-legible artefacts by comparison with the inscriptions on other artefacts. Based on the similar shapes and sizes of the artefacts, as well as scriptural and textual analysis of the inscriptions, it seems arguable that all of these artefacts originated from the Tap Chumphon archaeological site in Nakhon Sawan Province, and that they were likely produced on the same occasion (see Fig. 17.3 for photographs).

The inscriptions are bilingual, but the Pali portion and the Old Mon portion record different messages. The Pali portion on every artefact is the *Ye Dhammā* verse, which is commonly found to be inscribed on artefacts in Southeast Asia. The Old Mon portion seems to state that the donor earned merit from the construction of a temple building. On some artefacts, the Old Mon portion is first, followed by the Pali portion. On others, the Pali portion appears first, followed by Old Mon. Similar artefacts have been discovered at Nakhon Pathom, but they are notably larger than those from Tap Chumphon. Moreover, the artefacts from Nakhon Pathom are inscribed with only the *Ye Dhammā* verse, while those from Tap Chumphon have Old Mon.

My study of these artefacts began while doing research for my MA thesis on Old Mon epigraphy in Thailand, entitled “A study of Old Mon word forms from inscriptions found in Thailand dating between the 6th-11th centuries CE” (in Thai) (Watson 2013). I conducted a survey of Old Mon inscriptions in Thailand and selected a group to study the development of word spellings. I translated the inscriptions relying primarily on Harry Shorto’s *Dictionary of the Mon Inscriptions from the Sixth to Sixteenth Centuries* (1971). Inscriptions in the Old Mon language have been discovered in various regions of central, northern and northeastern Thailand. It is argued that there are two Old Mon inscriptions in southern Thailand at Nakhon Si Thammarat, but I disagree, arguing these are not written in Old Mon, and that there have not as of yet been any Old Mon inscriptions found in southern Thailand.

Inscriptions in Thailand written in Old Mon can be divided into three periods. The first period was roughly the 6th-7th centuries CE, and Old Mon inscriptions have been found only in central Thailand. The second period was roughly the 8th-10th centuries CE, and Old Mon inscriptions have been found primarily in northeastern Thailand, but also in central Thailand. The third period was roughly the 11th-12th centuries CE, and Old Mon inscriptions have been found only in northern Thailand, at Lamphun and the surrounding region (Watson 2013: 5). Old Mon inscriptions in Thailand are not very numerous and often lack historical detail in the contents.

In central Thailand, Old Mon is the earliest local vernacular discovered inscribed, leading scholars to believe Old Mon was the language of the Dvaravati culture. However, the ancient city at Nakhon Pathom, often considered to be the capital city, has yielded only a single artefact with Old Mon inscribed on it. The region of Suphan Buri, also in the principle region considered as Dvaravati, has not yielded a single inscription in Old Mon. A few Old Mon inscriptions have been identified at other sites in central Thailand, including at Lop Buri, and nearby at Sara Buri. There has been one clay tablet inscribed in Old Mon found in Chon Buri Province. Farther north on the Central Plain, two inscriptions from Uthai Thani have been proposed as being Old Mon. I believe one of these certainly is not Old Mon. I have supported the idea that the second one is written in Old Mon, but the language of that inscription is debatable, and if it is not Old Mon, then there are no Old Mon inscriptions from Uthai Thani, and Nakhon Sawan would thus be the only site in the north of the Central Plain where Old Mon inscriptions have been recovered.

Although none of the inscriptions from Tap Chumphon are dated, they are written in the script style commonly labelled “Post-Pallava”, and, based on palaeographic comparisons with other inscriptions,
these inscriptions have often been assigned to the 8th-9th centuries CE. I tentatively concur with these dates; however, these dates were proposed a long time ago, and more inscriptions have been discovered. Through a more current and detailed evaluation of inscriptions found in the region, it might be possible to propose more precise dating. In the present work, I will not propose new dates, but I will discuss some aspects of the palaeography and punctuation appearing in the inscriptions.

Many of the artefacts from Tap Chumphon have been registered, but some have not. For convenience, I created a registry specifically for these artefacts, using [TC] to represent “Tap Chumphon” and assigning a number to each artefact. For clarity, these TC registration numbers I assigned will appear throughout this article. Tentatively, I have registered sixteen different artefacts, assigned the numbers (TC 1) to (TC 16). I will mention other inscribed artefacts in this article, but those not belonging to this group are not assigned any new registration numbers. Of these sixteen artefacts, eight are inscribed, but they have not all been published. Of the eight remaining artefacts, one has modern Thai numerals etched into the surface showing the date of 2500 BE (1957 CE). The other seven artefacts appear to have no markings or inscriptions.

Today, these artefacts are held in different locations across central Thailand (see Fig. 17.1 for a map). Of the sixteen artefacts arguably originating from Tap Chumphon, four inscribed artefacts are kept at the Somdet Phra Narai National Museum, Lop Buri Province (TC 1, TC 2, TC 4, TC 5), and one inscribed artefact is kept at the Prachin Buri National Museum (TC 6). Four artefacts are kept at the Bangkok National Museum, two of which are inscribed (TC 7, TC 8) and two of which are not inscribed (TC 9, TC 10). Several artefacts are still in Nakhon Sawan Province. One inscribed artefact is at Wat Nong Kradon Temple (TC 3). The other artefacts I registered are not inscribed, including two at Wat Koh Hong Temple (TC 13, TC 14), one at the Satri Nakhon Sawan School (TC15) and two more in the possession of a private collector (TC 11, TC 12). At the Satri Nakhon Sawan School there is also a picture on the wall of the museum showing what appears to be an entire, unbroken artefact (TC 16). I have not seen the actual artefact, nor have I any information regarding its whereabouts or what registration number it was assigned.

The dimensions of all the artefacts are roughly equivalent. The tops of most of them are broken, except for TC 12 and TC 16. The top of TC 12 appears to have been cut off smoothly, perhaps before the artefact was baked (see Fig. 17.3, Pic. 12 and Pic. 20). TC 16 appears to be complete and unbroken (see Fig. 17.3, Pic. 16). Fortunately, the message on the eight artefacts is inscribed near the base. On six artefacts the inscription occupies two lines, and on two artefacts the inscription occupies three lines. All eight inscriptions are similar, but with minor differences. There are slight variations in the spellings, and the punctuation is inconsistent (see Fig. 17.2 for details of the artefacts).

In 1981, the Thai National Library published two artefacts after a private collector informed the museum in Lop Buri of two inscribed artefacts in his possession, said to be from the Tap Chumphon archaeological site. A villager’s account describes how in 1961 he made the discovery on his land, to the north of the moated area of the ancient settlement. He claimed to have found over one hundred of these clay artefacts, and that some were inscribed. He also reported finding numerous clay tablets imprinted

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1 Multiple Thai language sources have proposed dating these inscriptions to the period of the 8th-9th centuries CE. (Wiraprachak 1986a: 245, 1986b: 95; Phumathon and Na Nakhon Phanom 1981: 34, 38; Wimonkasem and Santithai 1999: 143). These dates have been repeated by international scholars (Bauer 1991a: 49, 1991b: 65; Revire 2014: 245-246).

2 Artefact TC 12 is not inscribed in Pali and Old Mon like artefacts TC 1-8, but it does have modern Thai numerals etched shallowly into the surface in two places showing the year of “2500 BE”, corresponding to 1957 CE. Perhaps the person who discovered this artefact etched the year when it was discovered. The four digit number in Thai numerals is in the centre, then it is written again near the base of the artefact.

3 At the Bangkok National Museum there is another artefact from Tap Chumphon labelled a clay stūpa, but the shape and design are different from the 16 other artefacts (see Fig. 17.3, Pic. 19).
with images of the Buddha (Phumathon and Na Nakhon 1981: 33, 38). If accurate, this would be quite an unusual discovery, with large numbers of these artefacts found together with clay tablets.

The clay tablets discovered at Tap Chumphon also represent a unique style. In comparing the iconography of clay tablets in Central Thailand, Revire (2012: 111) describes “a sub-regional type which developed its own local characteristic found only at Tap Chumphon...”, going on to explain how the dimensions of the images depicted on the tablets are notably larger than those depicted on tablets from elsewhere. At the centre of the image, the Buddha is seated in the bhadrāsana position, flanked by assistants and with two facing deer at his feet⁴. When I visited Tap Chumphon, a villager allowed me to photograph a fragment of a clay tablet in her possession. Although only the bottom half of the tablet remains, it clearly matches the type described by Revire (see Fig. 17.3, Pic. 21)⁵.

The inscriptions on some of these artefacts have been published. Phumathon and Na Nakhon (1981: 33-38) published the inscriptions on TC 1 and TC 2, both reportedly inscribed in Pali and Old Mon. Readings were given for the Pali portion of both artefacts, but a reading for the Old Mon portion was only proposed for TC 1, as the surface of TC 2 was in rough condition. The two artefacts were later republished (Wiraprachak 1986a: 245-246; 1986b: 95-99), but the information and readings remained almost unchanged. These artefacts were first published in English by Bauer (1991b: 65), who offered a reading and translation of TC 1⁶. Bauer (1991a: 49) also published a chart listing seven artefacts which he labels as being “inscribed terracotta stupas”. Of the seven artefacts, Bauer claims that only one is inscribed in Old Mon and Pali, while the other six are said to be inscribed only in Pali. Bauer also assigns varying centuries to these artefacts (1991a: 49.). I argue that some of the artefacts listed by Bauer as being written in only Pali are in fact written in both Pali and Old Mon, and that more likely they came from the same period of time.

There have been additional publications. Daengdiloet (1999: 181) presented TC 1 in his MA thesis, offering a reading but no translation. As can be seen, the Old Mon inscription on TC 1 has been studied multiple times in both Thai and English, but the various readings offered vary between sources. Wimonkasem and Santithai (1999: 143) published the inscription on TC 3, suggesting that it also came from Tap Chumphon. But the reading and translation they offered differs slightly from the readings offered by other scholars for TC 1.

In the following section, I present my readings of both the Pali and Old Mon portions for each of the inscribed artefacts. I first present my readings for the eight artefacts presumably from Tap Chumphon, and then my readings for inscriptions on the two similarly shaped artefacts from Nakhon Pathom. The artefacts are damaged, and in some cases the part with the inscription is missing. In transliterating the texts, I use parentheses ( ) to indicate letters or words which are worn and cannot be confirmed, and I used dots [ . . . ] to represent letters or words which are missing or illegible. After the readings, I will explain the Pali and Old Mon portions of the inscriptions, I will explain the peculiarities in my methods of transliteration, and I will provide an analysis of the vocabulary and punctuation seen in these inscriptions.

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⁴ Revire (2012: 111) reprints a drawing of a tablet from Tap Chumphon.
⁵ The villager who owns the broken tablet (see Fig. 17.3, Pic. 21) informed me that she did have multiple complete tablets, but she had sold them all. This tablet was broken, so nobody had purchased it.
⁶ Bauer (1991b: 65) claims that it was a “chance-find of Dr. Samnuan Palawativichai of Chainat”. However, it seems more likely that Dr Palawativichai was only a private collector of artefacts and not the person who discover them. Phumathon and Na Nakhon Phanom (1981: 33) describe the find being reported by the abbot of Wat Tap Chumphon and two other villagers. Two artefacts were acquired by Dr Palawativichai, who himself suggested they originated from the site at Tap Chumphon. When I visited the site, I met with the children of the two men who actually found the artefacts, both of whom are now deceased.
I propose the following readings for the eight inscribed artefacts from Tap Chumphon:

TC 1
[01] n(e)ⁿ (k)yāka puña tara(la)ⁿ (j)rapa vihāra ||
[02] || ye dhammā hetuppabhavā yesaṃ hetuṃ tathāgato āh’ tesaṅca yo nir(o)dho evaṃ vādi mah(ā) sa-
[03] mano

TC 2
[01] ṭ || ye dhammā hetuppabhavā y(esam) hetuṃ tathāgato .. tesaṅca
[02] || ye dhammā hetuppabhavā yesaṃ hetuṃ tathāgato āh’ tesaṅca yo nirodho
[02] evaṃ vādi mahāsamaṇo neⁿ kyāka puña taralaⁿ jrapa vihāra ~

TC 3
[01] ṭ || ye dhammā hetuppabhavā yesaṃ hetuṃ tathāgato āh’ tesaṅca yo nirodho
[02] evaṃ vādi mahāsamaṇo neⁿ kyāka puña taralaⁿ jrapa vihāra ~

TC 4
[01] || ye dhammā hetuppabhavā yesaṃ hetuṃ tathāgato āh’ tesaṅca yo nirodho evaṃ vādi mahā.
[03] laⁿ j.apa vihāra

TC 5
[01] ṭ || ye dhammā hetu. . . . . . h.tu. (ta)thā. . . . .
[02] || ye dhammā hetu. . . . . . h.tu. (ta)thā. . . . .
[02] nirodho evaṃ vādi mahāsamaṇo. . . kyāka puña taralaⁿ jrapa vihāra

TC 6
[01] neⁿ kyā. puña tara.ⁿ .rapa vihāra
[02] || ye dha. . hetuppabhav. yesaṃ hetuṃ tathāgato āha
[03] tesa. . . . . . . . . . . . . . . . . . . . .

TC 7
[01] || ye dha(mm)ā hetuppabhavā yesaṃ hetuṃ tathāgato āh’ tesaṅca yo nirodho
[02] eva(m) v(ā)di mahāsamaṇo : ~ neⁿ’ kyāk’ puñ’ taralaⁿ’ .rapa vihāra ~

TC 8
[01] . . . . . u(ppa)bha(v)ā yesaṃ hetuṃ tathāgato āh’ tesaṅca yo nirodho evaṃ vādi mahāsamaṇo : ||
[02] neⁿ’ kyāk’ puñ’ taralaⁿ jrapa vihāra ~

Next, I offer my readings for the two similar artefacts from Nakhon Pathom:

305/2519
[01] . . . . . pabhavā yesaṃ hetuṃ tathāgato āh’ tesaṅca yo . . . . . . . . .

DV 1/1
[01] ṭ || ye dhammā hetuppabhavā yesaṃ hetuṃ tathāgato āha
[02] tesaṅca yo nirodho evaṃ vādi mahāsamaṇo || -

In each of these inscriptions, from both Tap Chumphon and Nakhon Pathom, the Pali portion is the Ye Dhammā verse, a traditional Buddhist expression which summarizes the principle teachings of Buddhism. Here is the canonical form of the verse:

\[
\text{ye dhammā hetuppabhavā} \quad \text{tesaṅca yo nirodho evaṃ vādi mahāsamaṇo ti} \]

Regarding the spellings on these inscriptions, Revire explains that the second phrase of the verse begins with [yesam] instead of the more commonly written [tesam], showing a variant form of the verse attested to in inscriptions found throughout the Central Plain of Thailand and along the region bordering northeastern Thailand, including at Sri Thep, Phetchabun; Mueang Sema, Nakhon Ratchasima; and at Chaiyaphum. Moreover, the canonical version of the Ye Dhammā usually ends with the last syllable [ti], but this syllable is omitted in all of these inscriptions. The word [mahāsamaṇo] is also traditionally spelled with the retroflex consonant /n/, while in these inscriptions it is spelled with the dental consonant /n/ (Revire 2014: 256-259).

On the eight inscriptions from Tap Chumphon, the Old Mon portion mentions the merit accrued by the donor. For the Old Mon portion of these inscriptions I propose the following generic reading, transliterated into the Mon and Roman scripts:
In my method of transliteration, the *virama* symbol, or the punctuation mark used to indicate a
cfinal consonant, is represented by using the apostrophe ['']. My representation of the *virama* symbol is thus
different from the methods of transliteration used by other scholars, who have traditionally Romanized
Old Mon texts without representing this symbol, as consonant clusters are easily represented in the Roman
script by putting the consonants together with no vowel symbol between them'. However, I have shown
elsewhere that in Old Mon inscriptions the usage of the *virama* symbol is inconsistent (Watson 2013: 25).
Sometimes the *virama* is written to indicate final consonants, but is often omitted from texts. Sometimes it
is written above consonant cluster, but this is irregular (Watson 2013: 25-26). Sometimes a final consonant
is represented by a doubling of the final consonant, in which case the *virama* still may or may not be
written (Watson 2013: 158-161). For these inconsistencies in spelling, and to maintain accuracy when
transliterating epigraphic records, I use the apostrophe ['] when the *virama* symbol is written, and when the
*virama* is not written, I transliterate with a final open vowel [a], even if this final vowel likely would not
have been pronounced in spoken Old Mon. Furthermore, I use the symbol [º] to transliterate the consonant
symbol [a] in order to not cause confusion following the inherent vowel of the preceding syllable. So, for
example, words in this inscription ending with the final consonant [a] include the words [neº'] and [taralaº'].
But in instances where these words appear in the inscriptions without the accompanying *virama*, following
the [º] symbol I do not add an additional [a] in transliteration.

Considering the meaning of the Old Mon portion, it is notable that while some words are Old Mon,
other words are borrowed from the Indic languages of Pali or Sanskrit, as well as from Old Khmer. The
word [neº'] means “this, here” and is arguably an Old Khmer loanword (Bauer 1991a: 67, 79; 1991b: 66).
In my experience, it is not unusual to see Old Khmer loanwords in Old Mon inscriptions in northeastern
Thailand. However, these eight inscribed artefacts are the only evidence of Old Khmer borrowing attested
to in Old Mon inscriptions on the Central Plain of Thailand. In northeastern Thailand, the three notable
regions where Old Mon inscriptions have been found are in the modern provinces of Maha Sarakham,
Chaiyaphum and Kalasin. Of these three, Maha Sarakham is the furthest south, and the closest to the Khmer
sphere of influence. Unsurprisingly, Old Mon inscriptions from Maha Sarakham show a greater level of
influence from Old Khmer than do the Old Mon inscriptions from Chaiyaphum and Kalasin. Interestingly,
this word [neº'] only appears with this spelling in the inscriptions from Tap Chumphon, Nakhon Sawan.
On inscriptions in Maha Sarakham, the form [nai'] is the same word with a slightly different spelling, and
is so far the only other evidence of this word being written in Old Mon inscriptions in Thailand. Bauer
suggests there may have been a certain level of “Khmer-Mon bilingualism on the northern periphery of
the Chao Phraya basin by the 8th c.” (Bauer 1991b: 66). More specifically, I believe it might point to
a direct connection between the ancient communities at Nadun, Maha Sarakham and Tap Chumphon.
The evidence of these artefacts at Tap Chumphon and the unique style of votive tablets already indicate
that Tap Chumphon was different from its immediate neighbours, and the votive tablets at Maha Sarakham,
which are inscribed with red ink, prove that site to also be unique and individual.

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7 To compare the methods used to Romanize Old Mon texts, see the following sources: Bauer 1991a, 1991b; Cœdès 1929, 1925;
Halliday and Blagden 1930.
Regarding the other words in the Old Mon inscription, the word [kyāk’] means “sacred being or thing: Buddha; Buddha image; shrine, pagoda” (Shorto 1971: 59). This word occurs frequently in epigraphic Old Mon. The word [puñ’] is an Indic loanword meaning “merit, work or act of merit” (Shorto 1971: 235). The spelling in Sanskrit is [puṇya] and in Pali is [puñña]. This word occurs with different spellings in Old Mon inscriptions in Thailand, including: [piñ’ / puña / puñ’ / punya / puny’ / pūñ’ / puṇ’] (Watson 2013: 225-226). Moreover, this word appears in almost every Old Mon inscription. Revire (2016: 404) points out that puṇya was not only used in the context of Buddhism, but also in the Brahmanical or Hindu context; that it could have the meaning of “auspicious, propitious, virtuous”. In some inscriptions it might best be translated as “meritorious work”. As regards the word [kyāk’], normally it is found used as a noun, but in this context I believe it seems to be used as an adjective for the word [puñ’]. Revire (2014: 246) also suggests interpreting [kyāk’ puñ’] together as “holy merit”.

The word [taralaª’] means “lord, master, owner” (Shorto 1971: 172). This word appears in various forms in Old Mon inscriptions in Thailand, including [tarla / tarlla / talaª / trala / tar’la] (Watson 2013: 218). On each of the artefacts from Tap Chumphon this word has been spelled as [tarala”] or [taralaª], yet this spelling has appeared nowhere else aside from the group of inscriptions from Tap Chumphon, indicating a unique local variant. The only other instances of this word being written with a final [”] are in two inscribed clay tablets from Kalasin, where the spelling is [tala”] (Watson 2013: 218) Bauer (1992: 277) argues that the structure using this term was borrowed from Old Mon into Old Khmer; then was borrowed from Old Khmer into Thai.

The word [jrap’] means a “resthouse” or a “building with open sides for use of travellers or of persons assembling at or visiting monastery, pagoda” (Shorto 1971: 129). The word [vihār’] is an Indic loanword meaning “a monastery” (Shorto 1971: 350). Scholars offer different interpretations regarding the final words in trying to reconcile both a resthouse and a monastery (Wimonkasem and Santithai 1999: 145; Revire 2014: 246). However, I consider this to be a reference to a single structure. The idea that this could be interpreted as two buildings, both a resthouse and a monastery, is complicated, as there is no conjunction to indicate that two things are being referenced. This expression more plausibly refers to a single building, a pavilion or resthouse, constructed for people assembling at the temple.

I propose a rough translation of the Old Mon as something like “This sacred meritorious work (was done by the) lord (of the) temple resthouse”, or “This holy merit (is accrued by the) donor (who constructed the) temple pavilion”. It would appear that a patron made a donation to fund the construction of a building for a temple. In this context, the “lord” was not necessarily the monarch or ruler, but more precisely the patron of the meritorious act, which could have been any wealthy individual. It thus seems plausible to interpret [taralaª] as the donor.

There are minor differences between the readings offered by various scholars for these inscriptions, due in part to different methods of transliteration. The significant difference is between the reading of the words [taralaª jrapa]. Earlier proposed readings include [tara piª’ prapa] (Phumathon and Na Nakhon 1981: 34; Wiraprachak 1986b: 98) and [tara tra’ jrap] (Wimonkasem and Santithai 1999: 145), but former studies have each focused on only a single artefact at a time, usually TC 1, and sometimes reading only from the ink rubbing. Now, I am able to propose improved reading based on comparison between artefacts (see Fig. 17.4, Ex. 24-33).

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8 On some artefacts, chalk powder was applied to the inscription to make the letters stand out more clearly.
From the photographs I took of each artefact, I was able to see that the word [tarala⁺] is not clearly legible on TC 1; the first two letters can be seen, but the following two letters are unclear. This caused earlier scholars, reading from ink rubbings, to misread this word. On TC 3, this word is more legible when viewing the artefact and not the ink rubbing. The final letter [⁺] is clearly recognizable, although the third letter, [la], is written with a gap in the loop. On TC 5, TC 7, and TC 8 this word is clearly visible. Regarding the word [jrapa], TC 1 does not present a clear reading, causing complications for earlier scholars. On TC 3 the word [jrapa] is clearly legible, and on TC 5, TC 7 and TC 8 it is likewise legible, but the letters look slightly different, again showing that the hand-written message into wet clay did not come out identically on every artefact. From a comparison between these examples, the correct reading of the words becomes more apparent.

On a separate note, the script style on TC 8 looks notably different from the other seven inscriptions. The letter [y] and especially the letter [s] seem to have different forms, which may indicate two scribes working together. In the study of palaeography, Salomon (1998: 67) warns that “individual and idiosyncratic variations must also be kept in mind...” giving the example that “an older person tended to write in a more old-fashioned style than a younger contemporary” (Salomon 1998: 67). If this point is taken into consideration, I believe these inscriptions from Tap Chumphon might be evidence of two scribes, and we can imagine a situation where artefact TC 8 was written by an older scribe, and artefacts TC 1-7 were inscribed by a younger scribe.

Another topic which merits discussion is the usage of various symbols and punctuation in these inscriptions. A few different symbols occur. The first symbol is two vertical lines, or the double daṇḍa, which I transliterate as [ || ]. This symbol can be written at the beginning or ending of a message. The second symbol is a clockwise swirl that opens upwards, which I transliterate as [ ʊ ]. This symbol is only seen at the beginning of messages. But these symbols are used inconsistently. Salomon (1998: 66) remarks that in Indic language inscriptions punctuation “seems to have been considered more or less optional.” He goes on to explain how the usage of punctuation became more regular during the Gupta period, when double-line symbols began being used to mark the endings of verses. He further states that these symbols seemed to change and evolve, but that usage of these symbols was always sporadic and often inconsistent even within a single inscription (Salomon 1998: 66).

It seems plausible that the upward curving symbol [ ʊ ] is likely synonymous with the auspicious siddham symbol, often placed at the beginnings of inscriptions. Salomon (1998: 115) explains that this symbol written at the beginning of messages can be understood as the invocation. He states that in the Gupta period this symbol was “a curved stroke open to the left”, mentioning how this symbol was previously interpreted as being “om”, but is more likely to represent “siddham”, or “success”, similar to the word “svasti”, or “well-being”, which also commonly occurs at the beginnings of inscriptions (Salomon 1998: 67). Bhattacharya (2000: 137-138) describes this symbol, showing its usage in Pala engraved records, and agrees that this symbol should be interpreted as “siddham” rather than as “om”. Other scholars describe this siddham symbol occurring at the beginning of a Ye Dhammā inscription in Java, explaining that this symbol “is very widespread throughout the Hindu and Buddhist worlds...” (Griffiths et al. 2013: 15). On the artefacts from Tap Chumphon, I have identified this symbol with the double daṇḍa [ ʊ || ] at the beginning of three inscriptions (TC 2, TC 3 and TC 5; see Fig. 17.4, Ex. 3, Ex. 5 and Ex. 9). But, on several artefacts the siddham symbol does not appear. Some of these begin with only the double daṇḍa [ || ] (TC 1, TC 4, TC 6 and TC 7; see Fig. 17.4, Ex. 2, Ex. 7, Ex. 10 and Ex. 11), and two inscriptions show no initial punctuation (TC 1 and TC 8). The double daṇḍa [ || ] can also occur alone at the end of a message (TC1; see Fig. 17.4, Ex. 1).
There are additional symbols which occur at the ends of these inscriptions. One symbol resembles a zigzag line, which I transliterate as [ ~ ]; this is likely the unolome symbol [ ~ ] and is written alone at the ends of some messages (TC 2, TC 3, TC 7 and TC 8; see Fig. 17.4, Ex. 4, Ex. 6, Ex. 13 and Ex. 15). Another final symbol which is written alone is the double dot symbol, which I transliterate as [ : ] This symbol likewise only appears at the end of messages. (TC 4; see Fig. 17.4, Ex.8). These final symbols also occur in combinations, such as the double dot and unolome [ : ~ ] (TC 7; see Fig. 17.4, Ex. 12), and the double dot and double daṇḍa [ : || ] (TC 8; see Fig. 17.4, Ex. 14).

Similar punctuation appears in other inscriptions. For example, one of the two similar artefacts from Nakhon Pathom, inscribed in the commonly labelled “Post-Pallava” script, is also punctuated; it begins with the siddham symbol and the double daṇḍa [ || ] and ends with the double daṇḍa and unolome [ || ~ ], but the unolome is only a short, straight line (DV 1/1; see Fig. 17.3, Pic. 18 and Fig. 17.4, Ex. 16 and Ex. 17). A stone inscription from Nakhon Pathom also starts and ends with the same symbols, engraved more elegantly in the commonly labelled “Pallava” script (NP.2; see Fig. 17.3, Pic. 23 and Fig. 17.4, Ex. 18 and Ex. 19). Another stone inscription from Lop Buri with the Ye Dhammā verse also starts and ends with the double daṇḍa [ || ], but the first line of both sets is curved slightly, showing a variant form (LB.23; see Fig. 17.3, Pic. 24 and Fig. 17.4, Ex. 20 and Ex. 21).

When I considered these various symbols, another inscription in southern Thailand came to mind. There is a stone inscription in Nakhon Si Thammarat Province which has perplexed scholars, and I now believe that it might have these same symbols, yet this idea seems to have eluded the attention of earlier scholarship. The inscribed message is a single line carved in large letters. Clearly, the message begins and ends with the double daṇḍa, but there is a symbol before the initial double daṇḍa which has always been interpreted as the consonant symbol [bha], and the final double daṇḍa is preceded by two dots, which have always been interpreted as the visarga symbol, or the final punctuation in Sanskrit which indicates aspiration (NS. 3; see Fig. 17.3, Pic. 22 and Fig. 17.4, Ex. 22 and Ex. 23). Cœdès (1929: 55) first offered a reading for this inscription, and dated it to the 5th-6th centuries CE, but did not translate the text or specify which language he believed it to be. He interprets the initial symbol as being the consonant [bha], and the final dots as being the visarga (Cœdès 1929: 55). Thai scholars later proposed that this inscription was written in Old Mon, and likewise interpreted the initial symbol as [bha] and the final dots as visarga (Wiraprachak 1986b: 38, 41; Wiraprachak and Yeungcharoen 1984: 87-88). I therefore included this inscription in my survey of Old Mon inscriptions in Thailand, but I was unable to translate this text into Old Mon, and concluded that it was probably inscribed in a different language (Watson 2014). Assavavirulhakarn and Skilling (2006-2007: 20) have also studied this inscription, and argue that it is not Old Mon, suggesting it is inscribed in Prakrit and date to the 8th-9th centuries CE (Assavavirulhakarn and Skilling 2006-2007: 17, 21). They also interpret the initial symbol as [bha] and the final dots as visarga, although they comment on the initial symbol that it poses a problem in translation (Assavavirulhakarn and Skilling 2006-2007: 21).

In opposition to earlier scholarship, I propose the possibility that in this inscription from Nakhon Si Thammarat, the initial symbol might be interpreted as the siddham symbol rather than being the consonant [bha]. It occurs before the double daṇḍa, as the siddham symbol normally does. On the other hand, it appears to be opening downward, as opposed to the examples opening upward and toward the left. Nevertheless, when considering examples presented by Bhattacharya (2000: 139), this symbol had originally opened to the right before having the direction reversed. The last four examples given by Bhattacharya show how the symbol reversed directions, and as can be seen, the earlier forms of the left-facing symbol appear to go more in a downward direction (see Fig. 17.4, Ex. 34, Ex. 35, Ex. 36 and Ex. 37). The downward opening symbol at the beginning of NS. 3 from Nakhon Si Thammarat (see Fig. 17.4, Ex. 22) does not seem that
different from the examples offered by Bhattacharya, leading me to consider that the symbol represented on NS. 3 may, in fact, be the siddham symbol. And equally so, I propose the possibility that the final dot symbol on NS. 3, which has frequently been interpreted as the visarga, could possibly be a combination of the final double dot symbol with the double daṇḍa, as attested to in an inscription from Tap Chumphon (TC 8, see Fig. 17.4, Ex. 14).

In summary, based on similarities in size and shape of these artefacts, and the similar nature of the inscriptions, it can be argued that all sixteen of these artefacts were likely produced at the same time and place, being the site at Tap Chumphon, Nakhon Sawan. Furthermore, based on comparisons of the inscriptions between artefacts, and by studying images of both the actual artefacts as well as the ink rubbings, improved readings for each of these inscriptions can be offered. There are likely more artefacts originating from this same site. It is quite possible that some are in the storages of other museums in Thailand. It is also probable that more of these artefacts remain in private collections.

This find is notable for the implications. These inscriptions from Tap Chumphon are solid evidence for Old Mon being present to the north of the Central Plain of Thailand towards the end of the first millennia CE. The earliest Old Mon inscriptions found in Thailand were on the lower Central Plain, around the areas of Nakhon Pathom and Lop Buri. In later centuries, Old Mon inscriptions were in the Lamphun-Chiang Mai Basin of northern Thailand. Nakhon Sawan is coincidentally about half-way between these two regions and is on the river system which leads up to the north. At the same time, connections can be drawn between these inscriptions from Nakhon Sawan and Old Mon inscriptions in northeastern Thailand, especially Maha Sarakham, and it is interesting to note the evidence of influence from Old Khmer seen in these Old Mon epigraphs. The dating of these artefacts still poses a problem. Although dates in the range of the 8th-9th centuries CE have been proposed, there needs to be a re-evaluation of the palaeographic dating of ancient inscriptions in Thailand. Furthermore, very little attention has been given to punctuation marks appearing in inscriptions in Thailand, and a thorough comparison of the various symbols found inscribed in Southeast Asia as well as in India could help to establish better approximate dates for inscribed artefacts in the region.

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<th>Picture</th>
<th>TC.#</th>
<th>Inscription</th>
<th>Lines</th>
<th>Size</th>
<th>Registration</th>
<th>Location of Artefact</th>
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<td>TC.1</td>
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<td>NW.7</td>
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<td>LB.26</td>
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<td>3 lines</td>
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<td>TC.5</td>
<td>Pali, Mon</td>
<td>2 lines</td>
<td>H.8 cm x W.19.5 cm</td>
<td>03983; 281/2504</td>
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<td>TC.6</td>
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<td>3 lines</td>
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<td>25/129/2526; 203/2504; 532/2526</td>
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<td>Pic.7</td>
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<td>H.16.5 cm x W.22 cm</td>
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<td>H.26 cm</td>
<td>NP.2</td>
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Fig. 17.2 List of artefacts mentioned. The first column shows the number of each picture in Fig.17.3. The second column gives the TC.# (Tap Chumphon) registration number which I assigned to artefacts in this group. The third and fourth columns give the language(s) inscribed and the number of lines. The fifth column gives the size of each artefact, the sixth column gives the various registration numbers for each artefact, and the seventh column gives the current location of each artefact. The abbreviations H., W., D. and L. represent Height, Width, Depth, and Length.
Abstract

Specialized studies of archaeological earthenware in Southeast Asia recently (Ha 1988; Rispoli 1992, 2007; Stark 2000; Miksic 2003; Sarjeant 2010, 2012a, 2012b, 2012c, 2014; Niziolek 2011, 2013; Favereau and Bellina 2016) are an encouraging sign. Earthenware is not often the focus of analysis in Southeast Asian ceramic collections and assemblages, unlike other categories such as stoneware, glazed trade ware and exotic porcelains. The analysis of 14th century CE earthenware decoration in Singapore is central to this paper. Specifically, the following research evaluates patterns and textures on the surfaces of low-fired earthenware potsherds. Decorations were produced by various methods commonly identified as impressing, incising, punctating, sculpting and appliquêing. Although pottery decorations are an essential component in archaeological research, the data presented on Southeast Asian earthenware decorations are often implicit and ambiguous, barely breaching the identification of motifs (e.g. chevrons, herringbone, etc.) or how decorative traits were manufactured (e.g. carved-paddle-impressed, incised, punctated, etc.). Although useful, there remains ambiguity in the terminology used to describe decorations, leading to confusion. Furthermore, there are marginal attempts in tracing the source of inspiration. We must also consider the roles that attributes may have played in their socio-technological environment. This paper is intended to move towards a more systematic and nuanced approach by presenting explicit typologies, analyses and implications for the 14th century National Art Gallery1 (NAG) assemblage from Singapore. Various earthenware surface treatments were identified and analysed. Analysis took into account the physical characteristics, manufacturing technology, design configurations and type-variations of motifs. The aim was to form a typology to determine quantitative and qualitative characteristics as well as variance among the sample set. This is useful for intra-site, and inter-site comparative analysis. It also has applied value for rescue and salvage projects as it provides a systematic baseline. The identification of 75 different motifs from a dataset of 585 pieces weighing 2,564 grams demonstrated that the decorated earthenware were heterogeneous, with approximately half being decorated by carved-paddle-impressing and the remainder by incising and appliquêing. The designs of these decorations are mostly geometric and can be found on earlier pottery throughout Southeast Asia. Additionally, their manifestation on other forms of material culture such as textiles, statuary and architectural bas-reliefs suggested their popularity.

1 Now re-named National Gallery Singapore.
**Keywords:** Earthenware, decorations, surface treatment, typology, pottery tradition, manufacturing technology, Singapore, Temasek, pre-colonial, 14th century CE

**Introduction: The Definition of Decoration**

In the archaeological context, decorating is a process to ornament pottery or to make it more attractive (Rice 2015: 154). Decoration is often carried out before firing. However, decoration is not so easily defined. For example, a textured surface created by a carved-paddle or paddle bound with cord, vine, bark or basketry material, may have been intended to provide some form of grip especially to a rounded pot (Mourer 1984: 33). Slipping and burnishing, which is often associated with the intention to beautify, could also have been carried out to seal the surface of the clay fabric in order to reduce the porosity of the vessel so it could store fluids more efficiently. Some decorations may have been simultaneously functional and symbolic. It is important to define what is considered a decorative feature in the context of this paper.

For this paper, features that were deliberately created on the surfaces of potsherds via impressing, incising, punctating, sculpting and appliquing will be considered decorations. Textured sherds that could be attributed to the ergonomic functions stated above were only identified on a handful of sherds. These are considered decorations until evidence suggest otherwise. Furthermore the variety of decorations found at NAG appears to imply that decorations were more likely a form of visual communication. Other attributes that were excluded were the small quantities of slipped and/or burnished sherds. The few examples were badly deteriorated and inconclusive and will be examined at a later stage as part of this on-going research.

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Functional appendages such as spouts, handles, lugs and knobs (different forms of appliqué) are not considered a decorative feature because they are primarily utilitarian components designed for a functional role. Furthermore, there were no visible decorative qualities on the sample set to suggest they contributed heavily to ornamentation. Appliqués, however, refer to ornamental relief features such as bands and ridges. More descriptions on each type of decoration are in the methods section below. No painted earthenware was identified.

**Literature Review and Terminological Confusion**

The majority of decorative terms (Table 18.1) used in the research of Southeast Asian earthenware (decorations) subscribed to archaeological conventionality. Terms such as “impressed”, “stamped”, “embossed” and “pressed” were easily understood. Many of these terms were also inter-changeable. The same could be argued for “cut”, “carved”, “scratched” or “incised”. Although these terms provide a general understanding, it is difficult to distinguish the explicit variability within these techniques.

Prudence Rice (2015: 155-156) recognized two main processes used in pottery decoration: “penetration and displacement” and “addition”. Both were known as surface treatments. The former classified any action(s) that involved a tool or implement that cut into or through moist clay. As a result, they caused the movement of clay from its position. The later described processes that involved clay, paint or slip being added to the surface. Rice’s framework considered and encompassed most possible types of decorations in fundamental detail. It provided the most suitable and adaptable framework for analysing the NAG artefacts.

Wilhelm G Solheim II exercised similar terminology and categorization by regarding surface treatment as a fundamental attribute to pottery decorations. His terminology made clear distinctions when describing a particular decoration. For example, he used “impressed: bound paddle” or “impressed: carved-paddle” (Solheim 1959a). The word structure was definitive and helpful because it combined the technique (impress) and the type of tool used (e.g. carved-paddle), allowing readers a more accurate understanding.

Terminology used in the same context can be rather confusing; for example, impressing and stamping share similar meanings. The loose application of these terms without clear definitions does little to delineate their differences. Generally, they describe a tool or object that was pressed into the moist clay
to form a recessed impression. Miksic explains “stamping implies a more careful, systemic application of
a complex motif” (2013: 276). However stamping may be difficult to determine when the sample set is
fragmentary. It is very difficult to visually locate definitive signs of a “systemic application” of repetitive
imprints caused by stamp edges.

Additionally, determining the boundaries and component traits of a “complex motif” can be difficult.
Miksic illustrated examples of stamped designs that featured curvilinear scrolls, solar radials, lenticular
petal-like elements and irregular floral patterns. These examples were used for comparison. However, this
category may need revision when appropriate samples are available for analysis.

Rice recognizes impressing as a broad category that includes all decorations formed by the
technique of pressing (and removing) an implement onto the moist clay causing it to be displaced as oppose
to incising, which cuts into the clay and involves the tool being drawn along the surface. Stamping is
defined as a form of impressing alongside other methods, such as simple impressing (shells, carved-paddle,
etc.), rouletting, rocker stamping and punctuation.

Michael Hughes and Clive Orton (1993: 89-92) formulated a similar framework to Rice’s. They
used different terminology to describe the same decorations. However, they were less explicit and did not
create more detailed subtypes. Alternatively, Anna Shepard’s (Shepard 1956: 193-202) classification is
dissimilar by making distinctions between plastic techniques and painting. Glazing, slipping and polishing
were considered types of surface finishing not exclusive to pottery ornamentation. Her detailed analysis
of incising techniques is particularly helpful. Ultimately a clearly defined terminology is crucial to reduce
confusion. A clear definition also needs clear examples, and this will give readers and researchers a more
accurate and synchronized understanding.

Summary of the Excavation

Since 1984, vast corpuses of artefacts have been recovered in 10 major archaeological excavations
in Singapore’s civic district. Most sites are situated on the northern banks near the mouth of the Singapore
River (Fort Canning 1984, Parliament House Complex 1994, Empress Place riverside 1998, Colombo
These excavations concluded the existence of Temasek or Singapura circa 14th century to 17th century CE.
Archaeologists now believe the sites represent the remains of the ancient cosmopolitan port city (Miksic

The NAG site (Fig. 18.1) is located by the Supreme Court (1939) and City Hall (1929) buildings.
These colonial buildings were slated for redevelopment into a museum to showcase Southeast Asian
art. Archaeologist Lim Chen Sian carried out evaluations in December 2009, which revealed pockets of
undisturbed Temasek cultural layers (14th century). This resulted in a major rescue excavation. A total of
375 kg of artefacts were recovered from stratified layers spanning the past 700 years.

The majority of the ceramics was Chinese high-fired glaze and unglazed stoneware storage vessels,
greenware (celadon) produced in Zhejiang and Fujian, white ware, and late Yuan period blue and white
ware (Lim 2017: 57-64). Several glazed high-fired religious figurines were also excavated. One example is
possibly the torso of a Bodhisattva Avalokitesvara or the Chinese deity Guanyin.

Earthenware formed the next most abundant group after stoneware and porcelain. Most represent
household utilitarian vessels similar to those produced in the Straits of Melaka region. Other unique artefacts
consisted of a small fragment of crumpled gold foil, rare medieval glass and dense pockets of Chinese
copper cash. A provisional interpretation by Lim suggested that the unusual pattern of artefact distribution
and variability of the 14th century layer ceramics indicated that small residential units were represented at
the site. Additionally, dense artefact clusters found in several units suggested that specific activity areas also
might have demarcated the compounds of these households (Lim 2017: 67).
### Table 18.2

<table>
<thead>
<tr>
<th>Description</th>
<th>Weight</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total artefact yield for NAG</td>
<td>375,042 g</td>
<td>100%</td>
</tr>
<tr>
<td>Total pottery yield for NAG</td>
<td>185,255 g</td>
<td>49%</td>
</tr>
<tr>
<td>Total earthenware yield for NAG</td>
<td>32,061 g</td>
<td>9%</td>
</tr>
</tbody>
</table>

*Table 18.2* The overall mass\(^2\) of the artefact yield from both phases of excavation (Lim 2017).

### Methodology

Prior to analysis, the earthenware artefacts were sorted into two basic categories: those with inclusions in the clay fabric and those without. Staff and volunteer labour at the ISEAS – Yusof Ishak Institute’s Archaeology Unit used touch and visual recognition to sort the categories. Those with inclusions were typically rough and gritty due to either natural occurring or purposefully added non-plastic material such as sand. These were grouped as tempered. Fabrics without any discernable inclusions were grouped as fine paste – primarily because they felt smooth, chalky or soapy. Sub-categories were then created according to physical traits such as rim, neck, body and base. Decorated sherds were separated from non-decorated (plain) sherds.

The term “tempered” did not elucidate whether the inclusions were natural or intentionally added. It is recognized that the properties of the clay matrices is an important component of pottery analysis. This topic may have significant implications for the earthenware assemblage, but will be addressed in a separate paper on clay fabrics.

### Sampling and Analysis

The initial intent was to examine all decorated earthenware sherds in order to compare horizontal and vertical distributions. However, due to the disturbed nature of the upper stratigraphic layers, the better-preserved 14\(^{th}\) century layer (Temasek cultural layer) was selected from several excavation units to be analysed. All 11 test units (NAG 001 to 011) from the evaluation (2009) were selected because they formed an east-west transect spanning 87 metres, and was therefore ideal to examine site distribution. Six more units (NAG 012, 013, 020, 021, 022, 024) from the rescue excavation (2010) were sampled based on their distinctly rich earthenware density. A sample of 585 pieces weighing 2564 grams was analysed. The sample size mass is approximately eight per cent of the total earthenware assemblage. It is one per cent of the entire ceramic yield.

All sherds were visually analysed. Some were examined with the aid of a 30x magnification loupe. Data was recorded on specialized typology sheets featuring attributes with vessel part, mass, approximate dimensions, provenience and photographic documentation. Consequently, a data set was formed to create charts for comparison and interpretation. The following sections describe the four main attributes with additional information in figures 18.2, 18.3, and 18.4.

**Attribute Number One: SURFACE TREATMENT**

Surface treatment describes the kind of intervention carried out by the potter on the surface of the clay while in a plastic state (Rice 2015: 154-155). These physical manipulations may remove and/or displace the clay. In some cases, combinations of surface treatments were observed. The three types of surface treatments identified were:

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\(^2\) Weight is based on un-washed artifacts.
Penetration-and-Displacement
This occurs when there is displacement or removal of clay material (Rice 2015: 155-156). It involves two types of operational actions (see description of attribute no. 2): impressing and incising. Impressing requires a tool or implement that is pressed down with one or more depressing actions to ingrain motifs (defined in attribute no. 4) on the pottery surface when the clay is still in a plastic state. Incising involves a tool that penetrates the moist clay surface before being drawn to cut or excise along the surface.

Addition (to the surface)
Addition (Rice 2015: 159) refers specifically to extra clay material being applied onto the vessel surface to create a raised or relief feature that is commonly known as an appliqué. The added clay is usually manipulated with fingers and or with the aid of a simple implement to resolve the decoration. Appliqués found at NAG were mostly horizontal or vertical bands, and these were defined as low-relief-appliqué. The physical junctures between most appliqués and the main pottery surface were often not smoothed properly to create a seamless joint, hence allowing their easy identification. High-relief-appliqués, such as decorated spouts, handles and lugs, were not present in the sample size but can be added to the typology. Painting did not occur and slipping may have only occurred in low frequency.

Shaping
Shaping in this context should not be confused with the physical manipulation of the clay during appliquéing. It diverges from appliqué by not requiring the addition of clay to form a relief decoration. Ridges and bands look very similar to those produced by appliquéing. However, close examination of the sherd profile indicates they were formed by penetrating a tapered implement into the moist clay surface at an angle to accumulate clay in order to form a relief feature, possibly with the aid of a turning device. These operational actions (attribute no. 2) were defined as sculpting. The resulting decorations are termed as low-relief-sculpting. In addition to bands and ridges that often adorn the shoulder of vessels, this method was also used to create ridges and cleft lips on stylized rims.

Attribute Number Two: OPERATIONAL ACTION
Surface treatments require operational action(s) to be carried out by the potter. Four types of operational actions were identified:

- Impressing (see description in Penetration-and-Displacement)
- Incising (see description in Penetration-and-Displacement)
- Appliquéing (see description in Addition)
- Sculpting (see description in Shaping).

Attribute Number Three: DECORATION
The third attribute is a combination of the type of tool used in conjunction with a specific operational action (attribute no. 2). This is normally used to describe the resulting ornamentation. Figure 18.2 exemplifies these decorations and shows them in relation to the other attributes described earlier.

Attribute Number Four: MOTIF
The visual components that make up a decoration are called motifs. Elements, which are considered the “simplest regular parts” of any motif, may combine to form the fundamental decorative unit in a simple decoration (Shepard 1956: 266). In the case of more complex designs, they may be configured in groups of units made up of a combination of different elements (Shepard 1956: 266-267). The NAG sherds are highly fragmented. Thus, in most cases only partial units or elements can be discerned. It was sometimes not possible to determine if the element, unit or motif is the primary or secondary component of the decoration. Figures 18.3 and 18.4 present these motifs in their respective categories.
Many types of decorations were encountered. The majority of decorated sherds, however, were found in relatively small quantities in each excavation unit. There are no indications that the pots were broken and deposited in situ. There are few matching sherds to allow reconstruction of whole vessels or even substantial parts of the same vessels. This implies the broken sherds may have been moved or re-deposited – perhaps related to ancient site cleaning/maintenance practices, possibly re-deposited as fill for instance. In any case it is difficult to fully reconstruct and understand the design configuration of the decorations.

It is possible that multiple fragments from the same pot featuring different decorations were counted separately. A solution for this problem will be to expand this research to assess clay matrices to strengthen the current typology.

The following points summarize the results of the analysis:

1. **Surface Treatment** (Attribute no. 1): Five types of surface treatments (Figs. 18.5 and 18.6) were carried out to produce the decorations. Penetration-and-displacement accounted for 88 per cent (by sherd count). They were responsible for all the recessed decorations. The remainder consisted of relief decorations or a combination of recessed and relief decorations.

2. **Operational Action** (Attribute no. 2): The surface treatments mentioned above were performed by eight operational actions (Figs. 18.5 and 18.7). Impressing and incising were the most common at 52 and 38 per cent respectively by sherd count. Appliquéing represents 4 per cent, and sculpting 1 per cent – both considered rare.

3. **Decorations** (Attribute no. 3): A total of 23 decorations (Figs. 18.5 and 18.8) were identified. Carved-paddle-impressing accounted for the majority with 272 pieces weighing 718 grams (46 per cent by sherd count). Gouged incising were the second most common (30 per cent). This is evident on mainly rim fragments with concentric grooves. In contrast, the remaining 21 decorations are relatively uncommon – sherd counts range from 5.6 per cent to less than 1 per cent.

4. **Motifs** (Attribute no. 4): A diverse assemblage of 75 motifs (Figs. 18.3 and 18.4) was distinguished. These include type-variations of certain designs. Carved-paddle-impressing resulted in 18 geometric motifs, forming the majority (46 per cent by sherd count), with the alternating hachured motif (18 per cent) being the most common. They were found in 10 of 16 excavation units. Other recurring geometric motifs produced by the same method were: hachured (13.5 per cent), rectilinear meander (7 per cent) and herringbone (3 per cent). Rim fragments featuring concentric grooves (one-groove, two-groove, three-groove, five-groove motifs) were found in abundance. They were found in every excavation unit, and the one-groove motif in particular was slightly higher in quantity (20 per cent) than the alternating hachured motif. (Refer to Figs. 18.2, 18.3 and 18.4).

All carved-paddle-impressed sherds were coarse. Therefore, they belong to the tempered variety. Their predominance was consistent with the assemblage excavated at other nearby sites in Singapore (Miksic 2013: 266-280). Recurring motifs such as the alternating hachured (Fig. 18.3a), hachured (Fig. 18.2a) and herringbone (Fig. 18.3c) consist of a series of diagonal parallel lines set either in a repetition going around the neck/shoulder of the vessel or were grouped in geometric units to form symmetrical configurations.

The rectilinear meander motif (Fig. 18.3b) was found in small amounts over several excavation units. It consisted of at least four type-variations, with one variant made of unconnected square-within-a-square design instead of a right angled-spiral. Most of the other carved-paddle-impressed motifs (Fig. 18.3) were found in limited amounts, with some occurring only in a single excavation unit. Other impressed decorations scattered throughout the site such as bound-paddle-impressed, stamped and punctated were...
featured on both the fine past and tempered varieties. There were 11 fine paste sherds featuring matt-marked, floral, curvilinear scroll and dot-in-a-circle motifs. An unusual motif of what appears to be the palm of a human hand was stamped onto a small fragment. This is possibly part of an appliqué or figurine. Also, there is a unique delicate lid of a thin-walled fine-paste covered box impressed with a fine pattern of a radially woven net fabric (Fig. 18.3g).

Although incising made up 37 per cent of the assemblage by count, the motifs produced were not as varied as those produced by impressing. The bulk includes stylized rim fragments featuring gouge incised concentric grooves. Mirroring Miksic’s observation of their rarity in Singapore (Miksic 2013: 276), single-point-incised decorations were significantly less frequent, forming only 5 per cent of the sample size. Nevertheless, this particular decoration still resulted in 10 different motifs. These motifs range from simple border bands and parallel lines to more representational designs like chequered pendant and scallop motifs found exclusively on the fine paste variety. It is also important to note that all multi-technique decorated sherds (Figs. 18.4 and 18.5) feature single-point-incising and gouge incising.

Appliqué decorations often appear as ridges or border bands that encircle the body of the vessel. There are only eight tempered sherds out of 39 with appliqué decorations. The rest are the fine paste variety. Appliqués on the fine paste sherds were regularly accompanied by recessed motifs created by incising or impressing (Figs. 18.4a, 4b, 4d). A very small and thin walled fine paste sherd (Fig. 18.3i) was found in unit NAG 004, with a thickness of only three millimetres (discounting appliqué elements). It features a curvilinear pattern, which appears to be organic or floral elements that were painstakingly added and sculpted. NAG 022 yielded a putty coloured, smooth and chalky sherd (Fig. 18.3k) with possible green lead glaze featuring an appliqué with stamped elements resembling a tubular scaly body; presumably a reptilian representation or dragon. This sherd was either low-fired or badly fired. There are no signs of clay vitrification. It is an unusual specimen in the earthenware category.

Discussion

While the carved-paddle-impressed, alternating hachured, hachured, rectilinear meander motifs, and rims with gouged concentric grooves were found throughout the site in appreciable quantities, the remaining scattering of 71 motifs were significantly low in individual sherd counts. Is it possible that this pattern reflects both consumer consumption and site function? What sort of activities could have resulted in such a distribution? Despite the small sample size being only eight per cent (by mass) of the total earthenware yield, some important considerations can be presented.

Site Distribution of Decorated Earthenware

Researchers have not yet determined the population density or spatial distribution of Temasek. Archaeological evidence backed by historical records indicates that the settlement was a commercial transhipment point for various commodities, especially Chinese trade pottery (Miksic 2013: 289-323). The society was likely cosmopolitan with foreigners intermingling with the local population (Miksic 2013: 175). It is therefore plausible to assume that the immediate areas north of the river mouth would have been bustling with commercial, industrial and residential activities.

We have not yet been able to discern specific quarters or activity areas. However, we do know for example that glass working and metalworking represented specialized industries and may have been relegated to certain sectors (Miksic 2004: 49-50). The “palace” may have been located at Fort Canning. The palace area may have housed specialized artisans as well. The earthenware assemblage variation will assist with understanding urban settlement and activity variation as well. All proximate archaeological sites (Fort Canning 1984, Parliament House Complex 1994, Empress Place riverside 1998, Colombo Court 2000, Old Parliament House 2002, Singapore Cricket Club 2003, St Andrew’s Cathedral 2003/2004, Victoria Concert Hall 2010/2011 and the Empress Place lawn 2015) yielded dense assemblages with vast quantities of earthenware artefacts.
Similarly, earthenware is found in every excavation unit at NAG, and this may suggest that some of the activities related to the site were domestic in nature. Examples of ethnographic studies conducted on Kalinga earthenware usage in northern Luzon, Philippines, demonstrated how they were used for cooking rice, meat, vegetables and storage of drinking water (Stark 1991; Skibo 1994), and also for steeping herbal medicine, and as religious paraphernalia in southern Yunnan, China, northern Thailand, Laos and Vietnam (Lefferts and Cort 2012).

A solitary earthenware jar found on the 14th century Turiang shipwreck (Sjostrand and Barnes 2002), presumably a crew item for storage or cooking, provided an imaginable setting where docked ship crews and passengers may have come ashore with their personal earthenware vessels amongst other supplies for subsistence. These items could have been bartered or simply left behind after breakage. If visitors such as these were a common occurrence in ancient Singapore, this might explain the high variability of earthenware decorations deposited at the site. Based on Lim’s provisional hypothesis (Lim 2017: 67) that small households probably occupied the site, this small but heterogeneous assemblage may represent the types of decorated earthenware present in those environments.

**Trade and Exchange of Earthenware Goods**

Hundreds of fine paste kendis vessels had been found as secondary cargo on the 10th century Intan shipwreck (Flecker 2004), 13th century Java Sea shipwreck (Flecker 2003: 400-401), and the early 15th century Bakau shipwreck (Flecker 2001: 226-227). These particular kendis vessels with a possible South Thailand region origin suggest that earthenware goods were not entirely restricted to household production and small-scale distribution.

Research conducted at Tanjay, Bais region, Philippines (Junker 1993: 14-15), for example, indicates that upland interior tribal populations did not produce earthenware themselves, but traded forest produce with the lowland coastal regions for earthenware products. Furthermore, Southeast Asian trade networks had been well established by that time (Hall 2004, 2016). Earthenware vessels were undoubtedly part of the material culture exchange as products, vessels/containers for other products, or both. Examples of these products were foodstuffs, spices, pearls, frankincense, textiles, Chinese ceramics, metals and jungle products: rhinoceros horn, elephant tusks, tropical wood and tropical birds (Hall 2004: 236-237).

Miksic and Yap conducted compositional analysis on fine paste sherds from Singapore and Kota Cina, and hypothesized that South Thailand and East Java were probable production centres of fine paste earthenware near Singapore. The fine paste sherds found in Singapore appear similar to those from South Thailand (Miksic and Yap 1992). A value-chain (exchange network) can be deduced from this line of inquiry.

To supplement this hypothesis, an incised fine paste sherd (Fig. 18.9a) found in Pa-O, seventeen kilometres south of Mueang Satingpha, Thailand, had the same decoration as fine paste fragments found in Singapore (Fig. 18.9a). At NAG, small quantities of kendis spouts were also found in addition to fine paste sherds decorated with motifs (low-relief-appliqué; border band, single-point-incised; parallel lines, single-point-and-hollow-point-punctated; dot-in-a-circle) that were typical on some kendis. Fine paste sherds comprise 12 per cent of the NAG sample size. Their rarity may suggest they were either unpopular, not a common item at the site, or they could have been niche products at Temasek, or simply limited as elite/prestige items.

Coarse earthenware found on the 15th century Koh Sdach shipwreck (Beavan et al. 2012) provides evidence that the trading of earthenware was not limited to the fine paste variety. Amongst the primary cargo of Thai celadon and stoneware vessels were numerous cooking pots and stoves. Therefore, it remains

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3 Derived from the Sanskrit word kundika, which means water vessel, the Malay word Kendi or kundi describes a type of vessel that was common in Southeast Asia. Its typical form consisted of a globular body featuring a stubby or slender spout, a tall neck with flanged rims and a flat base or ring foot.
debateable that earthenware products found in Singapore, regardless of the more numerous tempered variety or the sporadic fine paste variety, could have been imported, locally produced, or both.

**Antiquity of the Decoration motifs**

Solheim proposed that there were two main pottery traditions in Southeast Asia: the Bau-Malay pottery tradition and the Sa-huỳnh-Kalanay pottery tradition (Solheim 1990: 26).

The dominance of the carved-paddle-impressed geometric decorations seems to place the NAG assemblage in context with the former. Solheim believed that it was inspired by the geometric pottery from Southeastern China (Solheim 1990: 26), which occurred as early as 3000 to 2500 BCE (Meacham 1979: 127). The formation of the Bau-Malay pottery tradition could have been simultaneous with the Sa-huỳnh-Kalanay pottery tradition (Solheim 2005: 92), starting as early as 1000 BCE (Solheim 1964: 376).

Although comparisons made in this section were restricted to decorations, many similarities seen through the widespread use of similar motifs could be found throughout prehistoric Southeast Asia. For example, the carved-paddle-impressed, alternating hachured motif (Fig. 18.3a, 18.9) were single-point-incised on pottery excavated within a context of the late prehistoric Phung Nguyen culture in the Red River valley region (Vietnam) dating from the first millennium to the second millennium BCE (Ha 1984/1985: 136, 138). This particular motif, along with the rectilinear meander (Fig. 18.3b) and herringbone motif (Figs 18.3c, 18.3h), were also circulated on later period Sa-huỳnh pottery (Parmentier 1924: Fig. 2, Fig. 11, Fig. 12, Fig. 13) in southern Vietnam. Potters who produced the Late Neolithic period Kalanay pottery in southern Philippines also had a preference for geometric motifs, such as the alternating hachured, rectilinear meander, herringbone, chevron, plain circles and dot-in-a-circle motifs (Solheim 1959b: Fig. 1, Fig. 2, Fig. 3, Fig. 4, Fig. 6). These motifs are mostly single-point-incised and punctated. The NAG variants were carved-paddle-impressed, stamped or punctated.

Carved-paddle-impressed chequer motifs were found on Han style ceramics at Khao Sam Kaeo (Bellina et al. 2014: 77), an early fourth to second or first century BCE coastal settlement in the northern part of the Kra Isthmus, Gulf of Thailand. The chequer motif is made up of alternating square units of hachured lines. This corresponds with NAG’s alternating hachured (perpendicular) motif. A site in northeastern Bali, Indonesia, yielded earthenware artefacts with similar motifs (Ardika 1991: Fig. 5.12). The examples were excavated from a first and second century CE stratigraphic context. Examples presented a diverse application of hachured triangles and dot-in-a-circle motifs in varying design configurations. In spite of these similarities, it must be noted that the complete designs found on the earlier pottery were often uniquely different from the NAG specimens.

**Similarities with Nearby Sites**

The earthenware decorations found in Singapore are often identical to those from the Kota Cina and Johor Lama sites, in Indonesia and Malaysia respectively. These settlements appear to indicate a preference for geometric motifs made by carved-paddle-impressing. Kota Cina was an economically thriving settlement (Miksic 2004: 52) which existed one or two centuries earlier than Temasek along the northeastern coast of Sumatra. Alternatively, Johor Lama appeared after the decline of Temasek, serving as the fortified capital of the Johor empire from about 1540 CE (Gibson-Hill 1955: 138).

Rectilinear, meander and hachured motifs are common elements in the assemblages of these sites. However, what makes the Johor Lama assemblage (Gibson-Hill 1955: Pl. 13) distinct is the variety of impressed floral motifs. These are also present at NAG in small amounts, but lacking in the Kota Cina assemblage (McKinnon 1984: Figs. 18-21, Pl. 57-69). Other common motifs between the sites are variations of solar radials and intricate saw tooth elements. These are more prominent at Johor Lama (Gibson-Hill 1955: Pl. 8, 9, 10, 13, 14). The differences may represent an evolution of style because Johor Lama was the latest of the three sites.
The homogeneity seen in the decorations may reflect the vast socio-economic networks (Hall 2004, 2016) that had already been in place many centuries preceding the rise of these settlements. Hall describes that the population of Southeast Asia was heterogeneous and political power centres were defined by the loyalty of people and shared resources, unlike present day partitioning by geographical borders. The traditional arrangement encouraged “cultural crossovers”, which could explain that the shared pottery tradition between these three settlements may not have been limited to their contiguous periods of existence, but rather, as a result of the wide ranging networks that existed over a multitude of overlapping settlements (Hall 2004: 231; 2016: 391).

Neither were similarities limited to within the Straits of Melaka region. Archaeological investigations carried out by the Greater Angkor Project III (GAP) at Kok Phnov, Cambodia in 2012 yielded decorated earthenware potsherds with strikingly similar motifs (Rachna et al. 2012: Fig. 11). This 10th to 17th century CE site in the heart of the Angkor interior contained ceramic industrial production consisting of earthenware artefacts decorated with carved-paddle-impressed, serrated saw-tooth and alternating hachured motifs (Fig. 18.9b). However, it is not certain what sort of information was being communicated through these motifs, if any, and whether the producers of these pottery shared the same inspirations as those in the Straits of Melaka. It is difficult to know if there was a shared tradition or if motifs were coincidentally similar. It is also difficult to know if meaning may have been similar or the shared popular motifs may have taken on different meanings among different peoples.

**A Wider Context of Artistic Style(?)**

It appears that some of the enduring motifs discussed earlier in this section were not merely recurrent on pottery, but were expressed on a variety of other material as well, such as metal artefacts, statuary, textiles and architecture. What could the widespread sharing of these motifs over long periods of time mean in a wider context of Southeast Asia? It is important to consider the similarities and implications, but caution is still warranted in assigning direct transmission or influence.

For example, the herringbone, rectilinear meander, serrated saw tooth and dot-in-a-circle motifs can also be found on Dong Son bronze drums in similar fashion with some of the NAG earthenware; symmetrical or repeating motifs configured within concentric bands and bordered panels (Calo 2014: 9-10). Interestingly, Dong Son pottery did not inherit the intricate decorations accorded to the drums. The pottery is in fact much simpler than preceding periods and mainly consisted of impressions made by carved or cord-wrapped paddles with virtually no incised decorations (Ha 1984/1985: 141-142). Is it possible that the widespread circulation of the iconic Dong Son drums during the Late Metal Age (300 BCE to 500 CE) proliferated the popularity of specific geometric motifs? However, geometric motifs are a widespread phenomenon globally, and the Austronesian repertoire of pottery designs over the last three to five millennia, for example, are replete with a large variety of geometric designs.

Interestingly, textiles depicted on the bas-reliefs of Apsaras at Angkor Wat, circa 12th century CE (Fig. 18.9c), featured once again rows of alternating-hachured, floral, and lozenge geometric motifs interspersed with beaded borders. Similar depictions can also be found on a 12th to 13th century CE Khmer stone sculpture of Tara (Abbate 1972: 141), which is on display at the Musée Guimet of Paris (Fig. 18.9d). These motifs, in comparison with those seen on the pottery, appear to be symbolic when viewed in the Angkor Wat context. Nonetheless, one could argue they may merely represent a popular design from that period.

Rare textile fragments found in Egypt and Indonesia, radiocarbon dated to the 14th to 15th century CE (Guy 2007: 41, 42, 45, 47, 48), seem to indicate the diversity of the textile designs being exported from Gujarat, India. The Egyptian specimen (Fig. 18.9e) presented a geometric style made up of radial floral motifs, one of which was also found at NAG, as well as rows of repeating lozenges similarly depicted on the Apsaras at Angkor Wat and on one earthenware fragment at NAG. The other specimen (Fig. 18.9f) found in Indonesia exhibited stylized humans and birds juxtaposed against an irregular background composed
of familiar dot-in-a-circle and curvilinear scroll motifs. These rather contemporaneous artefacts strongly suggested that decorative motifs were recycled, resulting in a popular visual style. It is too early to determine the degree and nature or relationships or coincidences. However, it is important to evaluate the designs and motifs on other forms of material culture. It is equally important to consider these within the larger context of extended trade and influence networks.

Conclusion

This research achieved its aim of forming a typology. The immediate results present an interesting profile of the pottery style as well as the people who produced, circulated and consumed these products. Several aspects of this profile are: 1) the various manufacturing traits associated with the production of pottery decorations; 2) the types of actions carried out by the potter(s) during these activities; 3) techniques and tools; and 4) decorative motifs and type-varieties. Additionally, comparisons with other sites and material culture suggested the possibility of shared traditions, interactions and trade. In summary, this research presented stylistic, technological and the distributional characteristics that form a baseline to examine the wider context of earthenware tradition found in ancient Singapore.

However, the research on decorative traits only represents a few of the aesthetic qualities of pottery style. As defined by Prudence Rice, pottery style is multi-dimensional and includes the variability of several crucial components, such as the communicative function (visual information, decorations, for example), production technology (the way it was made) and traditional constraints (established practices) versus the distinct extreme of an individual potter’s choice (artistic expression) (Rice 2015: 388-410). These components remain unexplored with the NAG and other Singaporean earthenware assemblages. Further consideration and research will provide more information and perhaps address the socio-techno-economic network mentioned above.

Style, as is, will be the central theme for the expansion of this research paper. The same sample set will be subjected to a new battery of analysis to determine if this typology can be further refined to characterize and distinguish the types of earthenware present at NAG. The next stage will involve macro-analysis of the clay fabric to identify properties such as the colour, firing quality, texture, clay inclusions and tempering, granulometry, grain angularity, grain proportion, porosity, etc. The results will also exemplify the way the pottery was manufactured based on the way raw material was selected and prepared, the forming methods, the surface treatments, decorations and finishing. Chaîne opératoire (Roux 2015) considerations are critically important as it addresses the technological choices of potters during these various stages of manufacturing: Why were materials selected, and how, and why were they processed in that manner? This anthropological approach provides a valuable dimension to pottery style.

Consequently, this paper raises more questions than answers. The discussion topics are by no means exhaustive. The objective to expand this research is to collect more data from the artefacts and reconcile them with the topics raised. Vessel form and function will also be analysed, despite the fragmentary and incomplete nature of the sample set. More effective quantification methods as well as ethnographic data will be introduced. Some basic questions remain, such as: How many types of earthenware were present at NAG, and how were they made? Was there any standardization in their production that might suggest a centralized production industry indicating an economic production centre or monopoly? Or perhaps the opposite occurred, whereby production was ad hoc and carried out by dispersed household/cottage industries? What implications will the new results have on the earlier data? Which earthenware type(s), if any, were native to Singapore and truly Temasek pottery? The future research will set the stage for more explicit analysis, such as ceramic thin sectioning and compositional analysis to identify the origins of the clay source.

Ceramics form the majority of artefacts found at NAG. They are material residue from past human activities that were not necessarily limited to the site function(s). These activities may range from acquisition (of raw materials), manufacturing (of the vessels), usage, disposal, post-depositional activities
and formation processes. The physical characteristics that make up each earthenware potsherd serves as a chronicle to these activities and their analysis remains the only means to understanding the many aspects of daily life in ancient Singapore.

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<td><strong>Table 18.1</strong> Examples of terminology used in Southeast Asia.</td>
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The following paper provides readers a cursory overview of regional efforts in archaeology by the Nalanda-Sriwijaya Centre (NSC), ISEAS – Yusof Ishak Institute, Singapore. These include the NSC Field School, archaeological research projects, publications, fellowships and workshops. Sites specific to the geography of Singapore are excluded as they are covered separately (e.g. Kao, this volume; Lim 2017). Archaeological research sites outside of Singapore are currently concentrated in Cambodia. They include three 8th-9th century CE sites at Phnom Kulen; four sites at the 10th century CE Angkorian capital city of Koh Ker; and an Angkor to post-Angkor period rock art site (Kanam) in the Cardamom Mountains. The Koh Ker site was the Field School centrepiece for two consecutive campaigns in 2015 and 2016. The Field School arguably involves a much greater and broader level of regional impact as 73% of the Field School participants are ASEAN country citizens (41 of 56 total participants for four Field Schools since 2011), 90% of ASEAN countries are represented, and 100% of the research and training area includes Southeast Asian sites. Research projects inclusive of the Field School are intentionally small scale and diverse. They are intended to complement larger efforts being conducted by local and international teams. Furthermore, they are designed to address rudimentary research questions and provide training in research design, methodology, field techniques and basic analysis. Significant attention is given to the Field School due to its uniqueness, multi-faceted goals, regional impact and diverse regional participation. Comprehensive details of the Field School are provided in separate assessment reports (Latinis 2016a, 2017). A summary section is provided below. The results of the archaeological research remain the primary focus of the following discussion.

Keywords: Archaeology Field School; Koh Ker; Radiocarbon Dates; Phnom Kulen; Sema Stones; Rock Art; Decorrelation Stretch (DStretch)
The following article summarizes recent undertakings related to regional efforts in archaeology by the Nalanda-Sriwijaya Centre (NSC), ISEAS – Yusof Ishak Institute, Singapore. The NSC Field School, recent archaeological research projects in Cambodia, publications, fellowships and forums\(^1\) provided primary examples for the 2016 SPAFA conference presentation (Fig. 19.1). Field School research and training (Fig. 19.2) were conducted at the 10\(^{th}\) century Koh Ker site in Cambodia (Latinis 2016a, 2017). Other research projects include the 8\(^{th}\)-9\(^{th}\) century Banteay site (Phnom Kulen, Cambodia; Latinis and Ea 2015), the adjacent contemporaneous Peam Kre and Don Meas sema stone sites (Latinis 2016b) and the Angkorian to post-Angkorian Kanam rock art site (Cardamom Mountains, Cambodia; Latinis et al. 2016). Figures 19.3-9 provide summaries of primary research results. Although a brief synopsis of the NSC and Singaporean contributions to regional archaeology is provided, the Field School and Koh Ker project results are central to this particular paper. Field School design and assessments are discussed at length elsewhere (Latinis 2016a, 2017).

Although covered separately (Foo et al. 2016), it is important to note that several recent archaeological research and salvage operations have been conducted at various sites in Singapore (e.g. Kao, this volume; Lim 2017). Findings have significant implications for terrestrial and maritime archaeology throughout the region. The Field School involves basic post-excavation analysis of artefacts recovered from Singapore sites. In addition, Singapore archaeology provides examples of community-based inclusiveness and volunteer contributions – efforts that were pioneered by Prof. John Miksic and others since the 1980s. These efforts continue to steadily increase through multiple approaches, including current activities at the NSC.

Singapore’s regional efforts are nothing new. Prof. John Miksic (Miksic 2013; Miksic and Goh 2017) at the National University of Singapore (NUS) and many Singaporeans and Singaporean institutions have made integral contributions towards regional research, training, information dissemination and creating opportunities for both Southeast Asians and other regionally interested professionals for decades. In fact, Prof. Miksic was a key founder of the NSC Archaeological Unit (AU) to include the continuously evolving international NSC Field School. Prof. Miksic also inspired and supervised numerous postgraduate students from several Southeast Asian countries including Singapore. They continue to provide important contributions to archaeology as well as increased regional integration.

Likewise, a growing number of Singaporeans are pursuing higher-level degrees in archaeology and related fields at institutions outside of Singapore. This has also resulted in professional research, education and employment opportunities with significant regional and global contributions. Furthermore, many Singaporean institutions and special interest groups play equally important roles, such as NUS, NUS Museums, Asian Civilisations Museum (ACM), the National Heritage Board (NHB), the National Library Board (NHB), the Ministry of Education (MOE) and the Southeast Asian Ceramic Society (SEACS). Contributions from private donors and researchers have added considerably.

Our current accomplishments at NSC are the legacy of cumulative efforts. Equally important are the regional partners at institutional and individual levels. Much of the success is built from their passions and perseverance to ultimately benefit local and international stakeholders – ranging from professionals in the humanities, science and social science fields, to local communities, schools, teachers and tourists who respect learning from the past and appreciate what the past can offer our future.

\(^1\) For example, “The Heritage of Ancient and Urban Sites: Giving Voice to Local Priorities” held in Singapore in March 2016 was designed to address regional concerns among ASEAN countries.
The NSC Field School

The NSC Archaeological Field School is one of the NSC’s premier regional efforts with high impact results. The Field School evolved from an East Asia Summit (EAS) initiative funded by Singapore’s Ministry of Foreign Affairs (MFA). It is open to all citizens of EAS countries. Overall, the MFA supported four Field Schools since 2011.

The most recent NSC Field School was implemented from November to December 2016 in Cambodia and Singapore. Research and training excavations were conducted at the Koh Ker site in Cambodia. It was the second campaign at Koh Ker since 2015. Koh Ker is an early 10th century Angkorian capital city associated with King Jayavarman IV. The site contains numerous architectural monuments and large-scale landscape features.

The 2015 NSC Field School was a unique revision of previous Field Schools. Rather than limiting the scope of the Field School to site visits, basic excavation skills training and cursory handling of artefacts during post-excavation processing, the Field School architects emphasized multi-level and interdisciplinary research design, planning, implementation, management, analysis and information dissemination. This addresses several gaps in typical skills-training programmes. We particularly stress the inclusion of research design\(^2\), methodology and management.

The general archaeological and historical theme of the Field School strategy focuses on the evolution of complex polities and urbanization in Southeast Asia amidst nested and overlapping economic, political and cultural networks. Different scales of interaction are emphasized – ranging from local contexts, such as local industries, ecology, labour, management, population, politics, economics and other specialty topics including food processing and consumption; to large multi-regional scales, such as trade and influence among South, Central, East and Southeast Asian polities. Furthermore, Southeast Asia is viewed as a diverse region of agency for analytical purposes rather than a passive receptor of foreign influence, a backdrop supplier and consumer or simply a passageway for more prominent global polities (e.g. those found in India and China during pre-modern periods).

The Field School re-design entailed a shift beyond opportunistically joining existing projects undertaken by universities, government agencies, international organizations and others in which conservation, restoration and/or research agendas are set by the principal investigator(s) – often the normative approach. For the 2015 Field School, the Directors asked upcoming mid-level Cambodian archaeologists to design their own relevant research questions and projects at Koh Ker, also taking on leadership roles in research design, planning and operations. The four site/operation managers decided on appropriate methodologies in relation to their own research questions, hypotheses, constraints and expectations. They coordinated and managed operations, receiving experiential training at a higher managerial level with mentorship from the Field School Directors and other professional staff. They also provided professional archaeological training and expertise to the participants. Subsequently, Field School participants rotated through the operations and were trained on a variety of field skills. Groups of participants then devised their own mini-research designs and methodologies, conducted basic analysis and presented their preliminary findings in Singapore.

Prior to excavations, a comprehensive itinerary of site and museum visits with interactive lectures and training opportunities covered complex polity evolution and dynamics in Cambodia, beginning with

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\(^2\) Understanding research design has significant implications including academic reporting and information dissemination. We emphasize the “why we are doing this” aspect of analytical and critical thinking skills, rather than merely the “how do we do this” and “what did we do and see” descriptive approach (a topic stressed during the SPAFA post-conference “Writer’s Workshop”).
the Neolithic, Bronze and Iron Ages and moving more thoroughly through the Funan (ca. 1st-6th centuries), Chenla (ca. 7th-8th centuries), Angkor (ca. 9th-14th centuries) and post-Angkor periods – approximately two to three millennia of history, art history and archaeology. Site visits and lectures began at the National Museum in Phnom Penh to review art and architectural history. Angkor Borei (Funan capital) and Sambor Prei Kuk (Chenla capital) were subsequently explored with interactive lectures and field survey training. Subsequently, numerous Angkorian sites were visited. All sites included discussions and experiential training in archaeology, art and architecture history, infrastructure, settlement, landscape modifications, hydrology, industry, GIS, environment, ecology, historical ecology and so forth.

Incidentally, topics including site and park management, tourism, local community impacts, social responsibility, ethics, education, cultural resource and heritage management, etc. were constantly emphasized. For example, ethics and informed consent were covered in lectures and demonstrations during anthropology and ethnoarchaeology modules. The training included local respondent interviews concerning traditional industries and current heritage preservation issues. Various professionals provided interactive lectures, demonstrations and discussion groups, either periodically or continuously throughout the Field School.

A key intent was realized, where participants, staff and professionals were able to share knowledge and skills with others in the context of a diverse yet socially comfortable, interactive and meaningful environment with a truly interdisciplinary, intercultural and experiential emphasis that addressed a relevant research initiative. Participants come equipped with a variety of complementary skills and experience in which lateral education among peers is highly cultivated. Participant selection is competitive and involves assembling a complementary team. What participants stand to gain is equally important to what they have to share and how they intend to share it. As of the 2016 Field School, there is almost 90% EAS representation and 90% ASEAN representation with 41 of the total 56 participants thus far (73%) being citizens of ASEAN countries.

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3 Phon Kaseka discussed kiln technology and recent discoveries at the Cheung Ek site to also include issues on site threats and management (Phon 2016). Dr Nancy Beavan covered radiocarbon dating with National Museum lectures on the Cardamom Jar Burial sites (Beavan et al. 2012, 2015). Tep Sokha discussed ceramic technology, conservation and the Koh Sdach shipwreck at a special exhibit at the National Museum. Several leading experts at the APSARA National Authority orchestrated a workshop (e.g. Im Sokrithy on the “Living Angkor Roads” project; Dr Hang Peou on water management; HE Dr Tan Boun Suy on local community development and agriculture; Keo Dara on GIS applications; Dr Ea Darith on kiln technology (Ea 2015); and others on topics to include park management, codes of conduct, environment, stewardship, etc.). Dr Damian Evans, Sarah Klassen and Dr Terry Lustig provided lectures on LIDAR, landscape archaeology, water management and water engineering during the Field School in conjunction with their own research at the massive Koh Ker dam site (Evans 2013, 2016). Dr Karoly Belenyesy provided on-site lectures regarding the Hungarian mission’s multiple research endeavours at Koh Ker, especially structural archaeology at Prasat Krachap (Belenyesy and Kuszinger 2015). Dr Kenneth Hall (Hall 2011) provided history, economic system and ancient network lectures. Dr Helene Njoto and Tran Ky Phoung (2014) oversaw art and architectural history, to include experiential workshops at Angkor Wat, Phnom Chisor, Sambor Prei Kuk, Angkor Borei, Phnom Da and Koh Ker among other sites. Youern Vuthy provided expertise on faunal analysis. Tse Siang Lim and David Brotherson provided workshops on mortuary and trade ware ceramics, respectively. The purpose was to provide a diverse spectrum of topics and professionals in order to expand awareness, build networks and appreciate the multi-disciplinary holism inherent in archaeology and related fields – another gap identified during the re-design of the Field School. Likewise, NSC researchers provided various focused training sessions with research contributions. Foo Shu Tieng held ethnographic and ethnoarchaeological training at both Kampong Chhnang traditional potting villages and Koh Ker while overseeing training for excavation skills and data recording. Aaron Kao provided technical and artefact drawing modules. Michael Ng oversaw survey and mapping training. Throughout the duration of the Field School, Dr Ea Darith and Dr Kyle Latinis covered topics ranging from auger sampling, geomorphology, ceramic industries, artefact typologies, economics and value chains to include site visits to the Torp Chey and Tani kilns. They also provided mentoring and highlighted the overarching themes related to research design, cooperation, partnership building, management and research ethics among participants and staff.
A robust evaluation approach to assess qualitative and quantitative measures of effectiveness was established (Latinis 2016a, 2017). Feedback is obtained from staff, participants, local communities and others. Without recourse to a detailed overview, the 2015 and 2016 sessions ranked much higher than expected (approximately 9.0-9.5 on an overall scale of 1-10; 10 being excellent). The re-design has been highly effective. We hope it serves as a model for others to modify and use.

**Research Results from the Koh Ker Field School Excavations**

**The Koh Ker Sites**

The Koh Ker sites afford the opportunity to effectively train multiple field and analytical skills while testing a variety of research questions. Koh Ker is the early 10th century Angkorian capital associated with Jayavarman IV. The ancient city is famed for large monuments, architectural features, landscape modifications and dynamic statuary that give it a unique and definitive style. Koh Ker’s duration, layout and connections to Angkor were respectively speculated by historians to be relatively short lived, strangely oriented and remote (see Evans 2013 for a comprehensive overview). This remains the current popular narrative. Modern archaeological views, however, challenge these assumptions (Evans 2013). Although a fair amount of research concerning art history and epigraphy has been conducted, the nature of settlement, activity, industry, economics and ecology remains an almost complete enigma. LIDAR research (Evans 2013, 2016) has enabled a vastly greater understanding of landscape modifications, complexity and scale. This has also increased our ability to ask different research questions and apply different sampling and methodological approaches.

Two excavation campaigns have been completed with the 2015 and 2016 Field Schools. During the initial draft preparation of this paper, only the 2015 excavations were completed. 2016 excavations are now finished, although post-excavation analysis is pending. The following paragraphs will synthesize the findings as accurately as possible.

Three sites were initially selected for excavations in 2015 (KK1, KK2, and KK3; see Fig. 19.7). KK1 and KK2 were identified as possible household mounds and/or activity areas based on LIDAR pattern analysis and surface surveys (Tho et al. 2015/2016). They were tested to determine the nature, density, stratigraphy and similarity of material remains. Primary questions centred on initial settlement dates, duration of site use and the nature of represented activities. It is reemphasized that Koh Ker is thought to be an almost exclusively 10th century phenomenon by many historians, although surface pottery remains include representation of local and exotic pottery ranging from pre-Angkor to post-Angkor eras.

It was highlighted at the SPAFA conference that Field School activities at sites other than Koh Ker also contribute to new research findings. For example, LIDAR, satellite and aerial image analysis coupled with ground truthing are increasingly central to training and research. One exercise included visually assessing extensive landscape modifications while comparing satellite images and topographic maps during visits to Phnom Chisor, an early 11th century temple complex associated with Suryavarman II. The group assessed artefact surface scatters at several locales, to include several mounds at the base of the hill near the gopuras and baray. They identified a shouldered stone adze and an abundance of Funan period pottery, especially buffware and kendi. The group also assessed architectural variation at the Phnom Chisor temples, shrines and other architectural features. There are indicators that earlier traits and features may have been built over or masked by the typical Suryavarman I makeover and intensive construction boom during the early 11th century. Previous and current site visitations and reconnaissance have resulted in the identification of an abundance of Funan period pottery, Cheung Ek pottery, Angkorian pottery and exotic post-Angkor pottery in several locations, including mounds around the base of Phnom Chisor and many nearby locations. Incidentally, the landscape modifications appear somewhat more geometric at Phnom Chisor compared to Angkor Borei, but it may be illusive because of Angkor Borei’s prominent amorphic outer wall. Overall, the landscape, material remains, settlement patterns and ecology have a “Metal Age, Funan, to post-Angkor” character – i.e. very similar to areas and sites extending to Angkor Borei and Oc Eo. Thus, Phnom Chisor has a much more extensive temporal depth and settlement history than its 11th century stereotype. Additionally, it may contain a significantly large ancient settlement – possibly urban or urban-like – a hypothesis worth further testing.
KK3 was identified as a possible water control site (i.e. set of features) based on LIDAR pattern analysis, topography, orientation and the occurrence of specialized features in the vicinity. Excavations were intended to validate the hydrological feature hypothesis and shed light on the integrated water control systems.

A fourth site, the northern chute (part of the largest dam in pre-modern Cambodia), was targeted by the partnering EFEO team during the 2015 campaign. Results are pending and will be presented elsewhere.

Auger coring was also conducted to assist the creation of subsurface topographies, provide geomorphological and stratigraphic data and possibly help identify discrete archaeological units such as households, workshops, features and activity areas.

During the 2016 Field School campaign, excavations at KK2 and KK3 were expanded. Additionally, a fifth site, the adjacent royal palace grounds (KK4), was test excavated to validate the existence of royal palace structures and reveal existing subsurface features.

**Results from KK1 and KK2 (household/habitation sites)**

A comparatively high density\(^5\) of archaeological remains were recovered from KK1 and KK2, yielding approximately 11,000 and 12,000 artefacts and ecofacts in 8.0 and 12.0 square meters respectively, during the 2015 campaign. The 2016 excavations at KK2 included an additional 20.0 square metres with an estimated 20-30,000 added artefacts and ecofacts. Post-excision processing is still in progress. All units at KK1 and KK2 are 2.0 × 2.0 m. All units were excavated by 10 cm arbitrary levels and screened with ¼ inch mesh.

Most of the KK1 and KK2 assemblages consist of broken earthenware pottery (Table 19.1). The earthenware assemblage is largely utilitarian. Forms, morphological traits and designs are consistent with Angkorian and pre-Angkorian wares. Local Khmer and exotic stoneware pottery (glazed and unglazed), animal bone, charcoal, stones, burnt earth, metal, glass and worked stone artefacts (e.g. whetstones, mortar) were also recovered. Incidentally, a few stone window bars, a few large roof tiles and a unique stone pillar support (tentative speculation) were recovered. These items add further complexity to overall assemblage interpretation.

Only a few features were noted during the 2015 campaign at both KK1 and KK2. The most prominent features were horizontally oriented flat sandstone slabs (e.g. approximately 40-50 cm diameter and 10-15 cm thick on average) that may have served as wooden post supports for houses (highly speculative at present), and a few pit-like midden and ash features.

Interestingly, a large 2.0 m diameter oven feature was identified at KK2 during the 2016 campaign (Fig. 19.8). The oven contains multiple ash lenses, a high density of cooking pots, numerous faunal remains, several small post holes and an adjacent multiple sandstone slab feature. Midden pits, post holes and stone features were also identified in other units at KK2 during the 2016 campaign.

Post holes were not identified during the 2015 excavations at KK1 and KK2, but were identified during the 2016 excavations at KK2. Smaller 5-7 cm diameter post-holes at KK2’s oven feature may indicate cooking supports or other cooking apparatuses. Additionally, the team identified a few large 30-40 cm

\(^5\) It is difficult to determine comparable density because only one other similar type of urban household site near the main state temple has been systematically tested in recent years – a residential site at Angkor Wat (Stark et al. 2015). The seemingly lower density at Angkor Wat may be due to differences in sampling, depositional processes, site use, duration, periodicity of site use or abandonment behaviour such as a trend for more material culture being carried off with departing residents.
diameter post holes in other units typical of wooden pillar supports for households and buildings built on piles. Post holes of this size are also used for other types of superstructure supports (e.g. formal roofs for entryways, walkways, halls, terraces, etc.) as evidenced by post holes carved in laterite blocks at the adjacent palace site (KK4). However, at KK2, the latter explanation is less likely despite close proximity to possible palace features. This is because post holes in palace compound features of this nature often include formal pavements beneath. No paved floors were identified at KK1 or KK2.

The basic stratigraphies of KK1 and KK2 consist of 3-5 ambiguous and diffusely transitioned layers with all layers yielding cultural remains, except the lowermost natural layer. The 2016 excavations were more nuanced, however. Consequently, a more complex stratigraphy was discerned. Soil samples are still being analysed and there are no further details available at present. Regardless, the basic stratigraphy in both the KK1 and KK2 sites are relatively consistent with the exception of the oven and post hole features at KK2.

Cultural layers contiguously occur from the surface to approximately 2.0 m and 1.0 m metres below surface at KK1 and KK2, respectively. Layers are more compressed and shallower at the eight KK2 units and deeper at the two KK1 units. The only clearly distinct cultural layers at both sites are the lowermost 7th-8th century artefact-bearing layer yielding consistently similar pottery remains and almost identical radiometric dates (Table 19.2).

The radiocarbon dates are one of the most prominent contributions. These are the first set of radiometric dates provided for household/residential sites at Koh Ker. The KK1 and KK2 sites have similar lowermost layers with similar artefact and ecofact content and densities. The radiocarbon dates from multiple samples consistently date to the 7th-8th centuries except the two 9th-10th century dates. The 9th-10th century dates are likely representative of intrusive features.

If the 7th-8th century results were from one or two samples from only one site, the early dates might be considered aberrant. It is reminded that Koh Ker is popularly thought of as a 10th century urbanization phenomenon, rather than having a pre-Angkorian urban or “urbanizing” history.

The similar 7th,8th century dating results among multiple samples and the material culture consistency at both the KK1 and KK2 sites – sites that are approximately 250 metres apart – are not likely coincidences. Thus, data suggest a wider extent and greater density of pre-Angkorian settlement rather than a small discrete 7th-8th century habitation phenomenon. We are now more prone to conclude that Koh Ker had a sizeable and active pre-Angkor population at what later became the urban monumental and royal residential core during the 10th century.

Additionally, that particular urban sector continued to function as a settlement and activity area during the 10th century, the later Angkor periods and the post-Angkor periods. Subsurface and surface remains and densities (particularly among datable ceramics) support this hypothesis. It is important to note that habitation and activities may have occurred throughout the entire Angkorian and post-Angkorian periods despite Koh Ker’s demise as the Angkorian capital in the mid-10th century. Interestingly, there are no clear indicators of any abrupt changes in socio-economic conditions or status in the material remains, only possible changes to external value-chain sources as evidenced in the stoneware ceramic assemblages.

The occurrence of datable glazed stoneware (Khmer and exotic) increases in representation and quantity from lower levels to upper levels at both sites. It increases in a manner partially supporting the principle of superposition: older wares (e.g. 9th century Khmer green glazed stoneware) appear in lower levels while later wares were in upper levels (e.g. 12th-14th century Khmer brown glazed stoneware and Song-Yuan celadon). Fifteenth-century and later Thai, Vietnamese and Chinese ceramics are common among surface scatters throughout the sector and beyond (Tho et al. 2015/2016).
Regarding the radiocarbon dates, it is also noted that the lowermost layer at both sites may include latter period intrusive features (e.g. 9th-10th century intrusions). This was clearly evident during the 2016 excavations at KK2 with the oven feature and large post holes. As stated, it would explain the 9th-10th century dates of two radiocarbon samples (refer to Table 19.2; SUERC-68297 [GU41181] and SUERC-67251 [GU40783]). It may relate to urban sector repurposing at that time as well. In fact, upper layers may consist of temporally mixed fill.

Upper and lower layers at both KK1 and KK2 seem to be divided at the midpoints where a few, flat, horizontal sandstone slabs occur. However, artefact type and density are currently inconclusive for determining abrupt temporal and/or functional separation, or clear evidence for large-scale event-like landscape repurposing. Geomorphology, charcoal content and soil colour suggest a slightly different picture, but no clear, hard, layer divisions are readily discernable based on the present cursory analysis with the exception of a few upper layers in a few KK2 units excavated in 2016 (analysis and interpretation pending).

Material culture (cooking and storage pots) and faunal remains (cow, deer, turtle, fish, snail – mostly wild food remains, some non-local) indicate that the sites were households. They were constructed of wood and other organic materials on stilts/piles atop filled mounds with nearby excavated ponds. It remains unknown whether the more formalized “mound and pond” layout was constructed during the pre-Angkor phase, the 10th century construction boom period, at later times, or repeatedly. This is currently unclear in the stratigraphy, geomorphology or artefact content.

However, it can be hypothesized that the sites may have been significantly repurposed during the 10th century when a grid-like “mound and pond” pattern was perhaps constructed in accordance with other Angkorian urban site residential layouts such as those found at Angkor Wat and other Angkorian sites (Stark et al. 2015; Evans 2016). Nevertheless, the data remain equivocal on this matter with some exceptions pending how the features from the KK2 2016 excavations are interpreted. The 2016 excavations identified discrete layers in some units that may suggest a formal repurposing, such as levelling and refilling, to possibly form a floor during a later stage occupation (e.g. 10th century or later). We collected soil core samples from pond areas that may shed further light on the construction history once they are analysed.

Although it is also reasonable to assume the sites witnessed oscillating periods of more intensive and less intensive occupation, activity and rebuilding through time, the artefact content per 10 cm arbitrary level from the 2015 excavations have comparable densities. When levels were combined to best match possible layers, densities were also similar. There is no clear indication of major site repurposing such as levelling, filling, mound and structure building at discrete time periods from the 2015 data. There are also no hard floors or abrupt transitions suggesting an “event-like” major repurposing with the exception of the aforementioned data from the 2016 campaign at KK2. Again, we can only state at present that the only clearly discrete cultural layer is the lowermost 7th-8th century settlement deposit at both sites underlain by culturally sterile deposits. Additional cultural layers beneath the sterile basal deposits are possible but were not identified despite deeper test unit and auger testing in several locations.

Ancient activities at the sites included food and/or medicine processing, food consumption and habitation. Numerous faunal remains were identified. A large percentage included medium to large mammals, particularly deer and wild cow species. Some bone and antler remains contained cut marks. Cooking vessels are abundant. Large concentrations of ash, kitchen midden pits and the oven feature at KK2 are key indicators along with cooking vessels and food processing tools.

Small slag-like nodules and chunks with iron were recovered at both sites. This may indicate a small metal working industry in the vicinity. Additionally, many small, crudely formed, cylindrical earthenware
cups were recovered. Some may be crucibles, although they seem unrelated to the possible iron slag. The occurrences of other activities, specialized processing or industries remain unknown. An interesting range of small earthenware cups and shallow bowls – several containing ash residue – were recovered at both sites. These may be oil lamps or incense/aromatic burners. Several colleagues speculate that some may be crucibles.

Of particular interest, local and exotic pottery (mostly Chinese, but also Thai, Vietnamese and possibly Persian) recovered from KK1, KK2 and proximate surface collections indicate relatively continuous activity and connections to long-distance regional and/or extra-regional value chains spanning the late Funan to Colonial periods – well over 1,000 years\(^6\) (Evans 2013; Tho et al. 2016). A substantial amount of pre-Angkor pottery was recovered. The pre-Angkor pottery is very similar to remains from Sambor Prei Kuk – the site complex associated with the 7\(^{th}\)-8\(^{th}\) century Chenla period and Isanapura\(^7\) – and similar to other pre-Angkor sites (e.g. Prei Khmeng, located in the Angkor area at Siem Reap).

**Results at KK3 (water control feature)**

Seven trenches were excavated at KK3 with a total area of 34.75 square metres during the 2015 campaign. An additional 34 square metres in two trenches were excavated during the 2016 campaign. KK3 yielded evidence of a sandstone pavement and numerous roof tiles in some trenches that may relate to the adjacent palace area. Profiles and stratigraphy in key trenches indicate that a ditch or drainage was constructed to facilitate water management. Specifically, the ditch – or shallow channel – likely facilitated water flow from the Rahal (large artificial reservoir) northwestwards to the moat at Prasat Kraham. The water control feature (KK3) runs along a northwest-southeast axis, paralleling the eastern side of the palace and western side of the Rahal. Thus, it may have been designed as an integrated feature.

Surface topography, however, is inconsistent. Current surface topography would suggest water did not necessarily flow in the desired direction the entire length. Nonetheless, surface topography and subsurface topography do not always correlate for a variety of reasons. The 2016 and 2015 excavations provided similar stratigraphic profiles in different sample areas that further support the original hydrological feature hypothesis.

**Excavation Results at KK4 (palace site)**

During the 2016 campaign, the presumed palace grounds (KK4) were excavated at two main locations (120 square metres in total; 71.0 square metres at KK04-1: the east gate; and 49.0 square metres at KK04-2: a central palace structure). The goal was to validate the existence of a complex palace structure (or set of structures) as evidenced by foundations, floorings, alignments and other confirming material such as roof tiles.

\(^6\) It is noted that the occurrence of datable exotic pottery does not necessarily mean that the pottery was transported, used and/or deposited contemporaneously with the period of manufacture. For example, modern Cambodians still use Bronze and Iron Age burial ceramics for potted plants in village houses. Similarly, Angkorian brown glazed jars are still used for water storage. Stoneware in particular remains in circulation for long periods of time. Earlier wares produced in Angkorian and pre-Angkorian times could have been transported to the sites during the post-Ankgor to Colonial period settlement, for example.

\(^7\) The earthenware is not necessarily proven to be 7\(^{th}\)-8\(^{th}\) century or “pre-Angkorian” (though highly plausible). A proper seriation with corresponding absolute dating is warranted. Additionally, there remains some confusion as to the definition of “pre-Angkor” with some referring specifically to the Chenla period (7\(^{th}\)-8\(^{th}\) centuries), while others referring to anything before Angkor (i.e. pre-9\(^{th}\) century).
Unlike temples dedicated to gods, palaces were made of organic material that do not frequently preserve well. The site had not been excavated previously although roof tiles and some exposed surface features, such as laterite alignments, had been identified during previous archaeological investigations and mapping (Mizoguchi and Nakagawa 2011; Tho et al. 2015/2016).

Brick and laterite alignments, brick pavements and a drainage system were exposed during excavations (Fig. 19.9). Part of the possible gate features as evidenced by large laterite blocks was also exposed. The scale, layout and intricacy confirm that there were structures indicative of a large compound (i.e. a palace). Numerous roof tiles, eaves tiles and finials were also identified. Very few artefacts or ecofacts typical of habitation sites or other specialized activities were recovered.

Palace construction probably adhered to the following logical sequence: a) creation of blueprints/design, b) filling/levelling, c) paving, flooring and drainage construction, d) wall and wooden structure construction and e) the addition of roofing and decorative elements. However, it is unknown if all structures were built at the same time or various structures were added at different times. It is equally unknown if the palace witnessed periodic renovations.

Interestingly, there were no earlier deposits or lower cultural layers that were rich with habitation material, such as those found at the adjacent KK2 or KK1 sites. The excavations also did not yield any notable pre-Angkorian pottery in the removed overburden. The entire area may have been filled for terrace and palace construction during the late 9th and early 10th centuries. It may have been empty, uninhabited and marginally used space prior to palace construction – quite different from surrounding settlement sectors at Koh Ker as evidenced by KK1 and KK2 assemblages. Only a few occurrences of pre-Angkorian pottery were noted in surface collections in the surrounding areas (e.g. Anlong Preng), including 9th century Khmer green glazed stoneware and possible 9th century Persian blue glazed pottery fragments (Ly et al. 2010; Tho et al. 2015/2016).

The palace may have been entirely abandoned once the king vacated and/or died. The paucity of later period surface ceramics specifically in the palace sector (Tho et al. 2015/2016) could indicate abandonment and possible avoidance of activities on the palace grounds following Jayavarman IV’s reign. The palace area is comparatively devoid of Song-Yuan Chinese pottery in surface collections, unlike almost all surrounding areas (Tho et al. 2015/2016). Again, the palace may have been long defunct and perhaps avoided prior to Song-Yuan periods.

Lastly, it is unknown if the Rahal, palace, Prasat Thom and other constructions of the 10th century may have truncated or compromised 7th-8th century settlement layers – a distinct possibility given the presence of pre-Angkorian remains in surface scatters and other test excavations related to investigations of those particular features/sites (e.g. Mizoguchi and Nakagawa 2011). Excavations at KK4 were not particularly deep. The intent was to expose the upper structures by removing overburden. There is always the chance that more deeply stratified anthropogenic deposits exist beneath the terracing. Regrettably, excavation units at KK4 did not probe this possibility. However, if there were earlier habitation and activity remains, artefacts presumably would be present in the fill from repurposing, filling, levelling and constructing the palace site (i.e. artefacts from earlier layers should be part of the fill if the fill were taken from the immediate area). A more detailed synopsis of research results will address these issues in further depth (Latinis et al. forthcoming).
Conclusion

Key results have been provided above regarding the NSC Field School and the associated archaeological research projects conducted in Cambodia (Koh Ker, Banteay, Kanam, and the Peam Kre and Don Meas sema stone sites). The Koh Ker Field School results are a primary focus. This summary is by no means comprehensive. However, the paper is intended to be a simplified baseline to gauge future progress and to report on our Field School programme for regionally interested stakeholders.

It is important to highlight that the Field School and the research projects are designed to address enduring themes independent of a specific site. Projects are integrated. Primary themes include the evolution of complex polities, urbanization, economics and Asian connections – themes developed by Prof. Miksic and others from the onset. Urban sites are a specific target (e.g. Phnom Kulen and Koh Ker). However, sites such as the Kanam rock art site are relevant because they relate to economic value-chain networks and historical ecology. Value chain network models involve urban centres and remote sites such as Kanam. The historical ecology theme also relates to economic models. Furthermore, one of our research goals is to develop a greater understanding of ancient urban ecologies.

The NSC continues to expand with intentions to provide more opportunities, fill gaps, innovate and increase interaction, connectivity and cooperation. Not surprisingly, ancient regional connections are a central theme of our research and parallel with our current efforts. The success of the Field School for education, training, networking and research contributions make the NSC Field School a demonstrably effective and innovative model for 21st century field school design.

Acknowledgements

Major support for the previous and ongoing Field Schools have been provided by the ISEAS – Yusof Ishak Institute, Nalanda-Sriwijaya Centre, and APSARA National Authority. Funding was graciously provided by the Ministry of Foreign Affairs, Singapore. Supporting institutions for the Field School also include the Ministry of Culture and Fine Arts, Cambodia; Royal University of Fine Arts, Cambodia; the National Museum of Cambodia; the Royal Academy of Cambodia; the Hungarian Southeast Asian Research Institute, Hungary; and Ecole Francaise d’Extreme-Orient, France. The National Authority for Preah Vihear is now a supporting partner after assuming management of Koh Ker in 2016. We extend our sincere gratitude to all – including all staff members who made success possible. We would also like to thank the ISEAS – Yusof Ishak Institute, Nalanda-Sriwijaya Centre, for providing funding for archaeological research at Phnom Kulen as well as support for participating in the 2nd SEAMEO SPAFA International Conference on Southeast Asian Archaeology in Bangkok. In turn, we extend our deepest appreciation to SEAMEO SPAFA who graciously accepted our session and also supported the post-conference Writer’s Workshop. The Writer’s Workshop was particularly successful. Special thanks are extended to Ms Linh Anh Moreau, the SPAFA staff, Dr Noel Tan and Dr MR Rujaya Abhakorn, who supported the efforts. Ms Moreau deserves additional recognition due to her pivotal role, high impact contributions, and successful management. NSC staff members were also able to contribute including Ms Foo Shu Tieng, who played an equally significant role as a workshop instructor. HE Dr Tan Buon Suy, Dr Terence Chong, Dr Ea Darith, Dr Karoly Belenyesy, Mr Huon Yav, Mr Phin Samnang, Mr Phin Phakdey, Mr Chhea Phallai, Ms Seang Sophany, Ms Foo Shu Tieng Mr Michael Ng, Mr Aaron Kao and many others deserve special thanks and were integral to the training, research, analysis and interpretations. Numerous individuals and institutions deserve praise for support. Unfortunately, space is limited. However, we do wish to particularly thank the Field School participants and alumni, all contributing archaeology students and professionals, and especially all the local community members who have made the magic possible. We wish you and your families continued happiness, health and prosperity.
References


Kao, A (2017) *Decorated Earthenware of the National (Art) Gallery Site, Singapore*. This volume.


## All Artefacts and Ecofacts

<table>
<thead>
<tr>
<th>Categories</th>
<th>Count</th>
<th>Per Cent Column</th>
<th>Mass (g)</th>
<th>Per Cent Column</th>
<th>Count</th>
<th>Per Cent Column</th>
<th>Mass (g)</th>
<th>Per Cent Column</th>
</tr>
</thead>
<tbody>
<tr>
<td>Earthenware</td>
<td>9,630</td>
<td>87.9%</td>
<td>67,832</td>
<td>66.5%</td>
<td>10,322</td>
<td>85.0%</td>
<td>58,036</td>
<td>63.8%</td>
</tr>
<tr>
<td>Khmer Stoneware</td>
<td>633</td>
<td>5.8%</td>
<td>12,746</td>
<td>12.5%</td>
<td>776</td>
<td>6.4%</td>
<td>14,826</td>
<td>16.3%</td>
</tr>
<tr>
<td>Exotic Stoneware</td>
<td>32</td>
<td>0.3%</td>
<td>758</td>
<td>0.7%</td>
<td>21</td>
<td>0.2%</td>
<td>87</td>
<td>0.1%</td>
</tr>
<tr>
<td>Brick</td>
<td>2</td>
<td>&gt;0.1%</td>
<td>700</td>
<td>0.7%</td>
<td>7</td>
<td>&gt;0.1%</td>
<td>1,100</td>
<td>1.2%</td>
</tr>
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<td>Roof Tile</td>
<td>1</td>
<td>&gt;0.1%</td>
<td>400</td>
<td>0.4%</td>
<td>5</td>
<td>&gt;0.1%</td>
<td>1,105</td>
<td>1.2%</td>
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<tr>
<td>Faunal (bones, shell, antler)</td>
<td>187</td>
<td>1.7%</td>
<td>535</td>
<td>0.5%</td>
<td>593</td>
<td>4.9%</td>
<td>2,930</td>
<td>3.2%</td>
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<td>Metal and Slag</td>
<td>36</td>
<td>0.3%</td>
<td>110</td>
<td>0.1%</td>
<td>161</td>
<td>1.3%</td>
<td>1,142</td>
<td>1.3%</td>
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<tr>
<td>Stone Artefacts</td>
<td>6</td>
<td>0.3%</td>
<td>1,843</td>
<td>1.8%</td>
<td>4</td>
<td>&gt;0.1%</td>
<td>5,931</td>
<td>6.5%</td>
</tr>
<tr>
<td>Stone/Geologic</td>
<td>372</td>
<td>3.4%</td>
<td>14,780</td>
<td>14.5%</td>
<td>117</td>
<td>1.0%</td>
<td>1,295</td>
<td>1.4%</td>
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<tr>
<td>Other</td>
<td>55</td>
<td>0.5%</td>
<td>2,369</td>
<td>2.3%</td>
<td>135</td>
<td>1.1%</td>
<td>4,490</td>
<td>4.9%</td>
</tr>
<tr>
<td>Total</td>
<td>10,954</td>
<td>100.0%</td>
<td>102,073</td>
<td>100.0%</td>
<td>12,141</td>
<td>100.0%</td>
<td>90,942</td>
<td>100.0%</td>
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### Ceramics

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<th>Categories</th>
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<th>Per Cent Column</th>
<th>Count</th>
<th>Per Cent Column</th>
<th>Mass (g)</th>
<th>Per Cent Column</th>
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<tr>
<td>Earthenware</td>
<td>9,630</td>
<td>93.54%</td>
<td>67,832</td>
<td>83.40%</td>
<td>10,322</td>
<td>92.83%</td>
<td>58,036</td>
<td>79.56%</td>
</tr>
<tr>
<td>Khmer Stoneware</td>
<td>633</td>
<td>6.15%</td>
<td>12,746</td>
<td>15.67%</td>
<td>776</td>
<td>6.98%</td>
<td>14,826</td>
<td>20.32%</td>
</tr>
<tr>
<td>Exotic Stoneware</td>
<td>32</td>
<td>0.31%</td>
<td>758</td>
<td>0.93%</td>
<td>21</td>
<td>0.19%</td>
<td>87</td>
<td>0.12%</td>
</tr>
<tr>
<td>Totals</td>
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<td>100.00%</td>
<td>81,336</td>
<td>100.00%</td>
<td>11,119</td>
<td>100.00%</td>
<td>72,949</td>
<td>100.00%</td>
</tr>
</tbody>
</table>

Table 19.1 Artefacts and ecofacts by count, mass and percentage representation (above); ceramic vessels by count, mass and percentage representation (below)

a: This excludes large sandstone slabs and laterite blocks left in situ

b: Bones, snail shell, turtle shell, antler; remains include some soil remains – mass is exaggerated; total number of snail shells are estimated.

c: Sandstone chips, laterite and stone chunks, burnt earth/rock, waterworn pebbles

d: Excludes bricks, roof tiles and related architectural ceramics (i.e. only includes first three rows of upper table in order to better compare representation of ceramic vessels).
<table>
<thead>
<tr>
<th>Site</th>
<th>Unit</th>
<th>Level/Depth</th>
<th>Code</th>
<th>Material (Comments)</th>
<th>Radiocarbon Age BP</th>
<th>Cal 95.4% probability</th>
</tr>
</thead>
<tbody>
<tr>
<td>KK1</td>
<td>J28</td>
<td>Level 14</td>
<td>SUERC-67257</td>
<td>Charcoal (lowermost cultural layer)</td>
<td>1265 +/- 29</td>
<td>666 (90.0%) 778 cal AD</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(130-140cmbs)</td>
<td>(GU40786)</td>
<td></td>
<td></td>
<td>791 (1.7%) 805 cal AD</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>813 (1.2%) 825 cal AD</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>840 (2.4%) 862 cal AD</td>
</tr>
<tr>
<td>KK1</td>
<td>J28</td>
<td>Level 15</td>
<td>SUERC-68296</td>
<td>Charcoal (lowermost cultural deposit)</td>
<td>1275 +/- 34</td>
<td>660 (90.5%) 778 cal AD</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(140-150cmbs)</td>
<td>(GU41180)</td>
<td></td>
<td></td>
<td>791 (1.6%) 805 cal AD</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>813 (1.1%) 825 cal AD</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>841 (2.2%) 862 cal AD</td>
</tr>
<tr>
<td>KK1</td>
<td>J30</td>
<td>Level 13</td>
<td>SUERC-67258</td>
<td>Charcoal (lowermost cultural layer)</td>
<td>1341 +/- 30</td>
<td>644 (84.6%) 715 cal AD</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(120-130cmbs)</td>
<td>(GU40787)</td>
<td></td>
<td></td>
<td>744 (10.8%) 765 cal AD</td>
</tr>
<tr>
<td>KK1</td>
<td>J30</td>
<td>Level 16</td>
<td>SUERC-68297</td>
<td>Charcoal (dense soil clump in feature)</td>
<td>1138 +/- 34</td>
<td>776 (5.7%) 793 cal AD</td>
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<tr>
<td></td>
<td></td>
<td>(150-160cmbs)</td>
<td>(GU41181)</td>
<td></td>
<td></td>
<td>801 (89.7%) 984 cal AD</td>
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<tr>
<td>KK2</td>
<td>Q49</td>
<td>Level 10</td>
<td>SUERC-67255</td>
<td>Charcoal (lowermost cultural layer)</td>
<td>1275 +/- 29</td>
<td>662 (95.4%) 776 cal AD</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(90-100cmbs)</td>
<td>(GU40784)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>KK2</td>
<td>Q49</td>
<td>Level 09</td>
<td>SUERC-67251</td>
<td>Charcoal (near/in feature)</td>
<td>1201 +/- 29</td>
<td>715 (6.0%) 744 cal AD</td>
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<td></td>
<td></td>
<td>(80-90cmbs)</td>
<td>(GU40783)</td>
<td></td>
<td></td>
<td>765 (88.4%) 895 cal AD</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>893 (10.0%) 939 cal AD</td>
</tr>
<tr>
<td>KK2</td>
<td>Q49</td>
<td>Level 08</td>
<td>SUERC-67256</td>
<td>Charcoal (top of lowermost cultural layer)</td>
<td>1274 +/- 30</td>
<td>662 (94.3%) 777 cal AD</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(70-80cmbs)</td>
<td>(GU40785)</td>
<td></td>
<td></td>
<td>793 (0.7%) 801 cal AD</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>847 (0.4%) 852 cal AD</td>
</tr>
</tbody>
</table>

Table 19.2  Radiocarbon sample results
Context of the Port Cities Establishment in the Coast of Southern Vietnam: Understanding from Recent Surveys

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Abstract

Maritime networks and cultural exchanges played an important role in the establishment of the port cities in Southeast Asia. In Southern Vietnam, the formation of the Mekong Delta and the changes of the coastline created the best context in the last centuries BCE for the appearance and development of the settlements along the coast and the low fields which were connected by the waterways. These communities capitalized on cultural contacts and trading activities to develop into port cities and economic centres during the first half of the first millennium CE. Thus, they contributed greatly to the formation of one of the early states in Southeast Asia – Funan. By analysing data from recent archaeological surveys and studies in the coast of Southern Vietnam, this paper will provide a general picture on the natural setting and social context of some major sites of pre-Oc Eo and Oc Eo cultures in the Ganh Rai Bay (Giong Lon, Giong Ca Vo, Giong Phet, etc.) and the southwestern coast (Oc Eo, K9, Soa Ao, Nen Chua, Da Noi, Canh Den, etc). Initial results from paleobotanical research will also be discussed for a better understanding of the context of the establishment and decline of the port cities in the coast of Southern Vietnam.

Keywords: maritime network, cultural contact, Oc Eo culture, sea level changes, palaeoenvironment

Introduction

Archaeological studies show that local and regional contacts and exchanges among the communities along rivers and coastlines resulted in profound changes in economy, society and political power in Southeast Asia since the latter half of the first millennium BCE. The active participation in the international trading activities of the Southeast Asian people also resulted in the great changes of the distribution pattern of the settlements, particularly those that played the role as port city or major node on the so called “maritime silk routes” in the coastal areas (Bellina and Glover 2004; Glover and Bellina 2011; Lam Thi My Dzung 2011; Borell et al. 2014). The extensive contacts with the great civilizations in the first centuries BCE and CE, India in particular, led to the formation and prosperity of several early states who adopted Hindu and Buddhist cults, as well as cultural and political ideologies, for their governmental institutions in the early half of the first millennium CE.
Several researchers recognized the enlargement of this trading network and observed the development or expansion of the landscapes that were based on trading in Southeast Asia. These included the transportation of goods from the inland to the coast, which roused the enlargement of the settlements further inland and in highland regions where the demanded goods were available. Local labourers, including craftsmen, contributed greatly to the construction of coastal settlements, to provide foods for the traders and to load the goods onto the trading ships (Stark 2006: 11). Scales and characteristics of several sites demonstrated vividly the busy ports, with what the Chinese pilgrimages described on the ships in Southeast Asia as more than 50m long, carrying 600-700 people and 10,000 bushels of goods (each bushel is equal to 36 litres) (Manguin, according to Stark 2006). One can also realize that several factors affected the existence, changes or decline of major sites in different areas from time to time. Geomorphological features, the changes of river flow and the coastlines, the formation of the deltas and the fluctuations of sea level are important factors that can be seen largely affecting sites, such as those in the upper Thai-Malay Peninsula (Bellina et al. 2014), the Sa Huynh and Champa sites in Thu Bon River Valley (Lam Thi My Dzung 2011) and the surrounds of the Gulf of Siam during 3000-1000 BP (Trongjai 2014).

In Southern Vietnam, historical records and archaeological discoveries provide a rich source on Funan, one of the earliest states in Southeast Asia, its people, culture and their main realm in the Lower Mekong Delta. Many sites and numerous artefacts reflect a flourishing maritime civilization and the people who had contacts with several civilizations of the world (Pelliot 1903; Malleret 1962, Le Xuan Diem et al. 1995; Miksic 2003; Manguin 2009). However, a question still in discussion concerns the sudden emergence of Funan in the 2nd century CE and its quick decline in the 7th century CE. The studies on geological formation and the changes of coastlines and sea level are to some extent associated with cultural data. However, insufficient links between these sources are still debated (Reinecke 2012). In recent years, efforts have been made to study the sites and related vestiges that datable to the pre Oc Eo period (the first centuries BCE and CE) for understanding the emergence of the early state in Southern Vietnam. Several major sites of Oc Eo culture have been surveyed and excavated in large scale. Eco-geological studies have been conducted and artefacts analysed in context of topography, environment and archaeology (Le Xuan Thuyen 2005; Le Thi Lien et al. 2013a, 2013b). Although not thoroughly interpreted, initial results provide more details for our understanding of the fluctuations of sea level and associated changes of the environment. The periodization of archaeological sites has been made based on the natural setting and characteristics of artefacts, of which pottery is a common indicator (Nguyen Thi Hau 2008; Le Xuan Diem 2011).

Based on these research results, this paper will focus on linking several sources of data–palaeoenvironmental, geomorphological and archaeological in particular– to understand the context of the emergence of the trading centres which were enlarged as port cities in the Oc Eo period. The scope of this study will mainly be the river mouth and coastal areas of Southeastern and Southwestern Vietnam where a number of sites were discovered. Several inland sites that represented strong connection with the former ones will be referred to for understanding the material base of the trading and cultural exchange networks.

Chronologically, this study concentrates on the period from the latter half of the first millennium BCE to about the 7th-8th centuries CE, which witnessed the local people’s early contact with the outside world and the development and decline of Oc Eo cultural sites. The periodization of archaeological data dated to this time frame is still under discussion. The terms pre-Oc Eo culture and Oc Eo culture, or the protohistoric period and historic period, are generally used to identify two periods of this time frame. According to Nguyen Thi Hau (2008), the pre- Oc Eo period is represented by several late Metal Age or early Iron Age sites datable to 2500-2000BP. The stratigraphy generally includes two or more cultural layers continually developing into later periods. Artefacts discovered from these sites, pottery in particular, represent elements that will be developed or became characteristic during the Oc Eo period. Go O Chua
and Go Hang, sites in Can Gio (except Giong Am) referred to in this paper, are the typical pre-Oc Eo sites. Le Xuan Diem (2011) used the term protohistoric period for the sites that dated from 600-500 BCE to 100 CE, which contain high quality assemblages of iron tools and imported artefacts. The owners of these sites joined the network of contacts and exchanges with others but still followed traditional beliefs. The Oc Eo cultural period is characterized by the sites that dated from the 1st to 7th centuries CE, which represent a developed society.

Based on the data analysed in this paper, we consider “pre-Oc Eo” as the transitional period from prehistory to history in Southern Vietnam. The pre-Oc Eo sites are distributed in larger space than those of the prehistoric period, from the old alluvial terraces of the Southeastern region, expanding to the Vam Co basin and lower reaches of the Dong Nai river. In the Cuu Long river delta, the sites are distributed mainly in the isolated mounts, particularly in the coast, and gradually to higher ground in the lower delta. They are generally datable from the 5th-4th centuries BCE to the first centuries BCE and CE. In several cases, the sites continually developed into the Oc Eo period. Cultural layers are not very thick, mainly from 0.4-0.7 m. However, the artefacts are densely distributed and much more diversified in terms of types, material and origin. They represent a fundamental change from the traditional prehistoric sites in the old alluvium of the Southeastern area, which are characterized by undeveloped traditional stone tools, coarse potteries and stone bangles. Typical artefacts of pre-Oc Eo sites are more varieties of pottery, including botanic inclusion and fine potteries, imported buff and black polished ware, and imported ornaments that are mainly glass and stone beads. During this period, evidence of Hindu and Buddhist practices are not seen clearly, and their symbols or images are generally absent.

The Oc Eo cultural period is characterized by the large number of sites distributed mainly in the Cuu Long river delta and the old alluvial lower terraces in the Southeastern area. The scale of several sites is much larger (from tens to hundreds of hectares) and densely populated to compare with the earlier period. Characteristic of unearthed artifacts, architectural features and other vestiges of these sites represent various functions as economic, religious and also in some cases the political centres, during the 1st to 7th centuries CE. Archaeological remains are characterized by thick cultural layers in various topographical features with typical potteries, the complex of stone or brick foundations for religious architectures and other functions, house-on-stilts in swampy or canal sides, remains of craft workshops for the manufacturing of sculptures or wood work, ornaments in metal, stone and glass, pottery, cremated burials, etc. Pottery assemblages provide the most common characteristic for the identification of the Oc Eo sites, including typical types of kendi, sprinkler, stupa-shaped cover, high quality table-ware and rich varieties of coarse pottery, rice-husk inclusion for large-sized jar and ca rang (cooking stove) in particular. The presence of religious sculptures—tiny figurines in daily-life utilities and in the context of religious practice— is an important indication of an Oc Eo community.

Natural context and the change of the coastline in Southern Vietnam during the First Millennium BCE and CE

Located in the east of the Indochina Peninsula, between 8°-24°N and 102°-110°E, Vietnam has an area of 331,210 km², 4,639 km of the border and 3,444 km of the coast. Geographically, Southern Vietnam is divided into two regions: the Southeastern region and the Southwestern region. They have a closed relationship in a history of geological formation. The weather is hot and humid all year round, full of sunlight with the only rainy and dry seasons.

The Southeastern region (Dong Nai river basin) basically belonged to the old alluvial area. Two corresponding topographical areas that are related to the archaeological sites are at the height of 100-200 m,
which run parallel from the north-west to south-east direction and at the height lower than 100 m sloping from the north-east to south-west direction. During the early Holocene, when the flow of Cuu Long River had not yet changed as it has now, the old alluvial terrains formed a large arc running from Vung Tau to Ha Tien. Therefore, eastern Southern Vietnam represents clearly the stepped topography with more than 60% of the area being of 10 m higher than sea level which includes the highlands, low and wavy hills, rivers and coastal terraces (Ha Van Tan 1999: 351-352), with Dong Nai River and Vam Co River systems as the most important ones.

The Southwestern region (or the Cuu Long River Delta) occupies an area of 40,000 km² formed during the depression process of the rock base before the Kainozoai. It was then filled gradually with Kainozoai deposit during the sea transgression and regression, particularly in the Holocene. Most of the Southwestern plain is very flat, which was formed 6,000-7,000 years ago. There are only some protruding mountains, with Mount Câm (710 m) as the highest one among a group of seven mountains (Bay Nui) in the delta. In the coast of Kien Giang province and further inland of An Giang province, there are some isolated mounts. They can be reached by the waterways or canals, such as mounts Hon Dat, Hon Chong (Kien Giang) and Ba The, Mount Sap (An Giang). There are also shallow seabeds with several islands surrounding the mainland, such as Con Dao, Hon Khoai, Nam Du and Phu Quoc (Phan Huy Le 2011: 115).

Geological studies in the Southern delta indicate that sea level was stable in the late Holocene, helping the delta develop horizontally. In addition, the tidal regime of the East Sea (South China Sea) made the water of the Mekong River drainage to the east and brought a large amount of sediment which contributed to the quick formation of the delta. During 4000 BP, sea level was at +4 m amsl, the coastline was still in the area of Tan An city, and Can Tho city had not yet been formed. During about 2500 BP, sea level regressed to -2 m amsl. During the early Christian era, the coastal line crossed the areas of Can Tho and My Tho cities, providing a large drainage delta for the development of Oc Eo cultural sites (Ta et al. 2002: Fig. 4; Phan Huy Le 2011: 106) (Fig. 20.1). Lieu Kim Sanh (1984: 76-77) provides details on the fluctuations of sea level with four sea transgressions, signed as HI-IV and alternately three regressions, signed as h1-3. Focusing on our concerned time period, it is necessary to notice the sea regression h2 at -1 m amsl during 550 BCE, the sea transgressions HIII at +0.4 m amsl during 50 BCE, the sea regression h3 at -0.5 m amsl during 200 CE and particularly the sea transgressions HIV at +0.8 m amsl during 650 CE.

The Mekong River drained into the sea by several mouths, which were changing all the time. Chu Dat Quan (2017: 28) in the 13th century described that there were many sandbars and that ships could come in by the fourth mouth only. Thus, it can be presumed that the water passages were changing very quickly in comparison to the first centuries BCE and CE. In the southwestern coast, several isolated hills along the coast and small islands near the coast were present, which, although of modest sizes that were impossible for the existence of large settlements, allowed for convenient stopping points of the transportation in the coast and along the rivers when the Mekong Delta had not fully appeared in its present shape. The study of pollen components from the typical Oc Eo sites, such as Da Noi (An Giang province), Nhon Thanh (Can Tho province), Go Thap (Dong Thap province) and Go Thanh (Tien Giang province), indicates the alternate of the sediment layers that contain the pollen of fresh water or the brackish water at various depths (Nguyen Thi Mai Huong et. al. 2015). It corresponded to the geological data that during the development of Oc Eo culture, the Cuu Long Delta has observed several rising levels of the sea (Fig. 20.2). This phenomenon greatly affected the existence and expansion of the settlements, particularly the formation and development of the sites in the coast and the low field, including those that functioned as port cities of Funan.
The formation of the settlements during the first millennium BCE in the coastal areas

In the past 20 years, the archaeological discoveries have brought to light numerous remains of the people that represent their steps in exploiting the lowlands from the late first millennium BCE to the early centuries CE. The people of the Bronze Age who occupied mainly the higher terraces of the old alluvial delta came closer to the river side, river floating dunes (*cu lao* in Vietnamese) and the coast during the Iron Age (Reinecke 2012: Figs 19.7, 19.8). Some areas served as the gateways or major meeting points on the maritime network. Through their favourable environments, several sites developed into port-cities in various time periods. In Southern Vietnam, the areas of the Dong Nai River mouth and the Kien Giang coast are noteworthy as indicated by the archaeological discoveries.

The Dong Nai River mouth area discussed in this paper includes mainly Can Gio district of Ho Chi Minh City, Long Son Island in the northwest of Ganh Rai Bay (Vung Tau city) and in some extended areas of the coastal lowlands of Long An, Dong Nai and Ba Ria-Vung Tau provinces. Water of several branches of Dong Nai river system drains into the sea in this area, such as the Sai Gon, Song Be, La Nga and the Vam Co rivers. Thus, the Dong Nai River mouth acted as a gateway to further inland and upstream communities in Southeastern region. In contrast with the old alluvial terraces of the upstream (from 100-200 m high) and the lower reaches(from 2-3 m to 50-70 m), the coastal area at present is very low and mainly covered with a mangrove swamp. However, during the 5th century BCE, when sea level was at -1m amsl, it was a favourable area for people to settle down and make contact with others via the maritime networks that were already active in Southeast Asia. The large area of Can Gio district (about 700 km²) is enclosed by the Dong Nai river in the north and northeast, the Nha Be River in the northwest, the Soai Rap River in the west and Southwest, the Thi Vai River in the Southeast and the sea in the east. Hundreds of mounds, which are from 1 to 3 m high, are distributed along the small waterways in the mangrove swamp. So far, remains of the ancient people have been discovered on 26 mounds, which are mostly composed of red soil and some sandy soil. The excavations have been conducted in 5 mounds, namely Khu Bao Dong, Giong Ca Vo, Giong Phet, Giong Ca Trang and Giong Am. Among these, Giong Ca Vo (GCV) and Giong Phet provide the most important data on the settlements, such as the burial custom, economic activities and maritime contacts of the Can Gio people during the 5th to 1st centuries BCE (Dang Van Thang and Vu Quoc Hien 1995; Dang Van Thang et al. 1998; Nguyen Kim Dzung 1993).

About 10 km from Can Gio to the north, on the opposite coast of the Ganh Rai Bay, several archaeological sites have been discovered on the Long Son Island and the mangrove swampy coast of Vung Tau city. They are datable from the last centuries BCE to 3rd-4th centuries CE. Among these, the Giong Lon site was excavated in 2003 and 2005. There is a cemetery located on a 3-4 m high sand dune in the northwest of Long Son Island. From the excavated area of 556 m², 80 jar burials and earthen-pit burials were found. Two charcoal samples at the depth of 0.7m and 1m from this site provide the C14 dates of 2220±70 BP and 2680±70 BP, respectively. The excavators also, based on the characteristic of the sites and artefacts, including the presence of a Western Han coin, presume the date of 2000 BP for Giong Lon (Vu Quoc Hien et al. 2006: 40, 2007; Bui Chi Hoang et al. 2012: 93). Although the C14 results do not readily suit with the assemblage of artefacts and characteristic of the site, multiple periods of occupation at this site are suggested for further study.
Archaeological remains found from Can Gio and Long Son Island show that this area was densely populated during the last centuries BCE to the early Oc Eo period\(^1\). The people produced various types of pottery that were used in daily life and could be for trading, such as pottery containers (vestiges of the kiln site in Cay Keo mound, Can Gio district) and burial jars (Khu Bao Dong site). They also produced glass, sea shells and terracotta ornaments (Giong Phet and GCV sites). Some types imitated the stone ones (Dang Van Thang et al. 1998: 354-360; Nguyen Kim Dzung and Dang Van Thang 1996; Nguyen Kim Dzung et al. 1995: Table 2). Several types of pottery found at GCV and Giong Lon indicate relationships between these sites with those distributed further inland, particularly in the Dong Thap Muoi swampy area, such as Go O Chua and Go Hang, via the Vam Co river system (Nishimura 2005; Vu Quoc Hien et al. 2007; Dao Linh Con 2011; Le Thi Lien et al. 2013a) (Fig. 20.3). The people living in this area might have been the first ones who received new and strange goods from the traders. Grave goods at GCV and Giong Lon are very rich, particularly with imported items that represent contacts with other cultures and civilizations. From this area, imported luxury items were distributed to further inland communities or along the coast to the north. Face covers (or masks) discovered from the Giong Lon site (Fig. 20.4), although representing different characteristics and probably from a different time period, might have shared influences from the same tradition as its counterpart from the Phu Chanh site (Vu Quoc Hien et al. 2006: 37; 2007: 37)\(^2\). Earrings in the form of bicephalous animals, which bears the characteristics of Sa Huynh culture; bronze mirror and some potteries of Han types; and ornaments from India (beads in various forms made of carnelian, serpentine, amethyst, crystal) were used by these people (Nguyen Kim Dzung et al. 1995; Vu Quoc Hien et al. 2006: 35-37; 2007: 37, Tab. 3, 4). Some types of these goods might have been transported along the Dong Nai River to further inland, up to Binh Duong province, such as a bronze mirror found at the Phu Chanh site and glass beads at the Doc Chua site (Bui Chi Hoang et al. 2010: 345). The exchanges of luxury goods were probably more extensive via the Vam Co River to the Dong Thap Muoi area. It is attested by the presence of several types of Can Gio and Giong Lon glass and stone beads (mainly carnelian and agate) in Go O Chua, Go Hang and Go Thap sites (Bui Phat Diem et al. 2001: 291; Vu Quoc Hien et al. 2007: 35) (Figure 20.5a,b)\(^3\). Thus, the Dong Nai river mouth area obviously played a role as an important meeting point of the local people with those in the early trans-Asiatic trade routes during the latter half of the first millennium BCE (Glover and Bellina 2011: Fig. 2.5). This was the important premise for the development of the settlements of Oc Eo culture in Dong Nai province and Ho Chi Minh City in the following centuries CE.

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1. In 225 m\(^2\) excavated area at GCV, 399 jar and earthen-pit burials have been found overlapped on the settlement area. C14 result of 1 charcoal sample from the depth of 1.5 m (settlement layer) is 2480±50 BP. From Giong Phet site, more than 100 jar and earthen-pit burials have been discovered in 1993 and 2002. Two C14 samples have the results 2230±60 BP and 2100±50 BP (Nguyen Kim Dzung 1993; Nishimura 2005: Fig 32). Density of burials at Giong Lon is 3.8 m\(^2\)/burial.

2. Phu Chanh site (Tan Uyen district, Binh Duong) is distributed in a swampy area along the Cai stream, which is a branch of Dong Nai river. Chance finds by local people, including wood jar burials, bronze drums and tools of textile industry are distributed in a 3km long settlement area. 7 wood-jar burials in clay-pit, some of which were covered with Heger Type I bronze drum, have been unearthed in the 2000 excavation. The grave goods are mainly pottery, botanic remains, loomery tools, spinning wholes, Eastern Han bronze mirror, etc. The site is datable to the 1st centuries BC-CE (Bui Chi Hoang 2004). A chance find gold-silver alloy mask is also in Binh Duong Museum.

3. Go O Chua, Go Hang, Go Thap and some other similar sites are located on the low mounds distributed in Dong Thap Muoi swampy plain. The early phase of the occupation at Go O Chua was from 2500 BP and the latest one represents characteristics of early Oc Eo culture (Nishimura 2005: Fig: 23). Go Hang was a settlement developed during the 1st centuries BC-CE. The people in Go Hang produced pottery, glass and stone beads, and metal ornaments (Bui Phat Diem et. al. 2001: 98-99). Some etched beads also suggest relationship with Northeast India (Le Thi Lien 2015a: Fig. 3-4).
The coast of Southwestern region, from Ha Tien to Rach Gia, is scattered with isolated small mounds and narrow strips of lowlands which partitioned the Long Xuyen quadrangular plain with the Gulf of Thailand. Although there has not yet been a systematic survey in this area, archaeological remains dated to the pre- and protohistorical periods found in several sites will be discussed.

In the foot of Mount Hon Dat, several coarse sandy potsherds in brownish colour have been found in the fine sandy soil (Fig. 20.6). From Mount Mo So and the Tra San hamlet (Kien Luong district), which are about 33 km and 40 km to the northeast of Mount Hon Dat respectively, two chance finds of stone axes are typologically compared with the stone tools of the Middle and Late Neolithic periods (6000-7000 BP and 4000-5000 BP) (Phan Thanh Toan et al. 2014). However, more extensive surveys are necessary for a clear understanding of the occupation of prehistoric people in this area.

During canal digging on the western foot of another mount – Mount Soa Ao (Ha Tien Town), remains of ancient people have been unearthed at the depth of 2m (0.5 m amsl), in the area of about 2 ha. Vestiges of wood stakes of house-on-stilts, fragments of wood boat and a large number of potsherds (130 samples were collected during the surveys in 2013 and 2015) have been found together with grinding stones, natural pebbles and iron nails (Phan Thanh Toan 2013: 28-33). The fine fabric pottery includes the orange and black wares with whitish or blackish slip. Potteries with coarse and fine sand mixed with fibber-temper are also commonly used. Typologically, they are mainly daily-life utensils, such as pot, jar, vase, high-footed bowl and ca-rang. Potteries of Soa Ao represent close features with those found from the pre-Oc Eo sites in Kien Giang province, K9 and Giong Xoai in particular.

K9 is a noteworthy site that was formed in the late first millennium BCE. It is located in the previously Melaleuca (Tram) forest, on the low mounds (about 0.4-0.7 m higher than the surrounding field) that alternate the depressed wet lands. The landscape of the site was changed quickly due to the levelling of land for three crops of rice and canal digging recently. Vestiges of wood stakes of house-on-stilts and rich assemblages of artefacts, including terracotta objects, pottery, ornaments made of agate, carnelian, glass, tin and lead, and working tools were unearthed during the survey and test excavation in 2006 (Fig. 20.7). K9 is identified as a large pre-Oc Eosite datable to the 3rd-1st centuries BCE, based on a comparative study of artefacts (Nguyen Quoc Manh 2006).

Giong Xoai is a sand dune located 1000m to the south of Ba The Mount. During the excavation in 2001, remains of a settlement site were found, mainly pottery, distributed in the area of 4,000 m² to the south of the mound. Among 2,100 potsherds, 830 fragments of sandy coarse pottery represent similar features with Bronze and Iron Age sites in Dong Nai and Binh Duong provinces. More than 1,200 fine potsherds represent early types of Oc Eo culture. One charcoal sample at the depth of 0.80-0.85cm provides a C14 date of 2150±90 BP. Brick and stone architectural remains were also unearthed in the middle of the mound. From the centre of architectural foundation GX02-KT1, 100 consecrated artefacts were found, including gold plaques, beads and glass fragments (Dao Linh Con and Nguyen My Hong 2004: 283-292). Results of the excavation and various sculptures found from this site show that it developed continually during the first millennium CE (Le Thi Lien 2006a: Figs 14, 156, 157).

Remains of the occupation of the people in the late first millennium BCE have been found in several other sites distributed further inland of the Southwestern delta, particularly on low hills and the foot of mountains. Stratigraphy and C14 data of the mounds Cay Thi, Tu Tram, Oc Eo, etc. on the Oc Eo field indicate continuous development during the last centuries BCE and early centuries CE (Mission Archéologie du Delta du Mekông 2002: Tab. 1, 3; Manguin 2004: Fig. 12.13; Hirano 2005: Fig. 2.4). The
The development of the cultural and trading centres during the Oc Eo period

Stark has finalized the characteristics of the settlements of Southeast Asia in the first millennium CE (2006: 21.7-21.8). Three geological contexts were preferred: the coastal areas, the flooded deltas along the river branches and the areas next to the great freshwater lakes. The coastal settlements were generally located at freshwater sources and potential ports. Riverine settlements are always found from the bordering areas between the flooding fields and the high terraces. The settlements in the flooding areas are generally distributed on the floating hills, where a large population was living on agriculture, similar to the islands in Central Thailand and the Mekong Delta.

The above pattern can be recognized from the developments that occurred in Southern Vietnam in the second half of the first millennium BCE, which corresponded to the natural features, the change of the Mekong flows, and probably the h2 regression to -1 m amsl of sea level. From the first half of the first millennium CE, the occupation has been recognized in mostly the lowlands of the Southern Delta. Among the 50 archaeological sites on a map constructed by Vo Si Khai (2003: 39), more than 30 sites are distributed in the low delta, particularly in the Xa No and Dong Thap Muoi plains. Some of them continually developed from the pre-Oc Eo period and even to a later period, such as Oc Eo site complexes including Go Thap, Go Thanh (Tien Giang), Luu Cu (Tra Vinh) and Vinh Hung (Minh Hai). Evidence can be identified from the presence of settlement layer that was overlapped by the architectural foundation of mature and late Oc Eo periods, as in the case of the Go Thap, Go Oc Eo and Thanh Moi sites. Many other sites developed and flourished during the Oc Eo period and then disappeared, such as Nhon Thanh, Da Noi (An Giang), Canh Den, Da Noi (Kien Giang) and Thanh Moi (Vinh Long). Common types of pottery, inscription and religious artefacts are important indicators for putting many other sites into the discussed framework (Le Thi Lien 2006a: 187, Map II). People made great changes to the topography and living environment. Results of pollen analysis from the Go Thap, Nhon Thanh and Go Thanh sites indicate changes of the ecological system, affected mainly by the change in sea level and cultivation (Nguyen Thi Mai Huong et al. 2015). The landscape changes of the living area are observed by the presence of various man-made hills or enlarging settlements to avoid flooding, development of canal systems, moats, citadel walls or surrounding walls according to the scale and function of each site, such as Go Oc Eo, Go Cay Thi and Go Thap (Mission Archéologie du Delta du Mekong 2001: photo 9, Figs 12, 13; Le Thi Lien 2006b). The economic and cultural centres flourished; archaeological remains from which reflect the widespread contacts and exchanges with other peoples. Among these, several sites played important roles as port cities on the maritime routes.

4 From the excavations in 2002-2003 in Go Thap site, results of two C14 samples of the wood stakes from the earliest settlement layer at Minh su mound site are 2030 ±130 and 2010 ±60 ys BP. One charcoal sample from the next settlement layer is dated to 1875±70ys BP. Results of several charcoal samples from the cremated earthen pit and jar burials in the same area are 2090±85; 1960±55 and 1710±90 (the same cremated rectangular pit burial); 1820±60 and 1770±60 ys BP, respectively (Le Thi Lien 2006b, Le Thi Lien et.al 2014).

5 In addition to the Oc Eo site, evidence of contacts and cultural influences from Indian, Chinese and Roman worlds can be seen from several types of artifacts, including various style of Buddhist and Hindu images, the inscriptions and religious images on gold plaques from Go Thap and Da Noi (An Giang) sites, small terracotta figurine from Go Thap site, imitated Roman coin from Nen Chua site and so on (Le Thi Lien 2006a; Le Thi Lien 2015b: Figs. 11.5, 11.22).
The function of Can Gio-Ho Chi Minh City as port city

As mentioned above, the Dong Nai River mouth was an important gateway of maritime and riverine trading systems. Due to the development of Ho Chi Minh, Vung Tau and Bien Hoa cities, it is difficult to conduct an overall survey in these areas. However, in addition to pre-Oc Eo and early Oc Eo sites in Ganh Rai bay (Can Gio and Ba Ria-Vung Tau), architectural remains and sculptures from the Phung Son Tu mound (Ho Chi Minh City); a Buddha image from Thang Tam village (Vung Tau city); a stone base from Cho Lon; architectural remains from Chieu Lieu and Ong Tung mounds (Dong Nai province) and so on suggest a long process of development of the Can Gio-Ho Chi Minh port-city area during the late first millennium BCE and first millennium CE (Malleret 1963; Pl.XXXII, Fig. 4; Nguyen Thi Hau 2004; Vu Quoc Hien and Le Van Chien 2006; Vu Quoc Hien et al. 2007).

The excavations in 1980 and 1991 at the Phung Son Tu mound unearthed brick and pebble stone foundations of a large temple complex. Unearthed artefacts included a stone Vishnu image, a linga, terracotta human heads, typical Oc Eo pottery and iron slags. It is the most typical site during the flourishing period of Oc Eo culture in the area of Ho Chi Minh City and datable to the 5th century CE (Le Xuan Diem et al. 1995: 135-136).

Further inland, as mentioned above, the relationship between the Can Gio area and the inland pre-Oc Eo sites in the Dong Thap Muoi area (Go O Chua, Go Hang, Go Dung, Vinh Chau A, etc.) are indicated by the common artefacts found, namely stone and glass beads and high footed pottery, during the last centuries BCE (Bui Phat Diem et al. 2001: 291; Reinecke et al. 2009: 43-44, III.45; Le Thi Lien 2015a: Figs. 3, 4, 6; 2015b: Fig. 11.10). The distribution of religious sites and artefacts reflects the florescence of the Oc Eo settlements on both the old alluvial terraces of the Southeastern region and the fringe of new alluvial swampy area of Dong Thap Muoi (Le Thi Lien 2006a: Maps I &II). Various Hindu and Buddhist sculptures (Fig. 20.8) were found at Go Thap (Dong Thap), Binh Thanh, Go Mieu (Tay Ninh), Tan My and My Thanh Dong (Long An) can be seen as indicators of the continuous trading and cultural exchanges between the coastal and the inland regions via the Dong Nai and the Vam Co river systems in the 1st-7th centuries CE (Le Thi Lien 2006a: Table 2.1, 2.2, 2.3). Go Thap is a typical site that developed from a pre-Oc Eo settlement during the last centuries BCE into a strong economic, cultural, religious and political centre during the 5th-7th centuries CE, as attested by C14 dating results, inscriptions, sculptures, architectures, pottery and so on (Le Xuan Diem et al. 1995: 81-86; Le Thi Lien 2006b; Le Thi Lien et al. 2014). Evidence of the fluctuations of sea level and the significant effects on the palaeoenvironment of the site can be seen in the changes of the settlement area in the surrounding low field and the enlargement of the higher grounds6.

In the latter half of the first millennium CE, most of the sites in the lowlands of the Mekong Delta disappeared from the archaeological map, except those on the coastal sand dunes and on the slope of the scattered mountains. Meanwhile, the sites in Ho Chi Minh City and the surrounding high areas still existed as attested by the discovery of large-sized yoni in Cho Lon and a Vishnu image from the Dong Nai River at Bien Hoa city (Malleret 1963: Figs 4-5; Le Thi Lien 2006a: III. 74). It means that sea level fluctuations did not seriously affect this area.

Oc Eo port city

The Ba The-Oc Eo portcity site is wellknown, particularly due to the excavation in 1944 by L Malleret and others in the late 20th and early 21st centuries (Malleret 1959; Le Xuan Diem et al. 1995:

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6 During the 2002-2003 excavations at the foot of Go Minh Su mound (Go Thap), a small water way was filled with sand after the 1st centuries BC-CE. The site was also enlarged with brick debris after the 5th century (Le Thi Lien 2006b: ibid)
So far, the development history of Oc Eo has been reconstructed by Manguin and his colleagues (Manguin & Vo 2000), consisting of four main phases as follows:

- From about the 1st to the 3rd centuries CE, the houses-on-stilts were built on the low mounds in the Oc Eo field and on the foot of Mount Ba The. This was the living area of the people who farmed, traded and produced craft goods. Ornaments made of semi-precious stone, glass and gold were their main products. Moulds for manufacturing the earrings, beads decorated with “swastika” motif, scroll pattern, and seals all indicate that the population came from various areas. A cremation grave with ashes buried in a pot was found on the slopes of Ba The hill and showed that a new custom in burial ceremony was introduced to the area (Manguin and Vo 2000: Figs 4, 6).

The study on the canal system indicates that in the early Common Era, the regional canals that were not very deep but rather large had been constructed in the lower Mekong Delta. They were used for local transportation of goods (Bishop et al. 2003). In the next few centuries, large-scale canals were dug in Oc Eo which connected to all the local canals and natural waterways7. They played important roles both for transportation and multi-harvested water-rice cultivation as indicated by varieties of wild and cultivated rices found from Oc Eo and Go Thap site (Nguyen Xuan Hien 1984: 246; Nguyen Thi Mai Huong et al. 2012) (Fig. 20.9). An important Hindu temple was probably built on the Go Cay Trom site, as indicated by a large-sized linga and architectural remains (Le Xuan Diem et al 1995: 169-172; Le Thi Lien 2006a: Ill.93). Buddhist monasteries and stupas might have been built, as indicated by the presence of a bronze Buddha head in Gandhara style, terracotta bas-reliefs of lion images, etc. (Fig. 20.10). However, the exact scale and location of the port in this period has not yet been clearly identified (Malleret 1959; Manguin 2009: 110).

- The 4th-7th centuries CE (mainly from the 4th to the first half of the 6th century CE, based on the presence of major Buddhist and Hindu sculptures, is the most flourishing period of the Oc Eo portcity. The moat and walls of the city were completely constructed. The city was in close connection with the flourishing centres of Oc Eo cultures during this period, such as Mop Van, Da Noi (An Giang), Nhon Thanh (Can Tho), Nen Chua, Canh Den and Da Noi (Kien Giang). Canal systems, the Grand Canal – Lung Gieng Da in particular, were active. In this period, the pile dwellings were built densely in all the fields of Oc Eo, along the canals and in the foot of Mount Ba The. These were for living, working and the trading activities of the large population who were locals and those coming from afar. On the mounds and the higher slope of the mountain, brick and stone architectures were built. The scale and characteristics of these buildings suggest that most of them were religious or memorial constructions. Some of them could be palaces with stone foundation, wooden structures and tile roofs.

- From the 7th to the 12th centuries CE, one can witness the emptying of brick buildings on the Oc Eo field. However, they were still built on the slope of Mount Ba The. The lack of post-Oc Eo evidence, pottery in particular, also indicates that the people did not choose the low field for settlement.

7 Malleret recognized a system of at least 27 canals in Mekong lower delta, including 19 in Southern Vietnam. The traces visible from the photographs have been recapitulated by Stevens et al. (2004: Figs. 1, 6), which represent a network of waterways connecting various areas and also the rice fields. Geo-palaeoenvironment studies prove that Lung Lon canal connecting Angkor Borei-Oc Eo was dug to the initial depth of 246 cm in as early as 2nd century CE. Palaeobiological analysis shows that the canal was connected with the sea and salt water might have penetrated to Oc Eo area. The canal was possibly infilled and the circulation with the Rach Gia bay stopped in about 1400 BP (Le Xuan Thuyen 2005: 81, Fig. 3b).

8 Canal systems were used for draining and desalting the field, as indicated by content of K5 inscription (5th C. CE) in Dong Thap Muoi area, where the land had been subdued from the marsh (Coedes 1931). The people may also have taken advantage of tidal raises to entrapt river water into the field through the canal system during the dry season, as being practiced nowadays.
The richness of artefacts made from various materials such as gold, silver, bronze, tin, glass, precious stone, sandstone and terracotta found in Oc Eo shows that the Oc Eo people had contacts with the Mediterranean, the Middle East, Southeast Asia, China and India. Remains of the crafts, in particular the manufacturing of ornaments, indicate the important role of Oc Eo in various aspects during its heyday. Oc Eo thus is considered the most active site in Southeast Asia which has not been surpassed to date (Miksic 2003: 3; Manguin 2009: 105).

Based on the scale and symbol of the city (Mount Ba The), characteristics of major architectures, artworks and the inscription on a stone slab stored in Linh Son pagoda, and its relationship with the satellite sites in Cuu Long River delta, it is suggested that from a port city of early Funan (1st-2nd centuries CE), Oc Eo developed as a capital city during the 3rd and early 5th centuries CE, with contemporary Nen Chua as a frontal port (Le Thi Lien 2016). This is the outcome of economic prosperity based on extensive maritime trading and wet-rice cultivation, which was in accordance with the h 3 sea level regression to -0.5 m amsl during the 2nd century CE. Oc Eo might have lost its role due to several reasons in the 6th century CE. Particularly, the HIV transgression of sea level to +0.8m amsl during this time might be the major factor that caused the collapse of Funan. The political power might have moved back to Angkor Borei during 6th and 7th centuries CE. This hypothesis is indicated by the presence of the grand Vishnu and other Hindu and Buddhist images in Phnom Da style and the major reorganization or restructuring of Angkor Borei old city in the early 5th to early 6th centuries CE (Dupont 1955; Bishop et al. 2004: 334).

**Nen Chua – Takev frontal port**

The Nen Chua site (or Takev) is located in Tan Hoi commune (Kien Giang). It is 12 km from the east of Oc Eo and connected with this site by Lung Gieng Da (Grand Canal). The site is 1.5 to 2 m above sea level and connectable with other areas by the canals. The archaeological survey by L Malleret in 1944 and 1946 and the excavations by Vietnamese archaeologists have brought to light important remains and artefacts. The archaeological sketch map shows that the site included several areas with various functions.

**Settlement area:** In 1944, Malleret found at least 14 wooden stakes distributed between 0.6 to 2 m from each other in an area of 6 × 2.5 m² (Point 2). In the survey in 1982, wooden stakes were found scattered in a large swampy area of 15 ha and from the old stream. From the excavated pit 82NC-L1, several wooden stakes were found standing vertically and wooden beams were found lying horizontally at the depth of 0.8-1m. During the survey in 2015, many potsherds were observed along a modern canal. It is clear that the Nen Chua people lived and produced craft product mainly in the pile dwellings.

**Religious architectural area:** Several architectural foundations made of stone blocks or ramped soil and related artefacts were unearthed on higher grounds. On the Nen Chua Mound, a large architectural foundation (25.6 × 16.3 m) was built carefully (Le Xuan Diem et al. 1995: 165). A linga of 1m height was found. In the central structure of the foundation, the consecrated deposit included several gold plaques, fragments of gold ring, and precious stone. On some gold plaques, there were images of bull and lotus, which indicate the belief in Sivaism. Architectural structure BCX6 also had a square stone structure (2.14 × 2.14 m in size, 1.35 m in depth) and a central brick block which contained several artefacts, including images of bull and a sitting man which indicate its religious function.

Nineteen other architectural remains found from mounts Ba Chua Xu, Bà Chua Xu B, Phat Noi have been identified as graves (Dao Linh Con 1995). Among these, the architectural remains signed as BCX1, BCX2, BCX3 and NC82-PN1 are close in structure with the mentioned ones (Le Xuan Diem et al. 1995: 218-220; Vo Si Khai 1983). However, due to the lack of clear indication, it is difficult to identify their function. Several C14 dating results of wood and charcoal samples from Nen Chua dated to between 270-530 CE and mostly concentrated to 420-480 CE for the architectures (Le Xuan Diem et al. 1995: 430-431).
Some types of artefacts found in Nen Chua are noteworthy. On one stone block, there is an image of a ship. The stone sculptures, gold plaques with images, beads, seals, medal imitating the Roman coin, coin with image of a ship and Oc Eo coins indicate the function of the site as a trading port centre (Malleret 1959: 103-104, Fig. 13; Le Xuan Diem et al. 1995: Ill.45) (Fig. 20.11). The presence of several stone sculptures proves that the people practised Buddhist and Hindu religions and had close contact with Indian culture (Le Xuan Diem et al. 1995: 336-37; Le Thi Lien 2015a: Fig. 15; 2015b: Figs 11.3, 22, 23). The filling in of Lung Lon canal during the 6th and 7th centuries (Le Xuan Thuyen 2005) and the lack of artefacts that can be datable to the late Oc Eo period suggests that the site lost its role after this period.

The great canal connecting Nen Chua with Oc Eo and its typical artefacts show that Nen Chua was the frontal port city of Oc Eo during the first half of the first millennium CE (Le Xuan Diem et al. 1995: 45-48). Sites that developed in the south-western delta in the middle of the first millennium CE were connected with Nen Chua and Oc Eo by the ancient canals, as suggested by the vestiges of the ancient canals and the discovery of boat fragments from Nhon Thanh (Can Tho), Da Noi (An Giang), Canh Den (Kien Giang) and the likened artefacts found from these sites.

Regional and long-distance trading

Several utilitarian and nonutilitarian commodities have been exchanged as goods among the intra-regional communities in Southeast Asia during the last centuries BCE and continually in the first millennium CE, such as pottery, salt, iron, bronze, tin, silver, horse and shell coins. However, the products, their way of distribution and the context of consuming these goods have not yet been studied (Stark 2006: 10). The archaeological data from Southern Vietnam mentioned above may provide some clues to reconstruct the picture of regional and long-distance trading in this area.

Regional and inter-regional transportation and trading system

As discussed above, following the formation of the delta and the changes of coastlines during the latter half of the first millennium BCE to the early Common Era, from the foothills and higher grounds, the communities in Southern Vietnam came closer to occupy the areas along the coast, along the river and the low delta. They transformed riverine and coastal swampy areas by digging canals and linking them to natural waterways which were able to drain off the excess rainwater from the rice fields and aided in intraregional transportation. In the low field of Southern Vietnam, C14 dating results of recent archaeological studies show that the moat in Oc Eo had already been dug by the early 3rd century CE and the main canal – Lung Lon – was in use possibly as early as the 2nd century CE (Manguin 2009: 110; Mission Archeologie du Delta du Mekong 2002; Tab. 2, 3). Several other sizable canals might have also been dug in these periods to connect with natural streams that provided convenient transportation routes for living and exchange between the populated areas with the trading centres. The increased amount of agricultural

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9 Nhon Thanh (Phong Dien dist., Can Tho) was a large settlement cum workshop during the 4th-5th cent. CE (Niximura 2008; Le Thi Lien 2006a: Ills. 43-45, 51-52). Da Noi (Thoai Son dist, An Giang) was a religious centre located in a densely populated area during 4th-6th Cent. CE, with remains of Hindu temples and rich consecrated deposits (Le Thi Lien 2011; Le Thi Lien et. al, 2013: 762). Canh Den (or Cent Rues – Vinh Thuan dist., Kien Giang) was a flourished trading centre. Archaeological remains are distributed in an area of 1 km². It was probably connected with Nen Chua and Oc Eo by a canal running in north-south direction (Le Xuan Diem et. al 1995: 156-158; Pham Nhu Ho et. al. 1995).

10 Living in house-on-stilts (for also trading and craft working) on the water face or in the water front is the common way of life of both pre Oc Eo and Oc Eo people, as witnessed from Soa Ao, K9, Oc Eo, Nen Chua, Nhon Thanh, Da Noi, Canh Den, Go Thap, Phu Chanh etc.

11 According to historical records of Gia Dinh thanh thong chi and Dai Nam thuc luc, the Nguyen kings in 19th century ordered to dredge several old water ways, including the Vinh Te canal and Thoai Ha river, and dug the canals to connect with each other (Tran Duc Cuong: 2015: 249-257). Many parts of these systems might have been dug already by the Oc Eo people along with the growing of populated areas.
products, wet-rice in particular, was sufficient and even in excess for the growing population during the early Common Era$^{12}$.

The inland communities could easily interact with those in coastal and river mouth areas through the main canals in the Southwestern region. In contrast, the Dong Nai and Vam Co rivers played important roles in the Southeastern region. Can Gio (and the larger Ba Ria-Vung Tau area) and the Rach Gia-Ha Tien coast were important points of contact with the outside world. Among these, Can Gio was an international port of the exchange network to the inland Dong Thap Muoi area from the pre-Oc Eo period. During the Oc Eo period, various imported or imitated types of artefacts found from Nen Chua and Canh Den show that they were important gateways to the Long Xuyen Quadrangular plain (Fig. 20.12)$^{13}$.

The development of trading networks and their influence on agriculture and crafts made it possible to develop the settlements in all Southern Vietnam during the first half of the first millennium CE. The communities had enough capacity to organize and conduct the great work that required a high level of organization and large numbers of labourers for constructions such as religious temples, palaces, canals, city moats and walls (Manguin 2009).

**Long-distance trading**

Archaeological evidence (mainly beads, coins, various types of pottery, intaglios, Buddhist and Hindu sculptures, images on consecrated gold plaques, etc.) indicates that from the main points of Nen Chua, Oc Eo, Can Gio and other satellite sites, the inner regional trading networks were able to connect with other regions that had already developed with many ports along the west and the east coasts of India (such as Bharukachcha, Goa, Arrikamedu, Pattinam, etc.); around the Gulf of Siam (U Thong and Nakhon Pathom); along the coast of southern Thailand and Malaysia (Khuan Lukpad, Khao Sam Kaeo, Nakhon Sri Thammarat/Tambralinga) to the stopping points in Sumatra (Bellina 2014; Boonyarit 2015; Le Thi Lien 2015a). To the east, this system included points along Central Vietnam, of which the most active ones were in the Thu Bon valley. Towards the North, communities in the river mouth areas, such as the Lam river (the Lang Vac site in Nghe An province), the Ma river (the Dong Son site and the Han sites in Thanh Hoa province) and the Hong and Thai Binh rivers (vestiges from Hai Phong, Nam Dinh and Quang Ninh provinces) also participated in this system and shared common goods with Oc Eo people (carnelian and glass beads, Buddha images, several types of pottery, Han-type bronze artefacts, etc.) (Lam Thi My Dzung 2011: 11-12; Bui Van Liem 2014: 266-269).

This network opened up to southern China during the flourishing period, and missionaries, pilgrims and traders who went along this route could have contributed to the promotion of trade on national levels. The most common means of transportation were by ship. Dug-out canoes could have been the earliest in use for collecting local goods and bringing imported goods from the coast to inland areas. Fragments of dug-out canoes have been found at several sites of Oc Eo culture (Da Noi – An Giang, Nhon Thanh – Can Tho). This method is still used by the local people at the present time. From the images on stones and coins, it is possible that the big ships could have landed at Oc Eo and Nen Chua sites (Le Xuan Diem et al. 1995: 335, Ill. 3; Le Thi Lien 2015b: Fig. 11.3).

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$^{12}$Various types of rice and rice husks remained in bricks and potsherds are observed from many sites and described from Giong Cat, Ba The-Oc Eo, Nen Chua, Da Noi, Nhon Thanh, Go Thap which proves the high output of rice (Nguyen Xuan Hien 1984; Le Thi Lien and Pham Nhu Ho 1997; Nishimura et. al. 2008; Le Thi Lien et. al. 2014, Nguyen Thi Mai Huong at. al. 2012 ibid).

$^{13}$Several seals made of terracotta, lead, tin and lead alloy, bronze and crystal found from Canh Den and Nen Chua sites attest that these were prosperous trading centers. They connected with Oc Eo and other inland sites by the canal network (Le Xuan Diem et. al. 1995: 331-337).
Conclusion

Favourable conditions of topography in the coast of Southern Vietnam created good points for the establishment of the large settlement sites in the river mouth areas and newly formed deltas. The areas surrounding foothills, sand dunes and mounds were not only living areas but also ideal landing places for boats and small ships before large ships could be constructed. These were the first trading points between the local people and others in Southeast Asia. Giong Lon (Vung Tau) and Can Gio (Hô Chí Minh City) were the first international trading points connected to the great civilizations, the Indian and Chinese in particular, during the late first millennium BCE.

At the same time, the regression of sea level and the alluvium of the Mekong River created changes to the coastline during 2000 BP and made the Southern Delta fully formed. Thanks to the alluvium of the Mekong River and the genuine exploitation of the people, particularly with the canal systems, the Southern Delta became very rich in rice and varieties of products from forest and water environments. These were favourable conditions for the development of economy and exchanges of culture. In this context, the port cities developed actively. The most notable areas are the Dong Nai river mouth and the Kien Giang coastlines. The Giong Lon, Can Gio, K9 sites and so on were formed from the late first millennium BCE and became the important premise for the development of the so called port cities in the early first millennium CE. Following the Oc Eo port city, which was developed from the first century CE, Nen Chua is among the most important ones that functioned as a frontal port of the Oc Eo site itself.

The regression of sea level sometime during the latter half of the first millennium BCE and in the 2nd century CE might have been important natural factors, together with the catalyst of maritime commerce, which created the boom of Oc Eo civilization in the middle of the first millennium CE. However, the HIV transgression of sea level during the 6th-7th centuries to +0.8m amsl might have greatly affected the environment and agriculture. It caused the Oc Eo settlements to retreat from the lower delta. Concurrently, the change of maritime networks and disordered politics were other factors that caused the collapse of Funan.

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Abstract

Surakarta, capital of the Mataram kingdom in Java, was established in the 18th century, in the former swampy area of Sala village. The Javanese conceived their capital from a religious viewpoint, as a symbol of power and the centre of universe. To the Dutch colonizers, however, setting up a capital was a practical matter. The city needed to satisfy the interests of both parties, that is, both religious and economic needs. This historical archaeological research examines how these two interests were embodied in the layout of Surakarta city centre. It was thus carried out using a landscape archaeological lens and a phenomenological lens to investigate the relationships between natural and cultural landscapes, and the experience of local inhabitants, to explain how Sala village was selected as the new capital. This research uses written sources to answer an archaeological problem. Babad Tanah Jawi and Babad Giyanti, 18th-century Javanese texts, are referenced to explain how the new capital was planned and established, and how its layout was arranged to accommodate both Javanese and Dutch interests. The results of the research show that Sala village was selected primarily for religious motives. It was considered so by people with a faith or of that cultural persuasion, and next as a result of economic and political considerations. The new capital as residence of the king not only formed what was for the Javanese the magical centre of the realm, but also a centre of state politics and a strategic trading centre (particularly for the Dutch who came to Java as traders). Sunan Pakubuwana II, king of the Mataram kingdom, played a crucial role in modifying Sala village into a capital city for both parties.

Keywords: Sala village, new capital, Surakarta, Babad Tanah Jawi, Babad Giyanti

Introduction

Surakarta was established as the capital of the Mataram kingdom by the Javanese king Sunan Pakubuwana II in a former swampy area of Sala village. Scholars have discussed the village in depth, mostly in terms of the part it played in the historical background of the city. Historians and archaeologists are more interested in Surakarta as an established city rather than examining its process of transformation from a village to a city. For example, Susanto (2005) writes about forms of entertainment in Surakarta as part of the city’s economic activity. Soedarmono (2004) investigates the development of Surakarta as a colonial city. Kuntowijoyo (2000) states that Surakarta became a modern city at the beginning of the 20th century as a result of rapid technological developments, such as transportation and telecommunication devices, and the expansion of businesses, service industries and leisure facilities. Savitri (2015) writes about the development of Surakarta and how the city was sustained as the centre of the Javanese realm by the Javanese kings from 1745 to 1942 CE.
Surakarta deserves investigation by scholars, as from 1745 to 1755, it was the capital of the Mataram kingdom, the biggest Islamic kingdom in Java. After 1755 it became the capital of Surakarta kingdom, when Sunan Pakubuwana II and a Dutch representative signed the Giyanti Treaty in Salatiga, a small town 50 km to the west of Surakarta.

The Javanese believed that the capital city formed the magical centre of the realm (Behrend 1982: 225), following this concept to arrange the city’s layout. It was also important economically and politically (Soeratman 2000). Because of this, Sala village was selected as the site for the new capital. Its subsequent transformation is worthy of investigation.

The transformation of Sala from a village to a capital city was unique in its establishment process. It was conducted as a result of discussions by two parties – the Javanese and the Dutch – with the final decision being made by the *sunan* as king. This demonstrates the power of the Javanese king in the face of Dutch colonization.

The landscape, then, was modified to make feasible its function as both the Javanese capital city and a Dutch trading centre. The Javanese conception of their capital was in religious terms, as a symbol of power and the centre of the universe (Savitri 2015). In contrast, the Dutch colonizers were concerned only with practical matters. Their purpose for being in Indonesia was to trade, and thus their prime motivation was to fulfil an economic need. This paper examines why Sala village was chosen as the ideal place for the new capital and how its landscape was modified. It is argued that Sala village was chosen by the Javanese because of their belief in the sacredness of the landscapes surrounding it, which fulfilled the requirements of a Javanese capital city, the centre of a magical realm, and at the same time the economic considerations of the Dutch traders.

This paper aims to reveal the active interaction between humans and the landscape, in the drive of the former to transform their landscape. It is useful to gain a new understanding of human history in constructing a new capital, which was not only related to human beings, but also the active interaction between the landscape and human and vice versa.

This is a historical archaeology research using a landscape archaeology phenomenological approach to reveal the relationship between the cultural and natural landscape and human experience. The relationship of the village to the landscape and its human occupants is investigated using written sources such as Javanese texts written in the 18th century (*babads* Tanah Jawi and Giyanti). They are used to explain how the city was planned and established. These are both examples of literary history, which contain historical elements mixed with social reality and myth (Sutjipto 1977: 121). Both *babads* can be used as historical sources to explain events in the past. Literary history was written based on the experience interacting with knowledge.

### Why did the capital move?

Surakarta was the last capital of the Mataram kingdom. The previous capital was Kartasura, which was established by Sunan Amangkurat II in 1680 CE and moved to Surakarta in 1745 CE after two great wars which damaged the court. In 1742 CE, Kartasura was attacked and occupied by the Chinese. The king, Sunan Pakubuwana II, fled eastwards crossing the Sala River. After the *sunan* left the court, it was attacked by enemies from Madura island which was occupied by the *sunan*’s family, Sunan Amangkurat V, an ally of the Chinese (Daradjadi 2013: xxxviii).

A month after the Madurese occupation, Sunan Pakubuwana II returned to Kartasura and took back his throne with the help of the Dutch led by von Hohendorff and his soldiers (Daradjadi 2013: xxxix). *Babad Tanah Jawi* mentions the *sunan*’s sadness when he became aware of the extensive damage which had occurred to the court during the wars (Jasadipura 1941: 1). According to Javanese belief, the sacredness of the court and the sanctity of the palace had been lost as a result of enemy destruction, and calamity would
befall its residents if it was not moved (Boechari 1977: 15). It was von Hohendorff who suggested to the sunan that he move the court. The sunan agreed and appointed Sala village (later Surakarta) to be the new capital of the Mataram kingdom. In the minds of the Javanese, this moving of the court eastwards by 12 km assured the welfare of the kingdom.

Selecting the site of a new capital

The process in which Surakarta was established as the new capital was different from other cities in Southeast Asia. Melaka, a port city in Melaka Strait, for example, was established as a trading port in 1403 CE by Parameswara, the first Malay king and a descendant of Palembang king (Sandhu and Wheatley 1983: 140). Banten, another city port in Java, was established by Hasanudin – based on the suggestion of his father – after defeating the Portuguese in the 1527 war. In Surakarta, the Javanese and the Dutch discussed the new site for the capital together; the final decision, however, rested with Sunan Pakubuwana II as Javanese king (Savitri 2015: 74). This demonstrates the establishment process of the capital of Mataram kingdom that involved two parties, the Javanese and the Dutch, but the final decision on the Javanese, which is different from other cities in Southeast Asia.

Information about the discussions which took place around the choice of site for the new capital can be found in Babad Tanah Jawi. Both the Javanese court officials and the Dutch proposed several locations. The first location was Pokak in Kartasura; this was rejected because of its lack of a water supply. The second location suggested was Kapi, located to the east of Kartasura court. This place was not recommended as it would repeat the mistake of the past when Pajang Kingdom was defeated by Mataram in a 1587-8 war. The final suggestion was Sala village, located close to the Sala River. Von Hohendorff suggested this, as it would benefit the Dutch economically. The view of Sunan Pakubuwana II was that Sala village was a sacred place. This states that the sunan had absolute power to decide the new site and succeeded in balancing two interests.

Features of Sala village

Sala village: a sacred place

Sala village was considered by Sunan Pakubuwana II as the most appropriate place for the new capital. The village was thought to be a sacred place, a factor which would make the capital city, taking precedence over economic profitability and political factors. The sacredness of the village was evident firstly from its location close to the junction of two rivers: the Pepe and the Sala (Savitri 2015: 65; fig. 21.1). According to Javanese animism, spirits reside at the junction of two rivers, making it a special place. This belief in the forces of nature was rooted in the indigenous Javanese society (Koentjaraningrat 1985: 324; Koentjaraningrat 1994: 319). It continued in the next period when Hinduism-Buddhism influenced the Javanese. It can be seen at the site of Candi Borobudur (built in the 9th century), also located close to the junction of two rivers – in this case the Progo and the Elo. When Islam came to Java and exerted its influence on the inhabitants, the animism known to the Javanese for centuries continued, with the Javanese maintaining its mystical elements (Muhammad 2006: 2). They even synthesized Islam as the new religion with Hinduism, Buddhism and animism (Forshee 2006: 29). These religions were all practised by the Javanese, including the elites, to obtain strength and prosperity in their daily life.

Geographically, however, Sala village was not an ideal place for a settlement. It was a swampy area, situated in low-lying land vulnerable to flood. This information is given in the story of Sala village in Babad Tanah Jawi. At the same time, the Javanese believed that a swampy area like this was sacred, providing safety and assuring their welfare. For example, Ranca Anom in Siluman village, Ciamis, West Java, is a well-known swampy area which is sacred in Java. The surrounding community believes that the
swampy area is inhabited by a ghost, and many Javanese visit the place in the hope that their desires will be fulfilled (Suyono 2007: 213-4).

The sacredness of Sala village was strengthened by the existence of the tomb of Raden Pabelan. The sacredness of this tomb was believed to confer prosperity and security, both of which are priorities of the Javanese to this day. Belief in mystical powers, god and evil spirits, the worship of the forces of nature, local guardian gods, holy trees and the cemetery where their ancestors were buried formed a major influence in the choice of a new site. These beliefs, although rooted in an animistic concept of the universe rather than in Islam, lived on even in the Islamic Javanese court (Koentjaraningrat 1985: 324). Javanese Muslims retained certain mystical elements of animism, a tradition which had been established since the pre-Islamic period (Muhaimin 2006: 2), and after the advent of Islam, the new faith was practised and synthesized with popular beliefs, including Hindu-Buddhism and native animism (Forshee 2006:29).

The sacredness of the site chosen for a capital city was significant to the 18th-century Javanese, who would build it according to a cosmological (or religious) concept. The concept was rooted in Hindu-Buddhist tradition, which believed that the centre of the world was encircled by the sea (Heine-Geldern 1942: 15) and is known as Pajupat Kalima Pancer by the Javanese (Savitri 2015: 94). Sala village had a similar structure. It was located at the centre of four sacred cardinal points encircled by two rivers, the Pepe to the north and the Sala to the east. Each of the four cardinal points symbolized a different location, combining cosmic, chthonic and animistic elements (Heins 2004: 102) and inhabited by a spirit. To the north of the village was the sacred Krendhawahana forest, inhabited by the goddess Durga; to the east was Lawu Mountain inhabited by the god Kangjeng Sunan Lawu; to the south was the South Sea inhabited by the goddess Nyai Rara Kidul; and to the west was the Merapi Mountain inhabited by the goddess Kangjeng Ratu Sekar Kedaton. Sala village was clearly the ideal site for the capital, with its location proving its sanctity and meaning that it deserved to be established as the new magical centre of the realm (Moertono 2009: 123).

*Sala village: a good location economically and politically*

Sala village was also a good location for economic and political activities, increasing its suitability as a capital city. It was located around 1.5 km to the west of the Sala River, which transported goods from the hinterland to the coastal region and vice versa.

The Dutch military official Major von Hohendorff mentioned in Babad Tanah Jawi that the Sala River (known today as Bengawan Solo) had been used as a means of transporting goods such as rice and wood from the hinterland to the coastal area since the 14th century. This information is confirmed by information found on an inscription, the Ferry Charter. The inscription indicates the existence of an important port named Wulayu, identified by J Noorduyn as Semanggi, a Javanese kampong which still exists today (Soeratman 2000: 67).

From a political aspect, in terms of security, Sala village provided a safe place from enemy attack. The Babad Tanah Jawi states that if the new capital was located to the east of the Sala River, the inhabitants would likely convert to Hinduism, a threat to Sunan Pakubuwana II as king of an Islamic Javanese kingdom. He thus appointed Sala village to be located to the west of the Sala River.

Based on these three main reasons, it is evident that for the Javanese, sacred and religious matters took priority over economic and political considerations. Herusatoto (2008: 70) refers to the Javanese as a socio-religious people, who believed in the unseen and its influence on their lives. As a result, religious matters formed the foundation of their views and other factors followed.

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1 Pangeran Pabelan was the son of a regent in Pajang kingdom in Java.
Transformation of Sala village into the new capital

Process of preparation

After its appointment by Sunan Pakubuwana II as the site for the new capital, the transformation of Sala village began. Two issues needed to be addressed before construction could begin. The first related to the villagers and their removal from the land. Secondly, the swampy nature of the land needed to be tackled.

There does seem to have been a problem in the process of clearing the village. Babad Giyanti tells of the turmoil caused by the ordering of the Salanese inhabitants to move to another village (Poedjosoedharmo and Ricklefs 1972: 98). They eventually moved after being approached by senior officials of the Javanese court. This indicates the brilliance of court officials to negotiate with the villagers, which is never told in other places in Southeast Asia.

The second problem was solved by modifying the swampy area to make it a suitable site for a capital city. According to the Javanese texts Serat Nitik Karaton and Tus Pajang, this was done mystically (through prayers by the king) and practically (by infilling with wood, stones and soil). Their focus on the land reclamation process used to dry out the swampy area of Sala village revealed the role of the Javanese in the work. Praying first before acting is the way the Javanese solve their crucial problems.

Construction process

Babad Giyanti writes clearly about the construction process which transformed Sala village into the new capital. This Javanese text notes that its design followed that of the previous capital, Kartasura (Poedjosoedharmo and Ricklefs 1972: 99). A sketch of Kartasura as capital of the Mataram kingdom by Graaf in 1686 is included in Ricklefs (1993). It shows the court located to the south of the alun-alun (city square). A 1938 map found at the library of Mangkunegaran House adds to the overview of Kartasura as a capital city, showing a mosque located to the west of the court and a southern square to its south. Surakarta today follows a similar layout, with the court at the centre, the northern square to the north of the court, the southern square located to its south, and the mosque to the west of the court. Achieving this layout was due to Sunan Pakubuwana II, who strove to maintain continuity with his ancestors (Schrieke 1957: 10), perhaps a natural reaction where a significant break with the past (as embodied in the movement of the capital) has occurred (Schrieke 1957: 11).

Babad Giyanti also discusses other individuals involved in the establishment of the new capital. Senior Javanese officials helped decide its location and the materials to be used (Savitri 2015: 85). Members of the sunan’s family, Raden Pringgalaya and Pangeran Mangkubumi, acted as supervisors of the construction of both the court and city, ordering local rulers to contribute funds, workers and artisans (Savitri 2015: 85). Babad Giyanti states that tens of thousands of commoners were involved in the construction of the new capital (Poedjosoedharmo and Ricklefs 1972: 100).

Babad Tanah Jawi writes about the materials used to build the new court. Workers brought bricks from Pajang and Laweyan, both approximately 5 km to the west of Sala village. However, when it proved difficult to source the large quantities of bricks needed, Raden Pringgalaya agreed to produce them himself (Jasadipura 1941: 9). As for the palace fence, Babad Giyanti states it was made of bamboo, which was quicker to erect than bricks (Jasadipura 1941: 9). The indication is that there was limited time available to set up the fence.

Moving process

The moving process from Kartasura to Surakarta was reported by Babad Tanah Jawi to have occurred in 17 Sura Dal year, AJ 1671 (1746 CE). The Javanese considered the Dal year (which occurs
once every eight years) to be the most auspicious, and in 1746, several court ceremonies were performed in Surakarta to secure the safety and welfare of its inhabitants.

*Babad Giyanti* discusses the preparations for the moving day in great detail, including the offering (*sesajen* in Javanese) brought from Kartasura to the new capital. Making an offering was part of every Javanese spiritual ceremony, conducted to maintain the ideal of *tata tentrem*, a Javanese term meaning peace and harmony, between human and universe (Geertz 1960: 42). The offering included food (vegetables, meat, fish, poultry, porridge, fruits and eggs), yarn, batik, gold, silver, bronze, copper, iron, chicken and spices (Santoso 1973: 6). The symbolism of offerings made as part of ceremonies such as these was important to the Javanese to establish communication with the supernatural world (Koentjaraningrat 1985: 367) and to ask God, spirits and ancestors for protection. In this case, the aim was that the moving process, described by *Babad Giyanti* as a “merry festival”, would take place smoothly (Savitri 2015: 89).

The moving process was not only participated in by the king Sunan Pakubuwana II and his court officials, but also by Dutch troops led by von Hohendorff who marched 12 km from Kartasura to Surakarta. *Babad Giyanti* states that the inauguration ceremony for the new capital of the Islamic kingdom began soon after the arrival of the Dutch at Sala village. At this ceremony, the king announced the renaming of the village of Sala as the capital to Surakarta Adiningrat. Religious officials then prayed for the well-being of the kingdom (Poedjosoedarmo and Ricklefs 1972: 106). Sala village was now the capital city of Mataram kingdom.

**Conclusion**

Sala village did not only provide the setting for historical background to the development of Surakarta as capital of the Mataram kingdom, it also had an active role in the construction of the new capital city. The capital as residence of the king not only formed the magical centre of the realm, but also the centre of politics and trading.

The landscape of Sala village fulfilled the requirement of being an ideal place for a new capital based on a cosmological concept derived from Hinduism-Buddhism, blended with a traditional Javanese village layout. It had been chosen because of its location at the centre of four cardinal points and being encircled by two rivers. The sacredness of the landscape or religious concerns were thus of predominant importance, followed by economic and political concerns. Together, these factors decided the site of Sala village as the new capital. The Javanese are a socio-religious people; at the time that the new capital was established, their over-riding belief was in the unseen that influenced their life.

Sunan Pakubuwana II, the Javanese king, had a crucial role in transforming Sala village to a capital city. He determined the site, prayed for its improvement and appointed members of his family to construct the new capital. When moving day came, the *sunan* conducted the inauguration ceremony, establishing Sala as the capital of the Mataram kingdom and praying for the well-being of the kingdom.

There was interaction between humans and the landscape to modify Sala village into a new capital adjusted to the Javanese religious concept. At the same time ensuring economic and political considerations was not ignored.

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Abstract

The study of the Iron Age culture in Central Myanmar has given so far much attention to several unearthed iron implements. Among them some samples of iron artefacts were analysed in previous studies using the archaeometallurgical method to reveal the type of iron and the iron production techniques of ancient people. The earliest iron objects were used in Central Myanmar since 500 BCE. But knowledge of early iron making processes is still lacking. Understanding the iron making process helps to highlight certain aspects of the material cultural level reached by societies at that time. This paper is an attempt to rediscover the early iron making technique of ancient Myanmar and starts with a study of iron making sites situated in the Popa Mountain region by using an archaeometallurgical approach.

Keywords: Mount Popa, Ancient iron Furnace, Smelting Process, Archaeometallurgy, Slag

While working at their production sites, the ancient iron smelters left remains such as slag, lumps of ore, pieces of charcoal, pieces of nozzle clay, crucibles and furnace remains which can be examined. These remains represent significant evidence for studying ancient iron smelting technique and certain aspects of the cultural level reached by these ancient communities. In this study, the exploration of these remains was conducted at the Popa Mountain region and the study of ancient furnaces near Chaungphar Alei and Thanbo villages (Fig. 22.1). They are situated about 10 km northeast of Kyaukpadaung Township, near the Popa Golf Course, west of Kyukpadaung-Myingyan Road.

Several slag heaps can be found in the surrounding area of the two villages. Villagers refer to slag as thankyauk, meaning iron stone. Nowadays in this region, these heaps of slag are used to build trails used by farmers and make concrete water containers with the mixture of cement, sand and slag instead of using gravel. These slag heaps indicate that the ancient smelting community was settled in this region and produced iron for their needs. Because of the abundance of iron ore, wood fuel, water and natural wind power, there is no doubt that the ancient smelters settled in this area and found there a conducive environment for the production of iron.

Several furnaces were explored in that area and among them a total of 19 furnaces were studied and recorded. They vary in terms of shape, size and location. As the types of furnaces are different, the furnaces may have been operated in different periods, seasons and places. In many cases, the furnaces were discovered along small streams of this area. Most were located on the bank of the shallow streams. Such places were chosen by iron smelters for building furnaces because of the natural wind power associated with streams.
As they are not in the same shape, they can be classified in three different types as follows:

**TYPE I:** “Trapezium-shaped” or “Rectangular-shaped” bowl type of furnace

This is a “trapezium-shaped” furnace which is the only one out of 19 furnaces studied (Fig. 22.3). This type was found at the sloping bank of the shallow sandy river as well as on the slope of the small gully or ravine. The width of the furnace (CH-006) is about 140 cm, the length of the rear wall of the furnace is 100 cm and the height is about 110 cm from the present above top soil surface. The thickness of the furnace’s wall is about 15 cm. The rear wall of the furnace is slanted about 15° on the back. Some slag and pieces of charcoal were found inside the furnace. Some slag and pieces of lining were analysed in order to ascertain their chemical constituents.

Another furnace (CH Al-0011) could be categorized as “rectangular-shaped”, which is also the only one out of 19 furnaces studied. The width is 88 cm, the length is 104 cm and the height of the rear wall is about 85 cm and that of the front wall is about 15 cm from the present soil surface. The thickness of the wall is about 15 cm (Fig. 22.4).

**TYPE II: “Semi-circular shaped” bowl type of furnace**

Seven out of 19 furnaces found were semi-circular shaped and bowl type furnace. Such furnaces were found on the bank of the shallow sandy river. The diameter of furnace is about 136 cm, the present height is about 90 cm from above top soil surface and the thickness of the furnace’s wall is about 15 cm (Fig. 22.5). Some slag was found inside the furnace and their chemical constituents were analysed and recorded. This furnace type is similar to the primitive bloomery iron furnace.

**TYPE III: “Semi-circular shaped” bowl type of natural draught furnace with chimney**

These are semi-circular shaped bowl type with natural draught furnace connecting with the chimney at the back wall (Fig. 22.6). Altogether, there were 10 furnaces of this type out of a total of 19 and they are situated side by side on the slope of the small hill nearby the confluence of the two shallow rivers. Each furnace has its own chimney. The chimney was dug inside the small hill like a well and then the inside wall made with sandy clay. The overviews of chimney’s shape are trapezium or rectangular.

The bottom of the furnace was paved with baked clay. At the bottom of the rear wall of the furnace there is a small channel which is connected with the base of the chimney. The connecting hole is in the form of a semi-circle. The “opened hearth” was built on the sloping hill and the rear wall of the furnace was located on the slopping surface of the hill.

The distance between the furnace and the annex structure is only about 70 cm. The diameter of the furnace is about 160 cm; the highest point of the furnace wall is about 180 cm from the present top soil surface. The height of the chimney is about 260 cm. The length from north to south is 80 cm, and the width from east to west is 70 cm and 60 cm, respectively. Generally, the height of the furnace is greater than the diameter. The thicknesses of the furnace and chimney walls are about 15 cm. The lower part of the rear wall is a little slanted.

Iron smelters used natural wind power. Most rear walls of furnaces and chimneys still remain in their original condition but the front walls of furnaces have disappeared. These semi-circular shaped and natural draught types of furnaces were more abundant than the other types of furnaces. When we made a
test pit, pieces of baked clay were discovered on the floor of the chimney. Some pieces of the refractory materials and slag were analysed to find out the chemical constituents.

The small hill is oriented towards the north and therefore most furnaces are also oriented towards the north, taking advantage of the natural wind coming from the north during the winter season in this region. The winter season extends from October to February. During the hot season (March-May), the wind comes from the south and south-east direction.

The smelters probably chose the place to build their furnaces according to the natural wind direction. As the floor and front wall of the entire furnace could not be found, it is possible that, once the reduction process was finished, the smelters broke the front wall to take out the reduced iron pieces. Therefore only the rear walls of the furnaces can be identified. It is possible that when they restarted the reduction process, the front walls of the furnace were partially reconstructed and the rear walls only needed to renovate as they were semi-permanent.

These furnaces could be reused several times. When the furnaces were renovated, iron smelters covered the walls with layers of sandy clay. In certain furnaces, we can see several layers of this sandy clay on the rear wall. By contrast, the chimney didn’t need renovation; once built, it could be used repeatedly. This type of furnace testifies to a more advanced level in the iron making process than the other two types of furnace.

**Primitive smelting furnace types**

Most early bloomeries found in Africa, Europe and South and Southeast Asia were small with the height averaging a maximum of 2 m and the diameter of 1.5 m. They can be divided into three types: bowl furnaces, domed furnaces and natural draught or force draught furnaces. Moreover, primitive shaft or blast furnaces were found in China since the 4th century BCE. Most of the primitive furnaces were constructed on the hill side so that the natural draught gave a more intense fire. The temperature needed to operate a bloomery depends on the size and height of the furnaces. The slag running temperature needed is from 900 to 1200°C for the bloomery process. For the blast furnaces used to produce liquid iron, the temperature needed is higher than that of the bloomery process.

To study the iron reduction process in the Mount Popa region, the remains of refractory materials, slag and local ore, fuel and flux were also studied, with the exception of remains of crucibles and tuyères that are yet to be found.

**(a) Refractory materials for the furnaces**

Normally the furnaces were built with local materials such as clay, stone, brick, slag and organic materials like rice husk, hay, etc. The ancient smelters may have preferably used clay from termite clay mixed with a fair amount of rice husk for making furnaces (Turner 1920: 326). This clay affords resistance to thermal shocks and to collapse or failure caused by high temperature, a deficiency known as refractoriness (Bhupendra Pal Singh 1998: 265). In this study, the chemical composition analysis shows that all the refractory materials used are fire clay or siliceous clays (Table 22.1). The thickness of the refractory clay is more or less 15 cm. Most of these refractory materials essentially consist of silica sand and some clay. The furnace can resist the heat well and its wall usually doesn’t break down easily, when the silica sand content is high enough. The best ratio of silica sand and clay to build the furnace is 19:1.

The analysis result of sample CHAL-004, which is TYPE III furnace, contains the highest percentage of silica sand: 91.8%. The others contain more or less 75% of silica sand. The smelters understood that the high silica sand content in lining clay could maintain high temperature and prevented the furnace wall from breaking probably.
(b) Ore

According to the geological survey, hematite/limonite concretions occur in the region around Mount Popa. The main mineral found in these concretions is hematite. The hematite ore is reddish brown in colour. The concretions (small nodular iron ore) are made up of layers with different colours: yellowish, reddish brown and dark grey colour respectively. They are easily found on the surface of the dry sandy rivers in this region up until today. In ancient time, the smelters might have used this local iron ore.

Some iron ore, slag and cinders were collected around Chaungphar Alei village at the first field trip conducted in 2009. The analysis result showed that the iron ore contained 79% of (Fe₂O₃) and other minor elements (Table 22.1). Thus the iron ore was high grade hematite ore.

Some iron ore and slag samples were again collected in 2010 and 2011 around the Chaungphar Alei smelting site. Most of the local iron concretions were low grade ore with (Fe₂O₃) content over 40% but some hematite ore were high grade ore with over 60% of Fe₂O₃ content. The early smelters might have tried to select the high grade iron ore for smelting practice according to their experience. It means that they chose the ore by looking at its external feature or appearance such as colour, texture, shape, weight, size, etc. The chemical analysis of some local iron ores and concretions are shown in Table 22.1.

As they could get different grades of ore before smelting, with the objective of producing high quality iron, they tried to concentrate on the iron ore. And prior to smelting, the following procedures were observed: washing out the sand; roasting the ore; and breaking it into small pieces or even into powder. They may have used cinders which are semi-reduced ore. They could differentiate between cinder and slag by looking at their morphology including the brightness of metallic or glassy colour, weight and reflection. Yet, ancient smelters had to choose ore containing high iron content so as to produce the sponge iron because their primitive type of furnace could only be operated at about 1200°C. If the ore was low in iron content, the production was not successful, i.e. no sponge iron was produced but only the iron-silicate slag was produced.

(c) Fuel

The fuel used to smelt the iron ore was most probably wood charcoal in this region. They were made from the wood of local trees. Ancient smelters could easily collect fire wood to make the charcoal in this region. Although Mount Popa is situated in the central dry zone, the mountain and its surrounding area are covered with tropical forest. Today, the most favourite timber used for charcoal is the tamarind tree, *acacia catechu* tree and other tropical hardwood trees in this region.

(d) Flux

Some of the ancient smelters seemed to have lacked the knowledge about the use of flux. They knew that some ores produced good iron and certain fuel help to retrieve iron from slag. It is logical to assume that they must have learnt it over long practice and from their experience of burning ferruginous shales or ferruginous sands. Bamboo charcoal also acted as good flux. The chemical analysis shows that the amount of Calcium Oxide content is not much different between iron ore and slag. The ratio of the CaO and SiO₂ should be different before and after reduction. Therefore it is certain that they didn’t use limestone (CaO) as the flux. But the increasing amount of silica and alumina contents in the slag indicates that sand might have been used as a flux (Table 22.1).

(e) Slag

Several slag heaps were found at the site. The slag is irregular in shape but have more or less the same morphology. Most are semi-molten slag with smooth shiny surface. The colour of the slag is dark brown. Some slag has not much porosity in the cross section.
The chemical composition of the slag is related to the nature of the mineral which was used to produce the metal. Usually the composition of the slag lumps varies and its composition is heterogeneous. Slag composition is important in determining the melting point. Although the melting points of silica and iron are high when they are mixed up, the melting point of the slag system is lowered to about 1200°C due to the formation of wüstite (FeO·SiO₂).

The principle constituents of slag from this region are silica, alumina, magnesia, iron oxide, calcium oxide; but other oxides such as alkalis are in minor amount. The chemical analysis of sample A and B (Table 22.1) indicates that the silica content was over 30%, a percentage much higher than that contained in ore samples. The percentage of “Al” in the slag is more than the ore because almost all of Al₂O₃ contained in the ore went to the slag.

These slag constituents crystallized when cooling down from fluid state at the temperatures above 1100°C. It is assumed that melting temperature of slag would be between 1100-1300°C. The high content of silica and alumina indicates that some of the SiO₂ from furnace lining and fuel ash may have contributed into the slag.

Several microconstituents of slag have been observed and shown in the photomicrographs (Fig. 22.7). Microstructures reveal three major phases: fayalite or iron silicate (2FeO·SiO₄), dendrite of wüstite (FeO) and hercynite (FeO·Al₂O₃). The primary crystals of hercynite were observed in the section as white to grey-white hexagonal plates or polygonal shape crystals. The hercynite phase usually crystallized in a glassy manganese-aluminium-silicate. In addition, the dendrites of wüstite were observed as primary phase inside the glassy fayalite matrix. These kinds of slag were produced from low furnace and constitute dense slag.

**Discussion**

Observation of old furnaces reveals the ancient iron making process in Myanmar. In the ancient iron smelting process of the Popa Mountain region, alternate layers of ore and charcoal were filled into the furnace up to the top of the rim. Additional filling could be conducted by sliding the items into the furnace during the operation through the opening. There might be a hole at the base of the furnace or at the base of the front wall of the furnace where the slag could run out. The reduction process could take one or two days depending on the wind power.

After the reduction process, the superstructure of the furnace was broken and the iron lump, deposited at the base of the furnace, was taken out and hammered to separate the slag from the iron lump.

The melting temperature of iron is 1538°C and that of the pure silica is over 1600°C. When the iron ore is high grade and pure, the reduction of iron oxides occurs between 900°C and 1200°C and produces the sponge iron in direct reduction method. When the alumina content is high in charged materials, the melting temperature of those mixture materials becomes very high. Probably ancient smelters could not control the constant temperature round about 1200°C and sometimes the furnace temperature could have increased above the normal reduction temperature. In this situation the reduction process produced a lot of slag with some high iron content as the waste material.

If the ventilation used natural draught only, the smelting would have been inefficient because variations in natural wind power would have made it impossible to get the constant high reduction temperature for the whole reduction process. It is possible that the inside temperature of the furnace was varying and consequently the reduction process was not steady. The highest temperature was reached at the base of the front wall but some areas did not reach the reduction temperature. This reduction process produced a large amount of slag. If the stack of the furnace was high enough, the furnace temperature could reach the reduction temperature and keep the constant high temperature ideally.
The primitive clay furnace types (low furnace) were used for direct reduction method. It is obvious that these kinds of furnaces could not reach high temperatures for a long time resulting in the liquid state of iron. The process was solid state reduction and produced sponge iron. Moreover, the maximum height of furnaces in this region was not more than 2 m. This height would have made it possible only to reduce the iron ore to sponge iron.

Different slag samples of the Chaungphar Alei smelting site and local hematite ore or iron bearing materials were collected during each field visit. The possible metallic yields of each exploration were calculated with some basic assumptions, so as to find information about ancient iron smelting process.

Estimated yield percentage of Fe would be 25-30% with Cinder B (Table 22.1), which was produced from high grade hematite ore which contains 75% of Fe$_2$O$_3$ content.

But the estimated yield would be only over 10%, if the smelter used hematite concretion ore, which contains over 40% of Fe$_2$O$_3$. Our assumption is that SiO$_2$ from lining, fuel and flux were neglected.

**Conclusion**

All the types of furnaces in this study were used for the direct reduction process in order to produce sponge iron. Among them, the reduction technique of TYPE III furnaces was more efficient because of the chimney effect. Moreover, slag analysis shows that the slag from TYPE III furnaces was higher in silica content and lower in iron content than the slag from the other two primitive furnaces. There were no traces of the bellow or tuyères. All the furnaces probably used natural wind power, since their heights made them impossible to employ water power because the streams formed in this region are filled with water only when there is rain during the rainy season.

The yield of iron in the smelting process depends on the quality of iron ore and processing conditions, which were uncontrollable. Ancient smelters might have used local high grade iron ore which could be found easily on the surface of this region. By using the high grade hematite ore (over 70% of Fe$_2$O$_3$), they could produce sponge iron with their traditional furnaces.

As iron ore, fuel and natural draught could be all collected in the same region, the smelting community would have become larger and the utilization of iron became higher. Consequently, shortage of high grade ore occurred; this would have resulted in smelters continuing to produce iron metal with low grade ore and concretions. Thus, production could not have been efficient and it would have also resulted in large amount of slag containing large amount of iron oxide with high waste of fuel and time. This led the smelters to abandon their smelting site with the remains of furnaces and probably the smelting community to move to another place where the ore, fuel and natural wind or water power were abundant. And perhaps they had moved to another place nearby to meet the requirements of their societies.

This study contributes to a better understanding of the ancient iron making process in Myanmar. It is, however, necessary to study more ancient furnaces in other parts of Myanmar. Further study will help to understand more about ancient smelting process and the material cultural level of ancient civilization in Myanmar.

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Table 22.1 Chemical composition Analysis of refectories’ material pieces, local iron ore and slag. (Lab: No. 3 Steel Mill, Myanmar Economic Corporation)
Role of the Hoa Chau citadel (Thua Thien Hue, Vietnam) in the history of Champa and Dai Viet through archaeological results

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Abstract
In the history of Champa and Dai Viet, the Hoa Chau citadel (Quang Thanh commune, Quang Dien district, Thua Thien Hue province, Viet Nam) played a very important role in the strategies of defence and attack, protection and expansion of the Champa dynasties and Dai Viet, which were closely associated with many significant historical events in Thua Thien Hue. The evidence attained from the archaeological investigations, excavations and studies demonstrates that the Hoa Chau played multiple roles in the military, administration, economy and culture in which the military role was vital and maintained in almost historical periods. In the Champa period (before 1306), the Tran and Ho period (1306 - 1407), the Ming domination period (1407 - 1427), the early post-Le period (1428 - 1471), the Hoa Chau citadel played a role of the military citadel, while its administrative and economic roles were secondary. After 1471, the southern territory of Dai Viet was extended to Binh Dinh, the Hoa Chau citadel lost its outpost and as a result, its military role declined and was replaced by the administrative and economic role.

Keywords: Hoa Chau, Champa, citadel, Thua Thien Hue

Overview
In the history of Champa and Dai Viet, the Hoa Chau citadel (Quang Thanh Commune, Quang Dien District, Thua Thien Hue Province) played a highly important role in the region. Hence, it attracted the concern of feudatory historians very early on. Information relating to the Hoa Chau citadel has been mentioned in historical works, such as the Complete Annals of Dai Viet, Recent Accounts of O Chau prefecture, Miscellaneous Chronicles of the Pacified Frontier and Dai Nam Comprehensive Encyclopedia. Up to the present, there have been an investigation in 2009 and three excavations (1997, 2010 and 2011) at the Hoa Chau citadel. In this paper, under the light of new sources of material, especially archaeological materials, we would like to mention the position and the role of the ancient Hoa Chau citadel through different historical periods from Champa to Dai Viet.

The Ancient Hoa Chau Citadel: Position, Scale and Structure
The extent of the ancient Hoa Chau citadel covered the territory of three villages: Thanh Trung, Kim Doi and Thuy Dien in Quang Thanh Commune, Quang Dien District, Thua Thien Hue Province today (Fig. 23.1).
The position of this citadel is in the downstream area of the Bo river, which is close to the Sinh fork where the Bo and Huong rivers meet, near the Tam Giang lagoon (2.5 km away) and close to the sea (6 km away). The area surrounding the Hoa Chau citadel today is a low-lying delta, higher than the current sea level of 1 - 1.5 m. Therefore, it is usually submerged in the rainy season.

In general, the position of the Hoa Chau citadel has many similar points in comparison with the Champa citadels in central Vietnam; they lie near rivers and use that river as its axis. However, the Hoa Chau citadel is also close to the Tam Giang lagoon and not far away from the sea. Therefore, it could defend both the river and sea passages. The result of field research shows that the Hoa Chau citadel has two separate bulwarks: an outside bulwark and an inside bulwark (Fig. 23.2).

The outside bulwark is in a distorted rectangular shape and there are some disjointed parts which could possibly be water gates. The north bulwark (northeast - southwest direction) has a length of nearly 1.7 m, with the lowest width being 27 m and the highest width being 69 m. There are two disjointed parts and plenty of joggles. On the northwest, out of the outside bulwark, there are two layers of wall to separate the inside and the outside. The wall to separate the outside has a length of 685 m and is of an “L” shape. The south bulwark has a length over 2,000 m, with the lowest thickness on the east of 3.6 m and the highest thickness of up to 52 m (the average thickness of 12-15 m) and an average height of 1.8-2.0 m and one disjointed space (about 110 m in length) between the west and east part. On the south of the disjointed space, there is a short wall with a length of approximately 340 m. In the corner of the south bulwark, there are two layers of wall outside the bulwark (about 350 m and 410 m in length). The east bulwark (bordering Kim Doi village) and the west bulwark (bordering Tay Ba market, Quang Thanh Commune) both have disjointed spaces in the middle (around the area where the Kim Doi River flows through). If we took the space into account, the west bulwark would have the length over 500 m, with the highest width of 44 m, the lowest width of 15 m and the east bulwark would have a length of about 600 m, the lowest width of 28 m and highest width of 60 m. Based on this result, we can see that the total length and width of the outside bulwark (including the disjointed spaces) is over 4,700 m and about 12,877 ha of land was enclosed by the ramparts.

The inside bulwark (also called the “amputated bulwark”) has a rectangular shape and lies within Thanh Trung village, on the north of the Kim Doi river. Both the north and south bulwarks run parallel to the northern outside bulwark. The south bulwark is wider than the north bulwark. Both bulwarks have the same length of about 234 m while the width varies from 35 to 64 m. The west and east bulwarks have a length of 147 m and 137 m and an average width of 29 m. Therefore, the total length and width of the inside bulwark is about 750 m. After scraping the section of the previous 5th hole (2x10 m) which was excavated by Vietnam Institute of Archaeology in 1997 near the southeast corner of inner citadel, we realized that the stratigraphic of the rampart had no stratified structure of multiple layers with various soil quality that was often encountered in the citadel walls in north Vietnam, such as Co Loa and Luy Lau citadels. The earth layer in the wall is mainly made of sandy, yellow and pure soil and at the bottom of the wall, the natural stones were placed (30-50 cm) on a sandy ground (Figs. 23.3).

We also noticed that outside of the outside bulwark, there is an area which looks like a surrounded bulwark (temporarily referred to as the “north wall”). This north wall, built in a northeast-southwest direction, seems to be connected with the outside bulwark on the north, even if there are some disjunctions. On the east side of the outside bulwark, there is another parallel wall. Hence, when we consider all the four sides of this bulwark, the total length is about 1,770 m.

In addition, between the two bulwarks is a water canal – possibly a former water moat. Hence, combining the Kim Doi river and the two bulwarks (on the north and on the west), the current living area
of Kim Doi is also considered as a separate area of the citadel (Masanari N. and Nguyen Van Quang 2013: 9-28). Surrounding the bulwarks, there is a system of deep and wide water moats hugging the bulwark foot. This system of river and water moat connected to the Bo river, the Huong river and the Tam Giang lagoon made the citadel fortified as well as played a huge role in waterway traffic, by connecting it to the system of the Bo, Huong rivers, Tam Giang lagoon and the sea. At the same time, it also played the role of drainage to prevent the citadel from flooding. At critical places, wooden sticks are piled into rows close to each other and along the edge of the bulwarks to keep the bulwark firm (Fig. 23.4).

In addition, there are two rivers: the Thanh Trung river crossing the citadel and the Tien Thanh river flowing along the eastern wall. Today, water flows into the citadel through six water gates (marked A to F on Fig. 23.2) (Nguyen Van Quang and Tran Sac Nha 2015: 660).

Based on such remains, the Hoa Chau citadel is considered one of the biggest Champa citadels, just a little smaller than the Do Ban citadel in Binh Dinh (11th - 15th centuries) and bigger than some other Champa citadels, such as Cha (Binh Dinh), Tra Kieu (Quang Nam), Loi (Thua Thien Hue), Thuan Chau (Quang Tri) and Cao Lao Ha (Quang Binh). The above characteristics show that Hoa Chau had been built based on quite a good standard. It is a harmonic combination of natural and artificial factors making it a strong citadel, watching over a critical point along the sea, the rivers and the lagoon. It displays the typical characteristics of a water-citadel and which had military advantages in defending as well as in attacking the enemy.

### Role of the Hoa Chau citadel in history

The Champa ancient citadel was an important architectural type, supposed to play the central role in the military affairs, politics, economy and culture of a region or a country. First of all, a citadel was used for military purposes, in defence and in attack. Lying at a key position, the Hoa Chau citadel therefore always played an important role in the local history.

#### Role of the Hoa Chau citadel during the Champa era (before 1306)

Information on the Hoa Chau citadel in the Champa period is barely mentioned in history books. Hence, we can only rely on the archaeology of the Hoa Chau citadel before 1306.

An excavation in 1997 by Vietnam Institute of Archaeology uncovered Champa cultural relics and artefacts such as jar shapes (7th-8th centuries), foot of stove (6th-7th centuries) and pieces of Chinese pottery and half-porcelain (9th-13th centuries) (Vietnam Institute of Archaeology 1997: 15-17).

During the excavations of the Hoa Chau citadel from 2009 to 2011 conducted by the Faculty of History, Hue College of Sciences (Hue University) and Kansai University (Japan), the Cham layer was found in the form of many Cham bricks, rough pottery pieces and crockery pieces of pots, bottles and jars dating from 9th to 13th centuries (Fig. 23.5a) and plenty of Chinese pottery and porcelain wares dating from 9th to 13th centuries (Fig. 23.5b, Fig. 23.6, Figs. 23.9 and 23.10), mostly in shapes of bowls, dishes, pots and jars in trenches XM1, XM9, TN3, XM13, XM23.

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1 In the process of building the embankment along the Tay Thanh river in 2014, many wooden sticks were revealed to be piled into rows along the edge of the bulwark in order to prevent landslide, especially in the rainy season. We also know that in the cultivation process, people found other similar wooden sticks inside the citadel area. The sticks have a length of 1.8-2.3 m with a big end (diameter of 20-25 cm) and a small sharpened end, some of which have a rectangular mortise to tie the drawstring. According to the carpenters, the sticks were made from Kien wood.
Excavations on the southern section of the inside bulwark do not reveal any small layers in the strata. The upper part of the dirt layer within the bulwark was made from yellow sand and dirt. The lower part of the bulwark was made from natural stone blocks (30-50 cm) on a bed of black dirt and sand (Figs. 23.3). This building method as well as the structure of this bulwark is totally different to the other citadels in the north of Vietnam as well as in Champa, such as Loi (Thua Thien Hue), Tra Kieu (Quang Nam), Cha and Do Ban (Binh Dinh) and Ho (Phu Yen). We think that the upper layer was built in the Tran dynasty, the lower part was built in Champa period.

Within and outside the citadel, there are plenty of Champa sculptures such as a piece of altar, now stored in the Nguyen Quang family’s sanctuary (Fig. 23.7a); a part of a stone pedestal, found in the inside bulwark (Fig. 23.7b); a Ravana tympanum in Thanh Phuoc and an inscription in Phu Luong village (Fig. 23.8). All stone pieces have been dated to the 9th-10th centuries. All these archaeological pieces were found near the Hoa Chau citadel and are related to religious structures built inside or surrounding the citadel and it may be related to the citadel in Champa period.

We think that the Hoa Chau citadel was first built by the Champa people from the middle of the 9th century to the beginning of the 10th century above a Sa Huynh cultural complex2, and then in the 14th century it was occupied by the Viet people, as recorded in history books regarding the building of this citadel during the Tran dynasty in 1362.

We do not know the name of the first Champa citadel. Up to the 13th century, one used to call it “Thanh Noi [The inside bulwark]”, possibly because it lies within the marshland area. The excavations showed that the place was surrounded by ponds and rivers, both inside and outside of “Thanh Ngoai [The outside bulwark]” and that could explain the designation.

During the Champa period, the Hoa Chau citadel could have been one among the citadels of Ulik (O Ly) country, which was recorded in the My Son inscription at the beginning of the 13th century (Tran Ky Phuong 2002: 63) and was later called O, Ly/Ri district according to historical documents of Dai Viet. This was the northern area of Champa which bordered the dominated land of China, called Giao Chi, Cuu Chan district (before the 10th century) and then became the territory of Dai Viet (after the 10th century). Therefore, this area usually witnessed conflicts between both sides (Ngo Si Lien 2004). Hence, the Hoa Chau citadel in this age played the role of a shield (together with other citadels in the north of Hai Van pass) of the capital in the south and also was the impetus for Champa to attack the northern area of Ngang pass. After 1069, when the land from the south of Ngang pass to the north of Thach Han river (corresponding with Dia Ly, Bo Chinh, Ma Linh district) was merged into Dai Viet, the O, Ly/Ri area became the direct border between Champa and Dai Viet and the military role of the Hoa Chau citadel became more critical.

The number of artefacts of the Champa period discovered at the Hoa Chau citadel is not large. Possibly, the number of people living within this citadel was not so high. Thus the question is raised as to whether the citadel was also a political centre. Because we are inclined to suppose a denser population for a capital, Hoa Chau may have only played the role of military protection.

But other activities – whether administrative, economic or cultural – cannot be denied if Hoa Chau was also the administrative centre of the Ulik (O Ly) country in the north of Champa. Due to its close position to the Sinh fork, the sea and the Tam Giang lagoon, the Hoa Chau citadel could have played a part.

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2 The excavation at THC10.Ktr within the Hoa Chau citadel at the depth of 3.05 m uncovered plenty of pre-Sa Huynh pottery, which has a date of about 3,000-2,500 years, giving evidence of an earlier residential occupation before the age of Champa in the Hoa Chau citadel area.
in controlling the sea/lagoon economy and trade between lowlands and highlands along the Huong and Bo rivers. Among the plains from the north of Hai Van pass to the south of Ngang pass, the plain of the Bo river is considered as the most fertile land – it currently provides the province’s best rice harvests; hence, agriculture surely played an important role in the local economy and the management and tax collection of farming activities surely had been performed by the administrative government of the Hoa Chau citadel. In 1471, when King Le Thanh Tong dispatched troops to invade Chiem Thanh, he had his army stop at the Eo estuary (now known as the Thuan An estuary) to battle against Thuan Hoa/Hoa Chau. Additionally, the king also ordered the distribution of food to his soldiers which were taken from the storages of Thuan Hoa/Hoa Chau. This event proves the important role of farming economy in particular and the specific economic role of Hoa Chau in general (Ngo Si Lien 2004: 324).

Inside and surrounding the Hoa Chau citadel, currently there are plenty of Cham sculptural artefacts such as altars, reliefs, round statues and inscriptions (Thanh Phuoc, Phu Luong and Lai Trung). These places most probably were included in the “holy land” of the royal power, whose heart was at Hoa Chau.

**Role of the Hoa Chau citadel in the Age of Dai Viet (from the beginning of the 14th century to the beginning of the 18th centuries)**

**The Hoa Chau citadel during the Tran and Ho dynasties (1306-1407)**

In 1306, after the historical marriage of Princess Huyen Tran of the Tran dynasty with King of Champa, Jaya Simhavaman III (called Che Man in Dai Viet documents), the land of two districts O, Ly/Ri (corresponding to the area from the south of Lao Bao pass, Quang Tri to the north of the Thu Bon river, Quang Nam) formerly belonged to the territory of Dai Viet (Ngo Si Lien 2004: 567). Then, the name of the districts changed: the O district became the Thuan district and the Ly/Ri district became the Hoa one. The southern part of the Dai Viet at this time reached the north of the Thu Bon river. Hoa Chau became the border land of the south of the Tran dynasty.

With the role of the centre of Hoa district, the Hoa Chau citadel became the key town in the South and the advanced post of the Dai Viet government under the Tran dynasty, as well as one of the critical barricades protecting the Thang Long capital in the North, and one step in the South forward process. Hence, Tran and Ho governments were ordered to fortify the Hoa Chau citadel (in 1362, Tran’s era) and to build a thousand-mile road from the Tay Do capital (Thanh Hoa) to Hoa Chau. Officials from the Thang Long capital, such as Doan Nhu Hai, Truong Han Sieu, Do Tu Binh and Dang Tat were also sent to the Hoa Chau citadel (Ngo Si Lien 2004) in order to take care of the residents, stabilize the region and watch the border land of Dai Viet.

Results from the excavations in Hoa Chau show that in comparison to the Champa period, the remains of Tran and Ho dynasties are much denser. The citadel experienced a second stage of building and the living area was renovated from the 14th century. In this stage, they not only made repairs to fortifications (like the section of the inside bulwark) but also built up plenty of structures within it (trenches THC10.TN2, THC10.Ktr). More specifically, artefacts of Tran and Ho dynasties have been found in large quantities,

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3 Based on researching Han-Nom materials in Ban Thach village and Phu Xuan village (Duy Xuyen nowadays), Huynh Cong Ba thought that the southern border of Tran’s reign possibly reached to the Ly Ly river (Duy Thanh Commune, Duy Xuyen District, Quang Nam Province), which is the south of the Thu Bon river (Huynh Cong Ba 1998: 41-43).

4 Hoa Chau in Tran’s reign included the territory of Thu Thien Hue, Da Nang and the north of Quang Nam nowadays (People Committee of Thua Thien Hue province 2013: 167).

5 “Set up the towns and dispatching stations along the road 1402, Ho’s era” (Ngo Si Lien 2004 : 732)
including pottery and porcelain wares (bowls and dishes), earthenware for daily life, together with plenty of architectural materials such as bricks, tiles, lovebirds statues and even weapons such as stone bullets, all dating from the 13th century to the beginning of the 15th century (Figs. 23.11). In addition to the Vietnamese artefacts, Chinese pottery and porcelain wares were also found, dated from the 13th century to the 15th centuries (Fig. 23.12) (Vietnam Institute of Archaeology 1997; Masanari and Nguyen Van Quang 2013). The discovery of different skeletons has led to the speculation that at that time a bigger density of population occupied the citadel.

Because the region remained a border land, far away from the Thang Long capital and directly exposed to the adjacent Champa kingdom which regularly attacked it (Maspero 1928), people probably felt unsafe. As a result, the military role of the Hoa Chau citadel during Tran and Ho dynasties took precedence, while administrative and economic roles were less important. According to statistics from “Complete Annals of Dai Viet”, from 1307 to 1407, there were about 20 battles between Dai Viet and Champa, and Hoa Chau was directly attacked by Chiem Thanh (Champa) at least five times – in 1318, 1353, 1362, 1368 and 1376 (Ngo Si Lien 2004: 568-755). In those battles, the Hoa Chau citadel surely took a critical role.

The Hoa Chau citadel in the revolution against Minh enemy (1407-1427)

When the war against the Ho dynasty was about to end in May of 1407, “Hoang Hoi Khanh, Nguyen Roi, Dang Tat brought war elephants to take over Hoa Chau and then kept it” (Ngo Si Lien 2004: 761). From 1407 to 1414, Hoa Chau became the base of the later - Tran dynasty (Tran Ngoi/King Gian Dinh, Dang Tat (1407-1409), and then Tran Quy Khoang/King Trung Quang, Dang Dung (1409-1414).

Since 1402, under the reign of Ho Han Thuong, the border of Dai Viet expanded to the south with four districts: Thang, Hoa, Tu and Nghia (in Quang Ngai and the south of Quang Nam provinces today). Since then, Hoa Chau was no longer the “fence” of the country because the border had expanded southwards. However, the new districts of Thang, Hoa, Tu and Nghia were constantly under attack from Chiem Thanh. Hence, the Hoa Chau citadel remained a rear stronghold, a critical land and base to fortify and build the army. In reality, after the failure of the later - Tran dynasty in Quang Ninh, Nam Dinh and Nghe An, King Trung Quang and his courtiers ran back to Hoa Chau to continue the resistance (Ngo Si Lien 2004: 788). The importance of Hoa Chau was also clearly shown through the words of Truong Phu in 1413: “I live for Chau Hoa, die also for Chau Hoa; I don’t have the courage to see the King if I do not stabilize Chau Hoa” (Ngo Si Lien 2004: 788). The artefacts discovered at the Hoa Chau citadel during excavations include Vietnamese and Chinese pottery and porcelain wares which date from the 15th century and prove that at that time Hoa Chau had not lost its role of a military post.

The Hoa Chau citadel during the Le and Mac dynasties (1428-1557)

During the resistance against the invasion of the Ming dynasty led by Le Loi, people of Chau Hoa maintained their support and made many achievements to stabilize the south territory and thus received Le Loi’s compliment (Ngo Si Lien 2004: 62). After chasing Ming invaders away and gaining independence, King Le Thai To sent officials to administrate Hoa Chau, such as Le Khoi, Le Chuyet and Dang Chiem, with the mission of defending key towns in the south, operating and stabilizing the living of people, reclaiming
new lands and establishing new villages. Under the dominance of Ming invaders, Chiem Thanh had regained the land of Thang, Hoa, Tu, Nghia (south of Hai Van pass). Hence, in the beginning of the later Le dynasty, Hoa Chau was again the southern border of Dai Viet. According to “Complete Annals of Dai Viet”, from 1427 to 1471, there were about six battles between Dai Viet and Champa (in 1434, 1444, 1445, 1446, 1469 and 1471), among which Champa attacked Hoa Chau three times: in 1444, 1445 and 1469 (Ngo Si Lien 2004: 86-339). Due to its position, the people in Hoa Chau had positively taken part in the attacks against the Kingdom of Champa and gained many victories over them. For example, in the battle in 1471, “The military of Thuan Hoa had captured Tra Toan and gave him up to the King, the King ordered to treat him well” (Ngo Si Lien 2004: 327). Due to such historical circumstance, from 1427 to 1471, the military role of Hoa Chau was still a top concern. Since 1471, the pacification march to the south of Dai Viet under the leadership of King Le Thanh Tong had put an end to the threat of Chiem Thanh’s army over Hoa Chau. Since then, this northern border no longer existed and Hoa Chau was no longer a shield of Dai Viet because the border had been expanded to the south of Binh Dinh.

The military role of Hoa Chau was then less important. Meanwhile, after 1471, many villages were established around Hoa Chau such as Thanh Phuoc, Duong No, Nam Pho, Duong Mong, Tay Thanh, Thanh Ha and Phu Luong. After 1490, the Hoa Chau citadel became the ruling quarter of Trieu Phong town, where “mansions, schools and governmental offices” were established, as what Duong Van An described in the middle of the 16th century (Duong Van An 2009: 85). The noticeable point is that King Le Thanh Tong intended to make Phú Xuân the town palace managing the whole land of Thuan Quang, as recorded in Record fast in Nam Ha written in the early 19th century. The King said:

Thuan Quang is a far away land, so merge two palaces into one town-palace which is called Phú Xuân palace, Phú Xuân district. The right side of the river is a big river, the left side is the port. All four sides are covered by water, the outside is connected to Tu Dung sea front. Bo Chanh Mountain blocks the North, the majestic Hai Van mountain stays on the South. This place is built by the heaven and the earth, if we could manage to keep it, we can face all the difficulties (Le Dan 2012: 59).

According to researchers, the Phú Xuân palace could be at the position of the Hoa Chau citadel, also called the Trieu Phong palace at that time (People Committee of Thua Thien Hue 2013: 178).

After the victory over Chiem Thanh in 1471 by Le Thanh Tong, the land of Hoa Chau had the chance to develop in peace and flourished for almost 50 years. In 1519, the arbitrary rule of Pham Huan, as well as internal contradictions in the leadership team, had brought Hoa Chau into chaos. In 1527, the incident in which the throne of Le kings was taken away by Mac Dang Dung in the Thang Long capital led to a series of fluctuations all over the country, including Hoa Chau. From 1527 to 1552, Hoa Chau was permanently in unstable circumstances and witnessed many fights between feudal forces of Le and Mac (Ngo Si Lien 2004: 577-709).

The traces found from the investigations and excavations in the Hoa Chau citadel show that in the 15th and 16th centuries, people continued building structures, creating a new bustling residential area within the citadel. Trenches THC11.TN3 show that, possibly in the middle of the 15th century, people had built the walls on the ground of the inside in the northwest-southeast direction. Besides, excavation of trenches THC11.XM1 shows that the road between the 1 hamlet, Thanh Trung village and the east of Tay Thanh village were the bulwark in the 16th century (possibly in the reign of the Mac dynasty).

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7 Tu Hien estuary nowadays.
of artefacts dated from 15th-16th centuries discovered in excavations in large quantity consisted mostly of white porcelain bowls and dishes, etc., which originated from pottery kilns in Hai Duong – Bac Bo region (Figs. 23.13a,b), and plenty of Chinese pottery and porcelain wares made in the provinces in the South. This fact shows that living activities within the Hoa Chau citadel were crowded after the 15th century (Masanari and Nguyen Van Quang 2013). Records in Recent Accounts of O Chau prefecture also show that until the middle of the 16th century, Hoa Chau – with the role of an administrative and military centre, as well as the centre of the Trieu Phong district (Thuan Hoa province) – was an “urbanized place” where houses, mansions, schools, etc. were located closely on the left hand of Thanh Trung river. Around Hoa Chau, many villages had been built up, which were more crowded than other places; many markets appeared to serve the demand of trading and exchanging goods, such as Tay Ba market, Cau market (Dan Luong/Phu Luong) and The Lai market. Apparently, the area of the Hoa Chau citadel had become an urban centre.

The Hoa Chau citadel at the time of Nguyen kings (1558-1774)

In 1558, taking the advice of Nguyen Binh Khiem, Nguyen Hoang came to Thuan Hoa to rule it. From 1558 to 1626, Nguyen lords set their palaces in turn in Ai Tu (1558-1570), Tra Bat (1570-1600) and Dinh Cat (1600-1626) in the country of Quang Tri, followed by the Phuoc Yen palace (1626), Kim Long (1636-1687), Phu Xuan (first period: 1687-1712), Bac Vong (1712-1738) and the Phu Xuan city (second period: 1738-1775) in the country of Thua Thien Hue. There are many reasons explaining why Nguyen kings chose these locations for their capitals, but we wonder why Nguyen Hoang did not choose Hoa Chau to be his first capital because Hoa Chau was still an urban and capital town of Trieu Phong district under the Le dynasty with high walls and deep moats. We suggest two reasons:

1) The Hoa Chau citadel was still the headquarters of Trieu Phong district (Thuan Hoa province) of the Le dynasty. Nguyen Hoang did not come to Hoa Chau maybe because he wanted to cut off all the connections with the central court when he was being in the new land to avoid the watch of Le - Trinh’s court in order to facilitate his plot building his own land. On the other hand, at that time, in the Hoa Chau area, the clan of the Mac dynasty still existed. For a land containing so much danger, Nguyen Hoang could not risk to choose Hoa Chau as his capital while his army was still weak.

2) Ai Tu has the advantage of a capital with a high, flat and open territory that was easy to defend; an especially important economic land on the major routes between the lowland and the highland along Thach Han river.

In the 17th century, the Hoa Chau citadel was still the head of Trieu Phong district, Thuan Hoa province. According to Le Quy Don in Phu bien Tap luc [Miscellaneous Chronicles of the Pacified Frontier] (written in 1776):

“In Hoa Chau citadel in Dan Dien commune, Dan Dien district, there is a big river on the west and a small river crossing the citadel; on the right side of the river lie the houses and governmental palaces of Trieu Phong district; Kim Tra river flows on the south; four sides of the citadel are surrounded by the rivers; there are towering walls looking inside the citadel” (Le Quy Don 2007).

Thus, as described by Le Quy Don, the Hoa Chau citadel was not much different in comparison with the description of Duong Van An in the 16th century. This also shows that the Hoa Chau citadel still existed with the role of an administrative and economic centre of Trieu Phong district.

The excavations of the Hoa Chau citadel in 1997, 2009, 2010 and 2011 show that there are plenty of artefacts dating from 17th century found inside it (Figs. 23.14 and 23.15). Most of them are Vietnamese and Chinese pottery and porcelain wares and crockery wares mainly originating from My Xuyen pottery kilns.
These discoveries prove that at that time, the Hoa Chau citadel was still a bustling area. It is likely at the end of 17th century, the Hoa Chau citadel lost its historical role and slowly went into oblivion, and people then started to bury corpses on the bulwarks. After this point of time, Thanh Trung village and Thuy Dien village were established (at the end of the 18th century and the beginning of the 19th century). In the 2010 excavation, we found an ancient tomb on the southern bulwark. It still had walls outside, or a grave-mound made by brick, lime and mortar. The grave-stone was still immaculate and the head of the gravestone had been decorated with carved sun and cloud shapes. Based on the style of the tomb and gravestone, we could determine that it dates from the 18th century (Fig. 23.16). This consolidates our point of view that Hoa Chau completely declined in the early 18th century.

**Some comments for conclusion**

Based on the historical materials and results of investigations, excavations and archaeology research for many years, we can draw some comments on the Hoa Chau citadel.

Firstly, the Hoa Chau citadel used to be part of Champa culture, in the territory of Ulik (O Ly) in the North of Champa kingdom. This land had been “gifted” to the Tran dynasty by King Jaya Simhavarman III/Che Man for Princess Huyen Tran in 1306. This was recorded in history and known by many people. However, the archaeological excavations discovered one important fact: the Hoa Chau citadel of the Dai Viet in the Tran dynasty had been re-built (in 1362 according to *Complete Annals of Dai Viet*) right over the place of an ancient Cham citadel which was built around the 9th-10th centuries.

Secondly, based on the structural diagram as well as archaeological investigations, we can see that Hoa Chau was a citadel which had “thien toa” (God’s will position), i.e. close to the rivers, lagoons and sea, thereby controlling important water routes: north and south; east and west or lowland and highland. Thus, the Hoa Chau citadel had the characteristics of a defensive military citadel.

Thirdly, during its history, the Hoa Chau citadel played many roles – be they military, administrative, economic and culture, in which the military role was the critical one throughout the ages. In Champa era (before 1306), Tran, Ho era (1306-1407), Ming era (1407-1427), and the beginning of the later-Le time (1428-1471), the Hoa Chau citadel played the role of a military citadel; meanwhile, its administrative and economic roles were less important. After 1471, the southernmost territory of Dai Viet expanded to Binh Dinh, and the Hoa Chau citadel lost its outpost role. Consequently, its military role became less important while its administrative and economic roles became more important.

Evidence of archaeological investigations, excavations and research works show that Hoa Chau had a long-lasting history. There was no discontinuity through the 9th-10th centuries until the end of 17th century. It only lost its historical role in the 18th century when people started to bury corpses on the top side of bulwark. The building and renovation of the citadel can be divided into two big periods. The first period, from the end of the 9th century to the beginning of the 10th century, is the main and first period in the construction of the Hoa Chau citadel. The second period, during Tran, Ho era (14th century to the beginning of 15th century), was when the biggest scale upgrading occurred. At the beginning of the early-Le period (the beginning of the 15th century), developments still continued but on a smaller scale. This also proves the important role of the Hoa Chau citadel through time.
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Preserving Underwater Cultural Heritage Sites in the Natuna Islands, Indonesia: A Multidisciplinary Approach to Utilization towards a Marine Eco-Archaeological Park

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Abstract

The Natuna Islands were the foremost islands of Indonesia as an important landmark on the navigation routes within the South China Sea. Historically, the Natuna Islands had an important role on the maritime trade routes linking the Eastern and Western worlds, especially between 10th-14th centuries CE. Many ships were lost on the journey to the Natunas because of submerged rocks, reefs, bad weather and the dynamic conditions of the sea. Remains of underwater cultural heritage sites, such as ancient shipwrecks and their cargo, can be found at various locations on the seabed and around the coast of Natunas. They have high historical value. Unfortunately, research and recent surveys show that many threats are destabilizing the sites and their ecosystems due mostly to geodynamic conditions, illegal excavation of the site, treasure hunters and fishing trawlers. In consequence, the development of a marine eco-archaeological park was proposed for preserving underwater cultural heritage sites in Natunas, as well as developing site attractions for marine tourism. This paper offers a case study that examines characteristics of underwater cultural heritage sites in support of a marine eco-archaeological park in the Natuna Islands waters. The methods used in this study were multidisciplinary, such as geology and geophysical analysis for the distribution of surface sediment of the sites, marine ecology for analysing ecosystem conditions around the sites and maritime archaeology for site assessment. The data was combined and analysed using a submerged cultural resources approach for adopting the marine eco-archaeological park model. The results show three locations of underwater cultural heritage sites in the Natuna Islands with different characteristics that are represented by an assessment score. The three locations are the Tanjung Senubing shipwreck site, the Buton shipwrecks site and the Djadayat shipwreck site. The Djadayat shipwreck site has the greatest potential for being developed as a marine eco-archaeological park in the Natuna Islands.

Keywords: The Natuna Islands, preserving underwater cultural heritage sites, marine eco-archaeological park
Introduction

Historically, the Natuna Islands had an important role on the maritime trade routes linking the Eastern and Western worlds, especially between the 10th-14th centuries CE. These islands were the foremost islands of Indonesia as an important landmark on the navigation routes within the South China Sea. Many ships were lost on the journey to Natunas because of submerged rocks, reefs, bad weather and the dynamic conditions of the Natuna waters. The results of research and surveys (Dillenia et al. 2012: 89) show many shipwrecks are lying in the waters of the Natuna Islands. Ancient shipwrecks, which are part of underwater cultural heritage sites, have the potential for the advancement of science and technology. They retain important information about the history of maritime cultural exchanges and about the development of maritime trade in the past (Bruce 2003). This will be beneficial in supporting marine tourism development, while maintaining sustainability of the sites in situ. Unfortunately, research and recent surveys show that many threats are destabilizing the sites and their ecosystems, due mostly to geodynamic conditions, illegal excavation of the site, treasure hunters and fishing trawlers. As a consequence, the development of a marine eco-archaeological park was proposed for preserving underwater cultural heritage sites in the Natuna Islands as well as developing them as site attractions for marine tourism.

Marine eco-archaeological park (MEA Park) is a development concept of in situ preservation for underwater cultural heritage site management which allows visiting the site buried on the seabed. (Spirek and Scott-Ireton 2003). Besides having historical and cultural value, ancient shipwreck sites are also home to coral reef ecosystem growth. This is why underwater cultural heritage site are more valuable and unique if kept on the seabed. In situ preservation is an efficient concept for managing maritime archaeological sites (UNESCO Annex 2001). The most prolific reefs occupy the remains of underwater cultural heritage (Davidde 2002). Ultimately, the positive impact and increased income for the coastal people of the site environment are the objectives of a marine eco-archaeological park. An example of the positive impact and increased income from the MEA Park concept can be found in the SS Yongala shipwreck.

According to UNESCO (2006), the government of Townsville, Australia utilized the concepts for preserving the SS Yongala shipwreck as an underwater cultural heritage site. The wreck lies within the central section of the Great Barrier Reef Marine Park. Today, it is a major tourist attraction for the scuba diving industry. The intact historic shipwreck combined with marine life and ecosystem is one of the top ten dive sites recognized worldwide. The shipwreck raised awareness on the potential of wreck sites as underwater cultural heritage sites and as tourist attractions as the site is impacted by heavy visitor traffic. In 2006, more than 10,000 divers visited the wreck, with one-day tours costing approximately US$224. Assuming each of the 10,000 divers stays just one day, it thus amounts to US$2.24 million in tourism revenue per year, just for booking tours. In addition to this, of course, budget is spent on hotels and restaurants in Townsville. This is beneficial for coastal people living off tourism. Similar sites that also use the MEA Park concept are the Thunder Bay Underwater Preserve Management in Florida by the National Oceanic and Atmospheric Administration (NOAA) in the United States.

Currently, the Natuna Islands have been the Indonesian government’s priority in development of a strategic area for fisheries and marine tourism. In consequence, site significance assessment for marine eco-archaeological park imperatively needed to be conducted. The research objective in this paper is to highlight the potential for underwater cultural heritage sites in the Natuna Islands to become marine eco-archaeological parks.
Research Methods

The study was conducted at three marine areas of shipwreck sites in the Natuna Islands: Tanjung Senubing, Buton and Sedanau (Djadayat site) (Fig. 24.1). At the three locations, research focused on collecting data relative to the site condition, the structural remains of the shipwrecks, the artefacts, sediment substrate/characteristic, bathymetry and the marine ecosystem. Methods of data collection included observation, diving and using marine survey equipment, i.e. side scan sonar for wrecks identification in Tanjung Senubing sites, water quality checker and echosounder. The methods of analysis relied on a multidisciplinary approach, including geology and geophysical analysis for the distribution of surface sediment of the sites, marine ecology for analysing the ecosystem conditions around the sites and maritime archaeology for site assessment. Three parameters based on an archaeological approach allowed for assessing the site’s significance: 1) historical value, 2) educational value and 3) data quantity. Then, the environmental vulnerability of the sites was analysed using five parameters, based on a geodynamic approach: 1) seabed morphology, 2) sediment substrate/characteristic, 3) position of the site, 4) ecosystem of the site and 5) water quality.

Historical value of the site can accrue in several ways: from its rarity or uniqueness, from its technological qualities or from its archival/documentary potential (Mason 2002). This value describes the chronological aspects and meanings of the site. The capacities of the site to convey, embody or stimulate a relation or reaction to the past is part of the fundamental nature and meaning of heritage objects (Mason 2002). Site significance assessment used scores that range between 1 and 3 for explaining the level of the shipwreck sites in supporting the marine eco-archaeological park in the Natuna Islands. For historical value of the site, score 1 was given for the lowest level, or “Not Ideal” in order to support an MEA Park. This score refers to the early period of Indonesian history which highlights the World War II period. Then, score 2 was for a medium or “Quite Ideal” level and a site with score 2 refers to the colonial history in Indonesia. Score 3 was for the highest level referring to an “Ideal” site having an older (e.g. Hindu-Buddhist) period in Indonesian history. The educational value of heritage lies in the potential to gain knowledge about the past in the future through, for instance, archaeology or an artistic creative interpretation of the historical record embodied in the heritage (Mason 2002). For educational value of the site, score 1 was given for the site supporting Indonesian national history, score 2 for regional history and score 3 for supporting world history, such as World War II. Then, the data quantity on the shipwreck’s condition was another important criterion for supporting an MEA Park: score 3 was given for intact condition, score 2 for incomplete condition of the site and score 1 for damaged condition.

In terms of the environmental vulnerability assessment (geodynamic parameters) of the site (the seabed morphology, sediment substrates/characteristic, position of the site, ecosystem of the site and water quality), the determination of their values was based on the existing conditions during the survey as the data was retrieved. Because the objectives of an MEA Park in the Natuna Islands were for the preservation in situ of the shipwreck and for marine tourism, geodynamic condition analysis was needed for determining the level of vulnerability. For the seabed morphology of the site supporting an MEA Park, score 1 was given to sites with a continental slope. The score refers to the lowest level that is related to the high vulnerability of site stability. Then score 2 was for relatively flat and slightly sloping, referring to the normal condition of site stability, and a score 3 was given for flat condition which highlights the ideal condition for site stability. Sediment characteristic assessment was conducted to support MEA Parks for marine tourism development, in relation to the possibilities of diving there. The size and type of sediment substrates can influence underwater visibility of the site. The assessment focused on three characteristics of the sediment substrates: sand, silt and clay (Wibisono 2011). Based on the characteristics of sediment substrates, score
1 was given for the clay content and referred to a non-ideal condition. Because clay particles are very fine-grained and light, the effect of underwater visibility on the site can be very poor due to an increase in water turbidity. Score 2 was given for the silt content (medium level/normal condition), and score 3 for the sand content – the highest level, as sand particles are coarse-grained and heavier than clay and silt as well as relatively less affected by currents and provide good underwater visibility at the site.

The position of the sites in the water column is very important to the possibilities for marine tourism, such as diving activities on the MEA Park. Diving activities need a safe environment, because each person has a different level of proficiency in diving abilities in open water or deep diving. As shown in Table 24.1, deep dives (>20-30 m) are more dangerous and have greater risk than basic open water diving (15-20 m). The water column depth of the site location between 6-15 m is very ideal for diving tours, particularly for supporting a marine eco-archaeological park. Another parameter of the site environmental assessment was the marine ecosystem living on the remains of the underwater cultural heritage sites such as coral reefs. The coral reefs living on the sites’ remains can increase the site value as they would become the most interesting attraction for recreation diving at the MEA Park in the Natuna Islands. The assessment focused on live coral cover and the amount of living coral (Table 24.2). The last parameter for the environmental assessment was the water quality of the site environment. Water quality is fundamental to good marine health. The assessment needed to be done for supporting the underwater cultural heritage sites as the best diving spot in the MEA Park and as preservation in situ of the underwater cultural heritage site. As shown in Table 24.3, the main parameters of the water quality assessed were dissolved oxygen (DO), hydrogen-ion concentration (pH), temperature and salinity (according to sea water quality standards for marine parks: modified after the Ministry of Environmental Regulation of the Republic of Indonesia No. 2/1988; after Krumbein and Garrels 1952; and after Wibisono 2011).

<table>
<thead>
<tr>
<th>No.</th>
<th>Water Column Depth (meters)</th>
<th>Scores</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>6-15</td>
<td>3</td>
<td>Ideal site</td>
</tr>
<tr>
<td>2.</td>
<td>15-20</td>
<td>2</td>
<td>Quite Ideal site</td>
</tr>
<tr>
<td>3.</td>
<td>20-&gt;30</td>
<td>1</td>
<td>Lowest/Not Ideal</td>
</tr>
</tbody>
</table>

Table 24.1 The water column depth for supporting MEA Park. Source: Modified after Yulianda 2007

<table>
<thead>
<tr>
<th>No.</th>
<th>Coral Cover (%)</th>
<th>The Amount of Living Coral</th>
<th>Scores</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>&gt;75</td>
<td>&gt;12</td>
<td>3</td>
<td>Ideal site</td>
</tr>
<tr>
<td>2.</td>
<td>50-75</td>
<td>7-12</td>
<td>2</td>
<td>Quite Ideal site</td>
</tr>
<tr>
<td>3.</td>
<td>≤25-50</td>
<td>≤4-7</td>
<td>1</td>
<td>Lowest/Not Ideal</td>
</tr>
</tbody>
</table>

Table 24.2 Life form of coral cover (%) and the amount of living coral for supporting MEA park. Source: Modified after Yulianda 2007
<table>
<thead>
<tr>
<th>No</th>
<th>Parameters</th>
<th>Unit</th>
<th>Average Value</th>
<th>Scores</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Temperature</td>
<td>°C</td>
<td>28-30</td>
<td>3</td>
<td>Ideal</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>25-28</td>
<td>2</td>
<td>Quite Ideal</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>&lt; 25 &amp; &gt;30</td>
<td>1</td>
<td>Not Ideal</td>
</tr>
<tr>
<td>2.</td>
<td>pH</td>
<td>-</td>
<td>8</td>
<td>3</td>
<td>Ideal</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>7-8</td>
<td>2</td>
<td>Quite Ideal</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>&lt; 7 &amp; &gt; 8</td>
<td>1</td>
<td>Not Ideal</td>
</tr>
<tr>
<td>3.</td>
<td>Salinity</td>
<td>‰</td>
<td>35‰-37‰</td>
<td>3</td>
<td>Ideal</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>33‰-35‰</td>
<td>2</td>
<td>Quite Ideal</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>&lt; 33‰ &amp; &gt;37‰</td>
<td>1</td>
<td>Not Ideal</td>
</tr>
<tr>
<td>4.</td>
<td>DO</td>
<td>mg/liter</td>
<td>&gt;5</td>
<td>3</td>
<td>Ideal</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>5</td>
<td>2</td>
<td>Quite Ideal</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>&lt; 5</td>
<td>1</td>
<td>Not Ideal</td>
</tr>
</tbody>
</table>


Results and Discussion

The results of the archaeological and geodynamic study showed that there are three locations in the Natuna Islands that have the potential to become a marine eco-archaeological park (MEA Park). Two sites, Tanjung Senubing and Buton shipwrecks, obtained a medium score, which refers to being “Quite Ideal” sites. The third site, the Djadayat shipwreck site in the marine area of Sedanau, acquired the highest score referring to being “Ideal” and having ideal conditions for supporting the development of a marine eco-archaeological park in the Natuna Islands.

**Tanjung Senubing Shipwreck Site**

The shipwreck site located in Tanjung Senubing was a British merchant ship from the late 19th to early 20th century. The ship was sailing to Hong Kong, Malaysia and Sambas (West Kalimantan), which were British colonies at the time. Then, the shipwreck sank in the waters of Natuna Islands. It is located a few kilometres offshore from Senoa Island of Natunas. Based on the results of the site significance assessment, the Tanjung Senubing shipwreck site proved to be in a quite ideal position for future development as an MEA park, as shown in Table 24.4. Archaeological analysis result showed the Tanjung Senubing shipwreck site obtained a score 2 in terms of its historical value. This is closely related to the age of the site, with “Quite Ideal” referring to the colonial period. The shipwreck remains consist of scattered fragments of glasses and old-antique bottles (Fig. 24.2), wood, and copper plates which were components of the shipwreck or of the water distillation system. On the plate, the inscriptions “James Ewing & Co, Sole Manufactors of Graveley’s Patent steam sailor & Distilling Apparatus London and WH Graveley Patenette Winchester & Co
“Manufacturer’s London” are written and indicate the ship’s owner. The various types of bottles found on the site comprised wine bottles, mineral water and soda water bottles. Some of the bottles were produced in Europe, Surrey (Southern England) between 1800 and 1920. “Royal Spa German” was written on some other bottles, which were produced in Brighton between 1850 and 1950. It is based on the bottles and on the plate analysis that the shipwreck site in Tanjung Senubing was dated to the early 1900s, and identified as being British.

In terms of its educational value, the Tanjung Senubing site obtained the scoring of 2. This score is also related to the fact it belongs to the colonial period, and informs about maritime historical events in Natunas and surrounding area (i.e. regional history). The remains of the Tanjung Senubing site are historical evidence of the maritime activities conducted between the East and the West that occurred within the Natuna waters. It contributes to show the Natunas were strategically located on the Maritime Silk Road (Li 2006). In terms of the data quantity criteria, a score 2 was given to the Tanjung Senubing shipwreck site referring to the incomplete data for reconstructing the shipwreck provenance and the maritime history.

The Tanjung Senubing shipwreck site is located at a distance of about 1.96 nm (3.1 km) from the Teluk Baru port of Sepempang Village, and at about 2.1-2.4 nm (3.5-4 km) from Senoa Island, which is one of the tourism destinations of Natunas. The scoring of 2 was given for position of the site because it is located at a water column depth of 17-19 m, which is quite ideal for a diving spot and relatively safe for entry level divers. The ideal position of Tanjung Senubing for supporting a marine eco-archaeological park cannot be separated from seabed morphology of the site, but the score of 2 was only obtained. It refers to the seabed morphology being relatively flat and slightly sloping in some areas of the site.

In regard to the conditions of the ecosystem, a score 2 was given for the condition of the coral reefs and for its biodiversity. These could be the main attraction for supporting the setup of an MEA Park. Some new types of coral reefs and biodiversity were found at the Tanjung Senubing site. 58.06% of coral cover was still in good condition (Yulianda 2007). The life form of coral was dominated by acropora (34.55 %), non-acropora (22.3%), turf algae (4.05%), coraline algae (0.9%) and soft coral (5.6%). Some types of biota (terredo navalis) were found to be damaging the timber of the shipwreck. Meanwhile, the ecosystem of the site – especially hard coral living on the artefacts and the ship’s structure – was damaged as a result of treasure hunts, exploitation, excavation and illegal fishing. In 2012, illegal excavation and a massive looting occurred at the site. Most of the artefacts remain, while mostly antique bottles and European ceramics were lost. This also caused severe damage to the ecosystem and to the shipwreck site.

A geodynamic condition analysis was conducted to determine the level of vulnerability of the Tanjung Senubing shipwreck site and of its ecosystem. The results of the study showed an ideal condition for the site environment. A score 2 was given for the characteristic of sediment substrates and water quality of the site. Sediment substrates of the site were characterized by silt. It was quite ideal for supporting diving activity in the MEA Park (see method in p.214). The result of water quality measurement of the site indicated an “Ideal” level (score 3) for pH 8.06-8.15 with the average range being 8.1 (pH ≈ 8); “Ideal” (score 3) for DO 5.71-6 mg/l with the average range 5.88 mg/l (DO>5); and “Not Ideal” (score 1) for salinity 30.6-31.1 ‰ with the average range being 30.92 ‰ (Salinity <33‰). Temperature of the water at 28-30°C was ideal (score 3). Then the resulting average score for water quality is 2.5 (≈ 3), so it was ranked in the allowed condition (“Ideal”) for supporting an MEA park.

In conclusion, the total score of archaeological and geodynamic assessment parameters reached 17 for the Tanjung Senubing shipwreck site. These scores show that the Tanjung Senubing shipwreck site presents high value and “Ideal” conditions for supporting the development of a future marine eco-archaeological park in the Natuna Islands.
<table>
<thead>
<tr>
<th>Name of Shipwreck Site: Tanjung Senubing</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Parameters</strong></td>
</tr>
<tr>
<td><strong>Archaeological criteria</strong></td>
</tr>
<tr>
<td>1. Historical value</td>
</tr>
<tr>
<td>2. Educational value</td>
</tr>
<tr>
<td>3. Data quantity</td>
</tr>
<tr>
<td><strong>Geodynamic criteria</strong></td>
</tr>
<tr>
<td>4. Seabed morphology</td>
</tr>
<tr>
<td>5. Sediment substrates/characteristic</td>
</tr>
<tr>
<td>6. Position of the site</td>
</tr>
<tr>
<td>7. Ecosystem of the site</td>
</tr>
<tr>
<td>8. Water Quality</td>
</tr>
<tr>
<td><strong>Total Scores</strong></td>
</tr>
</tbody>
</table>

Classification:

- 1-8: Low (Not Ideal)
- 9-16: Medium (Potential to be Ideal)
- 17-24: High (Ideal)

Table 24.4 Results of the site significance assessment in the Tanjung Senubing shipwreck site

Buton Shipwrecks Site

Two shipwrecks lie close to one another: Pulau Buton, a Qing Dynasty ship, and Teluk Buton, a Song Dynasty ship. These ancient shipwrecks in Pulau Buton and Teluk Buton obtained a score of 3 for their historical value. Their value was higher than the value of the Tanjung Senubing shipwreck because the underwater cultural heritage remains date from an early period in Indonesian history (equal to the Hindu-Buddhist period). At Pulau Buton, the result study of 17 artefact samples indicated the Qing Dynasty period (1644-1912 CE). The remains consist of ceramics fragments, bowls, an ancient teapot (Fig. 24.3), buli-buli a small dish, crocks, and ship’s timbers. Large quantities of artefacts were found in the seabed of the Pulau Buton site that provides a score of 3 for data quantity.

At the Teluk Buton shipwreck site, 23 samples of ancient ceramic were identified as belonging to the Song Dynasty period (960-1279 CE). Both sites are important evidence of past maritime trading activities in the Natuna Islands water as a part of “Nusantara” history (Indonesian archipelago). An ancient port of the Song Dynasty was located between Pulau Buton and Teluk Buton. In front of the port, a military Japanese warship from World War II was found, now called the Setass shipwreck. It can be said that the
Buton site reflects the world’s history. Thus, it obtained a score of 3 for its educational value. From an archaeological point of view, the Buton shipwrecks site received the highest score. It is a perfect site for historical science and knowledge. The Buton shipwrecks site contribute to understanding the history of economic growth in the South China Sea, and how it started from the ocean, through the harbour, and then reaching the hinterland. The site remains also show the inter-island trade activities that occurred within the South China Sea. The study of this interesting site would reveal how cross-cultural and how important the Natunas were, in the context of maritime trade within the South China Sea since the Song Dynasty until at least World War II.

Unfortunately, the ecosystem conditions found at the Buton shipwrecks site were poor, due to the infertility in coral reefs living on the site. The score was 1 because of a lack of attractiveness to the site and because of the site’s vulnerability. Just the same, approximately 9 genus of coral, sea cucumber, soft coral lived on the site’s area, i.e. *Galaxea sp*, *cyphastrea sp*, *Favia sp*, *Favites sp*, *Montipora sp*, *Pavona cactus*, *Platygra sp*, *Porites sp*, *Psammocora sp*, *some of soft coral*, *Sarcophyton sp* (sponge) and *Pomacanthus*, *Parupneneus cyclostomus*. The disruption on the coral reef is seen during the growth and new coral attachment on the artefact scattered at the timber ship. In this case, the shipwrecks became fragile when the waves hit them. In other cases, disruption on the coral reefs occurred because of the looting of artefacts in the shipwrecks, thereby increasing the sediment substrate rate and disturbing diving activities. These shipwrecks are located in shallow waters which is very appropriate for diving spots: the Pulau Buton shipwreck site at depths of 11-15 m; the Teluk Buton shipwreck site at depths of 13-15 m; and the Setass shipwreck site is located in the tidal zone (part of the hull is located above sea level, and the other part is located 6 m below sea level). Unfortunately, the diving activities also caused damage to the coral reefs and intruded the newly settled corals on site. In this case, the coral would eventually die. This parameter factor reduced the scoring of the site for supporting marine eco-archaeological park.

The Teluk Buton and Pulau Buton shipwreck sites had the same bathymetry with depths ranging between 7-16 m. The seabed morphology of the shipwreck sites were sloping on the north and the east of the sites and close to the continental slope and tidal areas. The scoring of 1 was given to the sites referring to the high vulnerability for site stability at the Buton shipwrecks site. The sediment substrate on the Buton shipwrecks site was dominated by clay that was greatly affected by tidal currents, so it was given a score of 1 referring to the poor underwater visibility. Water quality condition at the site indicated value of pH ranges between 7-8, dissolved oxygen (DO) 3.07-3.67 mg/l with the average 3.4 mg/l, temperature 30.75 °C (≈ 31 °C), and salinity ranges between 30.8-31.3 ‰ (<33‰). Overall, a score of 2 was given for pH, and a score of 1 for temperature, dissolved oxygen and salinity. The resulting average score of water quality reached 1.25 (≈ 1), which refers to the lowest condition. Score 1 was given for the water quality in Buton shipwrecks site. These conditions made the result of the water quality assessment in the Buton site to be of “Not Ideal” condition. The water quality is one parameter that reduced the value of the Teluk and Pulau Buton marine area for supporting an MEA Park. In sum, the site obtained a total score of 16 (medium value). It was ranked as “Potential to be Ideal” for supporting the Buton shipwrecks site as a marine eco-archaeological park in the Natuna Islands, as shown in Table 24.5.
### Name of Shipwrecks Site: Buton (Teluk and Pulau Buton)

<table>
<thead>
<tr>
<th>Parameters</th>
<th>Description</th>
<th>Score</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Archaeological criteria</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1. Historical value</td>
<td>Early period of Indonesian history (equal with Hindu-Buddhist period)</td>
<td>3</td>
</tr>
<tr>
<td>2. Educational value</td>
<td>Both sites are important evidence of past maritime trading activities in the Natuna Islands water as a part of “Nusantara” history (Indonesian archipelago); the Japanese military warship (WW II) demonstrates how the Natuna Islands were located in a strategic area of world history events (supporting world history).</td>
<td>3</td>
</tr>
<tr>
<td>3. Data quantity</td>
<td>Large quantities of artefacts and ship structure remains (intact condition)</td>
<td>3</td>
</tr>
<tr>
<td><strong>Geodynamic criteria</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4. Seabed morphology</td>
<td>Sloping on the north and the east of the sites and close to the continental slope and tidal areas</td>
<td>1</td>
</tr>
<tr>
<td>5. Sediment substrates/characteristic</td>
<td>Clay (greatly affected by tidal currents; relating to poor underwater visibility)</td>
<td>1</td>
</tr>
<tr>
<td>6. Position of the site</td>
<td>Bathymetry with ranges between 7-16 metres deep</td>
<td>3</td>
</tr>
<tr>
<td>7. Ecosystem of the site</td>
<td>Disruption of the coral seen on the growth; obstruction occurs when corals are attached to the site.</td>
<td>1</td>
</tr>
<tr>
<td>8. Water Quality</td>
<td>Low condition</td>
<td>1</td>
</tr>
<tr>
<td><strong>Total Scores</strong></td>
<td></td>
<td>16</td>
</tr>
</tbody>
</table>

**Classification:**
- 1-8 : Low (Not Ideal )
- 9-16 : Medium (Potential to be Ideal)
- 17-24 : High (Ideal)

Table 24.5  Results of the site significance assessment in the Buton shipwrecks site.

### Djadayat Shipwreck Site

The Djadayat shipwreck site is located in the Sedanau marine area of Pulau Tiga, the Natuna Islands. It lies at a depth of 4-5 metres with the hull structures appearing at the sea level. The location of the site is about half an hour from Sedanau Island, one of the district centres of the fisheries industry in the Natuna Islands. Djadayat was a VOC ship that was re-used during Soekarno’s rule as a maritime border patroller. Soekarno is the first President of the Republic of Indonesia. The Djadayat site obtained the highest score for two archaeological parameters: the highest educational value and quantity of data. However, it obtained the lowest score for its historical value because it only demonstrates the early period of Indonesia after the Independence in 1945 (“national history” category). This resulted in the Djadayat shipwreck site
only obtaining a score of 1. The most complete hull structure was found on the Djadayat shipwreck site, representing ideal data (Fig. 24.4) and thus scoring 3 in the data quantity parameter. Some artefacts and the structure of the ship were still relatively intact. In terms of its educational value, the Djadayat shipwreck was an important evidence of maritime history in the Natuna waters, and thus an important aspect of Indonesian history. This ship was a VOC ship used by Soekarno (during the Colonial period up to the Independence) for maritime inspection of the border areas and foremost islands of Indonesia. At that time, Soekarno named the VOC ship as Djadayat. It then became the pioneer ship controlling remote areas, border areas and the foremost islands of Indonesia. Score 3 was given for the educational value referring to ideal value for supporting an MEA Park.

In terms of its environmental value, a score of 3 was obtained based on the ecosystem parameters assessed. Almost 70% of lifeforms of coral and new species were discovered on the site. The discovery proved marine life associated well with the shipwreck remains. Many corals were found attached on and around the site. The discovered coral, living on the hull of the Djadayat shipwreck, had rapid growth. The environment of the site was shallow water about 3-4 metres, but the overall ranges down to 40 metres from the surface. Sediment substrate condition of the site was dominated by sand which relates to “Ideal” conditions. Water quality on the Djadayat shipwreck site showed ideal conditions supporting the development of a future marine eco-archaeological park in the Natuna Islands. The result of pH between 8.09-8.16 with the range about 8.14 (pH ≈ 8) was given a score of 3; DO was 6.35-6.93 mg/l with the range 6.57 (score 3); temperature was 29-30.6°C (score 3) and salinity 31.02-31.07‰ with the range 31.01‰ (score 1). The resulting average score for water quality was 2.5 (~ 3), so it was ranked in the allowed condition (“Ideal”) for supporting an MEA Park.

The total score for the Djadayat shipwreck site was 21 as shown in Table 24.6. This site presents the best conditions to develop an MEA Park in comparison with the two other sites. With a total score of 21 in regard to the historical value of the site, the best condition of shipwreck remains, the beauty of the coral reefs and the discovery of new coral species, the Djadayat shipwreck site has the greatest potential for supporting the development of a future marine eco-archaeological park in the Natuna Islands. In this case, the educational value, maritime cultural value and scientific value could be further explored and reconstructed without disturbing the site condition and its ecosystem while maintaining the stability of the site in situ.

| Name of Shipwreck Site: Djadayat |
|-------------------------------|-----------------|---------|
| Parameters | Description | Score |
| Archaeological criteria | | |
| 1. Historical value | It only demonstrates the early period of Indonesia after the Independence in 1945 (national history). | 1 |
| 2. Educational value | The Djadayat shipwreck was a VOC ship used by Soekarno (during the Colonial period up to the Independence) for maritime inspection of the border areas and foremost islands of Indonesia. It was an important piece of evidence of maritime history in the Natuna waters, and thus an important aspect of Indonesian history. | 3 |
| 3. Data quantity | The most completely hull structure with some artefacts and the structure of the ship were still relatively intact. | 3 |
### Geodynamic criteria

<table>
<thead>
<tr>
<th></th>
<th>Geodynamic criteria</th>
<th>Description</th>
<th>Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>4</td>
<td>Seabed morphology</td>
<td>Relatively flat and slightly sloping in some areas of the site</td>
<td>2</td>
</tr>
<tr>
<td>5</td>
<td>Sediment substrates/characteristic</td>
<td>Sand (referring to ideal condition)</td>
<td>3</td>
</tr>
<tr>
<td>6</td>
<td>Position of the site</td>
<td>The environment of the site was the shallow water about 3-4 metres.</td>
<td>3</td>
</tr>
<tr>
<td>7</td>
<td>Ecosystem of the site</td>
<td>Almost 70% of lifeforms of coral and new species were discovered on the site.</td>
<td>3</td>
</tr>
<tr>
<td>8</td>
<td>Water Quality</td>
<td>It was ranked in the allowed condition.</td>
<td>3</td>
</tr>
</tbody>
</table>

**Total Scores**: 21

#### Classification:
- 1-8 : Low (Not Ideal)
- 9-16 : Medium (Potential to be Ideal)
- 17-24 : High (Ideal)

Table 24.6  Results of the site significance assessment in the Djadayat shipwreck site

### Conclusion

The results show three locations of underwater cultural heritage sites in the Natuna Islands with different scores in support of developing an MEA Park. They are the Tanjung Senubing site (“Potential to be Ideal”), the Buton site (“Potential to be Ideal”) and the Djadayat site (“Ideal”). The Tanjung Senubing site has almost uniformly scored “Quite Ideal” in all assessment criteria with a total score of 17. The Buton site with the total score of 16 has a high level on archaeological criteria, but low level almost on all of the geodynamic criteria. The Djadayat site has nearly an “Ideal” value in all assessment criteria, but low level on its historical value thereby reducing its total value of the site assessment (21). In addition, the strategic location of Tanjung Senubing gives support for it to be an MEA park as the location is close to Ranai, the capital city of the Natuna Islands Regency, and near to Senoa Island which is a tourist destination in Natunas. With a total score of 16, the conditions of the Buton shipwrecks site dated to the Song and Qing dynasties (having a high value in terms of their uniqueness factor) were not enough for supporting the set-up of a marine eco-archaeological park. This was mainly due to the geodynamic condition factors causing the high sedimentation, disruption of site stability and ecosystem. The poor quality of the marine ecosystem and site environment is also due to two main threats: illegal excavation and looting activities. With a marine eco-archaeological park in the Natuna Islands, it could have a positive impact to the community by increasing their income from marine tourism activities. In turn, the community themselves would protect the underwater cultural heritage site against the human threats.

### Acknowledgement

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References


Abstract

This study explores contemporary interpretations of Gua Tambun Prehistoric Rock Art in Peninsular Malaysia from a social perspective. It argues that interpretations of rock art by contemporary societies are poorly researched in Malaysian archaeological studies and that an examination into contemporary perceptions would advance rock art conservation from the grass-roots level. To date, more than 600 rock art images have been documented at Gua Tambun over three seasons of exploration since 1959. However, it is ironic to point out that interpretations of Gua Tambun Rock Art are solely archaeologically orientated and still socially under-represented. This reflects a “pattern of social exclusion” and further suggests an urge to encourage the inclusion of local community in rock art interpretation. Given that it is important not to undervalue the perception and attachment of the contemporary society towards the rock art, this study sheds light on the meanings that contemporary society gives rock art, specifically how contemporary society attaches meaning to the rock art through long-term social interaction with Gua Tambun.

Keywords: Gua Tambun, social meaning, rock art conservation, prehistoric rock art

1.0 INTRODUCTION

Interpretation of rock art has always been a debatable subject in the field of rock art studies (McNiven 2011; Solomon 2013; Pearce 2014; Biggs 2015; Lewis-Williams et al. 2015). The interpretation from the perspective of an archaeologist is often criticized as lacking validity or objectivity as it falls solely on the eyes of the beholder (Bednarik 2011, 2013, 2014). However, in most cases, the meanings and values of the heritage places or fabric were ascribed by the archaeologists or heritage professionals based on their own archaeological assessments (Bryne et al. 2003; Bednarik 2013). Bednarik (2013) stressed that researchers should be aware of political and cultural bias in rock art interpretation as this could directly or indirectly
affect the conservation management of a particular rock art site. In other words, investigation into the perception and attachment of contemporary society towards the rock art plays a vital role in conservation and preservation efforts, as it is seen as an approach to make heritage more socially relevant and further encourages social involvement in long term heritage conservation (Goh 2016).

Rock art research has been an emerging field of study in Malaysian archaeology since the 1950s (Matthews 1959; Dunn 1964; Adi 1990, 2007; Tan 2010; Mokhtar et al. 2011; Tan et al. 2011; Hamid 2014). However, the contemporary perception towards rock art has often been excluded and it is still under-represented in Malaysia. It is a common phenomenon where the archaeologist and heritage professionals in Malaysia conduct the process of ascribing meanings and values for an archaeological site without consulting and involving local communities who are the “traditional owners” of the heritage site (Goh 2014). For the case of Gua Tambun, the contemporary society’s perception is often excluded rather than being integrated into the interpretation process of the Tambun Rock Art. The lack of interaction among both parties creates a gap between the interpretations by society and the knowledge possessed by professionals. This gap of interpretations needs to be taken seriously for the sustainable development of future conservation and preservation efforts. We suggest that it is by bridging the gap between the perspectives of both the professionals and the contemporary society, we will be able to contribute to a more holistic conservation and preservation plan for the rock art.

The function of a rock art site differs through time (McDonald 2013), especially when the site is no longer in use by the same cultural group who produced the rock art. In modern times, rock art sites lie in a more secular context, such as a tourist or heritage site (Tan et al. 2016). Tan et al. (2016) observed the contemporary functions of three rock art sites in northeast Thailand (Khao Chan Ngam in Nakhon Ratchasima Province, and Wat Phra Phuttabat Buaban and Phu Phra Bat in Udon Thani Province), and they noted that it is the landscape of the site and not the rock art itself which plays a bigger role to the continuous usage of the rock art sites. Most of the current inhabitants and users of the site were not aware of the presence and the significance of the rock art in modern times (Tan et al. 2016). On the other hand, McDonald (2013) stressed on the recursive roles of the rock art through time. She demonstrated how the Martu rock art helps to reinforce the mythology and beliefs of the Aboriginal people of the Australian Western Desert – even though the rock art was produced in a different time frame, the Aborigines tend to link them together and interpret them as a homogenous group. The original meaning and functions of the rock art have probably been distorted due to the repetitive usage of the site (McDonald 2013) and different cultural backgrounds between the original artist and the beholder (Domingo et al. 2016). By comparing and contrasting the archaeological analysis with ethnographical information obtained from local indigenous artists and elders, further interpretations on the social context of the rock art can be made (May and Domingo 2010). It is important for the researchers to adopt informed methods during the research process in order to obtain more in-depth interpretations of the rock art meanings (May and Domingo 2010; McDonald 2013; Domingo et al. 2016). Bednarik (2016) in his recent paper explained how the phenomenon of pareidolia affected the interpretations of rock art meaning. In other words, our previous experiences play a critical role when it comes to making sense of visual information (Bednarik 2016). In this paper, we analyse the interpretations provided by the contemporary society to gain insights into how they value this particular rock art site.

1.1 Background of Gua Tambun

Gua Tambun is a limestone rock shelter situated at Gunong Panjang on the outskirts of the city of Ipoh and about 3 km away from the town of Tambun. Both Ipoh and Tambun were two major towns in the Kinta Valley (Fig. 25.1), in which the region played an important role during various major historical events, such as the blooming of tin mining sectors in the early 1900s, Japanese occupation from 1941-
In 1945 and the Malaysia Emergency Period from 1948-1960 (Khoo and Abdur-Razzaq Lubis 2005). Miners and mining companies from various backgrounds such as the *Orang Asli*¹, Malay, Siamese, Chinese and Europeans were brought in to the region since the 18th century and this massively changed the demographic and landscape of the region (Khoo and Abdur-Razzaq Lubis 2005). Gunong Panjang was mined for its large iron ore deposit by Malaya Mining Company and then by Tambun Mining Company until the early 1960s (Tan 2011). Both Semai and Temiar tribes traditionally inhabited settlements in Perak (Faulstich 1984; Masron, Masami and Ismail 2013). According to the Department of Orang Asli Development (Jabatan Kemajuan Orang Asli or JAKOA), the former was the largest population of *Orang Asli* in Perak, with their settlements scattered at the Titiwangsa Range, covering the central and southern part of Perak (Masron, Masami and Ismail 2013). For the region where Gua Tambun is located, Faulstich (1984) stated that the land was previously inhabited by the Semai people. The *Orang Asli* used to be governed by their own customs and social order until they were captured as slaves by the Malays during the spread of the Malay settlements into the more remote area of the country (Carey 1976; Khoo and Abdur-Razzaq Lubis, 2005).

The original population in the region underwent more drastic change during the Emergency period in Perak from 1948 to 1960 where the *Orang Asli* faced forced resettlements and air raids (Carey 1976; Khoo and Abdur-Razzaq Lubis 2005; Nah 2006). According to Tan (2010), there were still *Orang Asli* staying at Gunong Panjang during Matthew’s documentation of the site. However, there is no *Orang Asli* settlement in Gunong Panjang at the present day (Department of Orang Asli Development Kinta and Kampar, 2016, pers. comm.). These events led to a drastic modification to the demographic in the region over the past 100 years, thus making it rather difficult to identify the traditional ownership of the rock art in our current stage of research. Hence, in this paper, the “traditional owner” only refers to the residents who currently reside in the vicinity of Ipoh or Tambun town. “Social perspectives” refers to how the contemporary people perceive the meaning of the rock art and how they locate themselves in relation to the rock art.

At present, Gua Tambun lies in the middle of a busy town. An expressway, a petrol station, residential areas, and a Royal Malay Army Regiment Camp (Kem Rejimen Askar Melayu Diraja Tambun) are found within a 2-km radius from Gua Tambun. The original iron ore mining site at the foothill of Gunong Panjang has been converted into a private polo field. A Hindu temple was built inside a small cave at the foothill and devotees still visit the temple to this day. The Gua Tambun Rock Art site is approximately 50 m above current ground level and can be easily accessed through a concrete staircase. It currently holds the oldest surviving red painting rock art site in Peninsular Malaysia, relatively dated to the Neolithic period between 2,500 and 4,000 years ago. The rock art was painted along the northwest to the west side of the limestone cliff face. The paintings are monochromatic, either in red, purple or yellow. Analysis by Tan in 2010 confirmed that some of the rock art was painted using haematite of local origin. Most of the rock art has low accessibility, located at a height unreachable by humans at present time: The major panel of rock art motifs are located approximately 6 m above the floor, while the highest are located at approximately 25 m above the floor (Tan et al. 2011). It is possible that people in the past built scaffolding using bamboo or wood to produce the rock art (Tan 2010). However, this has become more difficult due to the quarrying activities in the early 20th century and excavation by Matthews in 1959, which has disturbed the original landscape of the site. Several sections of Gua Tambun have obvious traces of quarrying, especially the area directly below the major panel of the rock art (Fig. 25.2). The floor surface is left uneven, steep and full of debris.

¹ According to Aboriginal Peoples Act 1954, the term “*Orang Asli*” generally refers to anyone who is a descendant of aborigine, speak an aboriginal language, follows an aboriginal way of life, customs and beliefs, and is a member of an aboriginal community. In Peninsular Malaysia, the *Orang Asli* can be classified into three main cultural divisions: Semang, Senoi and Proto-Malay with at least 18 sub-ethnic groups.
At present, a gazebo and a concrete staircase has been built to provide better accessibility for the visitor. Three signboards indicating directions to the site were previously noted, however during our fieldwork in 2016, only two signboards remain and were poorly maintained. Realizing that conservation management is the core problem of the Gua Tambun Rock Art site, Adi (1990) suggested that the site needs to be constantly monitored through limiting public access and providing proper education to the visitors to the site. Nevertheless, the conservation and preservation efforts at Gua Tambun have only attracted weak attention from the locals and authorities. In September 2015, the Centre for Global Archaeological Research from Universiti Sains Malaysia launched a public archaeology programme which aims to raise awareness among the local communities regarding this rock art site (Goh 2016).

1.2 Literature Review

Gua Tambun was first reported by Matthews in 1959 but no in-depth archaeological studies had been conducted until 2009 (Tan et al. 2011). Tan (2010) documented 640 forms of rock art motifs across the 100-m long rock shelter in his MA dissertation. Since the first discovery of the site, various interpretations on the meaning of the rock art has been suggested by Matthews (1959), Knuth (1962), Faulstich (1984, 1990) and Tan (2010). Knuth (1962) made comparative studies with the prehistoric rock paintings of Tham Roob, Kanchanaburi Province, Thailand, and suggested that Gua Tambun functioned as an oracle site for the prehistoric people. Faulstich (1984) related a “squatting human figure” motif of Gua Tambun to the early agriculturalists of southern China and suggested that the position is symbolic of fertility, birth and afterlife. Tan (2010) proposed attribute-based identification of animal forms, where a list of possible animals is suggested based on the markings, tail shape, claws, horns and mane of the animals. For ease of documentation, he classified the rock art motifs into five categories, namely zoomorphs, anthropomorphs, geometric features, botanic shapes and abstract shapes. However, Tan (2010) noticed that most of the current interpretations of the rock art uncritically accept Matthews’ initial impressions. This includes “tiger”, “deer”, “tapir”, “wild boar” and “dugong” which have appeared in most of the following studies, tourism brochures and local newspapers. To date, the interpretations of Gua Tambun have been solely archaeologically based, reflecting a pattern of social exclusion of local community in rock art interpretations (Goh 2016).

2.0 RESEARCH OBJECTIVES

This study aims to involve the perspective of contemporary society in rock art interpretations. How contemporary society ascribes meanings towards an archaeological site is believed to have a high impact towards future interpretation and conservation of Tambun Rock Art. This study also investigates the gap of knowledge between the professionals and the contemporary society. Through this study, a more inclusive rock art interpretation and presentation, which incorporates both the perspectives of the contemporary society and the professional group, could be used as future reference.

3.0 METHODOLOGY

This study adopted both quantitative and qualitative approaches. The survey was conducted throughout a period of three months at Gua Tambun by distributing questionnaires to people who visited the site. On average, 15 people visited the site every weekend. The research sample could not be restricted because Gua Tambun is an archaeological site open to the public, hence, the samples were chosen based on a non-probabilistic sampling approach. Two target groups were identified for this study, which were (i) visitors to Gua Tambun and (ii) the local residents of Ipoh and Tambun town. The questionnaires were successfully distributed to a total of 62 respondents out of 180 visitors to the site. Out of 62, only 56 questionnaires were completed.
The questionnaire was constructed in order to explore the layers of conscious and subconscious meanings ascribed by the respondents towards the rock art. The study assessed (i) the respondents’ level of knowledge on rock art and Gua Tambun, (ii) the interpretations on rock art panels and (iii) to assess their personal perception and appreciation towards Tambun Rock Art. The questionnaire comprises five sections, namely demographic data, general knowledge on rock art, general knowledge on Gua Tambun, interpretations on rock art panels, and personal perception on Tambun Rock Art. Each section is made up of a mix of close-ended and open-ended questions. All close-ended questions were analysed using IBM SPSS Statistics Version 20, whereas all open-ended questions were analysed using QDA Miner.

A short interview was conducted on the spot with those who were interested in providing further information and opinions regarding Gua Tambun. The interview was semi-structured, based on the themes of the questionnaires. Examples of questions used in the oral interviews included:

i. Do you have any knowledge on the historical background of Ipoh or Tambun town, this area or this rock shelter?
ii. How did you get to know about Gua Tambun?
iii. What do you think about Tambun Rock Art?
iv. What are your recommendations for the future of Tambun Rock Art?

Informants were encouraged to share stories associated with Gua Tambun and historical knowledge about Tambun. Interviews were conducted in either English, Malay or Mandarin, based on the preference of the informants. Each interview was audio-recorded and video-recorded. A full transcript of the interview was later analysed using QDA Miner.

4.0 RESULTS

4.1 Knowledge on Rock Art and Gua Tambun

Overall, the survey showed that most of the respondents were aware of the existence of rock art sites in Malaysia; however, less than half of them had visited any rock art sites prior. Only a small number of respondents had visited Gua Tambun in the past despite most of them having heard or read about the site. It further indicates a lack of public access to the archaeological information and sites in Malaysia.

As shown in Figure 25.3, our respondents had very little knowledge about Gua Tambun. Even though they knew that the site contained rock art, the majority of them had no information on the composition, motifs and dating of the rock art, nor any historical knowledge about the site. Approximately one quarter of the respondents knew very little about Gua Tambun and thus refused to comment at all. Among these respondents, 20% (N=3) were local residents whereas 80% (N=12) were visitors from other places. Our respondents mainly obtained information about Gua Tambun through their friends and internet such as from blogs and other tourism websites. It is important to note that not many of our respondents had read about Gua Tambun from books or articles. This could have contributed to the reason why our respondents had limited knowledge about the archaeological significance of this prehistoric rock art site. At the same time, information obtained solely through social media and friends could have contained personal bias which could possibly affect the interpretation process.

4.2 Interpretations of Rock Art Panels

The respondents were presented with five images of rock art panel (Panels I-V), each with one close-ended question and four open-ended questions. The respondents were requested to elaborate on what they saw from the panel and what information they could retrieve from the panel.
For Panels I (Fig. 25.4), II (Fig. 25.5), IV (Fig. 25.7) and V (Fig. 25.8), we found that almost all of our respondents confidently pointed out animal figures from the rock art panels. The animals that were frequently being named are “boar”, “cow”, “fish”, “deer” and “monkey”. From here we can see that the respondents identified the rock art motifs based on more common animals that they encountered in contemporary life. A small portion of respondents identified insects, fruits and material culture from the rock art panels. Apart from identifying motifs separately from the rock art panel, we noticed that the respondents tended to link different motifs together and formed relationships between the motifs into a story. This is similar to the research conducted by McDonald (2010) where her informants linked rock art motifs from different time periods to fit into their narratives. Based on the rock art panels that we prepared in the questionnaires, our respondents frequently identified hunting or herding scenes. It was uncommon for the respondents to portray the rock art panel as ceremonial or ritual activities, probably due to their mainstream cultural belief.

On the other hand, most of the respondents identified only human figures from Panel III (Fig. 25.6). It was generally felt that the panel represented a human figure interacting with his surroundings, such as conducting ritual activities, farming or hunting. Several respondents identified material culture, such as tents and flags, hence portraying the panel as a view of early settlement.

Interestingly, Panel V was more commonly associated with aquatic animals instead of land animals like the rest of the panels. The most commonly named aquatic animals were “fish”, “dugong” and “dolphin”. Others also portrayed it as a scene of past environment or landscape. This panel also had the highest number of respondents who failed to interpret it at all.

Several respondents reflected that Panels II, III and V were more complicated and abstract as compared to the other panels. They were unable to comprehend the rock art motifs, thus unable to provide any interpretation for these panels. On the contrary, Panels I and IV were more straightforward and easier to comprehend.

When the respondents were asked about their opinion on the purpose of the rock art for the prehistoric people, more than half of the respondents believed that it was to record daily life and important events of the past. Producing rock art was seen as “prehistoric” entertainment and as a way to express creativity, thoughts and emotions. About one fifth of respondents believed that rock art was a medium for knowledge transfer in educating the younger generation. Other purposes of the rock art according to the survey included for ritual purpose, a tool for communication and to show the status of the artist.

### 4.3 Personal Perception and Appreciation Towards Tambun Rock Art

Two questions were chosen from the questionnaire to study the relationship between the age of respondents, residential status, length of residence and the knowledge about Gua Tambun and appreciation towards Tambun Rock Art. The questions are as follows:

- Knowledge on the existence of Gua Tambun
- Frequency of visit to Gua Tambun

Pearson’s correlation coefficient was computed to assess the following relationships:

#### i. Relationship between age of respondents and responses

To examine the relationship between the age of respondents and their knowledge about Gua Tambun and the appreciation towards Tambun Rock Art. The table below shows the correlation between the frequency of visits with the age of respondents.
Table 25.1  Correlation between the frequency of visit with age of respondents

<table>
<thead>
<tr>
<th>Age</th>
<th>Frequency of visit to Gua Tambun</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>None</td>
<td>Once</td>
</tr>
<tr>
<td>18-24</td>
<td>9</td>
<td>1</td>
</tr>
<tr>
<td>25-34</td>
<td>11</td>
<td>1</td>
</tr>
<tr>
<td>35-44</td>
<td>15</td>
<td>3</td>
</tr>
<tr>
<td>45-54</td>
<td>3</td>
<td>2</td>
</tr>
<tr>
<td>55-64</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Total</td>
<td>39</td>
<td>8</td>
</tr>
</tbody>
</table>

ii. Relationship between residential status and responses

To examine whether the status as a local resident would affect their knowledge about Gua Tambun and appreciation towards Tambun Rock Art. The table below shows the correlation between the frequency of visit with residential status.

Table 25.2  Correlation between the frequency of visit with residential status

<table>
<thead>
<tr>
<th>Residential Status</th>
<th>Frequency of visit to Gua Tambun</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>None</td>
<td>Once</td>
</tr>
<tr>
<td>Local Resident</td>
<td>7</td>
<td>6</td>
</tr>
<tr>
<td>Visitor</td>
<td>32</td>
<td>2</td>
</tr>
<tr>
<td>Total</td>
<td>39</td>
<td>8</td>
</tr>
</tbody>
</table>

iii. Relationship between length of residence and responses

To reveal whether or not the respondents with longer social interaction with Gua Tambun had better knowledge about Gua Tambun and showed more appreciation towards Tambun Rock Art. The table below shows the correlation between the frequency of visit with length of residence.

Table 25.3  Correlation between the frequency of visit with length of residence

<table>
<thead>
<tr>
<th>Length of Residence</th>
<th>Frequency of visit to Gua Tambun</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>None</td>
<td>Once</td>
</tr>
<tr>
<td>Not local resident</td>
<td>32</td>
<td>2</td>
</tr>
<tr>
<td>&lt;1 year</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>1-10 years</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>11-20 years</td>
<td>2</td>
<td>0</td>
</tr>
<tr>
<td>21-30 years</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>31-40 years</td>
<td>2</td>
<td>0</td>
</tr>
<tr>
<td>41-50 years</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>&gt;50 years</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>Total</td>
<td>39</td>
<td>8</td>
</tr>
</tbody>
</table>
Pearson’s correlation coefficient represents the linear relationship between two sets of data. The Pearson correlation coefficient is also known as the ‘r-value’. The r-value always falls between -1 to 1, with the negative number indicating a negative relationship (the higher the scores of X variable, the lower the scores of Y variable), while a positive value indicating a positive relationship (the higher the score of X variable, the higher the score of Y variable). In other words, r-value shows the direction of linear relationship between the variables. To access the significance of the relationship between the two variables, p-value has to be calculated. If the p-value is more than or equal to the significance level (in this research the significance threshold is set at 0.05), it means that there is no significant relationship between the variables. If the p-value is less than 0.05, there is a significant relationship between the variables (Cohen 1988).

The table shows that both the p-value to assess the significance between age group and knowledge about Gua Tambun to the frequency of visit to Gua Tambun is 0.49 and 0.95, respectively. With the significance threshold set at 0.05, any values more than 0.05 indicate that there is no correlation between the variables. Hence, age group is not a determinant on the respondents’ knowledge about Gua Tambun.

There is a significant positive relationship between residential status and the knowledge on the existence of Gua Tambun, r(54) = .29, p = .02. However, there is a significant negative relationship between residential status and frequency of visit to Gua Tambun, r(54) = -.35, p = .008. This shows that the local residents have a greater attachment towards Gua Tambun compared to non-local residents. Even though the local residents do not visit Gua Tambun often, they are more aware of the existence of the site compared to non-local residents.

There is significant negative relationship between length of residence and the knowledge on the existence of Gua Tambun r(54) = -.28, p = .03. This shows that the longer they stay in Ipoh or Tambun, the more aware they are about Gua Tambun. The table shows that there is a significant positive relationship between the length of residence and the frequency of visit to Gua Tambun, r(54) = .34, p = .01. This implies that there is a possibility that the attachment of society towards Gua Tambun increases through longer social interaction with the rock art site.

### 4.4 Oral Interviews

A short interview was conducted on the spot after the respondents had completed the questionnaires. It was fully voluntary, in which the interviewees could withdraw from the interview whenever they wished to. Majority of the respondents refused to be interviewed due to their lack of knowledge and information about the site. Only 12 people were convinced to participate in the interview session. Four of them were local residents of Ipoh or Tambun town, whereas the others came from other states such as Penang, Selangor and Kuala Lumpur. Among the 12 interviewees, only three of them had been to Gua Tambun before. However, none of them possessed much knowledge about the site. Generally, the interviewees learnt about Gua Tambun from their friends or family who had previously visited the cave, through social media (mainly through Facebook) or the local heritage society. The authors were surprised that many local residents were
unaware about the existence of the site because all of them had been staying in Ipoh for more than twenty years. This further validates Goh’s (2016) previous survey at Gua Tambun which indicated that the local awareness of Gua Tambun is relatively low.

Through the interview, we noticed that most of the interviewees described the rock art as “interesting”, “fascinating”, “amazing”, “sophisticated”, and “incredible”. The rock art was perceived to be of high aesthetic value and created by skilful artists due to the height of the paintings and the details presented in the paintings. At first, some of them expressed doubt over the authenticity of the rock art because they always had the impression that rock art only exists in other countries. However, after seeing Tambun Rock Art themselves, our interviewees were impressed on how detailed and nicely produced the rock art was. Mr Sang Tan was born and raised in Ipoh in the 1960s but he had never heard about Gua Tambun until 2015. He then started to visit Gua Tambun occasionally to observe the rock art and hoped that someday he would be able to understand the hidden meanings encoded within these rock arts. He appreciated the rock art for its archaeological and aesthetical value. Same as most of the interviewees, he believed that the rock art provides a glimpse into the human past. Based on the interviews, rock art is regarded as a tool for the prehistoric people to record their daily life and activities and as a medium for knowledge transfer.

In recognizing the importance of these prehistoric rock arts, our interviewees believe that the creativity of the prehistoric people in producing the rock art could have been the source of inspiration for modern day artists in producing their own art. This shows a continuum in the appreciation and usage of the rock art across time and space. All interviewees agreed that it is important to preserve the rock art for the future generation, acknowledging that Gua Tambun is a precious cultural heritage which provides an insight into prehistoric lifestyle.

However, the lack of proper conservation and preservation measures of the site is of most concern. Most of the interviewees emphasized the importance of public awareness and education in preserving and conserving the rock art site. It sparked the debate of whether the public should be the only side to be blamed for the lack of awareness towards the rock art site. They argued that the public are detached from the knowledge and thus do not recognize the importance of it. It is believed that people will start to appreciate the site once they are made aware about it. As Ms Zuhaila, a history enthusiast from the state of Selangor, said:

We can’t misjudge the people for not appreciating this place (Gua Tambun) because they just don’t know the existence of this place. It’s good to spread information about the rock art so that people will gain interest and make more research about it (Zuhaila, 26 March 2016).

Several interviewees also stressed that it is insufficient to just provide information about the site to the public. In fact, the public needed to be able to relate themselves to the rock art site for them to take the preservation effort more seriously. At the same time, collaborations among the governments, professionals, tourism and private sector was also seen as being vital to ensure a more holistic conservation and preservation effort. Ms Lee Ling, a visitor from Kuala Lumpur, stated that:

If you put the information (about Gua Tambun) in a very boring way, interest (towards this site) is not going to be generated (among the public). You need to put information that intrigues them, interests them and makes it relevant back to them... Comprehensive collaborations with the government, academicians, private sector and maybe the tourism would be good. So that there’s a balance of interest (LeeLing, 26 March 2016).

Overall, the interviewees showed their appreciation towards Tambun Rock Art for its archaeological value, aesthetic value and social value. They believed that the rock art depicts the prehistoric ways of life and that modern society might be able to learn something from it. From their perspectives, the lack of public awareness is due to the lack of intellectual interaction between society and professionals. Contemporary society is not given enough exposure and access towards the knowledge about the site.
5.1 Ascribing Meanings to Tambun Rock Art

In this study, the respondents believed that they were looking at records of past human life and activities. How contemporary society ascribes meanings to the rock art reflects how they experience the world. At the same time, the process of interpreting the rock art created a sense of attachment towards the rock art. The rock art site would carry no meanings if society did not assign any meanings to it, thus losing its function as a collective heritage for society.

There are several ways in which the contemporary society ascribes meanings to Tambun Rock Art. Apart from some of the respondents who were just purely guessing the meanings and those who felt that it was too complicated to make sense of the rock art panel, we have identified three patterns of interpretation among our respondents.

i. **Direct Visual Interpretation/Iconography**

Majority of the respondents ascribed meanings to the rock art based on direct visual interpretation or iconography, in which they identified the rock art based on the outline, shape and size. The respondents ascribed meanings to the rock art by focusing on certain motifs that they were able to relate to. Iconography is a widely adopted interpretation method in the field of archaeology. Previous interpretations of Tambun Rock Art were mostly done through direct visual interpretation, where the researchers identified types of animals based on the shape and features of the rock art motifs.

ii. **Interpretation Based on Human and Nature Interaction Activities**

The respondents observed the rock art as a whole picture, instead of identifying the motifs separately. They tried to relate different motifs together to build a story and to make sense of the rock art panel. For example, as they identified an anthropomorphic rock art next to a zoomorphic rock art, they recognized it as a hunting scene. From their perspective, the rock art motifs portrayed the interaction between human and nature.

iii. **Interpretation Based on Knowledge and Experiences**

The respondents acquired knowledge about rock art through books, TV, internet and movies. Experiences were gained through the involvement in hands-on activities or engagement with other subjects. For example, some of the respondents identified the dotted lines as “footprints”, whereas previous researchers identified them only as geometrical shapes. This is probably because the respondents had seen similar footprints by the beach and therefore related such experience to the rock art motifs.

5.2 Gap of Interpretations between the Contemporary Society and the Researchers

Tan (2010) had measured and classified each rock art motif into one of five categories: zoomorphs, anthropomorphs, geometric features, botanic shapes and abstract shapes. Tan and Chia (2011) suggested that the large surface area occupied by zoomorphic figures could mean that animals were an important element to the minds of the prehistoric artist who painted them. They also suggested that the paintings were produced consciously with some degree of planning due to the large scale and height of the paintings. A wider range of interpretations has been offered by contemporary society as compared to previous research. Past interpretations had narrowed down the identification of animals based on the observation and perception of the researchers. However, from a social perspective, society tended to be more creative and imaginative when they interpreted the rock art motif.
No interpretations of a “scene” had been suggested in previous studies. The rock art was identified and interpreted as separate motifs. On the contrary, human and nature interaction activities (i.e. herding and hunting) are popular interpretations offered by the contemporary society. Instead of interpreting the rock art motive per se, the respondents tended to interpret the rock art panel as a whole, creating links among the motifs to create a story about the past.

Through their interpretation, it also shows that society assumed the rock art artists were hunters-gatherers, even without much knowledge regarding the age of the rock art. From their point of view, producing rock art is how the prehistoric people recorded their daily life or important events. Only a minority related the rock art panels to ritual or ceremonial purpose.

On the other hand, Knuth (1962) had made comparative studies between Gua Tambun and the Tham Roob rock art in Thailand. He suggested that Gua Tambun might have been an oracle site for the prehistoric people. By taking into account the geography of both rock art sites, the scarcity of archaeological remains found and the superimposition of the rock art motifs in Gua Tambun, he believed that Gua Tambun was more likely a religious site than a dwelling place. However, we have not ventured into the indigenous perspectives and this will be done in our future studies. The current study only shows how the contemporary society incorporates their experiences from social cultural interaction into the interpretation of the prehistoric rock art of Tambun.

6.0 CONCLUSION

This preliminary study shows that the interpretation process is a dynamic and non-static process. Therefore, the discourse between professionals and contemporary society needs to be proactive in order to bridge the gap between different perspectives. Contemporary society’s interpretation of rock art can be very dynamic and changes through interaction with cultural landscapes. Conventionally, professionals interpreted the rock art through three different methods: scientific studies of the rock paintings (i.e. motif, presumed of subject matter and composition of rock art), the archaeological and spatial context and the ethnographic context. From this study, we found out that society ascribes meanings to the rock art based on their knowledge and personal experiences. The presentation and interpretation of rock art need to be socially relevant in order to promote heritage or social awareness and appreciation and to promote social ownership.

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Aboriginal Peoples Act 1954. s3.


Exploitation of a historical geographic information system (GIS) in Thua Thiên-Hue and Quang Tri provinces, Central Vietnam

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Abstract

The presentation of the first historical Geographic Information System (GIS) in Thua Thiên-Hue and Quang Tri provinces in Central Vietnam offers some new perspectives on the evolution of a landscape from a historical perspective. It consists of a study of geographical data for understanding history including the development of a few examples, explanation of the methodology and illustration of the study of a very specific environment. The different stages of this project can be seen on the website pacha.huma-num.fr. It represents a stage in deeper studies, conducted as part of a Franco-Vietnamese cooperation project, contextualizing some historical phenomena.

Keywords: Vietnam, Thua Thiên-Hue province, Quang Tri province, Champa, Nguyễn lords, history, landscape, geographic information system (GIS).

Framework of the study

This paper aims to present previously unpublished results obtained from the exploitation of a historical GIS in a region of Central Vietnam. This makes it possible to visualize the importance of geography and carefully study a territory for understanding the history and evolution of a landscape from a historical perspective.

In the framework of an International Scientific Cooperation Project funded by the CNRS-France and entitled PACHA (CHAm Heritage in Central Vietnam, translation from French Patrimoine CHAm du Centre Vietnam), a cooperation with the Hue branch of the Vietnamese Ministry of Culture (VICAS) helped to lay the foundations for a new approach to the history and geography of a region of Central Vietnam. The aim is to build, within a period of three years (2014-2016), an online documentation centre, a website and a geoportal, for centralizing knowledge on the Ancient Champa area and its history from the 5th century to the present day. The PACHA cooperation project proposed to study the two provinces while showing the connection between the history and the landscape of this particular territory over the centuries. The objective of the PACHA project was to use the technologies of GIS to gain a better understanding of the process of settlement in Central Vietnam – a process conditioned by the presence of waterways, which seem to have played an essential part in the lives of the population. Indeed the inhabitants of the region seem to have lived off its rivers and coastal lagoons.
The Chams are now one of the 53 ethnic minorities in Vietnam. A few thousand people still live in two southern provinces and strive to preserve their traditions and writing. But the Campā was once a confederation of kingdoms scattered across the valleys that opened onto the eastern coasts of the country. The Chams are an Austronesian language-speaking people, who probably migrated from the island of Borneo from around the 1st century CE onwards. These Austronesian seafarers settled in an area inhabited by Môn-Khmer speaking people. They brought their traditions, religious values and technology. It was the Chams who developed the region and left their imprint. The provinces of Thua Thiê -Hue and Quang Tri, with their respective capitals of Hue and Dông Hà, had a tumultuous history since they served as borders with the Kingdom of Dai Việt from the 11th century onward. The Cham civilization flourished in Central Vietnam until the 15th century, when the last Cham political entity (Campā) gradually moved to Southern Vietnam, before its disappearance from the political scene in 1832.

The history of the region can be divided into several stages: a period of development by the Chams between the 2nd and 9th centuries, followed by the rise and apogee of the Cham civilization between the 9th and 13th centuries. Archaeological indicators show that between the 13th and 15th centuries, the Cham focused on protecting the territory. When Nguyen lords settled in the region, there does not seem to have been any conflict with the Chams and the latter’s presence remained strong between the 15th and 19th centuries. The Cham imprint on the territory was still felt when the Nguyễn kings developed the south of the region between the 19th and mid-20th centuries.

We will here explain here the methodology used for implementing a system of historical geographical information in Central Vietnam and the avenues of research that it might open, whether it be for understanding the rationale underlying the establishment of the Nguyễn capitals, for identifying the connection between the political power and waterways – based on the evolution of river mouths over time – or for finding traces of palaeo-rivers, thus making it possible to study the resilience of the landscape. And more specifically, focusing on local history in a specific landscape can demonstrate that evolution of landscape has an influence on the course of human history, and climate\(^1\) can be considered “as a contributing factor\(^2\) of changes in Central Vietnam.

The methodology was developed in several stages:

1. GPS positioning of Cham citadels, Cham sites and the Nguyễn capitals
2. Documentary research: texts, maps, publications
3. Digitization, georeferencing and vectorization of maps
4. Analysis of the distribution of access to water (statistical approach)

1. GPS positioning of the main sites

A field survey conducted with the VICAS-Hue team over three months between 2013 and 2014 helped to identify 70 sites in the provinces of Thua Thiên – Hue and Quang Tri and to geo-reference them using GPS (Fig. 26.1). This made it possible to develop maps indicating the precise location of historical sites, and which could therefore be used for research on land use and the process of settlement in the region.

In addition to the georeferencing data, thousands of photographs and written sources provide data on the archaeological and historical resources of each site.

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\(^1\) Including volcanic activity, during the Little Ice Age (mid. 13th century to 19th) and the Samalas eruption in 1247 CE: see Lavigne and al. 2013.

\(^2\) Buckley et al. 2014; Grove 2007: 75 “The study of climatic stresses is however important to be able to contextualise a historical phenomenon on a global matrix.”
Through georeferencing, we were able to order sites hierarchically and to gain some understanding of the land use, using a grid that distinguishes Cham sites from Cham citadels and the latter from Nguyên citadels.

2. Documentary research: texts, maps, publications.

The documentary research is divided into two main categories: The first category gathers texts and maps in a Western language and the second contains the documents written in Hán Nôm or Chinese.

a / Western cartography

The search for old maps initially focused on archives available in France. For this purpose, the project planned to search through the archives of the National Geographic Institute (near Paris), the National Archives of Overseas Territories (Aix-en-Provence), the National Defence Archives (Vincennes) and the French National Library (Paris).

We currently have at our disposal a corpus of maps covering the French colonial period, that is to say, from 1875 to 1953. These maps were produced by the National Geographical Service using accurate field surveys. We currently have regional maps dated 1875, 1877, 1880, 1883, 1886, 1889, 1893, 1897, 1899, 1901, 1908, 1923, 1925, 1929 and 1940, as well as a set of aerial photographs taken in 1952-53. The large-scale maps (larger than 1: 500,000) could not be included in this study because they do not provide a sufficient level of detail.

b / Asian Cartography

The Chinese or Chinese-Vietnamese maps are, for the most part, unpublished and it is difficult, or even impossible, to get access to them in the local archives in Vietnam. A bibliographic search indicated the existence of local maps dated from 1490 to the present day. However, these old maps cannot apparently be georeferenced because they are more political (or military) than topographical; and above all, much of the information contained in those maps was written directly on them and is essential to understanding them. The geographical sketches cannot therefore be dissociated from the comments and explanations written on them.

Thus, the Asian maps must be decrypted to be useful because they contain written information that is essential to any study of the resilience of the landscape. Using those maps can provide more data on historical as well as environmental conclusions (Fig. 26.2).

The first stage of this process consisted of studying the map of Hong Duc, dated 1490. Although the representation of the local landscape is schematic, the hand written information on the map indicates the name of the regional districts (from north to south: Trieu Phong phu, Vu Xuong huyện, Hai Lang huyện, Kim Trà huyện, Dan Diên huyện and Tu Vinh huyện) and shows that four rivers (with the river mouths named Minh Linh môn, Viêt môn, Tu Khach môn and Thuy Khê môn) used to wind through the region. The Quang Diên/Dan Diên district is represented as an island, suggesting a connexion between the Quang Tri River and the Perfume River. This first map immediately raises the question of the evolution of the landscape over time. Indeed, the coastal lagoons which are now a characteristic feature of the Thua Thiên

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3 Huong Tra today
4 Quang Dien today
5 Phu Loc today
6 The way of naming the river mouth or channel changes during the time, and one finds môn as well as hai môn or cua
– Hue province (in the area of what is Hue today), seem to have existed in ancient times; but in a different way, i.e. without the southern opening to the now-coastal lagoons of Thuy Tu and Cau Hai – and the Thuy Khê mouth, and with an access to the northern Quang Tri River, up to the Hai Lang district, a present-day provincial border (Fig. 26.3).

In addition, a comparative study of 17th-century maps has enabled us to discern the evolution of the landscape. Thus, the rivers seem to have changed their courses, creating a network of islands along the coastline. The back shores of these islands then opened onto coastal lagoons on which ships could navigate, and which offered protection for men and goods. These coastal lagoons, so typical of the Hue region today, had multiple and complementary functions and served as channels of communication, as tools of territorial and political control and also as a means of controlling natural resources.

The maps used in the context of historical research became tools of investigation and of evaluation of the resilience of landscapes. It seems very instructive to work on a local scale, in order to get detailed analysis that a global visualization does not permit. As such, the evolution of the landscape has influence on the course of human history, and I shall demonstrate that floods and instability of the river courses were probably one factor in the change of the Nguyen Lords’ capitals, and that anomalous climatic situation can contextualize some historical facts.

Hence, combining three maps dating back to the early, middle and late 17th century respectively makes it possible to identify certain persistence as well as changes in the landscape (Fig. 26.4):

- In the course of the 17th century, some river mouths seem to alter. On the comparative document, the blue circle shows the gradual disappearance of a river mouth, which did not exist in the 15th-century map. This mouth, the Yêu (Tiên) môn, seems to appear during the 16th century, a fact that is not impossible due to the instability of the sand soil. Floods and storms are mentioned in the Hue chronicles during the third quarter of the 17th century. When the Yêu mouth closed, it blocked direct access to the sea from the Nguyen citadel of Dinh Cat, identifiable on the maps thanks to the yellow circle in the top section of the documents, under the name Cat Doanh.

- In the southern section of these maps, we find that what is now the Tam Giang coastal lagoon (formerly the West lagoon) formed gradually during the century. This lagoon stretches from the mouth of the O Lau River to the mouth of the Perfume River, a section already visible on the Hong Duc map. It is now 27 km long. Its shape seems to have changed a great deal over time. It is marked on the maps by a pink circle at the centre;

- Further south, the Thuy Tu coastal lagoon (formerly the East Lagoon) now stretches almost 25 kilometres and runs into the Cau Hai lagoon. Thus, the Cau Hai lagoon is probably quite recent; it was in the 13th century that the Chams built the Linh Thai site at the top of a mountain overlooking the Tu Hien channel. This might suggest that the economic and political interest in the region shifted southward during

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7 Grove 2007: 96 on the French Revolution and climate stresses by the end of the 18th century.
8 Dumoutier 1896 maps XVI, XVII and XVIII. A discussion on the date of Dumoutier’s Portulan is open. His maps are taken as the early stage in our comparison because of the landscape evolution. That is not to say that we cannot propose any date, but Dumoutier’s demonstration (1896: 142, 194, 202 “it could be a re-edition of a late XVIIIth century’s geography”) is based on false historical data –mainly Hue as a capital – and cannot be taken into account. His sole explanation on landscape recognizes that “many modifications seem to have appeared during three centuries… due to sedimentary supply of the rivers” (1896: 142-3).
9 As described in Buckley 2014: 11-12, “we have less data on the Hue region than the Hanoi region before the 17th century”, and as “the Central Vietnam coast is protected from the western monsoon by the Annamite Mountains, while the Central coast typically receives significantly less rain from the east than does Northern Vietnam”, the two regions cannot be precisely compared.
10 See Buckley et al. 2014: 12, fig. 12 (b) Hue.
this period. The maps indicate that this coastal lagoon formed in the mid-17th century and gradually carved a channel of access to the south, a channel now called the Tu Hien Channel. The coastal lagoons of Thuy Tu and Cau Hai are marked on the maps by a pink circle at the bottom.

- Finally, one can notice some discrepancy in the designations of the river mouths. Apparently the Yêu mouth’s disappearance during the 17th century was not passed on by the geographers. Thus, by the end of the 17th century, the names of the mouths seem shifted to the south, while the coastal toponyms were put at the right place. This spatial “gap” can be observed regarding the capital named Phu Xuan near the former Kim Long: It is supposed to be situated opposite the Tu Khach mouth, but is now facing a “noan hai nôm”, previously unknown. Hence, the “Tu Khach mouth” tag is located more south, at the entrance of the Cau Hai lagoon (where the modern Tu Hien pass is, and the former Vi mouth was), and the “Canh Duong mouth” tag (today’s name of the Tu Hien pass) appears more southern, out of the coastal lagoon. No logical explanations can be proposed for this spatial gap, apart from a lack of field verification. The geographers could have repeated some other maps without up-to-date field reports, and no observers approved of the coastal alterations. The following maps will not repeat this error, and the disappearance of the Yêu mouth will be taken into account.

This example of a comparative study of documents dating back to the 17th century made it possible to observe that coastal lagoons formed over time and that a river mouth closed up, probably changing the geopolitics of the northern part of the region and creating a dual access to the sea from the southern part of the region. Thus, the Nguyen citadel of Kim Long/Phu Xuan, marked on the maps with a yellow circle in the lower section of the documents, gained better access to the sea by the creation of the coastal lagoons in the middle of the 17th century. And it was precisely during that period (1636-1687) that two Nguyễn lords moved their capital to Kim Long. Indeed, we have found that in 1626, the capital – Dinh Cát – in what is now the Quang Trị province was transferred to the present province of Thua Thiên – Hue, first in Phuoc Yến, near the Bô River (Quang Diên, Thua Thiện) for ten years, and was then moved successively to Kim Long11 and Phu Xuan (Huong Trà, Thua Thiện) on the banks of the Perfume River.

An examination of the Chinese-Vietnamese cartographic documents suggests that the capitals could have been relocated for environmental reasons. Indeed, examination of the map enabled us to establish a link between landscape changes and the relocations of political centres, and the study of landscape evolution is important to be able to contextualize some historical phenomena.

The research can be refined by conducting a comparative examination of the maps with the annals and other Chinese-Vietnamese texts, which, for example, report changes in the locations of river mouths to the sea. For example, the mouth of the Hue River or Perfume River shifted to different locations over the centuries (to Hòa Quán, or Hòa Quan12 -later called Thuan An, and to Thai Duong Ha).

An examination of historical records written in Chinese-Vietnamese enables us to gain a better understanding of the evolution of each channel. Thus, the so called “Thuan An” channel opened in 1404, closed in 1467 and opened again in 1504; then closed and reopened in 1740; and permanently closed following a tsunami in 189713. There is some confusion as to the names given to those channels: Indeed,

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11 The absence of this name on the maps can be explained by the revisions done to the maps through the centuries. The copies given in the Hong Duc ban do are probably not original, and as the editor explained on pp. XXV-XXVI, some confusion in the copies is always possible.

12 This Northern channel can probably be recognized in the 1655-1690 map under the name “Noan Hai Môn”

13 Morineau (1914: 221): “De cette ville et de ce port jadis considérés comme la clef de Hué, on ne verrait là où fut la ville et sa zone suburbaine, qu’une dune...”
the channel that opened in 1897\textsuperscript{14} – which still exists today – carries the same name as that of the Thuan An estuary, even though it is formally located in the village of Thai Duong Ha. And the Thai Duong Ha channel opened in 1467, closed in 1504 and eventually reopened and has been the main opening to the sea since 1897.

The maps make it possible to see how the landscape changed and to understand how quickly the openings to the sea could shift\textsuperscript{15} and cause significant changes in the communication channels.

For example, a French map dated 1883 shows all the fortifications that protected the Thuan An channel (opened between 1740 and 1897). In 1882, Emperor Tu Duc reinforced the Thuan An forts, which defended the entrance to the Hue river. Aerial photographs dated 1952 indicate that this channel was closed and that two channels were opened further north (Fig. 26.5).

Thus, a comparative examination of cartographic documentation, both Western and Asian, shows that a multidisciplinary approach is necessary because the different maps can be studied in a complementary and fruitful manner. They provide additional elements of analysis in the context of a study on the process of formation, evolution and decay of the Tam Giang-Cau Hai Lagoon.

The insights provided by the written documents are undeniably useful in the study of the resilience of the landscape. The documents written in Western and Vietnamese languages, including the annals in Chinese-Vietnamese (Han-Nom), are studied in the framework of the PACHA project.

### 3. Digitization, georeferencing and vectorization of maps.

All the maps must be scanned in the .tiff or .png format before they can be georeferenced. While it has not been possible to geo-reference the Chinese-Vietnam maps in our possession, precise georeferencing of the aerial photographs and the French maps dating from the 19th and 20th centuries did, however, enable us to work on the river system of the region.

A vectorization of the hydrographic network (that is to say, tracing the waterways using a GIS software programme such as ESRI’s ArcGIS) allows for conducting valid comparisons, enabling us to study the evolution of the waterways. We compared vectorized maps dating back to 1883, 1889, 1893 and the early and mid-20th century.

\textsuperscript{14} Dao Thai Hanh (1914: 243): “Two centuries before our era, there were two river mouths on the Thuan An coast: Cua-Eo, on the edge of the village of Hoa Quan; and Cua-Sut, on the territory of the village of Thai-Duong-Ha. The first mouth was wide, deep and dangerous; it was later called the Thuan An-bar. The second was narrow and too shallow for navigation. A few years before the restoration of Our Great and Illustrious Gia Long (1800), the Cua-Sut river mouth widened a little, but it remained impassable for large tonnage ships. During the 9th year of Thanh Thai Reign (1897) the Cua-Eo river mouth, Thuan-An bar, was completely buried by river alluvium and that of Cua-Sut, in the village of Thai Duong-ha was reopened and became wide enough for vessels of all sizes. It is now the port of Thuan-An” (Thuan-An name was given to Cua-Eo by S. M. Gia Long in the third year of his reign (1814).)

\textsuperscript{15} The testimony of Pierre Poivre, French ambassador at the Hue court in 1750, clearly indicates that the mouths could close over quickly. Thus, when speaking of the capital (the present Hue), he writes: “This capital is located four miles from the sea in a great plain bounded on the south by small mountains. The river (...) flows into the sea through two main river mouths that were formerly ports, but in recent years, sandbanks and bars have formed there, making it impossible for even the smallest vessels to enter and making it difficult even for the local boats to navigate.” (Poivre’s Dairy 29th September 1749). But in 1750, a channel opened again. “Continuous rainfall, great flood. The water that rushed down the mountains into the river flooded the plain and flowed at such speed that the current moved off a sandbar that had closed off the mouth of the river, stopping any boat from entering this port, which was the closest to the yard and the most convenient for the exit and entry of an infinite number of row boats which bring to Hue tributes from all provinces of the Kingdom. This is great news for the King and for the whole of Cochin China, for this port infinitely shortens the boats’ route. Previously they were obliged to sail five or six leagues up, with great danger.” (Poivre’s Dairy 14th November 1749).
The geographic information system process highlights the flexibility of the landscape. This helps to reconstruct the evolution of the landscape and to understand the population settlement process through the centuries. The superimposed layers on the vectorized maps reveal the densely populated and the barren areas and a comparison of the vectorized maps shows that on a scale of 70 years, the main hydrological network changes very little except in terms of the width of the waterways and of the movements of sandbanks, whereas the secondary network changes and becomes denser.

The GIS makes it possible to distinguish the changes related to human activity (roads, urbanization) from those related to geological changes (soil subsidence, erosion). It therefore seems possible to extend the reasoning validated by the study of the vectorized maps to ancient times, thanks to an additional study of the texts.

Thus, all the sites are located in plains prone to saltwater intrusion. GPS-based positioning of the ancient sites makes it possible to identify them easily on the maps. It appears that soil salinization was dealt with differently from one period to another: the Cham sites were usually built on elevated land, whereas during the occupation by the Nguyễn Lords, the secondary water systems intensified (i.e. wetland stabilization), probably because of the increasing population density. The development of networks of canals certainly helped to gain arable land and to desalinate the soil.

An in-depth comparative examination of the vectorized lines of the maps from the 19th and 20th centuries, and of the Chinese-Vietnamese and Western textual documents must therefore be conducted. It will probably reveal that environmental issues determine history as well as human issues.

4. Analysis of the distribution of access to water (statistical approach).

*Accessibility to water of the historical sites*

As mentioned above, precise georeferencing makes it possible to conduct a thorough analysis of the spatial dynamics in the region.

Other types of information can be obtained through statistical calculations. These calculations are derived from a specific spatial analysis technique. The field data are combined together to allow for a comparative analysis of water accessibility from ancient times to the present day. This provides new insight into complex phenomena, such as lifestyles and exchange systems.

A statistical analysis of the water accessibility of the ancient Cham sites yields a median value of approximately 400 metres. This implies that a distinction should be made between two functions of the Cham sites, a distinction based on a distance to water of more or less than 400 metres.

The Cham sites located less than 400 metres from a river are primarily the citadels, which were all built directly on a river. We know of five Cham citadels in the region, three in the Quảng Trị province and two in the Thừa Thiên-Huế province. In the north, the northern access was guarded by the citadel of Co Luy (Thanh Co Luy) on the banks of the river Hien Luong, which probably dates back to the 10th century. The central plain, situated on the winding Thạch Han River, was guarded by the citadels of Thuan Chau (Thành Thuan Châu, also called Ve Nghia, name of the closest modern village) and of Co Thanh. In the south, Thanh Loi guarded the southern bank of the Perfume River and Hoa Chau guarded what was probably an opening to the sea, possibly situated near the channel of Thai Duong Ha.

The function of each ancient Cham citadel seems to have been structured around the role of water. The Thanh Loi Citadel in the Thừa Thiên-Huế province dates back to the 8th century. It was built on the banks of the Perfume River and its role seems to have been to protect the local population. In the 10th
In the 15th century, the purpose of the Cham citadels seems to have been to guard the access to the sea. Thus, in the Quang Tri province, the Co Luy Citadel stands along the Hien Luong River (also called the Hoi / Luong Minh / Ben Hai River) which runs into the sea at the Viet river mouth (cua Viet). The Thuan Chau Citadel is situated on a secondary network of the Thach Han River (also called Cai River or Quang Tri River), which flows into the sea at the Tung River mouth (cua Tung). The Co Thanh Citadel, which was destroyed as a result of changes in the course of Thach Han River, seems to have had the role of guarding the river leading to the Thua Thiên-Hue province.

Unlike the Nguyên citadels, none of the Cham citadels seems to have been built to guard the access to the highlands.

Apart from the citadels, all other sites situated less than 400 metres from water might have had a strategic function: for example, in the control of commercial activities between the highlands and lowlands. The Cam Lo River flows into the Quang Tri River – which winds across the plain – and was clearly the main access to the riches of the highlands. It is strewn with several 10th-century Cham sites, which were definitely related to the development of the territory at the time (Fig. 26.6).

Furthermore, many sites are nowadays situated more than 400 metres away from water. They were probably built to guard the territory and played a role in farming activities. They are found all over the landscape and their presence was probably more related to the topography than to the hydrology of the territory. One can assume that these sites were almost cadastral landmarks for local people.

However, we are working with modern maps, which do not necessarily indicate the exact positions of the ancient sites and might not show any trace of old or palaeo-rivers. Although we have been able to demonstrate that the main river system changed very little, the secondary network seems to have played a more important role in the past than nowadays. The palaeo-rivers seem to have greatly shifted over the centuries and have left traces that are still visible in the landscape of today. This process of photo-interpretation cannot be done automatically and requires a detailed study of the traces of ancient waterways, using maps and ortho-photos. The results can then be used as a basis for a palaeo-environmental study.

Finding the traces of the past in the landscape is therefore another essential step in a detailed study of the resilience of this landscape.

For example, the Cham citadel of Thuan Chau (Ve Nghia) dating back to the 10th century used to stand in the early 20th century on the banks of a secondary river, which has now silted up and will soon be included in one of the parcels. In the area surrounding the citadel, the landscape still bears the marks of the ancient meandering river (Fig. 26.7).

**Conclusion**

The PACHA project has made it possible to launch a first Geographic Information System and has offered new insights into history by opening new perspectives. It has consisted of the study of a very specific environment, prone to significant changes that interact with human occupation. A comparison of graphic materials offers the prospect of a long term study. The different stages of this project are described on the website: pacha.huma-num.fr. It represents a stage in more thorough hydro-morphological, geological, palynological or even climatological studies, conducted as part of a new cooperative project, investigating several types of documentation in a historical perspective, interpreting the impact of environmental events in local history and finally contextualizing each historical phenomenon.

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16 Following Wade’s assertion that ‘the development of temple network (can be seen) as key in agricultural and economic expansion’ (Wade 2009: 242).
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Recent research into the ancient port of Vân Đồn

Abstract

The ancient port of Vân Đồn was formally established as an international trading port of the Đại Việt in 1149 CE by King Lý Anh Tông (Lý dynasty). In 1288 CE, it was the site of the defeat of part of an invading Mongol/Chinese army in the Battle of Vân Đồn. Since 2012, archaeological and related investigations have been conducted by the Institute of Archaeology and the international Bạch Đằng and Vân Đồn Research Team as part of an on-going research programme into the ancient port of Vân Đồn. This paper will present some results of recent multidisciplinary research conducted by archaeologists, palaeo-ecologists and sociologists, including an initial account of the artefacts found from Son Hao, a small hamlet on Quan Lan Island. It will also explore the Quan Lan Festival, which celebrates the Battle of Vân Đồn, through a lens of cultural memory and intangible cultural heritage. This will provide useful information for better understanding the changes to the port during its active history.

Keywords: Maritime archaeology, trade routes, harbours, multidisciplinary studies, tangible and intangible maritime cultural heritage
Background

Vietnam has long been known to have had important port cities. Óc Eo, for example, the main port of the kingdom of Funan between the 2nd and 6th centuries CE, was located in the Mekong Delta in southern Vietnam. There is archaeological evidence connecting Óc Eo, by means of long distance shipping and trade networks, both with the Roman Empire through the Western Indian Ocean and with the Late Han Dynasty in China through the South China Sea and the East Sea (Higham 1989: 249-253; Tarling 1992; Miksic 2003; Hall 2010). In recent decades historians and archaeologists have also been investigating the maritime ports of the Champa kingdoms including Hội An, Thị Nại and Cuy Lao (Higham 1989: 297-306; Taylor 1992: 153-156; Momoki 1998; Vu 2008). This strong emphasis on central and southern Vietnam, however, has diminished the importance of the maritime activities that took place in the north of Vietnam which, according to Momoki (2005), is partly due to the fact that such activities are not sufficiently obvious in the available historical texts. This has also been linked to the dominant, normative idea that the socio-economy of the Đại Việt (or northern Vietnamese) was firmly based on agriculture such that it did not have to rely on the growth of international maritime trade (Momoki 2005).

Geographically, the Red River Delta in the north reached as far as Thăng Long (present day Hanoi) and provided important access routes for water transportation (Anderson 2012; Tana 2014). The first millennium CE has been called the “provincial era” mainly referring to the Tongking Gulf region (i.e. Gulf of Tonkin or the Eastern Sea) - which would later become northern Vietnam. The Tongking Gulf region formed part of what the Chinese called Jiaozhi (Giao province or the protectorate of An Nam) (Anderson 2012: 91; Tana 2012; Taylor 2013: 14-50). This was “the Red-River centred northern region of Vietnam prior to its independence from Chinese rule as the Đại Việt state in the tenth century” that would later became the kingdom of An Nam (Hall 2013: 82). International maritime trade and communications routes linked the Đại Việt northern Vietnam via what Li Tana has called the Jiaozhi Yang Ocean network through ports, including Vân Đồn, with India, the Middle East and the Mediterranean to the West, China and East Asia to the East and into archipelagic Southeast Asia (Sen 2006; Tana 2012: 39).

The Jiaozhi Yang Ocean network had started perhaps as early as the 2nd century BCE (during the Chinese Han dynasty) and continued in some form until after the coming of the Europeans in about 1500 CE (Tana 2012; Whitmore 2012). Maritime trade activities varied from the transport of official tributary offerings and exchanges between the various Chinese and Vietnamese dynasties, through both long-distance international and short-distance regional/local commercial maritime trade, to smuggling and even piracy (Momoki 1998: 4; Anderson 2012: 91-92). In addition to maritime trading activity, naval battles took place suggesting the existence of warships on both sides of the Sino-Vietnamese border, certainly by the 10th century and probably much earlier. There were, for example, two attempted invasions of northern Vietnam by the Chinese in 938 CE and in 980 CE that was defeated by Lê Hoàn as well as an attack by more than 100 Vietnamese ships on the Chinese garrison at Ruhong, also in the late 10th century (Anderson 2012: 95).

Recent studies by historians on maritime trade in Vietnam have to some extent started to recognize Đại Việt involvement in international maritime trade (Momoki 1998; Tana 2006; Whitmore 2006). Nevertheless, there is considerable room to assess this from an archaeological point of view focusing on the identification of specific sites of maritime trade within the ancient port(s) of Vân Đồn.

Introduction

An international research group has worked in Vietnam since 2008 with Vietnamese researchers from the Institute of Archaeology (Vietnamese Academy of Social Sciences), under the provisions of a formal five-year agreement (2011-16), to conduct maritime archaeological and related projects (Lê et al.
The ancient port of Vân Đồn project is part of this long-term international collaborative effort focusing on building working relationships among institutions and aiming to protect and research underwater and maritime cultural heritage based on scientific study in Vietnam. Vietnam is a nation that has previously conducted very limited maritime archaeological research, often as collaborative efforts with for-profit motives and in partnership with salvage and treasure hunting consortiums.

Today, Vân Đồn is a local district within Quảng Ninh province that includes Quan Lan Island within an archipelago to the north of Ha Long Bay. The Vân Đồn project aims to contribute to establishing the location, size and chronology of the ancient port(s) of Vân Đồn, which is believed to have changed location on one or more occasions during a period of several centuries.

One aim of this project is to establish precise locations for the ports and sub-ports of Vân Đồn using archaeological survey and excavation methods, including specialized marine and terrestrial geophysical equipment in, on and around the waters, coastal zones and islands of Cái Lân and Quan Lạn (Staniforth et al. 2014; Kimura and Pollack 2015). The research will conduct comparative analysis of recently discovered archaeological evidence (such as sites, ceramics and inscriptions) in order to bring more light into both the quality and quantity of northern Vietnam’s maritime commerce and international networks in the late pre-modern and early modern periods (10th to 16th centuries). The 2016 Son Hao survey and test excavation forms part of this long-term international collaborative effort.

Intangible cultural heritage (festivals, oral histories, stories and cultural memories) at Vân Đồn and on Quan Lan Island have been recorded and analysed by Co-principal investigator Dr O’Toole during the 2012 and 2014 seasons. In addition, several shrines and temples are used by the local population on Cai Lan Island and Quan Lan Island and the precise locations, extent and nature of these shrines and monuments has been photographed and recorded.

The ancient port of Van Don

The ancient port of Vân Đồn consisted of a network of historically important trading ports, both international and domestic, located near Ha Long Bay in the northern part of the Gulf of Tonkin (Khắc 1987; Vu 2008; Delgado 2009; Abe 2010; Schweyer 2011; Dutton et al. 2012: 29, 41). It has been argued, for example, that archaeological evidence suggests that Vân Đồn could be an assembly of several ports, or sub-harbours, scattered among the islands, rather than a single port (Momoki 2005).

Research at Vân Đồn is based on the existing scholarship that attempts to demonstrate that Vân Đồn was the preeminent maritime port in northern Vietnam through re-evaluation of the trading systems based on the Red River Delta. With regard to the understanding of the north, however, according to Hall (Hall 1985 cited in Tana 2006: 94), “all Viet references to the northern urban centres are coloured by the prejudices of later Confucian historians, in particular by their general scepticism toward trade”. Similarly, Whitmore (2006: 103) has pointed out that “[t]he general historiography on Vietnam has tended both to downplay trade and international commerce among the Vietnamese and to treat ‘Vietnam’ as a whole”. Recently this view has been reoriented by historians; for example, Momoki (1998; 2005) has insisted on the existence of a strong maritime network in northern Vietnam which was a significant part of the trading zone in the Gulf of Tonkin, where Vân Đồn was central in the sea routes of the region (Tana 2006).

Historical evidence about the port of Vân Đồn is both limited and sporadic. It has often been suggested that the port was established under the Lý dynasty in the 12th century as the Đại Việt sử ký toàn thư (Complete Annals of Great Viet), for example, recorded that: “In the spring of the Year of the Snake
(1149 CE under the reign of Emperor Lý Anh Tông (reigned 1138-1175), boats of three nations, namely Qao Oa (Indonesia), Lo Lac (Malaysia) and Tiem La (Thailand), arrived in Hải Đông and asked for permits to open trading. The Emperor then decided to establish a trading site called Vân Đồn to trade valuable commodities” (Ngo 1993; Dutton et al. 2012: 42). Later in 1184, during the reign of Lý Cao Tông (reigned 1176-1210 CE), traders from Tiem La (Thailand), Tam Phat Te and other countries entered Vân Đồn market town, presented tributary goods to the court and asked to be allowed to trade (Dutton et al. 2012: 42).

In fact, Vân Đồn was probably in operation from well before the 12th century continuing through the Lý and Trần dynasties (13th and 14th centuries) until at least the Lê dynasty in the 15th and possibly 16th centuries (Yamamoto 1939; Matsuura 2010). Interestingly, the rise and peak of the historically documented Vân Đồn port between the 12th and 15th centuries corresponds to the rise and peak of Buddhist influence in Vietnam under the Lý and Trần dynasties (Taylor 2013: 51-164). Vân Đồn was visited by merchants and traders from China, Southeast Asia and even the Indian Ocean world between, at least, the 12th and 15th centuries CE (Momoki 1998, 2005; Bui 2003; Khắc 2006; Tana 2006; Whitmore 2006). Hall has suggested that “Vân Đồn was populated by Fujian Chinese, Cham, and multiethnic Muslim merchants dispersed among several island harbors”. Hall has further suggested that by the 12th century, Vân Đồn had replaced Nghệ An as the main trading port for northern Vietnam (Hall 2013: 83-4). Following the establishment of other international trading ports on the mainland coast of Vietnam, primarily from the 15th century onwards, and changes to the trading patterns, Vân Đồn slowly disappeared from history (Whitmore 2012).

The Battle of Vân Đồn

In about 1282 a Trần general, Prince Trần Khánh Dư, was appointed as governor and local commander of military/naval forces based at Vân Đồn (Taylor 2013: 127, 131). There is a traditional story told about Trần Khánh Dư who appears to have been a “sharp operator” with a poor reputation for greed, lust and arrogance (Taylor 2013: 128). When he was first appointed as governor, he decreed that the local people should wear Ma Loi hats made of woven bamboo in order to distinguish themselves from the northern traders (Chinese) who frequented the port. Trần Khánh Dư made a fortune because he had arranged for his family to “corner the market” on Ma Loi hats, which they had purchased for as little as 100 cash and were able to sell for as much as a whole bolt of cloth. (Dutton et al. 2012: 43; Taylor 2013: 131). This was by no means the first time Trần Khánh Dư had been in trouble as he had previously been expelled from the Royal family (in the years before 1282) for having an affair with the wife of Trần Quốc Tuấn’s son and he had subsequently spent some years working as a coal merchant (Taylor 2013: 127).

During the 1287 Yuan invasion of Vietnam, Prince Togan (Kubilai Khan’s son) and the Mongol general Omar Batur engaged in a battle with General Trần Khánh Dư’s forces. At this battle, the Trần prince was defeated and Togan and Omar Batur proceeded to enter through the Bạch Đằng River to reach the capital Thăng Long (now Hanoi) (Taylor 2013: 136). A traditional story told about the defeated Trần prince was that he knew that Yuan storeships, laden with provisions, would come through the same area following the main fighting forces by which he had been defeated. The prince waited in ambush and when the Chinese sent a fleet of between 50 and 100 storeships, under the command of Truong Van Ho, as he had expected, Trần Khánh Dư led a successful attack sinking, burning or capturing the whole fleet of vessels (Taylor 2013: 136). The Battle of Vân Đồn probably took place somewhere in the channels and bays to the west of Quan Lan Island, possibly starting in the channel known as Luong Song Mang. Thus Trần Khánh Dư was able to prevent the main resupply for the Yuan troops and horses, which were essential for the overall success of the invasion (Delgado 2009: 161-2). Many Đại Việt soldiers and local people were killed in the battle, among them three brothers: Phạm Công Chính (who was Deputy General of the Đại Việt forces),
Phạm Quy Công and Phạm Thuận Dung. The local people subsequently created a temple in Quan Lan town to worship the oldest brother Phạm Công Chính (see Fig. 27.2), as well as two other shrines to worship Phạm Quy Công and Phạm Thuận Dung (Ban Chap 2010).

The story of the Battle of Vân Đồn and its commander, Trần Khánh Dư, stays powerful in the community through a variety of ways. Many of these ways involve children, as well as adults. The stories told by elders are listened to by children. School children are involved in caring for the shrine of Trần Khánh Dư through an arrangement between one secondary school and the shrine. The famous Festival of the Battle of Vân Đồn also involves local school children. The Battle of Vân Đồn is also included in history lessons of secondary school children.

**Previous Research**

Cong Dong and Cong Tay islands, for example, formed part of the Vân Đồn trading port system and in 1971 the Institute of Archaeology (IA) first conducted an excavation of a Buddhist pagoda on Cong Tay Island. In the past 40 years, IA archaeologists have conducted research, surveys and excavations along the both sides of Cong Dong and Cong Tay islands. They have found pottery from Vietnam and China dating back to the 13th to 17th centuries and copper coins of Chinese dynasties, from Tang to Qing, and Vietnamese coins from Lý and Nguyễn dynasties.

Besides traces of commercial activity, archaeologists have also found religious architectural construction works such as temples, pagodas and towers. Cong Dong Island has four pagodas and one tower, including the especially large Lam pagoda, built in the Trần dynasty (13th-14th centuries). The Lam pagoda was built on the western side of Cong Dong Island and remains include the temple gate, Ho pagoda, Phat pagoda, the Upper shrine, Buddha’s throne, and squirrel and dragon-carved stone balustrades, illustrating that the Lam pagoda has been an important Buddhist centre for the whole island area. Three kilometres northeast of the Lam pagoda, on the highest hill of Cong Dong Island, there are ruins of a brick tower built from bricks that are decorated with dragon figures on fig-tree leaves. Thirteen fragments of an ivory glazed porcelain vase were found in the shrine inside the tower. The vase contained bone-ash of eminent monks whose names are closely connected with the Lam pagoda’s Buddhist heritage. Many architectural and other relics of the temples, pagodas and towers collected from Cong Tay Island are displayed at the Quang Ninh province’s museum in Ha Long City.

Another site for one of the ports of Vân Đồn has traditionally been considered to have been located on Cai Lan Island while the neighbouring island of Quan Lan has been presumed to have provided both the workforce and food supply for Vân Đồn. While some limited terrestrial archaeological survey and test excavations have been carried out on Cai Lan Island, there has been no underwater survey work done to establish the nature and extent of the port or the associated mooring areas. In addition, little archaeological fieldwork of any kind has been carried out on Quan Lan Island.

Limited archaeological research has been conducted to locate the actual port of Vân Đồn and that research suggests that the ancient port was located either on or near the island of Quan Lan (Yamamoto 1939, 1981; Abe 2010; Whitmore 2006). Despite the importance of the port, little is known about the mechanism of the Tran maritime trade system. Some of the best evidence about how ancient people operated international maritime commerce is shipwrecks. The remains of the actual ship and the cargo can be useful evidence to study various aspects of past trading activities, including the volume of trade and who were involved. Having the actual goods in hand alone will tell us the story from the past.
Research at Vân Đồn since 2012

In 2012, an international archaeological team conducted a brief marine survey using a side-scan sonar in order to assess the possibility of finding a shipwreck near the island of Quan Lan. This was the first time that such a geophysical survey had taken place in this region of Vietnam. This survey revealed the potential of finding shipwrecks in the area.

A short preliminary visit by the researchers to Cai Lan and Quan Lan islands in November 2012 revealed coins and Han style ceramic evidence that suggests Quan Lan was inhabited from at least the early Christian era from at least the 6th to 8th centuries CE, which is well before Vân Đồn first appears in the historical records (in 1149 CE), and other archaeological evidence from underwater that suggests Vân Đồn was an active port with international links until after the 15th century CE – again, later than has been generally accepted.

Son Hao is a hamlet (ancient Van Son village) in Quan Lan commune which is said to be the ancient village where Trần Khánh Dư drilled his soldiers. Cong Cai Bay is located on the central part of Quan Lan Island adjacent to Son Hao and is a relatively small bay at the entrance of the waterway that connects to Cai Lan Island (Quan Lan commune designates and protects Cai Lan as a historical port). The construction of a recycling factory recently started in the area next to Cong Cai Bay, but due to the discovery of many Vietnamese and Chinese ceramics in the Son Hao-Cong Cai area, the factory development was stopped. The assemblage of discovered ceramics indicates that the area could be part of a trading port. A shoreline walking survey was conducted on the rocky shore in the northern part of the bay and identified concentrations of many ceramic fragments. From a single one square metre grid (UTM48Q0762013,2314321) studied in 2014, for example, 177 ceramic shards were recovered and consisted mostly of fragments of stoneware jars and pots with a few glazed ceramics (see Fig. 27.1). The preliminary survey in 2014 also revealed the remains of settlement areas, architectural foundations and materials and a large number of ceramics, glazed pottery, stoneware, terracotta decoration, etc. Most of these artefacts are datable to the period of Trần dynasty (13th-14th centuries). However, artefacts of both earlier and later periods (prior to the 10th century and from the 15th century onwards have also been identified (Staniforth et al. 2014).

Underwater Archaeological Survey in 2014

The underwater archaeological fieldwork took place in July 2014 in order to identify the characteristic of the Cong Cai Bay in terms of its historical role as a small port for Son Hao. For underwater archaeological survey, heavy diving equipment, including dive cylinders, dive weights and a dive compressor, was rented from the Diving Center for Sport and Rescue in Ha Long City under the circumstance that the availability of diving facility was extremely limited. A boat of a local fisherman was also hired for use.

A diving team conducted shallow water survey inside the bay (see Fig. 27.2). The depth of the Cong Cai Bay averages approximately 2.5 m at high tide but this seems to depend on seasons. There is a rock wall around the mouth of the bay. The wall blocks the flow of the tidal current, which affects the visibility of the water inside the bay. Current flows and visibility during underwater surveys were worse than the previous underwater inspections. The water visibility is determined by both winds and tides.

A survey point was set for circular swim search, which determined light brown soft silts cover the seabed. However, no cultural remains were found on the surface bottom of the bay during this search. One square metre grid was placed for test excavation in three different locations (14 CC TS1: CC2; 14 CC TS2: CC3; 14 CC TS3: CC4) (see Fig. 27.3).
The excavation revealed below 5-10 cm of silt exists a compacted layer with rocks and shells. Beneath the layer, was a clay layer about 20 cm thick with shells. Ceramic fragments were found below this layer, embedded in the same greyish-brown clay. The recovered ceramics during the test excavation at the three locations include stoneware as well as glazed ceramics, which are not the majority among the ceramic shards on the shore. For instance, an almost complete glazed bowl, assigned to the 15th century onwards, was excavated at the CC4 grid. As we did not have relevant underwater excavation equipment, we could not dig down deeper into the seabed.

**Remembering the Battle of Vân Đồn**

The Festival of Quan Lan commemorates the highly significant naval engagement between Đại Việt forces and the military of Kublai Khan (i.e. the Battle of Vân Đồn). The Đại Việt were led by General Trần Khánh Dư, who is now recognized as a deity and a protector of the island.

In 2014, the village of Quan Lan celebrated the 726th anniversary of the victory. Our research team observed and recorded the events, artefacts, places and rituals of the Festival as we celebrated with the Quan Lan people. The events were recorded through photographs and digital recordings. Texts were translated and the speeches were interpreted (see O’Toole and Were 2008; O’Toole 2010 and 2014 for more information on methodology). Members of the research team had visited Quan Lan in previous years and were familiar with its streets and services. This research was conducted with a theoretical lens of intangible cultural heritage (Vecco 2010), informed by the investigation of social interaction with place and material cultural (Schlereth 1982).

Intangible cultural heritage is understood as “practices, representations, expressions, knowledge and skills – as well as the instruments, objects, artefacts and cultural spaces associated therewith (UNESCO 2003)” that can be seen to be a significant part of the cultural identity of groups and communities that can be shared across generations (Ahmad 2006).

The Quan Lan Festival 2014 started on 10 June of the Horse year in the Lunar calendar. For Westerners, the date of the Festival was difficult to determine at first because the lunar calendar is used. Although perplexing to adherents of the Gregorian calendar, the use of the lunar calendar automatically indicates high tides, which is an important component contributing to the Quan Lan Festival. For the research team, the investigation of the Festival involved similar instances where we had to come to terms with the sense-making of another culture, as well as a different language.

The days immediately before the Festival saw the village changing. Brightly coloured banners and flags appeared in the streets, some with legends, some with patterns. We saw the dragon boats appear, lying inert in the mud when the tide receded. People of the village started to gather at the entrance of two buildings at either end of the village. These places are recognized as the headquarters for the two teams, the scholars and the soldiers, who will vie for victory in the dragon boat race that is the pinnacle of the Festival. The headquarters are recognized as special places, the focus of the competition between the two groups.

The Festival started with the spring tide, the high water levels facilitating the dragon boat race on the third day. The drums vibrated through Quan Lan, people gathered at each team building, and Vietnamese men appeared in fine costumes. Families surrounded the men, including young boys who will one day compete in the festival.

The Festival involved spiritual ritual and practice, historical enactment and community remembrance. Processions to and from the temple involved the memory of the past with the prayer to the God. Lengths of white fabric anchored on land and falling into the sea helped lost souls find their way from
the water to heaven (see Fig. 27.3). Soldiers and families remembered their dead at the shrines. A Buddhist priest chanted the history and the future of Quan Lan, and flaming flowers were floated away on the tide. The elders had their own dances and feasts, while the young enjoyed the more modern dances and songs at concerts in the marketplace.

As the Festival progressed, a more martial element appeared. Conflict in the South China Sea was escalating at that time, and the Festival appeared more military as more soldiers participated (see Fig. 27.4). Banners were erected that bore the message, “Our Island, Our Home”, and an elderly woman tried to explain to us in Vietnamese what that message meant to her and her people. She traced the words with a stern face as she read them out to us.

Rituals and ceremonies heralded the dragon boat race, the culmination of the Festival. The general of each team donned sumptuous robes, and the teams marched proudly in procession. They collided with each other three times in the Commune House/Shrine courtyard, representing three wins over the Mongols. Many boats gathered to cheer on the teams. The dragon boats competed in three circuits while the spectators shouted and called for a team to win. After the dragon boat race, the Festival ended with religious ceremonies and feasts.

The Festival, and its artefacts, rituals and places, embody several levels of intangible cultural heritage. Firstly, the Battle of Vân Đồn symbolizes both the threat of invasion to Vietnam and the determination to resist and defeat such an invasion. Secondly, the Festival emphasizes Vân Đồn’s situation as an island surrounded by sea, which shapes the lives, fates and identity of the people who live there. The sea provides access for trade and communication as well as invaders, and provides the livelihood of many of the Quan Lan people. Finally, Quan Lan’s identity as an island that is further north than the southernmost regions of its powerful northern neighbour underlines the vulnerability of both Vietnam and Quan Lan in an international context.

Thus, the Festival of Quan Lan develops and maintains a shared understanding: An intangible cultural heritage not only commemorates the past but acts as a resource to meet future cultural and military challenges.

Paleoenvironmental History of Quan Lan

The paleoenvironmental history on Quan Lan Island was reconstructed to examine human-environmental interactions and how tropical island ecosystems have been maintained amidst long-term human occupation. In December 2012, two sediment cores of ~60 cm were taken from Quan Lan Commune from a wetland that has remained permanently wet (See Fig. 27.5). The sediment consisted mostly of sand, but there were changes in colour from a light grey to dark grey in the upper 15 cm.

The sediment core was taken back to the University of Colorado Denver and processed for pollen, macroscopic charcoal (>125um) and organic carbon content to reconstruct vegetation, burning patterns and wetland productivity, respectively. The collection and interpretation of the data was conducted by Dr Christy Briles and Olga Serenchenko. Dr Nguyễn Thị Mai Hương helped with pollen identification and interpretation. Dr Lora Stevens and AJ White at California State University-Long Beach conducted the fecal stanols (coprostanol) analysis and the carbon-nitrogen (C/N) ratios, which indicate changes in relative population levels and the type of water body. Four radiocarbon dates on the core suggest the record could extend back to 3000 cal yr BP; however, the bottom date and the Bacon age-depth model suggests that it could be as young as 1500 years. The age control for the last 1000 years (~40 cm of the core) is much more certain with three dates constraining the age model. Therefore, the focus of the interpretation and the most significant and interesting changes of the record occur within the last millennia.
The record was broken into three main time periods based on major changes in the pollen, charcoal, fecal stanol and lithological data (see Fig. 27.6). Prior to 1000 years, the record is dominated by native species, including those of *Fagaceae*, *Acanthaceae*, *Melastomataceae* and ferns; low charcoal accumulation rates; and moderate levels of fecal stanols. Levels of grass pollen greater than 40um (likely rice) are high. The data suggest people were living near the wetland, growing rice, but not burning to any great extent. At 1200 cal yr BP, rice pollen and charcoal increases, suggesting increased rice production. There is also a decline in many native species, including those of *Acanthaceae* and *Melastomataceae*. The Chinese introduced their agricultural practices to the Red River Delta during the mid-5th century (~1500 cal yr BP) and the technology may have spread to Quan Lan Island by ~1200 cal yr BP (Taylor 2013), resulting in increased rice production, burning and the removal of native vegetation.

Between 1000 and 500 cal yr BP, some major changes occurred near the wetland, indicated by the undetectable levels of fecal stanols and charcoal, a decrease in rice pollen, an increase in ferns and *Casuarinaceae* (seral species) and a decrease or very low percentages of native species. The data suggest population around the wetland significantly decreased. The carbon-to-nitrogen ratios also decrease. This suggests the water level of the wetland decreased and became more vegetated, perhaps due to the lack of interest in keeping it as an open water body for water consumption and/or agriculture. Growing of rice decreased and burning ceased at the site. However, given rice pollen did not completely disappear, it was likely still being grown on the island, just not near the vicinity of the wetland. This was a time of political unrest between China and northern Vietnam; however, there was also significant trade happening between northern Vietnam and other Southeast Asian countries (Dutton et al. 2012; Kimura and Pollack 2015). By 800 cal yr BP, a naval and trading port had been established near or on Quan Lan Island. It may have been established before, but it was first mentioned in the Đại Việt Annals in 1149 CE. There was a change in focus around the wetland from supporting a small population of people growing rice to one devoid of people. People may have moved closer to the area of the port and the shift in activities caused seral species to occupy fallow land.

From 500 cal yr BP to present, there again was a significant environmental transition near the wetland. Charcoal and fecal stanols increase significantly, the organic content of the wetland increases, rice pollen increases to the highest levels of the record, fern and *Casuarinaceae* species decline and native pollen types remain very low or undetected. The data suggest a return of people and agricultural practices around the wetland. By 500 cal yr BP, the Quan Lan was no longer used as an international port likely due to the increase in the size of ships unable to navigate Ha Long Bay, the southern displacement of the Đại Việt capital and/or competing coastal ports (Tana 2014; Kimura and Pollack 2015).

In 2015, we returned to Quan Lan Commune wetland to retrieve another core; however, it had been paved over and that the commune was growing exponentially due to increased tourism. While the site no longer exists, we were able to collect a sediment core in December 2015 near Son Hao and we are gathering additional records before they disappear. Additional sediment cores on Quan Lan Island and surrounding islands in Ha Long Bay have been recovered to examine the spatial extent of the change in agricultural and trading practices during the last 4000 years.

The use of archaeo-metal detection at Son Hao during March 2016 fieldwork

In February and March 2016, the Vietnam Maritime Archaeology Project (VMAP) team carried out an archaeo-metal detection (AMD) survey at Son Hao on Quan Lan Island to help determine if Son Hao was the old port of Vân Đồn, which was the base for Đại Việt naval forces that destroyed a Mongol supply fleet in 1288.
Archaeologists Bob Sheppard and Zack Sheppard from Heritage Detection Australia (HDA) trained the international and Vietnamese team members in the use of archaeo-metal detection and the techniques were used during the investigations (see Fig. 27.7). HDA’s participation in the project was supported by Minelab Electronics Australia, which also donated a metal detector to the Institute of Archaeology (Vietnam).

The AMD surveys recorded 234 metal targets at Son Hao. These metal targets were not visible and would not have been recorded without the use of AMD. The team practised a target identification methodology which:

a) used the target identification systems in the metal detectors; and
b) combined the test pitting on shallow targets with recorded readings on those targets, which the archaeo-detectorists believed would be of value to the survey aims.

This methodology proved successful and as the survey continued, the archaeo-detectorists were able to predict with accuracy if the targets were ferrous or non-ferrous and therefore “diagnostic” in the short term.

The most interesting find was a bronze dagger. The artefact is in a heavily corroded state and will require careful cleaning and conservation for it to be identified.

Other interesting finds by AMD included copper slag, a copper weight and a coin found at the Money Well. Two iron nails were also cleaned and conserved by HDA and appear to be of a type not previously described (see Fig. 27.8). The archaeo-metal detection team located numerous pieces of metal which appeared to be bronze during the survey. With most of these being heavily corroded, it is not possible to determine what they are or their age. A number of samples have been sent to the Australian National University for testing.

AMD was also used at a potential Neolithic site. The absence of metal at the site strengthens the argument that this is a Neolithic site.

The survey identified a number of sites which the archaeo-detectorists believe have high potential for yielding important information to assist with the aims of the project. These included the area where archaeologists from the Institute of Archaeology carried out excavations in August and September 2016. The AMD team believes additional survey work will help uncover more sites with the potential to assist with the research question.

Conclusion

This research has used multidisciplinary methods to establish the location, size and chronology as well as maritime trading and other relationships with regard to the ancient port(s) of Vân Đồn. In the longer term, this will allow us to evaluate the maritime trade networks that existed in northern Vietnam by taking a longue-durée perspective. Archaeology is a multidisciplinary subject area which relies on cooperative work with researchers from different fields and this project will contribute to the development of collaborative approaches to archaeology in Vietnam. Through an intercultural and comparative catalogue of questions, we will seek to arrive at a comparative analysis and interpretation of specific thematic research questions, which cannot be solved by one discipline alone. A multidisciplinary approach in the field of historical studies is, thus, of fundamental importance for this research.
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References


Abstract

New rock painting sites were recently discovered at Doi Pha Kan and Ban Tha Si near the famous Pratu Pha painted rock shelter – the largest rock art site in the country – in Mae Moh District (Lampang Province, Northern Thailand). These new sites are rock shelters featuring hand, animal, anthropomorphic and geometric forms and symbols painted in red ochre. This paper stylistically compares paintings from the three sites mentioned above. Results suggest a relationship between the sites based on style, their spatial patterning of landscape, ritual and mortuary use of the rock shelter. It can be generally assumed that the people who created the rock paintings were agriculturalists who still practised hunting. This is illustrated by the presence of very old burials at Ban Tha Si and Doi Pha Kan compared to Pratu Pha which, while suggestive of contemporaneity, leads us to raise the problem of the synchronicity of burials and paintings in Northern Thailand.

Keywords: rock painting, northern Thailand, red ochre, burials

Introduction

More than 20 rock painting sites in northern Thailand have hitherto been documented; however, archaeologists have only studied a limited number of these sites in greater detail to examine painting and spatial patterning in the landscape. For instance, at Ban Rai rock shelter, Mae Hong Son Province, rock art, log coffins and a stone tool workshop were found in the same area, but so far no correlations have
been identified between the rock art and log coffins or stone tool workshop (Shoocongdej 2003). At Pha Chang rock shelter at Ob Luang, Chiang Mai Province, archaeologists recovered abraded hematite ochre which is thought to have been associated with rock painting (Prisanchit et al. 1986). The Phratu Pha rock painting site excavation during 1998 and 1999 revealed burials covered with red ochre and their grave goods, suggesting that the human individuals are associated with the numerous paintings present on this site, in particular the figure of the burial ritual (Winyalai 1998).

The comparative study of painting styles in rock art is constrained by relatively few data on the necessary spatial scale required to make accurate comparisons. Thus, the comparative study of rock art in Pang Ma Pha, Mae Hong Son Province, aimed to study aspects of artworks and their relationship between eight neighbouring rock painting sites. This study separated paintings into five groups based on the style of rock painting (see Sawadsalee 1998). Another comparison in this study is between painting styles at the Pratu Pha rock painting site, Mae Moh District, Lampang Province and rock art sites in north-eastern Thailand (provinces of Ubon Ratchathani, Loei and Mukdahan). The results indicate a similarity of dress in anthropomorphic figures (Winyalai 1998); however, other styles of painting (e.g. animals and geometric forms) and their origins were not included in this analysis.

The discovery of rock painting sites at Doi Pha Kan and Ban Tha Si offered more information about rock arts in the Pratu Pha Valley (Fig. 28.1). These two sites are located in similar locations due to the mountain geography and share some painting styles: all the paintings at these sites face east toward the rising sun.

Owing to the aforementioned studies of rock painting sites, our hypothesis at Pratu Pha was that there should be an association between the human burials and artwork. To examine this hypothesis, excavations underneath paintings at Doi Pha Kan and Ban Tha Si were undertaken and led to the recovery of evidence for human occupation and mortuary activity.

Therefore, this article focuses on the three rock painting sites in Lampang Province, particularly in Pratu Pha Valley, to examine the relationship of painting styles in this area. To understand the relation of rock art in Pratu Pha Valley, we examine painting style and landscape to gain more information about painting aspects such as style, technique and how prehistoric humans chose this region for rock art painting.

### Three rock painting sites in Pratu Pha Valley

Pratu Pha Valley is a limestone mountain range in Mae Moh District. It is known as the largest rock art site in Thailand. Since the discovery of the Phratu Pha site, the study of rock art in Mae Moh District was concentrated and had more success in this area.

Rock paintings in Ban Tha Si and Doi Pha Kan were discovered approximately 10 kilometres southwestern from the Pratu Pha site. The excavation was undertaken by the Thai-French Paleo- survey in collaboration with the Northern Archaeological Center of Chiang Mai University, the Department of Archaeology of Silpakorn University and the 7th Office of Fine Arts Department of Nan at Ban Tha Si site in 2010. Recent excavations also occurred at the Doi Pha Kan site.

The primary material in these three sites is pictographs painted with red ochre representing anthropomorphic figures, animals (both wild and domesticated), geometric forms and hands. All the archaeological evidence suggests that the sites were occupied both as cemetery and habitation sites; however, the direct dating of paintings in relation to these human activities is unknown.
Pratu Pha

The Pratu Pha rock painting site is located 580 metres above sea level, on a steep cliff on the eastern side of Doi Pratu Pha mountain. Rock art occurs for approximately two kilometres along the cliff surface and was separated into seven groups. The paintings of each group are in red and show various features, such as several hand styles, geometric forms, anthropomorphic, zoomorphic and plant figures, and human activities such as dancing, hunting and pastoral farming (Fig. 28.2). Although the paintings appear to be connected between each group on the mountain, the story of each painting is independent of each other.

The purpose of excavation at the first group of paintings at Pratu Pha was to determine activities and relationships between rock art sites in this area. The archaeological evidence included burials with grave goods such as ceramics, basketry, stone tools, polished stone axes, adzes and arrow heads, stone ornaments, rice grains and floral and faunal remains. Some of the extended burials were covered by bamboo mats with red ochre on the head, and most body parts were burnt (Winyalai 1999). Radiocarbon dating of rice grains, vegetal remains such as fibre from wood and bamboo, and the human skeleton was dated between 1,245±55 BCE and 1,025±65 BCE.

The use of red ochre in the burial practice at the bottom of the painted walls demonstrates that people occupying this area also used red ochre for ritual purposes. It was not possible to assume that burials related to painting materials without the painting of the sixth group, which shows a drawing of painted burials (Fig. 28.3). Owing to the aforementioned evidence, people who occupied this area and participated in this kind of ritual may have derived from the same social or ethnic group.

Ban Tha Si

The rock paintings at Ban Tha Si are approximately 40 metres long and located 460 metres above sea level in the Doi Pha Kan mountain range. The red paintings, found on the eastern slope of the mountain and separated into five areas by position, include figures of hands, geometric forms, elephants, a small carnivore and sun bear (Fig. 28.4). Figures of hands dominate the scene, whereas zoomorphic figures are smaller in number but still important as they concern wild animals (Surinlert 2013).

The excavation at Ban Tha Si took place under the large elephant figure and inside the arch of an open cave. Archaeological artefacts and faunal remains appeared in two separate deposits; the first is a sedimentary deposit comprised of mixed erosional debris including small limestone gravels and dusty loamy deposits, while the second included stone tools, ceramics, small faunal remains and a single flexed burial. Radiocarbon dating on charcoal specimens from the deposits suggested a date of activity between 9,443±36 BCE and 4,723±25 BCE. In addition, a direct radiometric date of the mineral component of human bone indicated an age of 5,097±30 BCE (Zeitoun et al. 2013).

Doi Pha Kan

Doi Pha Kan is a limestone rock shelter site which is 20 metres long and located at the eastern side of Doi Pha Khan mountain, 440 metres above sea level. The artworks identified at the rock shelter include red figures of an elephant and small carnivores, two human paintings include anthropomorphic figures, cattle, chicken and a dog (Fig. 28.5). Hand figures do not occur in this site. Figures of human activities reveal subsistence patterns painted in different techniques (Surinlert 2013).

The excavation of Doi Pha Kan at the bottom of the painted wall revealed archaeological layers rich in faunal and cultural remains. Burials interred in these rich archaeological deposits included evidence for Hoabinhian stone tools and flakes (see Celibertini et al. this volume) and forestry animal remains (see Frère
et al. this volume). Flexed burials were present with red ochre spread over the bodies, and offerings such as grinding stones or pestles, which are associated with the making of red-ochre powder, were interred with the individuals. It is difficult to assume their association with artwork because a series of direct radiocarbon dates on human bones and offerings suggested an age of 10,550 BCE (Imdirakphol et al. in press). This is an early date for ochre manufacture and use, but in Yunnan, China, ochre paintings were recently dated to 8,385±97 BCE (Taçon et al. 2012) and even to 33,450 BCE in Sulawesi (Aubert et al. 2014).

**Comparison of rock painting sites in Pratu Pha Valley**

The relationship of rock painting sites in the Pratu Pha Valley are significant for understanding prehistoric human activity in Northern Thailand. It is important to note that the similarity in location, artistic design and traces of human activities from the excavations in these archaeological sites suggests a common pattern of using rock shelters in this region. This comparative study of landscape and rock art aspects examines these details.

**Landscape**

Despite the distance of 10 kilometres between the Pratu Pha rock painting site and the other two sites (Doi Pha Kan and Ban Tha Si), some similar aspects of these sites is present. The location of three rock painted sites is on the steep, south-eastern slope of the limestone mountain range where the paintings are preserved under the rock shelter from rain and sunlight. These sites are likely to have been suitable spaces for art creation, especially on the smooth surface of the shelter wall facing the rising sun. Due to the function and preservation of deposits in rock shelters, traces of human activities were found in this area including cooking, tools manufacture and artistic creation but also mortuary behaviour.

The spatial distribution and density of rock arts possibly correlates with site size and accessibility. The different size of surfaces relate to various aspects of artworks, particularly painting quantities and sizes. For instance, the Pratu Pha rock shelter is about two kilometres long with more than 1872 pictures separated into seven groups. The area of painting in each group is between 10-300 m², having a distinct scale and amount of artwork. Comparing Pratu Pha, Doi Pha Kan and Ban Tha Si, it is clear that the latter two sites are smaller, and their sizes of painting area are no more than 2 m² due to the limitation of the shelter wall space. The elevation of these rock shelter sites does not affect the density of the paintings.

**Painting aspects and technique**

Rock art sites in the Pratu Pha Valley are defined by painting using red ochre. The motifs consist of anthropomorphic (including hands), zoomorphic and geometric forms likely based on silhouette figures. The drawing of paintings at these three rock art sites likely used similar techniques including using a brush and wet pigment (red ochre mixed with water or some organic fluid) (Fig. 28.6).

The process may have included drawing contour line figures, painting outlines, filling thick lines by brush, imprinting pigment-coated hands and spitting the pigment. In terms of figures presented, the motif of hands is the most dominant figure followed by anthropomorphic and zoomorphic figures. Of the three sites, Pratu Pha yields the most diverse styles of artwork which comprise specific types of hands including both positive and negative images. For instance, hand imprints, hand images covered with circular lines or small crossed figures, hand sprayed, outlines of hand with inside decoration and outlines of hands painted in U-shapes (Table 28.1). These aspects of hand painting have not been found at Ban Tha Si or Doi Pha Kan.

The sizes of zoomorphic figures of these three sites tend to be comparatively larger than anthropomorphic forms; the average sizes of animal figures are between 20-100 centimetres (e.g. at Pratu
Pha), while anthropomorphic figure sizes are between 10-20 centimetres. These figures are based on silhouettes, partial silhouettes and outlines.

Based on this comparison, these three sites show similar techniques employed in creating artwork but at the same time retain their own unique style at each site. The scenes and images are plentiful and include actions of ritual, animal hunting, pastoral life and naturalistic actions of animals. Most anthropomorphic forms are based on narrative topics: first, ritual images (for example, scenes of people taking part in a ceremony or rite, such as the pictograph at Doi Pha Kan) depicting a group of people surrounding a person being carried on the shoulder of another person and raised above something; second, an image indicating the action of animal hunting (for example, the drawing at Pratu Pha, which illustrates a group of people who hunted bulls); and lastly, a scene of pastoral life, with people and domestic animals including cattle, dog and chicken. These types were present in both Doi Pha Kan and Pratu Pha.

**Conclusion**

Interestingly, the similarity of geographical locations of the three sites (Fig. 28.7) that concentrate on the eastern side of the limestone mountain range suggests special selection of the locations of painting sites in this area. The specific geographical features have clearly influenced consideration of where the painting occurs, particularly on the wall of shelters with protection from rain and bright sunlight. Moreover, these features are also selected for rites and other activities as the results of excavations at these three sites indicates that painted shelters were suitable for use as burial locations and temporary settlements. Some repainted images and the density of burials strongly demonstrate the necessity of rock painting sites in this area where people in the past repeatedly used these locations as special or sacred places in their communities.

The painting styles and techniques, especially drawing contour (outline figures) and outline fill with thick line by brush (for making silhouette image), are similar but certainly related to the size of the painted wall. Furthermore, the diversity of artwork from Doi Pha Kan and Ban Tha Si is less than at the Pratu Pha site, where various styles and techniques, especially images of hands having both positive (imprint) and negative (hand stencils) images, are present. The narrative of artwork of these sites is about natural features, especially the actions of animals. The scenes of human activities demonstrate three different functions: actions of ritual, hunting and pastoral life, suggesting an agricultural society of people in this region. This conforms to the evidence from excavations and the dating of Pratu Pha. Finally, further work is needed concerning the chemical nature of the red-ochre to examine if some art panels are linked to the burials or not. We have evidence of funeral practices close to the painted walls at Pratu Pha, which conform to our common knowledge of Neolithic or Iron Age period practices, but the old dating of the burials at Doi Pha Kan and Ban Tha Si raises the question of the synchronicity between some of the burials and some of the painted figures. The use of ochre as a cover or bed in the burials close to the painted wall of Pratu Pha, but also at Doi Pha Kan and Ban Ta Si in the same valley, is very interesting because using of red ochre in both burial and painting context rarely finds together in the same place. Continued and future rock art research in northern Thailand will help clarify and expand our knowledge on human-artistic traditions during the late Pleistocene and Holocene.

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<table>
<thead>
<tr>
<th>Site</th>
<th>Location</th>
<th>Elevation (above sea level)</th>
<th>Site size</th>
<th>Amount of painting</th>
<th>Repeated use of rock shelter for painting</th>
<th>Radiocarbon dating from excavation</th>
<th>Scene of images</th>
<th>Colour of painting</th>
<th>Evidence from excavation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pratu Pha</td>
<td>Eastern</td>
<td>580</td>
<td>2 km.</td>
<td>1,872</td>
<td>Yes</td>
<td>1,245±55 BCE and 1,025±65 BCE</td>
<td>Natural, pastoral life, hunting and ritual</td>
<td>red</td>
<td>Extended burials with grave goods: pottery, basketry, rice grains, melon seeds, textile and hematite ochre</td>
</tr>
<tr>
<td>Ban Tha Si</td>
<td>Eastern</td>
<td>460</td>
<td>40 m.</td>
<td>52</td>
<td>Yes</td>
<td>6,673±36 BCE, 4,723±25 BCE and 5,097±30 BCE</td>
<td>Natural</td>
<td>red</td>
<td>A flexed burial, stone tools, ceramics and small fauna remains</td>
</tr>
<tr>
<td>Doi Pha Kan</td>
<td>Eastern</td>
<td>440</td>
<td>20 m.</td>
<td>29</td>
<td>?</td>
<td>10,550 BCE</td>
<td>Natural, pastoral life, and ritual?</td>
<td>red</td>
<td>Flexed burials, red ochre spread over the body, Hoabinhian stone tools, flakes, fauna remains</td>
</tr>
</tbody>
</table>

Table 28.1 The details of three rock painting sites
Could Nen Chua be a port for Oc Eo?

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Abstract

The importance of one of the earliest states of Southeast Asia, Funan, and its trading centre Oc Eo to the history of both Cambodia and Vietnam is undeniable. Trade as an economic activity is important for any development and the availability of a suitable port greatly assists with this development. Current literature suggests the port for Oc Eo provided the basis for the development of this trading hub. The current study discusses the likelihood that Nen Chua was in fact the port and hence the origin of the trading centre of Oc Eo. This thesis is based on the presence of an ‘abandoned channel’ identified by morpho-sedimentary investigations of the Mekong River delta and the fact that Nen Chua appears to have been originally located on a large coastal inlet while Oc Eo was a further 12 km inland.

Keywords: Oc Eo, Nen Chua, Abandoned Channel, Port

Introduction

It is generally accepted that Funan was one of the earliest - if not the earliest - states in Southeast-Asia, and Oc Eo was its trading centre (Fig. 29.1). The Oc Eo culture derived its name from this trading centre. Wang (1958: 5) has discussed the importance of Funan and the early trading, noting that “the Chinese first moved south in 3rd century BC. By this time, the Indians, more peaceably, had brought their culture as far as Funan and possibly Lin-yi.” This possibly indicates that Oc Eo may have been operating as a trading centre as early as 3rd century BC, and even earlier. While the centre of trade is generally considered to be Oc Eo, some consider that Oc Eo was also the port. However, considering Oc Eo may not have been located on the coast (i.e. it was located near the Nui Ba The mountain) this was unlikely to be the case. Indeed, Higham (2002: 237) states that the “canals which radiate from Oc Eo included a link to Ta Kev which was probably the actual port.” Furthermore, that author suggested that the small artefacts found at Oc Eo confirmed the presence of a ‘trading state’ within the river delta. Considering that a number of the artefacts referred to by Higham (2002) were of ancient European origin this provides some indication of the age and extent of the trading activities in Oc Eo. Additionally, personal communication with Le Thi Lien (2014) indicates that Nen Chua and Ta Kev were the names for the same site (or area). This is based on the suggestion that the name Ta Kev is Khmer, and Nen Chua is Vietnamese, however, this has not been verified.

This paper aims to investigate whether Nen Chua, which is located far closer to the present coastline (i.e. ~17 km), was in fact the port for Oc Eo which is located a further ~12 km inland. This study also considers the work by Nguyen et al. (2000) and, in particular, the presence of an abandoned channel which was in close proximity to the location of Nen Chua (identified from morpho-sedimentary mapping of the
Mekong River delta) at the end of which was an ideal harbour. Considering the physical distance between Nen Chua and Oc Eo it is possible that these sites were connected by an early stream (Vo Shi Khai, pers comm) and later a canal (Higham 2002). This paper proposes that the development of the port of Nen Chua was based on the position of the inlet which provided a safe and convenient harbour, close to the important commercial centre that was Oc Eo, and this will partially explain why Oc Eo, the commercial centre, was such an important trading hub.

The early coast line and river systems of the Southern part of Vietnam.

Maps provided by Nguyen et al. (2000) and subsequently Ta et al. (2002) indicated the presence of an ‘abandoned channel’ running North-South from close to Chau Doc to the Gulf of Siam (Fig. 29.2). These maps also indicate the presence of a large coastal inlet at the former confluence of the abandoned channel and the sea. Subsequent discussion with Nguyen Van Lap about the abandoned channel shown in these morpho-sedimentary maps (which were based on satellite imagery and, sedimentary studies using coring) lead that researcher to consider the abandoned channel to be an early course of the Bassac River. Whilst Reinecke (2012) has pointed out there is some uncertainty about the findings of Nguyen et al. (2000), including the existence of the abandoned channel, the morpho-sedimentary studies of these latter authors and potential existence of a large coastal inlet provide a basis for discussion.

It is recognised that further work is required to understand the presence of the abandoned channel and its actual course. However, assuming its presence is confirmed, consideration must be given to the implications for the historical development of the region and for early trade. Nguyen et al. (2000) recognises that further work investigating morphological change along the coastline between Rach Gia and Ha Tien in the Gulf of Siam needs to be undertaken.

Where was the early coast line?

Based on aerial exploration, Malleret (1951) stated that the town of Oc Eo was connected to the coast by a large canal with a foreshore and to the back of the country by additional canals. Furthermore, he stated that the town showed itself to have been an industrial and commercial centre which had extensive navigable channels to the shores of the Gulf of Siam. However, based on the maps provided by Nguyen et al. (2000), the postulation by Malleret (1951) that Oc Eo was connected to the coast by a large canal may not be correct. Nen Chua may have provided the “connection” depending on the exact location and extent of the inlet over time. Indeed, stratigraphic testing of the area around Nen Chua could determine where the coast line was during the Funan period.

Work conducted by Nguyen et al. (2000) on the South-East coast of Vietnam on what is now the Cape of Ca Mau has shown that the development of the Cape was due to deposition of sediment originating from the Mekong River delta (Fig. 29.3). Based on the magnitude of this sedimentation, and the presence of tidal flows of coastal waters, it is possible that the inlet at the mouth of the abandoned channel eventually became unusable as a port due to sedimentation. This may also partly explain why Nen Chua is currently located over 17 km from the coastline after deposition of coastal sediment over the last 1500-2000 years.

The Nen Chua site

Location and description

The site of Nen Chua is located in Xa Tan Hoi, Tan Hiep District, in Kien Giang Province, and is 17.24 km from the current coast of the Gulf of Siam. Le Xuan Diem (1995) gives the co-ordinates of Oc Eo
as N 10°15′00″ E105°10′16″ and that of Nen Chua as N 10°08′08″ E105°09′48″. A Google Earth search of the above coordinates gives the elevation of Oc Eo as 13 ft above sea level and Nen Chua as 10 ft. These sites are located 12.69 km apart. Le Xuan Diem (1995) indicated that the Nen Chua site is today described as wetlands (see Fig. 29.4).

Archaeological Discoveries

A number of researchers, including Dr Le Thi Lien, have reported on the archaeological discoveries of Nen Chua. One of the most comprehensive works to date on the site has come from Le Xuan Diem et al. (1995) which included the description of Nen Chua including the settlement, monuments, burials, and additional information from the period 270 AD to 480 AD. Work is also currently being undertaken on Nen Chua by Nguyen Quoc Manh, but details of the specific research are not available. Dr Le Thi Lien has provided, in a personal communication, an interesting photograph of a stone located at Nen Chua which depicts a ship carved into the stone (Fig. 29.5).

Map overlays and location of Nen Chua

The map by Manguin and David (personal communication) indicates the current location of Nen Chua (Fig. 29.6). Whilst this map is drawn to scale it does not provide latitude and longitude. However, the location of Nen Chua is considered to be relatively accurate. In order to investigate whether Nen Chua may have indeed been located on the coastal inlet indicated by Nguyen et al. (2000), maps of both these authors were overlaid after resizing. Whilst it is recognised that the coastlines in both maps may vary to some degree, the coastline was used to resize and orient the overlays. The results of the combination of the maps by Manguin and David and Ta et al. (2002) are shown as Fig. 29.7. Indeed, this combination of images suggests that Nen Chua was located on the coastal inlet outlined above. The location of Nen Chua, in relation to the inlet, is further confirmed by the latitude and longitude of an archaeological site.

Conclusion and Future studies

The author recognises that a substantial amount of stratigraphic testing is required around the Nen Chua site to test for the early presence of the “inlet”, together with testing for the possible connection of this site to Oc Eo along the Lung Lon (also known as Lung Gieng Da) canal (Vo Shi Khai 2003) which lays on the approximate course of an early river. The findings of this study, which postulate that Nen Chua was located on a coastal inlet (and was the major port of Oc Eo), suggest that future work focussing initially on the extent of the coastal inlet and its exact location is required to establish whether Nen Chua was indeed the port for Oc Eo. This study would aim to address questions relating to the development of Oc Eo as a major trading centre and may include:

1. When was the canal from Oc Eo to Nen Chua built?
2. Was there any trading activity along and particularly at the Southern end of the abandoned channel?
3. If there was trading activity along the North-South channel, did Nen Chua remain as a port once the North-South channel silted up.

If these initial studies indicate that the coastal inlet was the reason for the port of Nen Chua additional questions would be raised, and may include:

1. What were the implications for the development of Oc Eo?
2. Did the early coastline of between Rach Gia and Ha Tien, and the possible early course of the Bassac River, have any significant effect on early trade from what is now central Cambodia.
The answers to these questions could have interesting implications for what is currently thought to be one of the earliest states in Southeast Asia and in particular the development of Oc Eo, and Angkor Borei.

Acknowledgements

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References


Abstract

This paper introduces on-going research by presenting the original proposal for this work. This research seeks to combine archaeological and bioarchaeological analyses, as well as theoretical perspectives from these fields, to obtain an integrated and holistic perspective of social change and its effect on health in prehistory. This approach will be tested on the archaeological and human skeletal remains from the late Iron Age site of Non Bak Jak in northeast Thailand. Social organization prior to the advent of state society in mainland Southeast Asia has long been a focus of archaeological research. The Iron Age of northeast Thailand (420 BCE-500 CE) has received particular archaeological attention, as rapid social and technological change has been identified in this region during this period. These changes include increasing social complexity, which is often associated with inequality between social groups and deterioration of population health. In contrast, bioarchaeological research in northeast Thailand has largely focused on the periods prior to the Iron Age, leaving the biocultural consequences of these late social changes relatively less well understood.

Excavations at Non Ban Jak, a moated settlement and residential burial site with two distinct mounds, have been undertaken from 2011 to 2017. These have provided a well-preserved skeletal sample, unusual for this period in Thailand, making it ideal for investigating health and social change. The project underway aims to explore how a putative rise in social inequality might have affected levels of physiological stress at Non Ban Jak using holistic approach presented. Social groupings will be identified through spatial analyses of
grave wealth, burial practice and location in the Esri ArcGIS programme. This programme uses statistics to identify and explore the patterning and relatedness of spatial data. Dental enamel defects and long bone lengths will provide information on physiological disruptions in growth. It is expected that this work will inform on health and social organization during a period of rapid social transition.

**Keywords:** Project Development, Research Approaches, Bioarchaeology, Iron Age, Thailand, Social Change, Health/Stress, GIS

### Introduction

Bioarchaeological and archaeological research in Southeast Asia has increased in recent years and is challenging existing models of social organization and health change that have been applied around the globe (Douglas 2006; Halcrow 2006; Tayles et al. 2007; Higham 2011b; Halcrow et al. 2013; Cekalovic 2014; Clark et al. 2014; Higham 2014a; O’Reilly 2014; Shkrum 2015). This research has pursued these questions using separate modes of enquiry and different theoretical perspectives. Archaeological research has largely been performed from a processual perspective that focuses on the causality, process and impact of social change at the system (society) level. In contrast, bioarchaeology seeks to combine archaeological information with the analysis of human remains to provide contextualized interpretations of stress and disease in the past (Roberts 2010), by combining these strands of information through use of the biocultural theoretical model. This model aims to assess the environmental, social and biological factors influencing health, but has attracted criticism for its failure to emphasize the sociocultural aspects of humanity that archaeological approaches highlight (Singer 1989; Segal and Yanagisako 2005). Traditionally this issue has been addressed through combining archaeological and bioarchaeological theoretical models, allowing their complementary strengths to be applied to single research questions. Although such approaches have the potential to allow holistic insights into the past, they are frequently only integrated and holistic at the theoretical level. A truly integrative approach ideally includes not only complementary theory, but amalgamated methods, analyses and data, and as such is holistic from the “top to bottom”.

This paper introduces an on-going project using a “top to bottom” holistic approach by presenting a research proposal-style project outline. This research aims to investigate social inequality and physiological stress at the late Iron Age (IA) (400-600 CE) site of Non Ban Jak in northeast Thailand (Fig. 30.1) (Higham and Higham 2009; Higham et al. 2014). Patterns of social change underlying the emergence of state-level societies in this region have been identified as atypical, as these changes occur rapidly and relatively late in prehistory in comparison with other parts of the world (Muhly 1988; Higham and Higham 2009; Higham 2014a). From 500 CE, this area sustained small states affiliated with the emerging Dvaravati civilization of central Thailand and the Chenla society of northern Cambodia. It later comprised the northernmost part of the Angkorian Empire (Welch 1998; Higham 2014a).

Current archaeological models of this social change posit that climate change stimulated aggrandizers to create and monopolize water supplies necessary for rice agriculture (O’Reilly 2014; Wohlfarth et al. 2016). In times of drought, it has been argued that the need for water would place individuals in debt to the aggrandizer, providing this individual the leverage to manipulate the population and entrench social inequality (Hayden 1995, 2001; O’Reilly 2014). Higham (2011a) contends that this power was further reinforced through control of prestige items and land, creating a shift from egalitarian to hierarchical social organization. This mode of social organization is often characterized by the presence of social inequality (Price and Feinman 1995).

Social inequality is a systematic variation in access to resources created by social processes (Hoffman 2008). Where social inequalities are not avoidable, they may influence human well-being and
cause health inequalities (WHO 2016). Health is typically considered as an overall state of physical and mental well-being (WHO 2014), though this perception has been contested by Temple and Goodman (2014), who recognize this application of the term as being too categorical, simplified and difficult to apply to past populations. These researchers identify that bioarchaeologists who are studying skeletal stress indicators are observing the evidence of physiological stress, which is a product of complex social, environmental and biological influences.

A correlation between stress and social inequality has been observed in societies around the globe through both clinical and bioarchaeological studies (Lambert and Walker 1991; Kawachi and Kennedy 1997; Dunn and Hayes 2000; Robb et al. 2001; Murali and Oyebode 2004; Pechenkina and Delgado 2006; Redfern and DeWitte 2011). It is therefore possible that the rapid social change observed in late prehistory in northeast Thailand may have increased physiological stress. Unfortunately, due to the poor preservation of many Iron Age skeletal samples, the biological repercussions of increasing social inequality in Iron Age northeast Thailand remain poorly understood. The few bioarchaeological studies focusing on health during the Iron Age provide conflicting evidence for a decline in physiological stress (Domett 2001; Tayles et al. 2007; Halcrow et al. 2013; Cekalovic 2014; Newton 2014; Halcrow et al. 2016).

The double-mounded late Iron Age site of Non Ban Jak in northeast Thailand (Fig. 30.1) provides a unique opportunity to investigate Iron Age stress in relation to social change, with a well-preserved skeletal sample and archaeological evidence of social differentiation. The skeletal assemblage currently consists of approximately 196 individuals, making it the largest late Iron Age skeletal sample in the region. Moreover, infants and children comprise 54% of the burials discovered during the first three seasons of excavation (Higham et al. 2014; Higham 2015a). This proportion is higher than those calculated for other prehistoric sites in northeast Thailand, where they comprise 25.6-45.0% of the skeletal sample (Halcrow et al. 2016). The site is of further interest as the mortuary ritual exhibited involved residential burial. Residential burial is defined here as the burial of the dead in or near houses (Adams and King 2010). This custom has not previously been observed elsewhere in northeast Thailand and may relate to land ownership and attachment to place (Higham 2014b, 2015a). Variations in house size and the amount and type of mortuary goods interred with burials between the two distinct mounds also suggest differentiation between social groups.

The following sections demonstrate the need for a more archaeologically inclusive bioarchaeology by reviewing popular models of social change and current understandings of prehistoric stress and health in northeast Thailand. The review illustrates the different research questions addressed by archaeologists and bioarchaeologists, as well as the different methods and theory used to address these separate aims. We then outline the aims, hypotheses and methods we will use in our study.

The Holes in Our Holism

Southeast Asian Prehistoric Social Change: Challenging Global Perceptions

Early understandings of Neolithic and Bronze Age social organization in northeast Thailand (1750-420 BCE) (Higham and Higham 2009) were based on small archaeological samples from the sites of Non Nok Tha, Ban Chiang and Ban Na Di (Fig. 30.1). Two competing chronological frameworks were applied to these sites. The first placed the initial Bronze Age at 3600 BCE (Gorman and Charoenwongsa 1976), suggesting a delay between the adoption of bronze technology and the emergence of state society, and contrasting with accepted models of technological and social change applied in other parts of the world. This led Muhly (1988) to observe that the adoption of agricultural and metalworking technology in Southeast Asia was not accompanied by an increase in social complexity. Northeast Thailand in particular
provided an example of this atypical change, as indicators of a shift towards social complexity including warfare, evidence for heritable social status, a unified ideological system and economic control by elites had not been found in the Neolithic and Bronze Ages of this region (White 1982, 1995; O’Reilly 2003).

Based on this lack of evidence for complexity, White (1995) has argued for the presence of a heterarchical social system, additionally supported by evidence for independent, household-based specialists at a number of Bronze Age sites in Thailand (White 1995; White and Pigott 1996; Cawte 2007). Other studies (e.g. Bayard 1984; Bacus 2006) have conducted mortuary analyses and favour a traditionally hierarchical system of organization in Bronze Age northeast Thailand.

Our appreciation of social change during the Bronze Age has undergone a transformation with the excavation of Ban Non Wat (Fig. 30.1) (Higham 2011a) and the development of a second chronological model placing bronze use at least 2000 years later (Higham 1984, 2015b; Higham and Higham 2009). This model shortens the prehistoric chronology of Southeast Asia considerably and demonstrates that social change in the region was late and rapid. In addition, mortuary analyses at Ban Non Wat indicate the presence of a wealthy elite in the early Bronze Age phases (Higham 2014c), though recent research suggests that achievement of social status at Ban Non Wat was not durable and elite control was flexible (Smith et al. 2015).

During the course of the Iron Age (420 BCE-500 CE), there is evidence for inter-community conflict, agricultural intensification, population growth and greater spatial and wealth-based differentiation of burials. These findings suggest that social organization shifted towards entrenched hierarchy throughout this period (O’Reilly 2000; Talbot 2002; Higham and Higham 2009; Higham 2011b; Higham 2014a; O’Reilly 2014).

These changes have been attributed to numerous factors including climate change (Boyd 2008; Wohlfarth et al. 2016), land ownership (Higham 2014a), the introduction of the plough and agricultural intensification (Higham 2014a), water control, long distance trade (Bellina 2003; Carter 2015), labour control (Higham et al. 2014) or a combination of all of the above (O’Reilly 2014). Issues of increasing Iron Age social complexity are significant to Southeast Asian archaeology, as it has been proposed that this transition stimulated rapid state formation (Higham 2014a, 2016a).

In contrast to the broad applications of one model of social organization across the region, Oxenham (2015: 1222) reasons it is likely that a “mosaic” of social systems existed across mainland Southeast Asia. It is also possible that hybrid modes of social organization were in use. Hierarchy and heterarchy may be complementary and Crumley (1995) argues that a combination of both models within one society increases its adaptive ability.

The archaeological research reviewed above has largely been performed from a processual perspective that focuses on the causality and process of social change at the system (society) level. Although agency theory is increasingly used alongside political-economy perspectives to balance this approach, individual agents have received little attention to date (see Cawte 2007 for an exception). White (1995) has also critiqued these processual perspectives of the past as being built upon neo-evolutionary frameworks (e.g. Service 1962).

**Bioarchaeology of Northeast Thailand**

Bioarchaeological research in northeast Thailand has largely focused on human physiological stress and adaptation. Where there is an imbalance of stress to adaptive ability, the physiological stress response may cause certain changes in the dentition and skeleton. These non-specific indicators of stress
in the skeleton provide a useful window into stress in the past. In northeast Thailand, the analysis of stress has been used to elucidate health in relation to the adoption and intensification of rice agriculture during the Neolithic and Bronze Ages (1750-420 BCE). In contrast to widely accepted models of health deterioration in response to agricultural adoption and intensification, low prevalence of dental enamel defects, consistency in adult and sub-adult stature over time and improvement of oral health profiles in the Early Bronze Age have suggested that stress was reduced and health stable during this period (Douglas 2006; Halcrow 2006; Cekalovic et al. 2014; Clark 2014; Shkrum 2015; Dhavale et al. 2017).

In contrast, a deterioration of health has been identified in the Iron Age. Current models of this deterioration (Halcrow 2006; Halcrow et al. 2016; King et al. 2017) posit that social and environmental changes, including drought and population growth, had deleterious effects on health. As well as fluctuating oral health profiles (Shkrum 2015), a reduction in infant and maternal health, increased infant mortality (Halcrow and Tayles 2008) and infectious disease have been identified (Tayles and Buckley 2004; Tayles et al. 2007; Halcrow et al. 2016). However, these findings are not homogenous, with a number of authors arguing for improvements or stability in health during this time (Domett and Tayles 2006; Cekalovic 2014; Newton 2014). Field anthropology analyses show increasing uniformity of burial practices in the Iron Age (Willis and Tayles 2009; Harris and Tayles 2012), which Harris and Tayles (2012) argue reflects a desire to solidify community ties in response to increasing socio-political centralization. Research investigating mobility in northeast Thailand using strontium and oxygen isotopes has identified similarity in isotopic signatures from a range of individuals, suggesting low levels of immigration into the region and intrinsic, locally driven social change (Cox et al. 2011; King et al. 2015).

The bioarchaeological studies reviewed above have used archaeological data to form the environmental and social backdrop for understanding health change, but these data are not routinely analysed as part of bioarchaeological research (see Cekalovic 2014 for an exception). Most, if not all, bioarchaeological studies in the region use the biocultural framework. While the currently outlined study also uses this framework, it builds upon it through incorporating additional social theory and socially focused archaeological methods and data.

**Social Inequality and Modern Health**

Studies of poverty and social inequality in modern societies have shown that these conditions have negative effects on mental and physical health (Kawachi and Kennedy 1997; Dunn and Hayes 2000; Murali and Oyebode 2004; Siegrist and Marmot 2006). However, poverty and social inequality are relative and must be considered within their cultural, social and geographic contexts. This is because social inequality is not discretely measureable and instead forms a continuum, with all social groups placed on this spectrum based on their mortality and morbidity rates and quality of life (Kawachi and Kennedy 1997).

Social inequality has also been shown to negatively affect societies as a whole, as the segregation of wealth reduces social cohesion. This lack of social cohesion results in increased violence and crime as well as limited economic growth and democratic function (Kawachi and Kennedy 1997: 1037). However, Sanders and Spencer (2004) have cautioned that socioeconomic status is one of many factors affecting health, including genetic, cultural and psychological variables. Social inequality may result in reduced access to or lack of nutritious food, limited access to healthcare and lower income, increasing mortality and morbidity in lower socioeconomic groups (Pannarunothai and Mills 1997; Morris et al. 2005; Heidary et al. 2008). Analyses of social inequality in past populations are reviewed below.
How Can We Apply an Integrated Approach in Southeast Asia? An Example from Non Ban Jak

The following sections outline an on-going project and demonstrate how a holistic approach may be developed and applied to bioarchaeological research in Southeast Asia. The project forms the first author’s doctoral research, which will combine archaeological analyses of material culture and spatial analyses with bioarchaeological analyses of physiological stress to inform on social influences on health at Non Ban Jak. In particular, this research aims to investigate how social change and the possible development of social inequality affected levels of physiological stress in the past population of this site. The research objectives associated with this aim are manifold and include quantifying individual, group and population stress at the site through analyses of non-specific stress, identification of burial groups at the site through GIS (Geographic Information System) analyses of material culture and spatial organization of burials, and investigating the relationships between burial group membership and levels of physiological stress. It is expected that health, as represented by stress, will vary over space and between social group, representing fluctuations in inequality and social organization throughout time.

Non Ban Jak

Non Ban Jak is located in Amphoe Non Sung of Nakhon Ratchasima Province, northeast Thailand (Fig. 30.1) (Higham et al. 2014). The site was first identified in 1996 through pedestrian survey and has since been excavated and described in detail in a number of publications (Boyd et al. 1999; Boyd and McGrath 2001; McGrath and Boyd 2001; Higham 2011b, 2014a, 2014b; Higham et al. 2014; Higham and Rispoli 2014; Higham 2015a, 2016)

Non Ban Jak is characterized by an eastern and western mound divided by a shallow depression. This is unusual, although also present at the nearby site Non Muang Kao (Fig. 30.1). Two encircling moats with intervening banks surround the conjoined mounds. Higham et al. (2014) have identified variations in mortuary goods accompanying burials in each mound, with those in the western mound including a larger number of iron sickles in their mortuary assemblages. The presence of sickles may suggest that these people were engaged in rice farming activities (Higham et al. 2014). These presumed differences between the people of Non Ban Jak suggests they were differentiated into varying social classes, with those in the eastern mound being of higher social standing than the putative rice field workers of the western mound. The currently proposed project will test this hypothesis in the course of investigating social change and stress.

The mound portion of the site has been excavated under the “Paddy to Pura” and the “Origins of Social Inequality in Southeast Asia” projects between 2011 and 2017. Radiocarbon dating undertaken through these projects places site occupation in the period 300-820 CE, situating the use of Non Ban Jak during the transition from the late Iron Age to the Early Historic Period (EHP) (IA4 circa 300-600 CE, EHP 500-800 CE) (Higham and Higham 2009).

Non Ban Jak features relatively well-preserved human remains in comparison with other Iron Age sites in the region. An in-depth description of the site’s palaeodemography will be published elsewhere (Halcrow et al. in prep). Many of these burials include grave goods, outlined in Higham et al. (2014) and Higham (2016), which will be analysed to gain an understanding of “wealth” and social standing. Burials have been assigned to four mortuary phases within the site’s overall chronological sequence based on grave orientation, relationship to site features, depth, mortuary ritual and variation in grave good type. The burials of Non Ban Jak, their grave goods and spatial distribution form the main focus of this project.
The site also features village lanes, clay floors and clay foundations for wattle and daub walls. Although other examples of such structures have been found in the region, the large excavation area uncovered at Non Ban Jak allows spatial analysis of the relationship between these structures and the human burials (Higham 2014b). Higham et al. (2014) have argued that the walls represent residential structures. Interestingly, some of these structures contained both adult and infant burials cut through the floors, leading Higham et al. (2014) to suggest that these burials were interred deliberately in this location and that the rooms had a ritual, as well as a residential, function.

**Theoretical Perspectives**

As noted, this on-going research takes a holistic approach to the study of health and social change by integrating bioarchaeological and archaeological analyses. The theoretical perspective underpinning this approach is therefore a combination of bioarchaeological and archaeological theories that allow adequate consideration of the social, cultural, environmental and biological aspects of life in the past. To this end, this project integrates agency theory into a biocultural theoretical framework.

The biocultural framework identifies that human adaptation occurs against a complex backdrop of biology, culture and the environment (Goodman et al. 1984b, 1988; McElroy 1990; Goodman and Leatherman 1998; Dufour 2006; Agarwal and Glencross 2011; Zuckerman and Armelagos 2011; Stinson et al. 2012; Ulijaszek 2013). Physiological stress is the key protagonist in this framework. Stress limits physiological function and immune resilience and reduces socioeconomic productivity, thereby increasing poverty (Goodman et al. 1984b; Temple and Goodman 2014). Poverty further decreases health and creates a self-perpetuating cycle (Bogin et al. 2007). This cycle typically affects people of lower social standing who have restricted access to resources and healthcare (Goodman et al. 1984b; Temple and Goodman 2014). This model has been critiqued for failing to adequately address the social influences on human stress and health. Therefore this project will include socially focused agency theory in an attempt to rectify this imbalance.

Agency is defined as the capacity that individuals or agents have to make choices, thereby shaping their own world (Gardner 2008). This is perceived as active and requires social and self-awareness on the part of the agent (Giddens 1984). Thus individual agents are responsible for both creating change and maintaining it (Barrett 1988; Gardner 2008). However, this relationship flows both ways and individual actions are constrained by society and cultural beliefs (Joyce and Lopiparo 2005; Gardner 2008). This view has formed the basis of the structuration approach developed by Giddens (1984), which perceives agency and structure as an intertwined, interactive cycle. While agency theory is believed to provide a more comprehensive and culture-specific view of the past (Gardner 2008: 100), it has been criticized for its poor definition (Dobres and Robb 2000; Dornan 2002), failure to incorporate complementary theoretical frameworks (Saitta 1994), its “shallow” application in archaeological studies (Dobres and Robb 2000), and for being both too relational and too reductionist (Archer 1995; Gardner 2008).

The following sections outline the archaeological and bioarchaeological methods to be used in the proposed study. These methods are included in this contribution for two purposes. The first is to demonstrate how biological and social data may be analysed and combined to provide a holistic perspective on the past. In this study, dental and skeletal stress indicators will be studied to investigate childhood stress, growth and overall health at Non Ban Jak. This information will be combined with grave good analyses in a Geographic Information System (GIS) to identify and investigate social change and its effects on health. The second purpose for including the methods below is to showcase bioarchaeological and archaeological methods for anthropologists unfamiliar with techniques used in these fields.
**Archaeological Methods for a Holistic Approach**

**Geographic Information Systems Analyses at Non Ban Jak**

Geographic Information Systems are a powerful tool for visualizing and analysing spatial data (Kvamme 1999; Wheatley and Gillings 2002; Lake and Woodman 2003; McCoy and Ladefoged 2009). While GIS is now applied to a number of archaeological issues (Brandt et al. 1992; Lake and Woodman 2003; Bevan and Conolly 2004; Howey 2007; Bevan and Conolly 2009; White and Surface-Evans 2012; Mills et al. 2013), these studies typically use material culture and site features as a proxy for human social and environmental interactions. Use of GIS among bioarchaeologists has been slower in implementation but now encompasses a similar breadth of application to purely archaeological studies (Herrmann 2002; Gowland and Western 2012; Duncan and Schwarz 2014; Herrmann et al. 2014; Schwarz 2014). Of particular interest is a recent study by Smith et al. (2015), who have applied GIS to Bronze Age Phase Four burials from Ban Non Wat to refine understandings of burial clustering at this site. GIS techniques detected fewer burial clusters than were identified “by eye” and demonstrated that these groups were associated with particular artefact types.

This project will use GIS to explore social differentiation and inequality at Non Ban Jak from a spatial perspective. This analysis will not assume the presence of different social classes at the site but instead seeks to identify and explore burial clustering, considering a wide range of social characteristics such as age, sex, wealth, stress, relationship to site features and intra-site location. It is anticipated that these analyses will give insight into agency, ideology and social organization.

**Material Culture Analysis at Non Ban Jak**

Mortuary remains of past peoples are typically used to interpret social organization (Binford 1971; Saxe 1971; Tainter 1973, 1978). However, the interpretation of material culture in burial contexts is not straightforward as these goods may also relate to social identity, social relationships and gifts, self-aggrandizing behaviours and ideological legitimization (Hodder 1982; Pearson 1982, 1999; Hayden 2001; DeMarrais 2013).

Material culture analyses in northeast Thailand often consider grave goods as an indicator of status and wealth and assess these from a “quantity over quality” standpoint (e.g. Talbot 2002; Cawte 2007). This standpoint aims to reduce cultural bias in ascribing value to grave goods but potentially neglects the social, cultural and ideological aspects of material culture. A number of studies that have considered these issues find that multiple intertwined interpretations of material culture are possible (Bayard 1984; Chang 2001; Bacus 2006; Cekalovic 2014).

Grave goods interred with burials at Non Ban Jak will be analysed to explore wealth, markers of social identity and social differentiation. To support the social focus of the current study, the Barretto-Tesoro method (Barretto-Tesoro 2003, 2008) will be used to investigate grave goods. Using ethnographic analyses, Barretto-Tesoro (2003) has identified four “prestige factors” associated with grave goods. These are the source of the object, raw material, energy expended in manufacture and acquisition of goods and their cultural function. Each of these factors is scored to produce a prestige score for individual artefacts. This system, while still subject to observer bias, provides a culturally considerate alternative to quantity-focused methods. This method has yet to be applied in archaeological research outside of that conducted by Barretto-Tesoro, which may reflect the focus towards traditional grave goods analyses in the region. Therefore its use in the current study will allow the usefulness of this method to be evaluated.
Bioarchaeological Methods

Physiological stress may result in disruptions to skeletal and dental growth and development. These disruptions manifest as developmental defects of the dental enamel and reduced adult and child long bone length. These stress indicators will be studied to investigate childhood stress, growth and overall health at Non Ban Jak.

**Developmental Defects of the Tooth Enamel**

Tooth formation is sensitive to environmental perturbations such as poor nutrition and disease (Kreshover 1940; Sarnat and Schour 1941; Sarnat and Schour 1942; Kreshover 1944, 1960; Pindborg 1982; Hillson 2005; Nanci 2013; Salanitri and Seow 2013; Hillson 2014; Anthonappa and King 2015; Seow 2015). These perturbations may cause developmental defects of the dental enamel (DDE). As teeth do not remodel during life and are often well preserved, DDE may provide a useful record of stress and health throughout childhood (Kreshover 1940; Sarnat and Schour 1941; Sarnat and Schour 1942; Kreshover 1960; Sweeney et al. 1969; Enwonwu 1973; Suckling and Pearce 1984). In addition, the observation of enamel defects is non-destructive, inexpensive, portable, and requires no specialist equipment or training. It is therefore culturally sensitive and easily applicable in fieldwork situations. While the subjectivity of defect identification and severity assessment are recognized as an issue with DDE analyses, these issues may be overcome with training, practice, and inter- and intra-observer reliability testing. As a result, analyses of DDE are commonly used in bioarchaeological studies to investigate stress at both the population and individual level. Issues investigated include biological responses to agricultural transitions (Goodman et al. 1984a; Goodman 1989; Cucina 2002), periodicity, duration and age of onset of stress in early life (Temple et al. 2012, 2013; Temple 2016), the effects of early life adversity on later life health (Boldsen 2007; Amoroso et al. 2014), stress during transitions towards increasing social complexity (Cucina and İşcan 1997; Robb et al. 2001; Cucina et al. 2006) and stress in relation to weaning (Corruccini et al. 1985; Blakey et al. 1994).

**Skeletal Growth and Growth Disturbance**

The skeletal formation and growth process that begins *in utero* and continues until young adulthood is shaped by interaction between physiological and environmental factors (Tanner 1978; Bogin 1999; King and Ulijaszek 1999; Scheuer et al. 2000). Stress triggered by social changes such as emancipation and industrialization may also impact skeletal growth (Lewis 2002; Cardoso and Garcia 2009; Carson 2013). Growth disruptions may be restored through “catch up growth” (Prader et al. 1963), though the effectiveness of this accelerated growth depends on the severity and duration of the stress event and the age of the individual when stress is relieved (Eveleth and Tanner 1990; Steckel 1995; Bogin 1999; Cameron 2012; Vercellotti et al. 2014). Steckel (1995) states that where stress has been severe or prolonged, the body will be unable to reach its genetic potential for height. Therefore, reduced stature may be used as a proxy for stress and health.

A number of studies have investigated the effect of increasing social complexity and social inequality on human growth (Haviland 1967; Hummert and Van Gerven 1983; Bielicki and Szklarska 2000; Pechenkina and Delgado 2006; Camara 2015; Hughes-Morey 2016). These studies have demonstrated that stature varies between status groups and attribute these differences to environmental factors. Conversely, a number of studies argue that social standing does not negatively influence stature (Mays et al. 2009; Abu Dalou 2016).
Bioarchaeological Analysis at Non Ban Jak

Levels of stress will be compared between social groups identified through GIS analysis at Non Ban Jak. As social inequities may increase stress and impact health, it is anticipated that groups and individuals of lower social status will suffer relatively poorer health compared to their high status contemporaries. This analysis will support the archaeological analyses of social differentiation.

Although analyses of stress may provide valuable insight into past social structures, care must be taken in interpreting them due to the confounding effects of the Osteological Paradox (Wood et al. 1992). The Paradox states that the construction of morbidity and mortality profiles in archaeological populations is influenced by changes in population composition, unequal susceptibility to stress between individuals and selective mortality (Wood et al. 1992; Wright and Yoder 2003; DeWitte and Stojanowski 2015). As those who suffer stress in early childhood are more likely to suffer adversity in health in later life (Barker 1997; Bateson et al. 2004; Kuzawa 2007; Gowland 2015), caution is necessary in considering changes in social status and health over time. Multiple interpretations of health will be considered at Non Ban Jak, including paradoxical and traditional explanations.

Regional Comparisons

Findings of this project will be compared to data from other Iron Age sites in mainland Southeast Asia. This will enable Non Ban Jak to be placed in its regional context in terms of population health, social inequality and social organization. This comparison will be conducted using data from Noen U-Loke (Tayles et al. 2007; Halcrow et al. 2016), Vat Komnou (Pietrusewsky and Ikehara-Quebral 2006), Muang Sema (Pureepatpong 2001; Halcrow 2006), Phum Snay (Domett and O’Reilly 2009; Newton 2014), Phum Sophy (Newton 2014) and Ban Non Wat (Cekalovic 2014; Dhavale et al. 2017).

Conclusion

Through a combination of bioarchaeological health analyses and archaeological spatial analyses, this research will increase our understanding of social change and its biological repercussions at the late Iron Age site of Non Ban Jak. By considering the site in a regional and temporal context, this project can also address social organization on a broader scale, a question that has been longstanding in Southeast Asian archaeology. The use of an agent-focused biocultural perspective may provide a deeper understanding of how groups and individuals responded and contributed to social change.

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Abstract

Bagan, the historic 9th to 13th century CE kingdom of Myanmar is located in the dry zone of the country on the banks of Ayeyawaddy River. However, the monuments and villages of Bagan relied on streams draining across the 80 km² area. This article identifies three water management areas: (i) the east and west foot of the Tuyin range, (ii) the fringes of the monument suburbs and (iii) the historic plain. Classification shows progression expansion from village and community use to an enlargement of reservoirs followed by royal and religious use of water to fill the moat of the inner court zone and extensive monastic compounds within the historic plain. This supports the analysis of the style and inscriptions of the monuments as expanding from the river bank to inland areas.

Keywords: Ancient hydraulic system, Bagan, Myanmar

Introduction

The first palace of Bagan built by King Thamoddarit is traditionally dated to 107 CE in the Hman-nan Yazawin (Glass Palace Chronicles of 1829, Pe Maung Tin and Luce 1923). Current historians prefer to date the founding to 664 CE. Thamoddarit was followed by his son-in-law Pyusawhti (according to the Maniyadanabon, a chronicle by Shin Sandalinka in 1781 CE), with the fourth palace of King Pyinbya within a walled and moated city, recorded in chronicles dated 849 CE (U Yi Sein 2007; Hudson 2004:16-25). These events show considerable change and development prior to the first inscriptions erected in the reign of King Anawratha (1044-1077 CE).

All the kings of Bagan relied upon the prosperity of the farmers and traders who in turn relied upon water management. Much historical, socio-economic, art and architectural research has been published about Bagan, but we lack documentation and research on the ancient hydraulic works of surrounding Bagan. The beginning of Bagan was a collaboration of villages known as the “19 villages” in the Myanmar chronicles (Pe Maung Tin and Luce 1923). In accord with the arid Bagan plain, dry zone crops such as beans and peas were grown with simple methods of water management at critical points which were able to be enlarged as the population grew in later centuries.
Analysis of the style and inscriptions of the monuments suggests they expanded from the river bank to inland areas in the 9th to 12th centuries CE (Kan Hla 1977; Win Maung 2007). By the 13th century, a suburban area had developed 10 km southeast of the walled city (Pichard 2001; Hudson et al. 2001; Hudson 2004). The management of water supply followed up on monastic developments, renovating and using a growing number of lakes and reservoirs. As a result, all of the natural water courses in the manmade catchment area were exploited. The manmade catchment – or the distribution of villages, fields, monuments and monasteries – occupied the area between the river and the Tuyin range as described below.

**City and Environs**

Historic Bagan is the walled, inhabited site located at the northwest corner of the Bagan plain where the Ayeyarwaddy River turns south from its east-west flow. Chronicles date the wall’s construction to 849 CE by King Pyinbya as the fourth and last palace transferred from Tampawadi near Pwasaw Village. The first and second palace sites are recorded as Yonhlut-kyun, east of Tuyin Hill and Thiripicsaya (Thiripyitsaya), south and west of New Bagan. On the bank of the river, one third of an area in the northwestern portion of the walled area is thought to have eroded and washed away into the river. Currently, the existing wall is 540 m on the north, 1,170 m on the east and 1,250 m on the south with an area of 106.80 ha. Inside the walled area are over a hundred ancient monuments including the Thatbyinnyu, Gawdawpalin, Mahabodhi, Shwegugyi, Mimalaung Kyaung and Nathlaung Kyaung temples, the Bupaya, Atwinsigon, Ngakwenadaung stupas and the palace sites attributed to King Anawrahta and King Kyansittha.

Three city gates are seen on each side except the west due to river erosion. If the fourth wall was in place, the conjectured walled area increases to 162.70 ha. The moats might have been brick-walled constructions to prevent erosion and maintain water. The east and southeast moats are 37-52 m wide and 3-4 m deep, while the northwest and southwest are less than 30 m wide and 3 m deep on average.

Prof. Daw Thin Kyi thought that the moat water was let in by channels from the Ayeyarwaddy River and hence the locations of river and city were close to each other (Daw Thin Kyi, 1966). Luce also suggested the water for the city moat was diverted from the river by breaching part of the moat and river bank (Luce 1969). This article documents water management features to argue that the moat was supplied from the rivers flowing across the Bagan plain.

No lakes and tanks are found within the walled area where water may have been taken from the river. We note the stone inscriptions of King Kyansittha (circa 1090 CE) indicate that for the royal ceremony of palace construction, water was most probably taken from the river by the officials, brahmans, architects and craftsmen (U Chit Thein 1965). This suggests that the water supply to the walled area was sourced from river water. But there was a different means for the supply of water for the moats accessed with the channels from storage tanks and lakes of the upland area to the southeast parts of historic Bagan.

The city of Bagan had brick walls, moats, palaces and royal quarters for the aristocracy like an ordinary feudal town (Kan Hla 1977). It was unlike the cities of the ancient Pyu such as Halin, Beikthano and Sri Ksetra, where the commoners like farmers, craftsmen, artisans and rulers lived inside the city wall; in Bagan, the palace citadel was for royalty, and even the agricultural fields, commodity production sites, canals and storage tanks were all enclosed within the city wall. This highlights the different social-political and hierarchy system of Bagan and Pyu.

Walled Bagan is by the river and surrounded by villages, monasteries, temples, stupas and arable lands. The uplands of Bagan are cultivated mainly with dry crops like sesame, beans, watermelon, cucumber, groundnut, maize, green gram, pigeon pea, indigenous toddy palm and native trees of tamarind, neem,
euphorbia, jujube, cutch, acacia tree and thorny bushes. The lowlands like Kyun-mye (alluvial island) and Le-mye (rice land) are less prevalent in the adjacent area of the river and where vegetables and rice are grown. These crops and related agricultural products were vital even when Bagan gained the rice supported areas of Myitha (11 Kharauins or districts in the Kyaukse Plain) and Mapinsara (6 Kharauins or districts in the Minbu Region) (Luce 1969). In addition to rice, the dry crops and palm tree products were the staple foods in daily life.

The origin of Bagan started with the gathering of 19 villages in the early 2nd century CE, which coincides with the developing Pyu cities. At that time, Bagan would have existed with a small territory north and west of Mount Popa. In this dry land, the streams start from the foot slopes of Mount Popa and water only flowed during the rainy season. The scarcity of water in the region prompted the early villagers to dig water storage tanks. More research is needed to assess whether or not the water management of Bagan was for agricultural purposes. The soils and crops indicate that Bagan had different irrigated agriculture in the past; today, river pump irrigation is being introduced. Current practices that may have been the case during the Bagan period include ploughing fields to create plough-lines able to receive rainwater. Sometimes, small channels are used to divert a quickening stream and channel its water to the fields during the rains.

Geology and Geography

Bagan is 32 km northwest of Mt Popa, which is rich in iron ore and other minerals. These lie within the inner core of the Dry Belt, the widest area of the Ayeyarwaddy basin. On the east, it is bounded by the higher mountain ranges of the Bago Yoma while on the west, Rakhine Yoma blocks the monsoon rains. Rainfall ranges from 500-600 mm during the monsoon rains from June to October. The prolonged dry season supports only sparse vegetation, contrasting with the tropical forest of the Mount Popa area farther inland and higher than the Bagan plain. As described below, the vegetation, cultivation and water management of historic Bagan is closely connected to its geology.

The underlying geological strata in the Bagan area are a result of the prolonged weathering of Upper Irrawaddy beds. This has formed a sandy matrix of variously sized fossil woods, conglomerate, quartz and slate pebbles called “ironstone hardpan”. This natural bed soil was critical for Bagan as the underlying concrete-like ironstone hardpan strata gave monuments some resistance against earthquakes (De Terra and Movius Jr. 1943).

Above this stratum is a complex Pleistocene formation forming an irregular surface on the east of Nyaung U and south of New Bagan. The historical buildings of Bagan are distributed across the wide flat plain on the south of Nyaung U and east of Bagan, reaching to the north edge of the Tuyin range on the southeast from the river of the northwest. Five river terraces formed during the pluviation and inter-pluviation events of tropical Pleistocene have been defined in this area of the Ayeyarwaddy basin. The Pleistocene deposits of this area are known as basal and red gravels, Nyaung U Red Earth, Pagan Silt and other alluvial and aeolian deposits.

- The basal and red gravel mostly overlie Terrace 3 of the old river at the 100 ft level. The prehistoric significance of this third terrace has been shown by finds of Early and Late Anyathian Palaeolithic stone tools during 1937-1938 and 2008-2010 surveys and the excavation at Kyauksaga in 2008.
- The Nyaung U Red Earth is a lateritic earth seen in an eroded surface along the slopes of higher altitude areas coming down to the northwest foot of Mount Popa, 32 km to the southeast. These are related to the Pegu Group formation, a lateritic earth from the slopes of the Pegu Yoma that accumulated on the top of a terrace during the pluvial and erosional stage when the slope
of Terrace 2 was previously exposed and Terrace 3 was eroded. The Bagan region on its east and south provides excellent exposures of this red earth at 180-250 ft (55-76 m) above the Ayeyarwaddy.

- Pagan Silt, so called as it was first noticed near Bagan, is structure-less with its pink and yellowish colour associated with pan soil. It has a varying 7-17 m thickness, a deposit seen to have developed from the underground Irrawadian (Ayeyarwaddy) bed soil. The silt is composed of smaller sized quartz gravels but it does not belong to the river-laid formation. Its origin is thought to be a wind-blown loessic type of sediment sourced from the silt of the valley flats and drifted ash from the neighbouring volcanoes and mudflats of the Ayeyarwaddy Valley during dust storms. In the river terrace stratigraphy of the Bagan area, the soil forms the Terrace 4 deposit of the Upper Pleistocene (De Terra and Movius Jr. 1943). This silt-soil separation extends within the larger area of historic Bagan landscape from the foot of the Tuyin range to the river.

The geology of the Bagan plain is closely linked to the geography and the formation of soils. Geographical survey of the Bagan plain defined four types of soils: (i) red brown savanna, (ii) dark compact savanna, (iii) meadow alluvial and (iv) primitive tuffs. Among them, the red brown savanna soils are spread across the largest areas with the primitive tuff soils being the second largest (Thin Thin Oo 2003). Within this flat silt plain, the author has identified some mud-blanketed areas of the primitive tuff soil that were very important for the water storage of the Bagan area.

On the southeast, the Bagan historic plain was bounded by the north-south oriented Tuyin range extending about 40 km southward including the Gwegyo range (circa 300 m). This range geologically is part of the Lower Pegu Group in the Oligocene Period of the Tertiary Era. It is seen in shallow marine deposits in the sedimentary rocks of sandstones. During the Bagan period, the sandstones used in the Bagan monuments were quarried from this hill range. The Bagan plain gradually slopes down from the foot of the range (circa 150 m) down to the 50 m level of the river bank. Within this slope is the drainage system of the Bagan historic area. Many small, dried streams of this area flow only in periods of heavy rains.

The In-daing Chaung (stream) on the northeast and the Ye-oh zin Chaung on the south are the natural boundaries for historic Bagan and its suburb area. Between these two, the Shwe Chaung (Wetkyi-in Chaung), Myinkaba Chaung and Ye-oh zin Chaung (New Bagan) and their tributary courses come primarily from the hill range and flow down to the river. The Ayeyarwaddy is the main artery, a vital drainage not only for historic Bagan but navigation up and down of the country for political, economic and communal relations. The river is also a food resource for fish and the hinterland production of vegetables.

The Bagan plain is a distinctive geographical area. The character of the Ayeyarwaddy River at the Bagan juncture and that of the streams and creeks of the plain is complex. This complexity mirrors that of the inter-layering of river terraces of this region. With the arid dry zone conditions exacerbated by the Rakine Yoma rain shadow, the rivers draining across the gentle slope are vital for human habitation.

Field survey of water management features 2015-2016

In 2015 and 2016, a Field School of Archaeology (Pyay) team surveyed the water management features in the Bagan area. Before surveying, the team members studied maps, collected old records and information about the areas. Most of ancient lakes are visible and easy to find from maps, aerial and satellite photographs but the decayed and neglected lakes need verification from ground survey following provisional identification on aerial and satellite photographs. This was done in discussion with local villagers. Further information on ancient lakes, old habitation sites, brick mounds and related oral history was also obtained.
A basic record was maintained, noting variables such as location, measurements, nature of construction, water resource and catchment areas, utilization, condition, approach-roads, type and other comments.

The exploration for water management in the Bagan area was conducted two times during 2015 and 2016: during the mid-rainy season in September, for measurement of water in lakes, and in the dry season of April, when there is less vegetation for measurement of how long the water is retained. Both old and new lakes were recorded on (i) both sides of the Tuyin range, (ii) the fringes of the historic Bagan suburban area and (iii) the historic plain.

On both sides of the Tuyin range, small lakes are found in a north-south series along the range and villages. The northern part of the Tuyin range is steep with a prominent slope at the foot. This may reflect the varied geological formations: the Lower Pegu groups of the range itself with the surrounding surface being Pleistocene beds. There was an important gap in the stratigraphic formation between them described as the Irrawaddian Formation in this particular area. The actual geological events in the Bagan plain occupy the residues of Irrawaddian Formation as foundation soil, almost covered by Pleistocene deposits. This geological setting of the Tuyin range and its surrounds formed the patterning of drainage system and deposition. Two dry or seasonal streams are good examples:

1. **Naletaw Chaung** starts from the slopes of eastern highlands and flows from east to west of the hill range through the narrow valley between two peaks of Thagya Taung (north) and Taungponwa (south). After passing through, the stream goes along the western foot of the range and is finally captured with the embankment at the north edge of Mya Kan.

2. To the south, the stream of **Seik Kwa Chaung** also crosses the hill range.

The suburban area of ancient Bagan area is naturally bounded by the Indaing Chaung on the northeast and Ye-oh zin Chaung on the south. Its fringe on the south is a line of the villages: from east to west, Shwedwin, Nwagyoaing, Kanbauk East and West, Tuywuntaing and Nyaungdo. The villages have respective tanks except Shwedwin which is by the river bank in the west. These areas are now supported by pumping river water into canals for agriculture and other uses. In the northeast, there are the villages of Myenelay, Sitha, Intaing, Kabani and Yedwin-nyaungbin with traditional tanks. There is also the constructed river water pump east of Kyaukku Umin, which runs to the south for agriculture. These two river pump canals are well arranged to drain the irrigated water against the natural contour altitude, which is basically sloped down from the hill range to the river.

In the historic plain, the two main streams of Shwe Chaung and Myinkaba Chaung flow from the southeast to the northwest. The tributaries of Shwe Chaung start from the high level (200-220 m) area and finally join the lower Ayeyarwaddy River. This stream might have once connected with the tanks of Thantsinkye, Hpyaukseik Pin Village and Wetkyi-in Kan during the heavy rains for the incoming stream water. Myinkaba Chaung, starting from the northern edge of the Tuyin range (150 m contour level), passes through the southern part of the Bagan plain and flows into the river at Myinkaba village. Along its way towards the river, some historic ponds/lakes are noted as they join for access of water: Alanpagan Kan, Zeyathut Kan (Pwasaw E.), Thuhte Kan, Tamani Kan and Myinkaba-inn.

Between Shwe Chaung and Myinkaba Chaung, there are ancient historic lakes and ponds that receive water from their own catchment areas without connecting with these two streams. The contour lines slope down from the southeast to the northwest from 50 to 150 m across a 10 km distance. The historic Mya Kan is at 150-140 m, the Alan Pagan Kan at 130-120 m, the Ale Kan at 100 m, the Minnanthu Kan at 90 m, the Nyunletaphat Kan, Sulamani Kan and Shwenanyintaw Kan at 80 m. The lowest level for water storage maybe the moat of walled Bagan is at 60-70 m.
Types of Water Management Features

The hydraulic works of ancient Bagan were primarily reservoirs and tanks made for daily use throughout the year rather than for seasonal agriculture. Water was received from the streams and sloping ground surface, sometimes trapped by an embankment of a dam. Selecting the site for a tank was crucial in Bagan as the surface soils were mostly deposited sand and silt. The underlying bedrocks are (i) sandstone, (ii) red earth and (iii) mud and silt. Sandstone is mainly seen at the foot and valley of the Tuyin range. Red earth is widely dispersed on the Bagan plain and the mud and silt(sometimes underlying with the primitive tuff) soils offer favourable locations for water management features. In the northwest part of the Tuyin range and on the historic Bagan plain, patches of mud blanketed soil are intermittently found, which is thought to be a result of Pleistocene aeolian action. These patches are at times an existing ancient tank or reservoir resistant to soaking. The mud and silt floors are easily spotted, providing good spots for renovating old features or building new ones. Examples of this soil type are seen at Alan Pagan, Alekan, a group of tanks at the Sulamani Temple area and the reservoir west of Thahtaykan Village.

Manmade water tanks connect points along the streams of the historic Bagan plain as they flow towards the river. The diverted channels from the streams to the tanks are at times visible as cart-tracks and pathways:

- Two small streams from the Nget Pyit Taung area west of the airport were captured as storage tanks at their ends. Today, urban growth is overwhelming the water storage areas of Nget Pyit Taung and Nyaung U. Yet during the 18th-century reign of King Alaunghphaya, a royal order on inscribed stone designated the area as a sanctuary.

- Shwe Chaung served as the main stream in the eastern part of the Bagan historic plain by filling water to the tanks of Zeyathut Kan (Kunsinkye Village), Hpyaukseik Pin Village Kan and others upstream. Before it joined the river, the water was diverted into the Wetkyi-in Village lakes.

- Similarly the whole Myinkaba Chaung, along with two main upstream tanks of West Pwasaw Village –Thahtay Kan and Kusinayon Kan–was finally captured by the manmade reservoir of Myinkaba in between the village of Myinkaba and Ayeyarwaddy River.

Apart from these two main streams of Shwe Chaung and Myinkaba Chaung, the area between them provides crucial elements of the hydraulic works of the Bagan plain without any distinguishing natural streams. This area can be bounded within 25-45 degree line from the Mya Kan to the northwest as a fan shape. Local people and archaeologists point out the drainage system in this area from Mya Kan when it was overfilled by the Naletaw Chaung (personal discussions with U Aung Kyaing, former Deputy Director General of Dept. of Archaeology and U Aung Soe, Asst. Director, a native of Bagan). Then the water drains and channels continue northwest flowing throughout Alanpagan, Alekan, Minnanthu Kan, Nyunlet-taphet Kan, Ywahaung-gyi Kan and finally to the moat of the walled city. This is how the moat and the storage tanks of monastery complexes of historic Bagan received water during heavy rain, but natural and manmade changes from the historic period to the present need further research.

Changing conditions and water feature types

*Changed water conditions include:*

1. Changes in upstream tributaries are seen in Alan Pagan. The upper courses of both the Shwe Chaung and Myinkaba Chaung originally flowed laterally into it but have stopped for centuries due to the lack of maintenance after the 13th-century CE decline of historic Bagan.
2. An inlet to the moat identifiable on satellite pictures and ground features was once the most important channel running from the lake of Shwenanyintaw Monastery complex to the southeast corner of the moat.

3. The later shifting of the drainage channels to the historic Bagan moat is suggested as seen from the west of Sulamani to north of Ananda Temple due to the development of monastic buildings or new drainage introduced within the area when the Sulamani was constructed.

Our preliminary survey noted 23 water features comprising lakes, tanks and reservoirs in the inner historic area. There were 6 large, 11 medium and 6 small features. Large features do not belong to a village or monastery complex, but medium-sized ones link to villages and communities. The smaller features and some medium ones are connected to temples and monasteries. We defined seven types of features: (i) large reservoir with an irregular embankment, (ii) tank with front filter-tank, (iii) In-kan, (iv) brick tank, (v) ritual tank, (vi) channel, drainage, canal, moat and (vii) others.

Large reservoirs are fewer in number and easy to recognize: Mya Kan, Alanpagan, Alekan, Nyunlataphet-kan, West Sulamani-kan and other two uncertain features around Sulamani; Suvannabhumi and West Dam of Thahtaykan Village. Suvannabhumi Dam has not been explored yet, but its location along the western foot of the Tuyin Hill range has been ascribed in traditional maps of land ownership, and the dam on the west of Thahtaykan Village needs to be confirmed (U AungKyaing, pers.comm.). Stone reinforcements are seen on the embankment of MyaKan, Alampagan and Alekan. These large reservoirs are provisionally assigned to the early phase of Bagan water management based on their sizes, the irregular character of dammed embankment and similarity to the reservoirs of Pyu areas.

Front filter-tanks are common in Bagan and its environs because of the heavy and quick flowing rainwater which carries a high percentage of silt and organic materials. Hence, the diverted channel from the stream firstly flows into the filter tank and after some time, the silted water goes up and drains to the main tank along the sluice channelling made up of stone or brick. This type is illustrated by Minnanthu Kan, attributed to the general and minister of Min Anandathu in 1223 CE. The main lake of the storage tank was constructed with a brick step-way to facilitate water carrying. The water inlet from the eastern filter tank was connected by a stone pipe and trough at a high level after the silted water rose up. The filter tank area is generally five or six times larger than the main tank. The stone inscription of Lay Myet Hna XX describes the garden that grew around the lake. Similar tanks are seen in the East and West Pwasaw Kan, Thahtay Kan and Phyaukseik Pin Kan.

The word “In” in Myanmar designates a lake-like depression retaining water adjacent to the river. During dry months, the water decreases and exposes the surface land, where the late rice (muyin-saba) and crops are grown. This is called “In-mye” or “land of the lake”. On stone inscriptions in the historic Bagan period, some categories of In-mye are included in the list of donated lands. Such types of water storage areas are found in two places in Bagan: Wetkyi-in and Myinkaba-in. Today these storage lakes are by-ways of water resources from the river and upland stream. But in the Myinkaba-in, for example, the local farmers always pump out the remaining water after a flood, thus exposing land for cultivation.

Brick tanks are found within the monastery complex for drinking water or bathing. The brick tank walls were stepped-in giving a wider mouth and narrower base. Their sizes range from 5 to 50 m wide and 2 to 4 m deep. In the Hsinbyushin monastic complex, the tanks were connected with brick channels to filter tanks for filling.

Ritual tanks are constructed as brick tanks, but are slightly different in their size and function. Their size is small and usually on the floor or yard of the temple or monastery. They may have received
water within the open space of the temple or monastery yard rather than from the outside. They are used to clean statues, watering plants and other monastic purposes. In the Bagan period, there would have been many more, but today, we have seen them only in the Ananda and Shwezigon pagoda compounds and the Laymyethna and Hsinbyushin monasteries.

**Drainage channels, canals and moats** of the Bagan period have deteriorated. The eastern parts of the moats were re-excavated in the 1990s but the drainage to the moats did not work properly. However, when there is heavy rain in Bagan, the inner network of channels, reservoirs and tanks have water. In historic Bagan, the channel from the north of Sulamani and Ananda served as the main water inlet to the moat. Additional drainage channels are paths and cart tracks that can become like small natural streams during rainy times. The manmade features are clearest at the outlet and inlet of tanks and reservoirs. Canals linking to reservoirs as ancient hydraulic works are hard to find, but modern works exist at river pump irrigation places. During the rains, local farmers traditionally are quick to dig out channels to access water from the small catchment area and drains.

**Sources of well and tank water:** Water was sourced in different ways for wells and tanks. A late Bagan period brick well in the compound of Hsinbyushin monastery is 23 m deep but has dried up. Another notable water tank is on Thetsoe Taung, just south of Tuyin Taung. This was originally a sandstone quarry producing architectural bits, stone slab and statues for Bagan temples. By gradually digging on the same spot due to the thick sandstone formation, the quarry became like a water tank below surface level. When the quarrying ceased, steps were carved into the side along with large reliefs of fish, turtle, bird and a labyrinth that recalls mazes depicted in the mural paintings of Bagan temples.

**Stone inscriptions on water management**

The early villages of Bagan mainly depended on the Ayeyarwaddy River and the lower reaches of seasonal streams. For instance, the villages of Nyaung U, Nagakyit (Wetkyi In), Nagabo (Taungbi), Anuradha (Myinkaba) and Thiripicsara (Thiripyitsaya) had easy access to water resources from the river and dry or seasonal streams. One of the most renowned kings of Bagan, Kyansitha (SritriBhuvana-ditraDhamma-raja), erected many royal edicts inscribed on stones narrating his lineage and his care for the welfare of his people identified in the Bagan area or tributary areas such as Pyay (Sri Ksetra), Bago (Ussa) and Thaton (Suvannabhumi) in Lower Myanmar. Among his edicts are two stones inscribed in Mon language of the Mya Kan and Alan Pagan reservoirs located southeast of historic Bagan. These two stones are now kept and displayed in Bagan Museum. These are noted as among the earliest written records of Bagan and notably with the date of 1630 Buddhist Era (1086 CE), and include writings about water management:

…may obtain happiness, bliss, plenty, be free from famine of tillage - in every place that lacks water or arable land, lacks strenuous cultivation, our lord the king of the law dams the water, digs a tank and thus creates arable land and strenuous cultivation...the king had dug this tank, he gave it the name of Mahanirbban Lak Chuy Khi Riy (Mya Kan stone inscription) and Mahanirbbanalanbagali (Alanpaganstone inscription) (Duroiselle 1960).

Subsequently, the Myanmar-language stone inscription of the couple Maha Senapati Anandathura (585 Myanmar Era or 1223 CE) is also about the digging of a water tank for the welfare of the sangha and layman (U Nyein Maung 1972). The tank is still useful and visible inside the Lemyathna monastery complex, Minnanthu Village, Bagan. The inscription records also lay out the arrangement of water inlet, ensuring the stone pipe and trough were well made and the garden set up near the tank. Another stone inscription (dated 1265 CE) recorded that the donor, Ami Pwasao, the aunt of King Narathiha Pati, made
the monastery tank and well for the convenience of the monks who were living in the residence or visiting from outside (U Nyein Maung 1982). This monastery is known today as Sutaungpyi, located near West Pwasaw Village. The next stone inscription dated 1276 CE is particularly interesting as it details the water supply for the monastery of Tuyin Pahto Kyaung, northeast of Minnanthu Village. Here the donor of the monastery, Princess Asao Pa, listed 100 slaves as water suppliers with other land slaves and monastic workers dedicated to the sangha (U Nyein Maung 1983).

Discussion

We have attempted an overview of Bagan’s water management with a discussion of the geographical setting, settlement pattern, the natural streams and manmade features. The early stages of water management were:

(i) Village and community use for sustenance such as drinking water for man and domestic animals. This can be seen today in some villages and ponds in the Bagan area and other parts of Upper Myanmar where villages were the nucleus of water resources with dry crop cultivation in the environs;

(ii) Enlargement of reservoirs managed centrally by the court with a probable chiefdom-level social organization in local villages beyond the reservoirs. Some scholars attribute this change at Bagan to influence via the Yin and Yanpe Rivers, south of Mount Popa leading to the Pyu period city of Beikthano (Stargardt 1990), and;

(iii) The renowned purification of Buddhism and irrigation features in the rice-growing regions by 11th- and 12th-century CE Bagan King Anawrahta (Ledwin Kharuins or rice growing districts). Bagan gradually developed a system of taxing the surplus of these regions. There were also an increasing number of religious monuments and monasteries built in the urban area. This supported water management innovations for the monasteries and in supplying water to the moat to mark its urban status.

The earliest known stone inscription of King Kyansittha recording a reservoir noted above underlines the growth of Bagan during the last decade of the 11th century CE. Another example is Min Anandathu’s stone inscription recording the water management features to support the resident monks of a monastery complex.

In addition to the manmade water management features, we consider the multiple uses of the Ayeyarwaddy River to historic Bagan. These included drinking water, aquatic foodstuffs, agriculture, transportation, communication and other social and economic purposes. The Bagan Empire can be seen from the perspective of the river as the story of an industrious people who lived midway on the river and who later overwhelmed numerous territories up and down stream.

Conclusion

Our first field investigation of Bagan water management features recorded over 50 lakes and reservoirs – with others remaining to be listed – in the historic Bagan plain and its vicinity. The natural setting played an important influence on the making of the cultural landscape but water management was the prevailing factor in the sustenance. Our conjectural hydraulic chronology spans the early village settlements and later development of villages, monasteries and moat of the possible inner court zone. We have not discussed the demise or attempted more than a general sequence given the absence of scientific studies including soil tests, analytical description of the deposits laid down in artificial lakes and canals,
test pit or auger profiles of stratigraphy, geophysical survey, full excavations and other detailed studies. The appropriate scientific research and mapping for the sampling can enhance interpretation and presentation of Bagan (Coningham 2015).

The long traditions of Bagan water management has regional characteristics including intangible beliefs and practices that continue till today in Bagan village communities. Nat shrines (spirit houses) are attached to the lakes, with some lakes having their own legends and some having been constantly renovated by communities even when the villages stopped using its water since the introduction of modern river pumps and tube-wells. Bagan farmers of today are still taking care of water resources, drainage and catchment areas for their cultivated fields. This traditional manner has helped to ensure the survival of water features in the village areas. Most of the Bagan monasteries were abandoned with ruins in brick heaps; among them a few monasteries are living with the old tanks and lakes. But the most original water management features have disappeared resulting from diversion of water courses; long-term neglect; construction of modern infrastructures such as new roads; urban extension; land use transformation; lack of conservation and a failure to document changes. In this regard, we present this preliminary work to begin to manually record observations and develop a hypothesized chronology of the types of water management features of the Bagan plain to test against future research.

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<th>NRSP</th>
<th>NISP</th>
<th>Identification ratio</th>
<th>Taxonomic ranks</th>
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Table 14.2  Animal bone counts from the Hoabinhian layers in Ban Tha Si.

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Table 14.4  Animal bone counts from Hoabinhian layers in Laang Spean.
Fig. 15.1  Back side of the flat gong with the pitch g. Source: Gretel Schwoerer-Kohl
Fig. 16.1 Location of the Kabaw and Kale Valleys. Source: Bob Hudson

Fig. 16.2 Fortified villages (shown in italic) and major towns. Source: Bob Hudson
Fig. 16.3  A headless Bagan-style “fat monk” image found near Kalaymyo. Source: Bob Hudson

Fig. 16.4  Plan of the Yazagyo fortifications. Source: Bob Hudson
Fig. 16.5  Earth embankment and ditch at Yazagyo. Source: Bob Hudson

Fig. 16.6  The natural river escarpment at Yazagyo which formed one side of the defences. Source: Bob Hudson
Fig. 16.7  Plan of the Khampat fortifications. Source: Bob Hudson

Fig. 16.8  Plan of the Myothit fortifications. Source: Bob Hudson
Fig. 17.1  Locations mentioned in text. Source: Hunter I Watson
Fig. 17.3  All six of these photos were taken by Hunter Watson: Pic.1, Pic.2, Pic.4 and Pic.5 at the Somdet Phra Narai National Museum, Lop Buri Province; Pic.3 at Wat Nong Kradon Temple, Nakhon Sawan Province; Pic.6 at the Prachin Buri National Museum.
Pic.7 (TC.07) Pic.8 (TC.08) Pic.9 (TC.09)

Pic.10 (TC.10) Pic.11 (TC.11) Pic.12 (TC.12)

Fig. 17.3  Pic.7 and Pic.8 were taken by Hunter Watson at the Bangkok National Museum. Pic.09 and Pic.10 were taken by the Bangkok National Museum. Pic.11 and Pic.12 were taken by Hunter Watson at the home of a private collector in Nakhon Sawan Province.
Pic.13 (TC.13)  Pic.14 (TC.14)  Pic.15 (TC.15)  Pic.16 (TC.16)  Pic.17 (305/2519)  Pic.18 (DV.1/1)

Fig. 17.3  Pic.13 and Pic.14 were taken by Cudamas Bradshaw at Wat Koh Hong Temple, Nakhon Sawan. Pic.15 and Pic.16 were taken by Hunter Watson at Satri Nakhon Sawan School. TC.15 is in a display case in the school museum, and TC.16 is a printed photograph on the wall of the school museum. The photo Pic.17 was taken by Hunter Watson at the Nakhon Pathom National Museum. Pic.18 was taken by the Bangkok National Museum.
Fig. 17.3 All six of these photos were taken by Hunter Watson: Pic.19 at the Bangkok National Museum, and Pic.20 and Pic.21 at the home of a private collector in Nakhon Sawan Province. Pic.22 is a picture of an ink rubbing held in the collection of the Department of Oriental Languages, Faculty of Archaeology, Silpakorn University. Pic.23 was taken at the Nakhon Pathom National Museum, and Pic. 24 was taken at the Somdet Phra Narai National Museum, Lop Buri Province.
| TC.1 | Ex.1 | || | Ex.2 | || |
| TC.2 | Ex.3 | ⬷ || | Ex.4 | ~ |
| TC.3 | Ex.5 | ⬷ || | Ex.6 | ~ |
| TC.4 | Ex.7 | || | Ex.8 | : |
| TC.5 | Ex.9 | ⬷ || |
| TC.6 | Ex.10 | || | Ex.11, TC.7 | || |
| TC.7 | Ex.12 | : ~ | Ex.13 | ~ |
| TC.8 | Ex.14 | : || | Ex.15 | ~ |
| DV 1/1 | Ex.16 | ⬷ || | Ex.17 | || ~ |
| NP.2 | Ex.18 | ⬷ || | Ex.19 | ( || ) ~ |
| LB.23 | Ex.20 | || | Ex.21 | || |
| NS.3 | Ex.22 | bha || (or) ⬷ || | Ex.23 | : || (or) || |

Fig. 17.4: Examples from inscriptions (continued)
| TC.1 | Ex.24 | Ex.25 |
| TC.3 | Ex.26 | Ex.27 |
| TC.5 | Ex.28 | Ex.29 |
| TC.7 | Ex.30 | Ex.31 |
| TC.8 | Ex.32 | Ex.33 |

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Fig. 17.4  Examples 1-33 are cut from images taken by Hunter Watson, who modified some images in Photoshop to make them more visible. Examples 34-37 are from Bhattacharya (2000: 139), corresponding with Fig.9.9, 9.10, 9.11 and 9.12, respectively (Ibid.).
Fig. 18.1  Map of NAG, the locality and site plan showing the excavation units. Source: Author and Lim 2017

Fig. 18.2  Flow chart highlighting attribute no. 3: decorations.
Fig. 18.3  Flow chart highlighting attribute no. 4: motifs produced by single technique.

Fig. 18.4  Flow chart highlighting attribute no. 4: motifs produced by multiple techniques.
Fig. 18.5  Typology flow chart (excluding motifs).

Fig. 18.6  Pie chart showing the proportion of surface treatments (attribute no. 1).
Fig. 18.7 Pie chart showing the proportion of operational actions (attribute no. 2).

Fig. 18.8 Pie chart showing the proportion of decorations (attribute no. 3)
A Comparison of decorative motifs between NAG earthenware, and various Southeast Asian artefacts.
**Singapore: Regional Commitment**

“Since its 2011 inception, the Archaeology Unit (AU) at the ISEAS – Yusof Ishak Institute, Nalanda–Sriwijaya Centre, Singapore (ISEAS NSC) has conducted: research, capacity building, partnership enhancement and international field schools in support of Southeast Asian archaeology and related endeavours...”

- **Field Schools**: Open to all EAS country members (90% EAS representation; 4 sessions since 2012)
- **Summer Program**: Art History & Conservation, Indonesia (Trawas), JUL 2016
- **Heritage Workshop**: MAR 2016
- **NSC Highlights (newsletter)**: Launched 2016
- **NSC Archaeological Report Series**: Launched 2015
- **NSC Working Paper Series**: Launched 2010

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**Fig. 19.1** Summary of main NSC regional commitment initiatives. Source: D Kyle Latinis

**Fig. 19.2** Pictorial flow chart of NSC Field School. Source: D Kyle Latinis
Fig. 19.3  Sema stone excavations at the Peam Kre and Don Meas sites, Phnom Kulen, Cambodia. Examples of sema stones are depicted in the upper images. Site locations are depicted in the lower image showing a Google Earth map with a LIDAR overlay of the Banteay site. Sema stones are Buddhist boundary markers demarcating sacred and protected space – such as would be found around an ubosot. The sema stone sites were first recorded by Boulbet and Dagens (1973) and subsequently studied by Murphy (2010) in relation to Dvaravati connections and Buddhism. The project addresses settlement, urbanization, ecology, industry and networks at Phnom Kulen during the 8th-9th centuries. The Banteay site is thought to be Jayavarman II’s palace. Jayavarman II established the Angkorian empire in 802. He may have supported the Dvaravati Buddhist communities to maintain alliances with polities in the Khorat Plateau (important value-chain partners for trade in commodities such as salt). Despite a Saivite Hindu dominance among the elite rulers, supporting Buddhist communities may have been essential for balancing a needed religious diversity in the kingdom. Source: LIDAR - KALC; photo images: D Kyle Latinis
Banteay site landscape modification analysis. Excavations in 2014 revealed brick walkways, staircases and large post-holes carved in the brick pavement. The post holes are indicative of wooden superstructures throughout the site. Excavations also revealed structural information on terrace engineering with the uppermost smaller terraces and platforms being more formally constructed. These indicators coupled with the LIDAR data support a “palace compound” interpretation of the site. A cursory labour analysis of landscape modification indicates the site could have been built in only a few years by a comparatively small but dedicated and specialized labour force. Notwithstanding, the scale of the site as well as the needed labour, planning, expertise and management capacity would have been impressive at that time. Source: KALC, D Kyle Latinis; Latinis and Ea 2015

Peam Kre and Don Meas pottery analysis. The pottery is mostly pre-Angkorian. It suggests the site may date to the late Funan or Chenla periods before the 9th century. Interestingly, no 9th-10th century Khmer green glazed ceramics were recovered from excavations at the sema stone sites or the Banteay site despite a massive green glazed kiln industry in the immediate vicinity (Anlong Thom). The palace and sema stone sites are thought to be short-lived phenomena; perhaps established in the late 8th to early 9th centuries when Jayavarman II began his reign in 802 and initiated the devaraja cult. The sites may have become defunct after Jayavarman II’s demise. Interestingly, the palace area at Koh Ker may have witnessed a narrow time span of use as well, unlike the long-term site use in nearby urban settlement and activity sectors. Source: D Kyle Latinis
Fig. 19.6  DStretch analysis examples at Kanam with summary statistics of animal representations. There was a prominent elephant capture, training and trade industry among ethnic minority groups in the area prior to the Khmer Rouge period (Elul 1983; Latinis 2016). Investment into rock art may relate to the dangers and importance of elephant capture and training among local specialists. The age of the site is unknown to local residents who still perform rituals at the location. The site likely dates to the 15th-17th centuries – contemporaneous with Cardamom jar burial sites located in similar contexts (Beavan et al. 2015). Paintings and activities may also reflect a response to overexploitation, habitat loss and decimated populations correlating with the massive 15th-17th deerskin export to Japan (Laver 2012). However, dates could extend to the Angkor or earlier periods (see Trautmann 2015 for an overview on elephant use history in Asia). DStretch (Tan 2014) facilitates a more robust and accurate analysis. I wish to explicitly thank Dr Noel Hidalgo Tan for suggesting and introducing the use of DStretch. I also thank Dr Jon Harmon who provided software and advice. Source: D Kyle Latinis; Latinis 2016

Fig. 19.7  Excavations at Koh Ker Sites. Source: KALC; D Kyle Latinis
Fig. 19.8 Oven feature from KK2, units Q51 and R51. The image above is a southeast view after feature removal. The adjacent multiple sandstone slab alignment is visible in south profile. The multiple stone slab feature depicted here is different from single slabs that may have served as post supports mentioned in the text for other units at KK1 and KK2. Remnant ash layers are visible in south and east profiles. The curvature of upper floor to the right highlights the outer perimeter and concavity of the feature. The lower image is a south view after cooking vessels were removed. Numerous small holes are still visible. These may represent wooden cooking supports, drying/smoking racks, vents, vacuoles related to cooking (e.g. bamboo tubes), bioturbation, etc. There are large mammal bones visible at the bottom right in the darker ash section. The sandstone slab alignment is visible in the south facing to the right. Source: D Kyle Latinis
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Fig. 20.4  Mask, gold or bronze, Phu Chanh site, Binh Duong. Source: Le Thi Lien
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Fig. 20.6  Potsherds, chance finds from Hon Dat Mount (Kien Giang). Source: Le Thi Lien
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Fig. 22.2 One of the 19 furnaces near Chaungphar Alei and Thanbo villages and some slag samples. Source: Ni Ni Khet
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Fig. 23.8  Phu Luong inscription, 10th century. Source: Nguyen Van Quang
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Fig. 23.10  Chinese ceramics, 9th-13th centuries. Source: Nishimura Masanari
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Fig. 25.2 Panoramic photo taken at the site in July 2015 shows that the landscape of the site is badly disturbed. The major panels of the rock art can be seen on the central and right sections of the cliff face where it is impossible to access without scaffold. Source: Chaw Yeh Saw

Fig. 25.3 Respondents’ knowledge about Gua Tambun.
Fig. 25.4  Panel I. Source: Chaw Yeh Saw

Fig. 25.5  Panel II. Source: Chaw Yeh Saw

Fig. 25.6  Panel III. Source: Chaw Yeh Saw
Fig. 25.7  Panel IV. Source: Chaw Yeh Saw

Fig. 25.8  Panel V. Source: Chaw Yeh Saw
List of the Nguyên Lords capitals from the sixteenth to the eighteenth century:

**In Quang Tri Province:**
- Ai Tu (1558-1570)
- Tra Bat (1570-1600)
- Dinh Cat / Cat Dinh (1600-1626)

**In Thua Thiên - Hue Province:**
- Phuoc Yen (1626-1636)
- Kim Long (1636-1687)
- Phu Xuan (1687-1712)
- Bac Vong (1712-1738)
- Phu Xuan (1738-1775)
Fig. 26.3 Map of Hong Duc. 1490. Part of Thuan-Hoa Thua Tuyen map, covering the provinces of Thua Thiên - Hue and Quang Tri. Source: Hong Duc Ban Do 1962: 46 & 48.

Apparently, the rivers are taken as district borders, and thus, I choose\textsuperscript{17} to be concerned by the ‘Phu Trieu-phong’, and his 6 huyện, that is Vu Xương huyện, Hai Lang huyện, Kim Trà huyện, Dan Điện huyện, Tu Vinh huyện and Dien Ban huyện.

In red: modern provinces
Translations:
\begin{itemize}
  \item \textit{Phu} province, prefecture
  \item \textit{Huyện} district, sub-prefecture
  \item \textit{Môn} mouth, estuary
  \item \textit{Hai} gulf
\end{itemize}

\textsuperscript{17}Even if “Minh-linh district” belongs today to Quang Tri province, obviously in the previous subdivision, it was thought as a part of the northern province, the “Phu Tien-binh” or Quang Binh province today. The ancient border seems to have been the Ben Hai River – and the Minh Linh mouth (today cua Tung).
Fig. 26.4 Comparison between three maps dating back to the early, middle and late 17th century. Sources: Map 1 after Dumoutier 1896: XVI, XVII & XVIII; Map 2 after Hong Duc Ban Do 1962: 90-93; Map 3 after Hong Duc Ban Do 1962: 142-147.

- Existence of an ancient channel, which disappears in the 17th century
- Location of the citadels that serve as landmarks
- Formation of coastal lagoons in the 17th century and of a new opening to the sea

Written comparisons between the documents:
A/the river mouths

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B/the provincial districts

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18 This name for the Tu Hien pass can be seen on the Dong Khanh map Thua Thiên. Huyen Huong Thuy và huyen Phu Lộc.
Fig. 26.5  Demise of the Thuan An channel at the mouth of the Hue River. Comparison between an 1883 French map showing the fortifications built in 1882 by Emperor Tu Duc and aerial photos taken in 1952 and 1953 showing the closing of the Thuan An channel and the replacement by the Thai Duong Ha channel. Source: Institut géographique National, France, and map by courtesy of Archives Nationales d’Outre-Mer at Aix-en-Provence, detail of FRANOM Asie 106_01)
Fig. 26.6  Graph of the trade route between the highlands and the Cham repositories. Positioning of the sites in the Cam Lo Valley. Source: Institut Géographique National, maps 1:100,000 Nr 119 East, and Google view with GPS points.

Fig. 26.7  Comparison between an early 20th-century map and a satellite picture taken in the early 21st century, performed in an attempt to produce a theoretical map of the ancient waterways that used to flow around an ancient Cham citadel at Than Chau, Quang Tri province. Source: Institut Géographique National, maps 1:25,000 Nr 23 West_1908, and Google view.
Fig. 27.1  Ceramic shards scattering on the shore of Cong Cai during the 2014 preliminary survey. Source: Mark Staniforth

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Fig. 27.8  Two iron nails were also cleaned and conserved by HAD. Source: Bob Sheppard
Fig. 28.1  Map of rock painting sites in Pratu Pha Valley. Source: The Thai-French Paleosurvey

Fig. 28.2  Pratu Pha rock painting site: a) The outline figure of group persons and bulls; b) figure of peacock; c) figure of serow; and d), e) and f) figures of hand. Source: The Thai-French Paleosurvey
Fig. 28.3  

Fig. 28.4  
Ban Tha Si rock painting site: a) Sun Bear image; b) and c) hands; and d) and e) elephants. Source: The Thai-French Paleosurvey
Fig. 28.5  Doi Pha Kan rock painting site: a) chicken figure; b) dog figure; c) elephant; d) outline figure of persons; and e) persons with cows. Source: The Thai-French Paleosurvey

Fig. 28.6  Doi Pha Kan site: a) drop of colour on the back of a cattle; b) anthropomorphic glyph showing the use of a brush; and c) hand with a weapon. Source: The Thai-French Paleosurvey

Fig. 28.7  Location of rock painting sites: a) Pratu Pha site; b) Ban Tha Si site; c) Doi Pha Kan site; and d) and e) Doi Pha Kan mountain range. Source: The Thai-French Paleosurvey
Fig. 29.1  Map of the Mekong delta showing the distribution of canals and major sites of the Funan civilization. Source: Higham 2002

Fig. 29.2  Morpho-sedimentary map of Mekong river delta. Red oval indicating abandoned channel and inlet. Source: Ta et al. 2002
Fig. 29.3  Coastal change around the Cape of Ca Mau, indicating Map A: 6000-5000 BP; Map B: 4500 BP; Map C: 4000-3000 BP and Map D: 3000-2000 BP. Source: Nguyen et al. 2000

Fig. 29.4 A map of the Nen Chua archaeological site. Source: Le Xuan Diem et al., 1995.
Fig. 29.5   Photograph showing an engraving of boat on a rock at Nen Chua. Source: Le Thi Lien

Fig. 29.6   Map indicating historical canals in Funan. Source: Pierre-Yves Manguin and H. David, personal communication.
Fig. 29.7  Combined map overlays by Ta et al. (2002) and Manguin and David. The red circle indicates the location of Nen Chua falling within the inlet.

Fig. 30.1  Map of mainland Southeast Asia showing the following archaeological sites: Ban Chiang (BC), Non Nok Tha (NN), Non Muang Kao (NMK), Noen U-Loke (NUL), Ban Non Wat (BNW), Ban Na Di (BND), Non Ban Jak (NBJ), Muang Sema (MS), Phum Sophy (PSo), Phum Snay (PSn), Vat Komnou (VK). Source: Charles Higham
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