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公益財団法人 Cultural Heritage Protection Cooperation Office, Asia-Pacific Cultural Centre for UNESCO (ACCU) ユネスコ・アジア文化センター文化遺産保護協力事務所

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ACCU Nara International Correspondent

The ACCU correspondents periodically send reports on cultural heritage protection activities in which they have been recently involved. This is a collection of fifteen reports submitted by international correspondents in the Asia-Pacific region.

The Seventeenth Regular Report

Contents

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India Cibanten River Expedition Dewi Puspito Rini Exterior Restoration of the Chhatrapati Shivaji Maharaj Vastu Sangrahalaya Munbai, India Kunkuma Devi Kishore Risk Mapping and Monitoring of Ancient Monuments in the Southern Region of Cambodia Vitharong Chan Cambodia Restoration of Wangditse Lhakhang Especial Type of Ancient Pottery — Northern Black Polished Ware (NBPW) — Obtained from Mahasthangarh (Ancient Pundranagara) Archaeological Site and Its Chronological Study Mst. Naheed Sultana Bangladesh Indonesia Phuntsho Wangmo Bhutan 20 5 s Ś

Malaysia -

A Ghafar Bin Ahmad Shah Alam, Selangor, Malaysia Restoration and Relocation of Rumah Bugis Traditional Timber House from Kuala Selangor to

Maldives

30

23

Shiura Jaufar An Archaeological Research on the Islamic Period of the Maldive Islands Cowrie—an Early Global Commodity:

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757 Horen-cho, Nara 630-8113 Japan Cultural Heritage Protection Cooperation Office, URL: http://www.nara.accu.or.jp E-mail: nara@accu.or.jp Fax: +81-742-20-5701 Tel:+81-742-20-5001 Asia-Pacific Cultural Centre for UNESCO (ACCU)

Published by

Mongolia Munkhtulga Rinchinkhorol	- 32
Protection of Cultural Heritage in Urban Areas in Mongolia: The Tonyukuk Complex	
Nepal	- 39
Suresh Suras Shrestha Post Earthquake Conservation, Reconstruction and Rehabilitation in Nepal: Current Status	
New Zealand	- 44
Matthew Schmidt Heritage on the Move: The preservation of William Gilbert Rees ca. 1864 Meat Shed	
Pakistan —	- 50
Tahir Saeed	
A Recent Study of the Individual Buddha Stone Sculptures from Gandhara, Pakistan	
Philippines —	- 56
Louella Solmerano Revilla Restaurtion of the Domen Cothelia Manile Matroneliten Cothedral Decilies	
Restoration of the Roman Catholic Manila Metropolitan Cathedral-Basilica	
Sri Lanka —	- 62
D.A. Rasika Dissanayaka Nee bigge and Atuwa: Earthen Structures for Storing Cranen, in Angient Sri Lanka	
vee bissa and Aluwa. Earthen Structures for Storing Granary in Ancient Sh Lanka	
Uzbekistan —	- 66
Akmal Ulmasov Proliminary Results of Auchaeolagical Researches in the Koustens Ruddhist Conton (in 2014-2015)	
Preliminary Results of Archaeological Researches in the Karatepa Buddhist Center (in 2014-2015)	
Vanuatu —	- 70
Richard Shing	
identifying Potential Archaeological Sites on a Polynesian Outlier –	

Preliminary Archaeological Survey on Futuna

Bangladesh



Especial Type of Ancient Pottery — Northern Black Polished Ware (NBPW) — Obtained from Mahasthangarh (Ancient Pundranagara) Archaeological Site and Its Chronological Study

Mst. Naheed Sultana, *Regional Director* Department of Archaeology, Ministry of Cultural Affairs, People's Republic of Bangladesh

Introduction: Clay or mud is a very ordinary thing, and is simply a covering of earth. This earth has been used for different works since 10,000 years ago (Singh 1979:1). For our existence in the world, in our daily work, in religious, cultural, and political works and royal orders, clay has been the greatest and most invaluable material. This is evident from the antiquities unveiled from excavations in different parts of the world. "Several thousand years ago this quality came to be recognized by man and delighted in making pottery. Thus a beginning of civilization came into being" (Singh 1979:13).

Flourishing of NBPW: The NBPW culture started in the Indian Subcontinent during the Iron Age (1700 BC to 230 BC). At the same time, two other special types of pottery cultures were also succeeding. The Painted Gray Ware (PGW) culture and Black and Red Ware (BR) culture thrived alongside the NBPW culture. The NBPW culture was prominent at the end of the Vedic era (700 BC) and it rose to the pinnacle of its glory in the 1st century B.C. At first, NBPW culture spread out in the great Mahajanapada or 16 districts of Northern India and subsequently proliferated throughout the entire Indian subcontinent. "The NBPW period witnessed the emergence of urbanization in the Ganga valley and existence of a strong central administration under the Mauryas, and the rise of Buddhism and Jainism. All these events were turning points for the subcontinent" (Rahman 2000:138).

Besides Black Polished Ware, some other varieties of NBPW have been found, such as grey, red, ochre, silver and gold colour with slip. And these wares are very exceptional or extraordinary quality NBPW, and were of the highest degree of technological excellence in the 6th century BC.

A number of specimens of NBPW have been discovered in the ancient archaeological sites in the Indian subcontinent. "Early discoveries of the NBPW were at Sharnath near Varanasi (Marshall in ASI-AR 1904-5:59), at Bhita near Allahabad (Marshall 1909:40), where it was described as Fine Black Lustrous and Lower Levels of Bhir mound, Taxilla (Marshall 1951:432), where it was regarded as Greek Black Ware. (Ghosh 1989:251)". R.E.M Wheeler and Krishna Deva published a report in 1946, and they christened these potteries as "Northern Black Polished Ware" (Ghosh 1989:251). They identified that the Ganga basin is the main centre of NBPW and mentioned the names of 18 archaeological sites, of which Tamluk, Bangarh and Chandrakatugarh were the most noteworthy.

The discovered NBP Wares from Mahasthangarh were vessels, large dishes, small dishes, cups, beakers, lipped basins, shallow dishes, and noteworthy pitchers. Some of them were featureless with an in-curved rim, and some had an externally thickened featureless rim, or an externally

thickened grooved rim. There was very fine fabric, with a grey and black core and well levigated. Both surfaces were very smooth, and were black slipped, red slipped and polished.

NBPW was not made or used in all regions in a certain era or at the same time. Actually this culture flourished and reached the pinnacle of its glory from the 7th to 1st centuries BC. For the first time, Northern Black Polished Ware has been found at Saranath and Bhita archaeological sites, dating from the Pre-Mauryan period (6th to 4th centuries BC). The NBPW culture spread continuously from the Upper Ganga to the Lower Ganga and gradually entered ancient Bengal and Bihar. It has been proved that the NBPW culture was widespread in the Indian subcontinent from Peshawar to the Swat District in Pakistan, Anuradhepura in Sri Lanka, Chebrolu, (Krishna district in India) in the south, Prabhas to Patna in Odisha in the west, Tildah and Tamluk in Midnapur in the east, Bangarh in the Dinajpur district, Chandrakatugarh in the 24 Pargana district, Mahasthangarh (Pundranagara) and Bhasu Bihar in the Bogra district, and Wari-Bataswar in the Narshindi district.

Naming of the site: The literal meaning of the word Mahasthan is "famous place." According to some, this place should be called Maha Snan or "famous bathing place." The old Pundranagara is now buried under Mahasthangarh. It is the ruins of the oldest provincial capital city of Bangladesh. It is known from the archaeological information that the location of this city emerged as a rich and resourceful place from the 4th century BC to the 15th century AD. The ruins of this old city on the west bank of the river Karatoa is a famous feature of today's Bogra district.

Location: This place is very important in terms of historical and archaeological value. It is situated on the west bank of the old 'Karatoa' river by the northern side of Bogra-Rangpur highway, 16 kilometers from Bogra district town. This fortified old city is 1524 meters long and 1371 meters wide, and 6.5 meters above the surrounding plain. The city was well-protected, being surrounded by a deep trench on the northern, southern and western sides and with the wide Karatoa river to the east.

Excavation at Mahasthangarh: Archaeological excavations started at Mahasthangarh fortified city in 1907 led by the District Engineer Mr. Nandi (Gazetteers 1910). In the first half of the 20th century, excavations were carried out irregularly. But excavations were continuing almost every year in the second half of the 20th century. Since the beginning of the 21st century, archaeological excavations have been continuing at Mahasthangarh fortified city.

At first, specimens of NBP Ware were found at Gobindavita



Map of Shibganj Upazilla

Map of Bogra District



Site plan of Mahasthangarh (Ancient Pundranagara) Fortified city

excavation very close to the fort city of Mahasthangarh in 1960 (Ahmed 1997), and by Mankalir Kunda in 1965-66 (Ahmed 1997). After that, NBPW was discovered at the Eastern Rampart area in the city of Mahasthangarh. A Bangladesh-France joint venture excavation started at the Eastern Rampart area into the fortified city in 1993 and this continued until 1999. A systematic research paper was published (1993-1999) about the unveiled ancient structures and antiquities from the site. The results of the excavations are 18 building levels discovered from the unveiled site. A number of NBPW items have been discovered from the lowest level (Building Level 1). The lowest depth was excavated at 15.82 m above sea level (1997) (Alam and Salles 2001:83).

Archaeological excavation started here at 23.80 m above sea level and deep sounding excavation was conducted up to the virgin soil. A total of 50 samples were collected for radiocarbon dating from the different layers excavated by both teams (Alam and Salles 2001). Level 1: NBPW was mainly found on Building Levels 1 and 1B (lowest layer) and these items had been created and used in the late 4th century BC. Level 2: Mostly NBPW with some Rouletted Ware and Red Polished Ware were found from Level 2. Level 3: Again mainly NBP Ware with some rouletted shards found on Building Level 3. Level 4: Only some NBPW obtained from Building Level 4. Level 5: Again mostly NBPW was found on Level 5 along with terracotta plaques, terracotta animal figurines, small objects, stone and glass beads, and a rock crystal ring (Alam and Salles 2001:159).

Among the 18 Building Levels, NBPW was discovered from Building Levels 1 to 5, with their time period being



Excavation at Mahasthangarh in 1993-1999



NBPW from Mahasthangarh excavation

late 4^{th} century BC to 1^{st} century BC. There was no NBPW found on Building Levels 6 to 18, which date to the 3^{rd} century BC to 18^{th} century AD. However, besides the NBP Ware, innumerable precious antiquities and potsherds were also retrieved from the excavated site.

After that, archaeological excavation was conducted in the Mazar area of Mahasthangarh (ancient Pundranagara), from 2000 to 2011 with an interruption between 2001 to 2003. A few NBPW items were retrieved from the excavation. It is true that neither team (Bangladeshi and French) did not conduct a deep sounding excavation in this area. For this reason, NBPW was not discovered here.

Again, both teams (Bangladeshi and French) have initiated

archaeological excavations close to the Bairagir Bhita site (inside the fortified city) since 2014 until now. Both teams have collected some NBP Ware from here with ancient brick structures and precious antiquities. The huge perforated terracotta tiles, Sunga terracotta plaques, and some beads prove that these NBPW items were used at the earliest occupation level. The same result comes from the 1993-1999 excavations which are well described in the "First interim report of Mahasthangarh" (Alam and Salles 2001).

Besides Mahasthangarh, NBPW specimens have been discovered in four different parts of Bangladesh: Sitakot Bihar (Archaeology 6:1969:4) (Buddhist Monastery site) in the Dinajpur district, Bhat Bhita (Buddhist Monastery site)



Recent excavation at Mahasthangarh

in the Magura district (excavation 2002-2004), and Bhasu Bihar site (Buddhist monastery site) near Mahasthangarh and Wari Bateswar in the Narsindi district. It is mentioned that the exact time period of discovered NBP Ware of Sitakot Bihar. "Discovery of Northern Black Polished Ware at the lower level of the western cell may eventually prove to be significant. After Mahasthan, this is the first site at which this type of ware generally associated with the Maurya and Sunga periods has been recorded" (Archaeology1969:4). At other sites, namely Bhasu Bihar and Wari Bateshwar, the NBPW is the same as Mahasthangarh NBPW.

Conclusion: In continuation of the development of human civilization, the role of NBPW was immeasurable in the Indian subcontinent. Although the NBPW culture arose in the northern part of India, this culture gradually spread throughout the entire Indian subcontinent. In continuation of the special type of NBPW Wares have been discovered from the earliest level of the Mahasthangarh (Ancient Pundranagara) excavation and some other sites in Bangladesh. This NBPW proves that the Great Mauryan

Emperors ruled over Bengal, and that Pundranagara was a rich provincial capital city from the 4th century BC to the 15th century AD.

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Bhutan



Restoration of Wangditse Lhakhang

Phuntsho Wangmo, Engineer

Division for Conservation of Heritage Sites, Department of Culture, Ministry of Home and Cultural Affairs

Background

Wangditse Lhakhang under Thimphu Dzongkhag is one of the most important heritage sites in Bhutan. It is said to have been built by the 9th Desi, Druk Rabgye, in the early 18th century. However, the Lhakhnag has suffered several areas of damage to the masonry walls, which worsened during the earthquake of September 2011.

Therefore, the renovation of Wangditse Lhakhang started in July 2011. During the renovation, an archaeological survey was carried out and it was discovered that there were some remains of the stone foundation southwest and northwest of the current existing external wall. The existence of a circumambulation room around the main shrine room was also discovered.

Reconstruction of external walls

As per the findings of the archaeological survey, construction of external walls on the southwest and northwest sides began. The existing southeast external wall was dismantled to be reconstructed, since the wall was in poor condition and unstable. Special stones ordered from Dawakha quarry under Paro Dzongkhag are being used for wall construction while granite stones from Sha Ngawang under Wangduephodrang are being used for corner stones.

Consolidation of walls

The old walls with cracks were consolidated by stitching and grouting as per the recommendation of conservation specialist David Michelmore. The areas where the walls were to be stitched were cut and cleaned thoroughly by removing loose mortar. The cut surface was wetted with sprinkled water, and mortar was laid over it. A stainless steel wire mesh was then placed above a layer of mortar and the new wall was constructed over it. The stitching was carried out at certain intervals. The grouting was carried out in order to fill up the voids that had developed inside the wall due to the crack and also to bind the inner and the outer leaf of the wall using an overhead tank and a 20 mm diameter flexible pipe. The grout was prepared on site by mixing local soil, lime and water in the ratio of 3:1:2.5 (3 parts of sieved soil: 1 part of lime: 2.5 parts of water). Holes 30 mm in diameter and 45 mm deep were drilled into the wall at certain intervals using a core drill. The grout was then injected into the holes.

Use of unripe green persimmon as a natural wood preservative

It has been challenging when it comes to preserving timber components, which deteriorate much faster than other historic building materials, timber being an organic material. While carrying out the renovation works, it was found that most of the timber components were not reusable. Timber inserted into the wall and unexposed to the air was found to have decayed, thus hampering the structural stability of the Lhakhang. Timber is also affected by relative humidity, causing it to expand and contract. Therefore, various interventions in historic timber structures have become necessary in order to preserve them.

Meanwhile, Her Majesty the Royal Mother advised us to use unripe green persimmon as a natural wood preservative, which is called "Kakishibu: Traditional Persimmon Dye of Japan". It is known that kakishibu has preservative and adhesive qualities. In Japan, kakishibu is used to reinforce paper, preserve wood and clarify sake. Following the Royal command, the project team collected unripe persimmon from Shelgana, Punakha on August 24, 2016. The very next day preparation of persimmon preservative liquid started following the proper kakishibu procedure. The persimmons were washed and their calyxes removed with the help of sharpened timber. Use of a knife was restricted. They were then put into a traditional mortar made from an oak tree and then pounded by a pestle which was also made of oak. The crushed persimmons were then put into a bucket and mixed thoroughly with distilled water, which was poured in until it reached the level of the persimmon pulp. Then the bucket was covered with a lid and additional cloth was used to cover it to make it airtight and prevent dust from entering. The mixture was thoroughly mixed twice a day. A week later, the fermented liquid was extracted from the mixture by filtration through a piece of cloth. The liquid was then applied to all the timber components.

Conclusion

The restoration of Wangditse Lhakhang is still in progress. Fabrication of all the timber components has been completed. Construction of the external walls has reached the first floor. Overall, 65% of the renovation works has been completed as of today. The project is planned to be completed by the end of 2018.



Fig.1 Front facade (East) of the Lhakhang before renovation



Fig.2 Plan showing existing wall, dismantled wall and stone foundation discovered after excavation



Fig.3 Surface being prepared for wall stitching



Fig.4 Wire mesh laid over the layer mortar



Fig.5 New wall constructed to stitch cracks on old wall



Fig.6 Red mark showing the location of drilled holes into which the grout was injected



Fig.7 Decayed timber components which were not exposed to the air



Fig.8 Reusable old timber members



Fig.9 Persimmon being crushed with traditional mortar and pestle made of oak



Fig.10 Crushed persimmon being mixed with distilled water



Fig.11 Applying fermented persimmon liquid to new timber components



Fig.12 The timber components being allowed to dry after application of the persimmon liquid

Cambodia



Risk Mapping and Monitoring of Ancient Monuments in the Southern Region of Cambodia

Vitharong Chan, Deputy Director

Department for Safeguarding and Preservation of Monuments, General Department of Cultural Heritage, Ministry of Culture and Fine Arts

The Ministry of Culture and Fine Arts will implement a risk mapping and monitoring project of ancient monuments in the southern region of Cambodia. This project is funded by the U.S. Ambassadors Fund for Cultural Preservation 2016. The signing agreement for this project between the Ministry and the U.S. Embassy in Cambodia was held on September 26, 2016 at Phnom Da, in front of Prasat Asram Moharusi. The project aims to contribute to the safeguarding of temples in the southern region. There are more than 2,238 temples in the southern part of Cambodia, but only 64 temples still remain standing. The 24 most important temples are the following:

No.	Site*	Province	Coordi	Coordinates	
1	Pr. Phnom Cheung Prei (group of monuments)	Kampong Cham	12° 3'46.66"N	104°59'23.43"E	
2	Wat Tang Kok	Kampong Cham	12° 8'5.54"N	104°56'24.00"E	
3	Pr. Kok Khvet	Kampong Cham	12° 6'16.61"N	104°56'58.30"E	
4	Pr. Preah Theat Tuk Chha (group of monuments)	Kampong Cham	12°10'53.31"N	105°11'39.44"E	
5	Pr. Han Chey (3 towers)	Kampong Cham	12° 9'43.88"N	105°31'41.64"E	
6	Pr. Kampong Preah (2 towers)	Kampong Chhnang	12°29'35.12"N	104°28'26.65"'E	
7	Pr. Phnom Ponnareay (2 towers)	Kampong Chhnang	12°24'35.90"N	104°44'24.50"E	
8	Pr. Sakhla	Kampong Chhnang	12°25'6.41"N	104°47'41.01"E	
9	Pr. Srei	Kampong Chhnang	12°23'57.34"N	104°48'39.46"E	
10	Pr. Thnam Phdei	Kampong Chhnang	12°22'54.65"N	104°48'0.41"E	
11	Pr. Kaek Pong	Kampong Speu	11°25'13.46"N	104°23'19.24"E	
12	Pr. Phnom Chhngok	Kampot	10°38'34.51"N	104°16'9.64"E	
13	Pr. Phnom Khyang	Kampot	10°36'32.65"N	104°31'0.70"E	
14	Pr. Phnom Toteong	Kampot	10°41'47.80"N	104°31'22.04"E	
15	Pr. Wat Tani	Kampot	10°46'31.60"N	104°39'47.51"E	
16	Pr. Preah Theat Chong Srok	Prei Veng	11°44'55.82"N	105°21'32.29"E	
17	Pr. Phnom Ta Mao	Takeo	11°18'4.94"N	104°48'5.66"E	
18	Pr. Phnom Thma Doh	Takeo	11°18'6.15"N	104°47'57.52"E	
19	Pr. Phnom Da (2 towers and 7 grottos)	Takeo	10°57'51.88"N	104°59'18.63"E	
20	Pr. Phnom Bayang (group of monuments)	Takeo	10°38'39.33"N	104°50'20.53"E	
21	Pr. Cheung Ang	Thbong Khmum	11°52'49.90"N	105°48'23.65"E	
22	Pr. Preah Samdei	Thbong Khmum	11°52'42.92"N	105°47'7.09"E	
23	Pr. Prei Ki	Thbong Khmum	11°51'19.89"N	105°47'24.64"E	
24	Pr. Banteay Prei Nokor (group of monuments)	Thbong Khmum	11°47'49.03"N	105°44'50.37"E	

* Pr. = *Prasat* (temple)

These temples are uniquely noted for their primitive architecture and man-made caves, and were mostly built of brick during the late 6th to early 9th centuries CE. Most of them were classified as the principal temples for the most significant pre-Angkorian period monuments, which are very important to the Khmer cultural heritage and for ancient architectural studies. The architecture, works of art and inscriptions of those sites constitute the most significant and complete early expression of a distinct Khmer culture that drew upon and adapted Indian architectural concepts and iconography and their accompanying artistic styles, which means that the temples exhibit the achievement of advances in Khmer architecture in the primitive period. Additionally, those sites continue to be used for the purposes for which they were established, namely architectural extensions and traditional worship, from the pre-Angkorian to post-Angkorian periods.

Aims and activities of the project

This project will create technical and architectural documentation in order to help protect the temples from emergencies. As a result of this project, architectural drawings will provide a detailed extension of the national database of Khmer monuments known as CISARK (http://www.site-archeologique-khmer.org). This project will lead to the sustainability of efforts to safeguard and conserve the monuments in the future; however, human resource training activities are also included in the project. The result of the project will be provided to the Ministry's long-term conservation framework for the southern region.

The project and related budget will cover 24 months' worth of activities along with other main activities. The first activity will involve an architectural survey of the existing features of each temple. This survey of architectural data will be the first step among other working processes. The necessary data will be surveyed through photography and 3D Photoscan for example. For some special classified temples, architectural measurements will also be taken such as plans, elevations and sections by a total station measurement instrument. The documentation will be preserved in a digital archive for future research and conservation.

The second one will be carrying out risk mapping. The risk mapping will begin at the same time as the architectural data survey. This work is the most important part of the project, and will apply to each temple at least once. The technical team will evaluate the risks of each temple in advance before starting the data survey and risk mapping. On the other hand, temples with decoration remaining such as bas-reliefs, paintings and inscriptions will also be paid much attention. A digital data survey of those decoration parts will be done. For the inscriptions, rubbing on the inscriptions will be done and this new documentation will be used as a comparison with any old documents that still exist. These data will then facilitate the study of art and inscriptions.

The third main activity will be to provide first aid / emergency conservation. After the first risk assessment, we also have a project for carrying out emergency work on those basreliefs, paintings and inscriptions which are at high risk. To conserve these elements of temples including those at high risk or susceptible to hazards, they will be supported to prevent any further loss and in fact strengthened.

The fourth activity will be risk monitoring. After obtaining the result of the data survey and evaluation of the risks of all temples, the plan to observe the progress of those risks will be conducted by the technical team. The monitoring will mainly focus on: a. Movement/vibration of the parts in danger, b. Strength of materials, c. Problems in the construction technique. For temples which have a problem with trees and unwanted plants, we will do clearances, but only if it will not affect the balance of the temples. This project will also endeavor to find a better solution for tree clearance from the temples. The result of this step will be used for the next conservation activities. At the end of this project, a report will be prepared and published. A final report will be drawn up based on the results of the project.

Result and Outreach Plans

We intend to publish the architectural drawings of temples in a separate volume from the final report as an extension of the previous documentation. Moreover, these drawings and selected photos of the state of conservation will complement the Khmer Archaeological Sites website (http://www.site-archeologique-khmer.org/) as part of the technical development efforts of the Ministry.

Additionally, to afford the public diversity of information on Khmer architectural studies, we plan to create a database in the Document Center at the Department of Safeguarding and Preservation of Monuments of the 3D Photoscan results for university students and researchers, as well as conservators. To help with the sustainability of the conservation project, RUFA students will be selected for training as surveyors in a six month program. They will be trained by technical staff from the Department to assist the technical staff in surveying and measuring the existing architecture. Additionally, they will also be introduced to how to map and monitor the risks to the temple.

Furthermore, the activities under the project will be joined by people surrounding the site, who will be part of the effort to increase awareness of how to care for their community's heritages.



Fig. 1 Location map of the sites and detail (Map: Google Earth 2016)

Cambodia



Fig. 2 Location map of the sites and detail (Map: Google Earth 2016)



Fig. 3 The main tower of Prasat Phnom Cheung Prei



Fig. 4 Stupas of Wat Tang Kok



Fig. 5 Prasat Kok Khvet (Photo: LENG Piseth)



Fig. 7 A tower of Prasat Han Chey



Fig. 9 Prasat Phnom Ponnareay



Fig. 6 The main tower of Prasat Preah Theat Tuk Chha



Fig. 8 Prasat Kampong Preah



Fig. 10 Prasat Sakhla



Fig. 11 Prasat Srei



Fig. 12 Prasat Thnam Phdei



Fig. 13 Prasat Kaek Pong



Fig. 14 Prasat Phnom Chhngok



Fig. 15 Prasat Phnom Khyang



Fig. 16 Prasat Phnom Toteong



Fig. 17 Prasat Wat Tani



Fig. 18 Prasat Preah Theat Chong Srok



Fig. 19 Prasat Phnom Ta Mao



Fig. 21 Prasat Asram Moharusi, Phnom Da



Fig. 20 Prasat Phnom Thma Doh



Fig. 22 Main tower of Prasat Phnom Bayang



Fig. 23 Prasat Cheung Ang



Fig. 25 Prasat Prei Ki



Fig. 24 Prasat Preah Samdei



Fig. 26 Prasat Preah Theat Thom, Banteay Prei Nokor



Fig. 27 The signing ceremony attended by the Minister of Culture and Fine Arts and the U. S. Ambassador in front of Prasat Asram Moharusi, Phnom Da (Photo: Ministry of Culture and Fine Arts)

India

Exterior Restoration of the Chhatrapati Shivaji Maharaj Vastu Sangrahalaya Mumbai, India

Kunkuma Devi Kishore, Architect and Conservation Consultant Good Earth Office, Bangalore, India

Introduction

Chhatrapati Shivaji Maharaj Vastu Sangrahalaya, formerly known as the Prince of Wales Museum of Western India, is one of the premier art and history museums in India. It



A view of the Chhatrapati Shivaji Maharaj Vastu Sangrahalay Museum from the entrance

A Brief History

The foundation stone of the museum was laid by the Prince of Wales in 1905, and the museum was named Prince of Wales Museum of Western India. The building was completed in 1914 but it opened to the public much later in 1922. Until then it was used by the military as a hospital and for Children's Welfare Exhibitions. The architect of the building, George Wittet, was selected after an open competition in 1909, and is more popularly known for his design of the Gateway of India. Wittet is widely known for the Indo-Saracenic style of architecture of which this museum is one of the best examples in Mumbai.

The Architectural Style

The Indo-Saracenic style combines native Indo-Islamic and Indian architecture with the Gothic revival and Neo-Classical styles favoured inVictorian Britain, and was used by the British in India in the late 19th and early 20th centuries. The Indian pillared hall, the arched pavilion, and the dome rising above the huge intersecting arches forming a beautiful geometrical pattern together make the museum building a typical example of the Indo-Saracenic style. Small openings in the traditional Indian style known as jalis for light and wind add to the grandeur of the building. The dome of this building is designed after the Gol Gumbaz of Bijapur and the finial is copied from the Taj Mahal at Agra. Today, this museum houses about 50,000 artefacts and has an outstanding collection comprising sculptures, terracotta and bronzeware, excavated artefacts from Harappan sites, Indian miniature paintings, European paintings, porcelain and ivories from China and Japan, etc. Besides these, the museum has a separate Natural History section.

The Mysore-based firm Ravi Gundu Rao and Associates was awarded the contract for execution of the exterior restoration works. I was fortunate enough to be assigned is situated on the southern tip of Mumbai close to the iconic Gateway of India and is listed as a Grade I Heritage Building. It has been awarded the 'UNESCO Asia – Pacific Heritage Award' for Cultural Heritage Conservation.



A view of the left wing of the Chhatrapati Shivaji Maharaj Vastu Sangrahalay from the garden

the role of Project Leader (execution) for the restoration project. This article comprises a number of excerpts and photos taken from the conservation report prepared for the restoration works undertaken, in addition to the author's descriptions.

Assessment of Existing Condition and Implementation of Restoration Works

A detailed assessment of all the components of the building exterior was undertaken to analyze the existing condition and propose repair works to restore and conserve the building. The flat roof area was found to be in fairly good condition. The cracks in the existing china mosaic, which was perhaps a later addition, required resealing along the entire surface area and wall junctions so as to ensure total water proofing of the roof. The coastal city of Mumbai receives very high rainfall during the monsoons and damage due to water is a major concern along all the building components. The central main and the adjacent smaller domes too required similar treatment to enhance their water proofing efficiency. The china mosaic surface also required a thorough cleaning as lots of dirt and grime had covered the entire surface over decades. The inappropriate terrace slopes, where present, were to be corrected so as to ensure smooth runoff of rainwater and prevent stagnation. If not done, stagnant water would inevitably seep into the roof through the waterproofing layers and eventually cause damage. All the drain mouths were required to be protected by SS (stainless steel) mesh so as to prevent dry leaves and other dust particles from choking the CI (cast iron) rainwater down-take pipes.

The cement chemical membrane coating on the china mosaic of the main dome was removed by scraping and water washing with a non ionic detergent, followed by further scraping and cleaning with brass fine wire brushes.



The discoloured main central dome with dust and grime deposits



The China mosaic dome during the cleaning process

The process of removal of the membrane was repeated until the original shine of the china mosaic was seen, followed by rubbing dry white cement to bring back the original glaze. The small domes were grouted by drilling holes through the china mosaic surface of the dome up to the depth of the inner concrete base and fixing 12 mm diameter pipe nipples at 1 meter c/c staggered spacing in both directions with removable putty. Acrylic polymer grout mixed with white cement was used in a standard grout pump, with calibrations to avoid rupturing of the shell. The same procedure was followed to grout the flat terrace area also. All the drain-mouths on the terrace were



Clogged drain-mouths on the terrace surface that had prevented complete drainage of surface runoff rainwater



The original shine on the white dome after the non-abrasive and non-chemical cleaning process



Leaking rainwater pipes and poorly managed storm water drainage on the terrace

cleaned, the objects that had led to choking cleared, broken spouts replaced, and inner slopes corrected and protected by SS mesh.

The original rainwater drainage system was thoroughly inspected during monsoons to check for leakages and seepages as well as assess the functioning of the existing CI down-take pipe sections, and those found to be faulty or extensively corroded were to be replaced entirely or in part and along the bends. Faulty down-take pipes were causing moisture ingress in the masonry walls. The soil pipes were also to be replaced in part if there were any



Removal of ficus growth and application of chemicals in the crevices to kill roots and prevent further growth



Leaking water pipes give rise to ficus growth and seepage of water into the masonry surface

damage or malfunctions found. New 100 mm diameter CI rainwater down-take pipe sections and soil pipes were fixed using MS clamps, screws and fixtures along specified locations including bends, and the joints were filled with lead. These were painted with primer enamel paint to match the stone color. Barbed wire was wound around the pipes and MS clamps were fixed, where missing, along all the rainwater and soil pipes.

The *chajjas* (sunshades/eaves/overhang) with brackets, beams and slabs beneath were found to have deteriorated, and there was de-laminated plaster along some portions as well as exposed and/or corroded steel reinforcements. These needed to be structurally consolidated. The deteriorated plaster and concrete of the *chajjas*, beams and slabs were removed after adequate propping, the steel reinforcements were cleaned with wire brushes and rusticide, and chemical coating was applied. Acrylic



Discoloured masonry wall surface with dirt grime and salt deposits on the left and a cleaned clear surface on the right



New reinforcement along the chajja and shuttering in progress for repair using acrylic polymer, cement and quartz sand

polymer, cement and quartz sand in appropriate proportion of weight were applied in layers to repair the chajja slabs after suitably shuttering along the edges.

Ficus growth was found on the wall surfaces along the different components of the building, indicating defects in pointing and the presence of cracks and crevices in cornices and walls, brackets and other ornamental stone works. It was also proof of inadequate drainage of storm water. The plant growth was removed by pulling out the root systems embedded in the masonry, cutting the stems and roots, and the application of patented chemical biocide such as 'Glycol' so as to prevent any re-growth. The area was then made good with lime and mortar.

The building is constructed using two types of stone: dark and hard basalt stone, and soft beige trackite. The stone surface had discoloured due to dust, dirt, pollution and



Discoloured urns and finials and other decorative elements with dirt grime and salt deposits on the right and a cleaned and repaired surface on the left

salt deposits over the decades and required water and chemical cleaning.



Cleaning discoloured surfaces usingthe water misting technique witha calibrated pressure pump and nozzle

façade before commencing the restoration works. The stone surface of the walls were gently cleaned with the 'Water Misting' technique employing an air water jet using a fine nozzle sprinkling system calibrated to spray a fine mist along the stone surface followed up by gentle brushing with soft nylon brushes. Chemical thinners and solvents were used to remove stubborn oil and emulsion stains on the stringer courses, decorative elements and stone surfaces. Clay poulticing was also adopted where required.

The original lime mortar pointing on the stone facade had been replaced by cement-based ribbon pointing on many Temporary partitions using 4 mm thick commercial plywood were fixed to isolate the windows and other interior areas from the water misting and other works on the exterior



Masonry walls with ribbon cement pointing removed, re-pointing done in lime mortar, and washing using the misting technique after blocking all openings temporarily using plywood boards

portions of all the walls at some point in time, which not only ruined the aesthetic value of the building but also prevented the effective breathing of the masonry walls. All the hard ribbon cement pointing was removed by raking out incongruous mortar very carefully so as not to damage the masonry, and re-pointing was done in lime mortar in a 1:3 ratio to match the original colour using traditional additive materials like katha. The missing pointing work along the entire exterior surface of the building masonry and decorative elements was also undertaken in a similar manner. Specialised tools and masking tape were used to ensure clear lines and a high level of workmanship on site.



Tools used to remove the stubborn cement pointing, rake out incongruous mortar and carry out re-pointing in lime mortar

Parts of the ornamental Malad Stone urns like the finials, carved bases or the domes were either missing or damaged. Some portions of the masonry walls had small as well as major cracks and severely distressed stone sections in Kurla Basalt. New finials, stone bulbs and caps etc in matching Malad stone were carved by skilled craftsmen and fixed to damaged, missing stone guldastas, chhatris and other ornamental stone work in the urns. They were fixed with SS dowels and epoxy plugs by making the necessary grooves, keys and jointing etc with lime mortar and pozzollanic additives such as brick surkhi or white cement.



The ribbon cement pointing seen on the upper half of the corner tower has been added, while the original lime mortar pointing can be seen on the lower half

Where such elements of the ornamental work were found to be loosely held or lying around on the ground, they were re-fixed using the same method as above.

The cracks in the cornices and masonry walls were repaired by raking out to form a groove and grouting, using acrylic polymer embedding 12mm diameter pipes. Wider, bigger or structural cracks in cornices and masonry walls were stitched using two 250 mm long 8 mm diameter SS bars for every 400 mm of crack. A certain type of repair called Dutchman repair was adopted for severely distressed Kurla basalt stone



Removal of ribbon cement pointing



The domes and finials of the *guldastas* were in a damaged condition. The fallen domes were collected and refixed again

pieces of the masonry sections. It involved fixing new pieces of stone by using stainless steel pins threaded at the end after carefully cutting out the damaged profile.

The windows and doors also required major repair work, given their exposure to extensive rainfall over the years. Some of the shutters required complete replacement due to the dilapidated wooden members while parts of the decorative molding and details were missing in others. The clear glass glazing panels were also broken, cracked or missing in many windows. The painted layers on the exteriors of doors and windows and the polished layers on the interior side were cracked, peeling off and discolored. All the pointing along the doors, windows, and ventilators were distressed and in need of replacement to prevent further damage due to water seepage through these joints. The existing paint and polish layers from all the door and window frames and shutters on the exterior of the building were removed by careful scraping using sandpaper. One coat of primer and three coats of enamel paint were applied to the exterior surface, and French polish was applied to the inner surfaces. New window shutters were made and fixed with heavy duty brass hardware and clear glass glazing, all matching the original design. Where parts of the windows and doors like moulding, details and frames were damaged or missing, they were restored by the carpenters retaining as much of the original wooden members as possible, or replaced with new well-seasoned good-quality Burma Teak wood (BTC) where required. The glass



Re-pointing in lime mortar after covering the sides with masking tape



A newly carved *guldasta* dome and finial fixed beside an original and existing one

panelled fanlights that were in poor condition were also repaired using BTC, and received enamel paint on the exterior surface and French polish on the inner surface.

The building line was edged with lawns, shrubs and green trees, which would eventually lead todamage of the building foundation and seepage through the plinth. The building did not have proper site drainage to drain the storm water collected from the roof through rain water pipes. This had caused rising dampness in the wall through the foundation, there by leading to serious damage to the interior plaster. An effective method for storm water management of the main museum building was proposed. The area along the building perimeter was excavated up to a width of 1 metre and a depth of 1.2 metres for the foundation and tuck pointing provided with cement mortar for the stone masonry. Grouting was injected through holes in the masonry foundation by a pressure pump using cement slurry and plasticised expanding admixtures to fill any hollowed out portions, thus strengthening it. The bed was prepared for the foundation and after the necessary backfilling, ramming and watering, soling was done using 80 mm size trap metal in 15 c. The voids were filled with sand.

The exterior restoration works were followed by a detailed study of the interior conditions, and interior restoration works were undertaken.

Indonesia



Cibanten River Expedition

Dewi Puspito Rini, *Archaeologist* Heritage Preservation Office of Banten, Ministry of Education and Culture

Rivers, which we know as the waterways that drain water from upstream to downstream regions, have long played an important role in human civilization. It has been proven by history that rivers in the past were an integral part of a community's activities that formed its cultural character, which make rivers as an important part of human life.

The oldest such historical evidence is the very well known role of the Euphrates and Tigris Rivers to the civilization of ancient Iraq, and the role of the Nile River to ancient Egyptian civilization. Rivers also led to the rise of the ancient Indonesian kingdoms. In Sumatra, for example, the Musi River contributed to the growth of the kingdoms in South Sumatra -Sriwijaya and Palembang Sultanate- as did the Batanghari River to the kingdoms in Jambi. In Kalimantan, we obtained proof that the great kingdoms in this region grew on the banks of rivers, which were the Mahakam and Kapuas Rivers; in Java, the Bengawan Solo for the Hindu Buddhist kingdoms in Central Java and East Java; and the Brantas River to the kingdoms in East Java, which were Kediri, Singhasari, and Majapahit. In the western part of Java, there were some important towns whose growth was affected by the presence of the rivers that connected them to the coastal and inland areas, such as the Ciliwung River for Sunda Kelapa port city and the Cibanten River for the central government in Banten Girang and Banten Lama.

In the past, one of the roles of rivers in the Indonesian archipelago was to act as transportation lines, connecting the heartland to coastal areas. The heartland in the past produced a variety of crops that were exported to other regions. To transport the crops, rivers were the main choice and the easiest method for sending goods toward the coastal areas at that time. Also taking into account the need for water sources for daily use, it is not surprising that people in the past lived not far from a river.

As mentioned above, one of the rivers in Banten province, Indonesia which had such a role in the past was the Cibanten River. Cultural remains that were discovered around the river prove that the Cibanten River played a significant role in the past. One of the best-known remains is Banten Girang. This kingdom chose to place the administrative center of the kingdom on the banks of the Cibanten. After Banten Girang ceased to exist, the administrative center was taken over by the Sultanate of Banten, which also placed the central government not far from the Cibanten River, located in the coastal areas of Banten Gulf. In the same way, the center of colonial rule in Banten, which was housed on residency, was also located at the edge of the Cibanten River.

The connection between Banten Girang as the central government of the Hindu kingdom and the Sultanate of Banten in Banten Lama was the Cibanten River. In fact, the



Banten Girang site

canals in Banten Lama were connected with the Cibanten River. It should be understood that along the Cibanten River, from Banten Girang to Banten Lama, there is still a lot of data that has not been revealed. Of course, there were many factors involved in the location of governments in the past, but they always looked at the river as a starting point in selecting the location of the central government in Banten. Based on that historical evidence, in October 2015, the Heritage Preservation Office of Banten held a Cibanten River Expedition. The Heritage Preservation



Cibanten River expedition team down in the river

Office of Banten invited people from all walks of life to participate in the event. The objective of the expedition was to record the potential of cultural heritage along the flow of the Cibanten River, Banten Province.

After they went down into the Cibanten River, the expedition team obtained some important data. Based on archaeological evidence found along the stream, the area around the Cibanten River has been inhabited by humans since prehistoric times. In the next period, the role of the Cibanten River increased in importance and served the Sultanate of Banten as an international port. Some cultural heritage was successfully recorded by the Cibanten River Expedition, as follows:

1. Banten Girang Site

Banten Girang site is located in Telaya Kampoong, Sempu village, Serang city. Banten Girang existed between 932 and 1030 AD. At Banten Girang site, there is a cave with three rooms, which were used for meditation. In the mid 1990s, a Dwarapala statue was found in the Cibanten River, not far from Banten Girang site. It shows that Banten Girang still holds many interesting questions for further study.

2. Kaujon Ancient Mosque

Kaujon Ancient Mosque is located in RM. HS. Jayadiningrat Street, Kaujon Afternoon Market Kampoong, Serang Village, Serang city. The construction of Kaujon Ancient Mosque was influenced by Hindu-Buddhist decorative art. The lower profile of the mosque was adapted from a temple. The terraced roof of the mosque was also adapted from a temple roof.



Kaujon Ancient Mosque

3. Gedung Juang 45



Gedung Juang 45 is located on Ki Mas Jong Street, Serang City. During the Japanese occupation of Indonesia, this building was used as the headquarters of the Kempeitai.

4. Banten Residence Building

Banten Residence Building is located on K.H. Syam'un Street, Serang city. The building, which dates back to around 1814, initially served as a residence office.



Banten Residence Building

5. Kenari Mosque

This mosque is located in Kenari Kampoong, Kasemen subdistrict, Serang city. There is no exact data about the establishment of Kenari Mosque. Folklore says that Kenari Mosque was built during the rule of Sultan Abu Mufachir Abdul Kenari (1596 - 1651 AD). He was the first ruler of the Sultanate of Banten, who acquired the title "sultan" from Mecca.



The gate near Kenari Mosque

6. Kasunyatan Mosque

Kasunyatan Mosque is located on Karangantu Port Street, Kasunyatan Village, Kasemen subdistrict, Serang city. There is no exact data on the construction of Kasunyatan Mosque. However, based on folklore, the mosque was founded by the spiritual teacher of Sultan Maulana Muhammad around the mid-sixteenth century.

Indon

Gedung Juang 45



Kasunyatan Mosque

7. Kaibon Palace Site

Kaibon Palace site is located in Kroya Kampoong, Kasunyatan Village, Kasemen subdistrict, Serang city. This palace was built in 1815, and became the second palace in the Sultanate of Banten after Surosowan Palace. Referred to by the name of Kaibon (Motherhood),



the palace was built for the mother of the Sultan, Queen Aisyah. At that time, as the 21st sultan of Banten kingdom, Sultan Maulana Rafiudin was too young (five years old) to hold the reins of government. So, Queen Aisyah temporarily acted as a regent until her son was ready to rule.

The Cibanten River Expedition is trying to remind Indonesians that one of their cultural roots in the past that may have been forgotten is the culture associated with rivers. The Cibanten River Expedition is trying to gather information about the Cibanten River from different angles, as well as to raise public awareness about the preservation of cultural heritage. The Cibanten River has great potential to be developed, because the area along the flow of the river still has some remains of the culture which spread from Banten Girang to Banten Lama in the past. Expected later, the Cibanten River Expedition can encourage and motivate preservation of the Cibanten River that divides the city of Serang.



Kaibon Palace site

Malaysia



Restoration and Relocation of Rumah Bugis Traditional Timber House from Kuala Selangor to Shah Alam, Selangor, Malaysia

Professor Dr. A Ghafar Bin Ahmad, *Professor* School of Housing, Building and Planning, Universiti Sains Malaysia

Introduction

Built in the early 1900s, Rumah Bugis (Bugis house), also known as the Red House, was owned by a Bugis chieftain (penghulu). The traditional timber house was erected and decorated with features and elements of the Bugis identity. Nonetheless, with the passage of time after three generations, the house was left abandoned. The building deteriorated due to termite infestation, roof leakage and poor maintenance. Restoration works of the Bugis house started on 25 June 2015 with a contract value of RM498,806 (USD119,888) secured by the Selangor State government agency, Perbadanan Adat Melayu dan Warisan Negeri Selangor (PADAT), who took the initiative to salvage, restore and relocate the house from Kampung Permatang, Kuala Selangor to the grounds of the Sultan Alam Shah Museum in Shah Alam, Selangor, a distance of 73 km. The project lasted for 10 months and was completed on 27 April 2016. The historical and architectural accounts of the Bugis house were narrated by Haji Roslan Zainal, the third heir to the Bugis house property.

Historical Background

The Bugis house was built by Mat Taib, a trader-cumcarpenter from Makassar (South Sulawesi, Indonesia) who migrated to the Malay Peninsula during the period of Dutch colonisation of Indonesia. This timber house was built during the reign of Raja Lumut, the first Sultan of Selangor. Timber, which is available in abundance in the tropical Malay Peninsula, was drawn to the construction site from a nearby village, Kampung Sawah Sempadan at Tanjong Karang, Selangor using bullock carts. The use of good timber and appropriate techniques of timber treatment can extend a house's life by about 100 years. Before the construction of the Bugis house at Kampung Permatang, Kuala Selangor, an important ritual process, was performed by the owner and local folks to select the best site and position for the house.

Architectural Significance

Raised on timber stilts upon granite stones, the Bugis house is divided into three sections: lowered verandah (serambi *jatub*), main area (*rumab ibu*) and kitchen (*dapur*). There is a small external staircase leading up to the main entrance at the front verandah. An interval space (selang) exists between the main area and the kitchen. The entire building is relatively small in size with the main area measuring 28 square feet, and with a height of 20 feet from floor to roof. The verandah, located at the front of the house, has many openings including louvered casement windows and carved lattice panels which provide good ventilation. It is a common space for entertaining guests, villagers' meetings and discussions. The women folk and children spend most of their time in the main area, which also leads to the master bedroom. The Bugis house has a storage attic which can be used as a resting space as well as for keeping home appliances, mats and cooking pots used during weddings and festivities. It is customary for young girls of the host family to keep themselves hidden in the storage attic when there are guests around in the house. Like most traditional timber houses, the Bugis house used thatched attap roofing material made of palm leaves called *nipab* (*Nypa fruticans*). The slightly curved and pitched roof of the Bugis house features double-layered gable ends (tebar layar) with a small window opening for both cross and stacked ventilation. The entire house was constructed without the use of a single nail. Instead, each building panel was locked using timber peg frames and wedges. The building and carpentry work was all done manually without any machinery. The building frames including trusses, columns and beams secured the timber wall panels, windows and doors. Apart from providing good ventilation, the Bugis house offers natural lighting through carved lattice panels called kerawang. These intricate lattice panels decorated in floral motif carvings and geometric patterns adorned the upper walls of the house.

Building Defects

The Bugis house, which was left abandoned for a period of time, deteriorated rapidly due to decayed timber structures, termite infestation, roof leakage and poor maintenance. The kitchen section fell into a state of disrepair and was demolished. A new annex was constructed using bricks, timber and zinc roofing to replace the kitchen section. A dilapidation survey was conducted prior to restoration works to identify major defects of the house, causes of the defects, methods and techniques of restoration as well as relocation. Decayed timber structures, poor condition of the palm leaf roofing, decayed windows and broken lattice panels were revealed as some of the common building defects. An architectural drawing or measured drawing of the house was drawn accurately to scale for reference during restoration and relocation.

Restoration Works

During the restoration works scaffolding was erected around the Bugis house to support the building structures, while temporary roofing of steel frames and corrugated metal decking was constructed above the house. This was to ensure that the house was well protected from heavy rainfall, particularly when the palm leaf roofing was removed and brought down to the ground. Two local carpenters, Mazlan Haji Anuar and his young nephew Muhammad Shafiq Kamaruddin, were engaged by the main contractor to restore and reconstruct the Bugis house. The Bugis house was dismantled from roof to bottom during a period of two weeks. Handling the broken and decayed timber structures and building elements required extra caution. Workers on site had to document the building structures and elements in detail in order to reconstruct the house at a new site in Shah Alam, Selangor. The dismantling process started from the roof to the roof trusses, walls including lattice panels, windows and doors,

floor boards, roof beams, floor beams, and finally, the main columns and stilts. The strut (*tupang*) system was used in the dismantling process to avoid building collapse. All building structures and elements were salvaged and marked systematically before they were temporarily stored on site. Preventive measures such as storage above ground surface and termite treatment were conducted during temporary storage. Restoration and relocation of the Bugis house involved three main stages as follows:

Stage 1: Coding, Dismantling and Salvaging

- i. Provide special codes for building structures and elements for reference.
- ii. Dismantle the entire house and document the dismantling process in detail.
- iii. Verify existing timber species and strength group.
- iv. Identify timber condition.
- v. Salvage any existing timber for reconstruction.
- vi. Document the condition of the house through the Historical Architectural Building Survey (HABS).
- vii. Conduct video documentation of work on site.

Stage 2: Treatment, Transport and Relocation

- i. Mark or label existing timber structures and elements for reference.
- ii. Transport all dismantled building materials from the site to a sawmill in Kelang.
- iii. Conduct timber treatment including repair, replacement and replication.
- iv. Upgrade timber species and strength group.
- v. Pack and store treated old and new timber.
- vi. Transport the timber structures and elements from Kelang to Shah Alam.
- vii. Document the treatment, transport and relocation process.

Stage 3: Remeasuring, Reconstruction and Repainting

- i. Identify a new site at museum grounds for reconstruction.
- Remeasure and peg the new site based on measured drawings.
- iii. Store building materials on site.
- iv. Reconstruct the house in its original form and design.
- v. Prepare for additional electrical appliances.
- vi. Repaint the house with the original type of paint and colour.
- vii. Document the reconstruction process in the HABS and final reports.

Timber Verification and Strength Group

All dismantled timber structures and elements were transported to a sawmill at Kampung Padang Jawa, Kelang, Selangor (a distance of 63 km) for the process of timber selection and classification. Seven samples of existing timber structures and elements were taken from the Bugis house and sent to the Malaysian Timber Industry Board (MTIB) in Kuala Lumpur for verification of the timber and strength group (SG). Results from the MTIB showed that six out of the seven timber samples were between SG 4 and SG 6, i.e. moderately strong and very strong (see Table 1). One timber sample which was used as the main column was found to be extremely strong (SG 1). In terms of the new house structures, all existing columns were replaced with extremely strong timber (SG 1) of either Chengal Batu or Balau species. Other timber structures and elements were a mix between new and old timber, and both were treated against termite infestation. Overall, 65 per cent new timber was used in the reconstruction of the Bugis house, mainly for the main columns, wall panels, floor boards and the attic staircase.

No.	Timber sample	Sample size (mm)	Species name	Scientific Name	Strength Group (SG)
1	Gable end	11 x 72	Light Red Meranti	Shorea spp.	6
2	Window	16 x 90	Dark Red Meranti	Shorea spp.	5
3	Wall panel	20 x 90	Dark Red Meranti	Shorea spp.	5
4	Wood carving	12 x 68	Yellow Meranti	Shorea spp.	6
5	Floor board	20 x 75	Perupok	Laphopetalum spp.	4
6	Column	15 x 50	Kapur	Dryobalanops spp.	4
7	Main column	7 x 16	Chengal Batu	Shorea maxwelliana	1

Table 1: Timber Verification and Strength Group for the Bugis House

Source: Malaysian Timber Industry Board (MTIB), Kuala Lumpur, 2015

Reconstruction

Reconstruction of the Bugis house in the grounds of the Sultan Alam Shah Museum began with the construction of a concrete mix foundation floor to create a level surface. Based on the measured drawings, the original granite stones were positioned on the foundation floor in the exact layout as those laid at the old site in Kampung Permatang, Kuala Selangor. Once all the granite stones were secured in place on the foundation floor, timber stilts were erected followed by floor beams, columns, beams, roof trusses, wall panels and other building elements including windows, doors, carved lattice panels and new staircases. During reconstruction of the Bugis house, scaffolding was erected to

support the building structures and elements, installation of new roofing materials, and repainting. One of the new elements introduced for the Bugis house is the roofing material. Palm leaf roofing is not suitable because it requires regular maintenance and replacement as well as being prone to natural decay and insect attacks. Asphalt shingles of a dark grey colour were used instead as the new roofing material for the Bugis house. Asphalt shingles are comparatively more durable, lower maintenance, less expensive in terms of up-front costs, and need only simple installation. They are also flexible to match the original roof shape and form. The Bugis house was repainted in its original dark red colour using locally-produced oil-based paint (*Cap Rumab* brand from Kepong, Selangor). The wood carving fixtures in the house interior were repainted in a shade of gold to revive their original colour. On 21 July 2016, the newly reconstructed Bugis house was officially handed over to PADAT Chairman YB. Datuk Dr. Ahmad Yusuf Hairi, witnessed by PADAT CEO Faizul Fitri Muslil, the PADAT conservator, representatives of government agencies, consultants, contractors, carpenters as well as family members and relatives associated with the Bugis house.

Conclusion

The restoration and relocation of the Bugis house presents a good example of a building conservation success story in Malaysia. To ensure the project's success, the Selangor State government agency PADAT worked closely with the conservation team including the consultant quantity surveyor, building conservator, building contractor and carpenters to monitor the work progress and resolve any technical matters through site meetings. At an earlier stage, attempts to secure a storage space on a neighbouring lot had failed due to a dispute over the rent to be charged. Moreover, the approval letter issued by the Shah Alam City Council to allow reconstruction of the Bugis house was delayed due to land conversion matters on site. More delays were observed in the appointment of a third party for site preparation and laying the foundation floor. The project team also faced a number of challenges since most of the building sections included decayed timber and were badly damaged due to poor maintenance and termite infestation. The salvaged timber was insufficient to reconstruct the entire house. Outsourcing of new timber with an upgraded strength group also took considerable time since certain timber species are more suitable for particular building structures and elements. Using asphalt shingles as the new roofing material posed another challenge to carpenters and roof installers, who needed to maintain the original shape of the slightly curved and pitched roofs.

Despite these challenges, the reconstruction of the Bugis house shows evidence of inheritance, with invaluable carpentry knowledge and skills being passed down from an older and more experienced carpenter to a young apprentice. It is recommended that more trainee carpenters involve themselves in the traditional methods and techniques for the conservation and repair of traditional timber houses. The initiatives undertaken by PADAT in ensuring the protection and restoration of traditional timber houses in Selangor including the Bugis house are highly commendable. The restoration and relocation of the Bugis house could not be completed successfully without the full support, good communication and amicable cooperation of those involved in the project at all levels. The entire team must be equipped with the necessary knowledge, materials, and skills, as well as a positive attitude and outlook to retain and upkeep the legacy of traditional timber houses. Today, the Bugis house stands proudly in the grounds of the Sultan Alam Shah Museum, to be valued and appreciated by all generations, and it has become a popular attraction amongst local and foreign tourists in Shah Alam, Selangor, Malaysia.

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The front elevation of the Bugis house showing its timber stilts, louvered casement windows and decorated wall panels.



The right elevation of the Bugis house showing its external staircase leading to the entrance door, carved lattice panels, louvered casement windows of two sizes, double-layered gable end with a small window and a pitch roof.



The left elevation of the Bugis house showing the two floor levels which are the lowered verandah (serambi jatuh) and main area (rumah ibu).



View of the Bugis house in 2014 after it was left abandoned and had deteriorated rapidly due to decayed timber structures, termite infestation, roof leakage and poor maintenance.



Painted in a shade of gold, the intricate floral motif carvings above the door frame reflect highly-skilled carpentry.



Decayed timber stilt and floor beam due to natural decay and termite infestation.



The front view of the Bugis house in 1999 revealing building defects such as a missing gable end, broken carved lattice panels and decayed thatched attap roof made of palm leaves.



Carved lattice panels (*kerawang*) decorated in floral motif carvings and geometric patterns adorned the upper walls of the Bugis house.



The entire Bugis house was constructed without the use of a single nail but it was locked using timber peg frames and wedges.



During the dismantling stage, scaffolding was erected around the Bugis house to support the building structures, while temporary roofing was constructed above the house to protect the interior from heavy rainfall.



Special codes were marked on timber elements before dismantling and salvaging.



All timber structures including stilts, floor beams and floor joists were marked and coded for reference.



Dismantling the Bugis house.



Dismantled louvered casement windows were taken down to the ground for investigation and salvaging.



All dismantled timber structures and elements were transported to a sawmill for the process of timber selection and classification.



Timber structures and elements were repaired, replaced and replicated at a sawmill in Kampung Padang Jawa, Kelang, Selangor.



Restoration of casement window panel in progress.



All new and old timber structures were treated against termite infestation.



Carpenters handling a newly restored gable end.



Treated timber structures and elements were loaded onto a truck at the sawmill before being transported to the new site.



The Sultan Alam Shah Museum in Shah Alam where the Bugis house was reconstructed at a new site next to this museum.



Reconstruction of the Bugis house in the grounds of the Sultan Alam Shah Museum began with the construction of a concrete-mix foundation floor to create a level surface.



During reconstruction of the Bugis house, scaffolding was erected to support the building structures and elements, installation of new roofing materials and repainting.



Installation of asphalt shingles on the roof.



View of the Bugis house during reconstruction.



Front view of the Bugis house after reconstruction.



Right elevation of the Bugis house after reconstruction.



Interior view of the verandah after reconstruction.



Newly restored floral motif carvings and geometric patterns on the upper walls.



Storage attic featuring double-layered gable end, small opening and pitched roof ceiling after reconstruction.



On 21 July 2016, the newly reconstructed Bugis house was officially handed over to PADAT Chairman, YB. Datuk Dr. Ahmad Yusuf Hairi, witnessed by PADAT CEO, Faizul Fitri Muslil and PADAT conservator Profesor Dr. A Ghafar Ahmad.



View of the Bugis house at night illuminated with floodlighting.

Maldives



Cowrie—an Early Global Commodity: An Archaeological Research on the Islamic Period of the Maldive Islands

Shiura Jaufar, *Archaeologist* Department of Heritage, Republic of Maldives

Cowrie shells, most importantly Cyprea Moneta, played a pivotal role and were a valuable commodity during the early global trade and exchange that took place around the world. They were used as a currency in many parts of the world and were exchanged for various kinds of goods as well as African slaves. According to several historical sources, it has often been suggested that the Maldives were the main exporter of these shells. The use of cowries in the trade links along the Indian Ocean trade network as well as the production and importance were mentioned by several authors from the ninth century onwards; however, this had never been tested archaeologically. Thus in December 2014, Prof. Anne Haour from the University of East Anglia received a grant from the Leverhulme Trust to conduct research in the Maldives as part of a research project investigating the timescale and nature of the importation of cowrie shells into West Africa from 1150 to 1900.

This paper will briefly report on the archaeological fieldwork undertaken in early 2016 in the Maldives, which involved test excavations at three sites (Ha. Utheemu, K. Male' and M. Veyvah). Broader surveys were also conducted mainly in Raa Atoll, which will not be discussed in this paper. The field team consisted of the Principal Investigator Prof. Anne Haour, Post-Doctoral Researcher Dr. Annalisa Christie, and the author as the PhD candidate for the project. The aim of the research was to identify sites likely to date to the medieval Islamic period.

The first site excavated was the island of Utheemu in Haa Alifu Atoll. Utheemu is a rather important island in the country's history, and reports of the discovery of a cowrie hoard along with various artefacts (including pottery and glass) apparently indicative of medieval trade had been received from the island. Five test pits were dug in four different areas of the island, including two units inside the Utheemu Palace. The other three units were placed within the current football field, a mound behind the palace and within a field nearby that had been marked as a tourism zone on the island. Test-pit methods and sizes differed per unit according to the nature and occurrence of the site within the area. Of the five units excavated, the palace and the tourism zone trenches were the most productive. Finds included several sherds of pottery, glass (including bracelets) and metal fragments, charcoal, shells (including cowries), faunal remains (mostly fish bones), coral stone blocks as well as a female grave in one unit of the palace and one bead.

Male' was the next site to be excavated—this had been historically, as well as today, the capital island of the Maldives. The Sultan's Park where the former palace once stood was selected for excavations since it is one of the only remaining open spaces in Male', being one of the world's most densely populated islands with few prospects for a study of undisturbed remains. This park consists of the only surviving building of the former palace structures (*Usgekolbu*) and eight shovel-test pits were established within the empty area in front of the building. The finds were similar to Utheemu with the exception of human bones and beads. There was less pottery than at Utheemu, but more cowries.

The island of Veyvah in Meemu atoll was the final site for excavation and was selected due to the presence of an ancient coral stone mosque (about 400 years old) on the island, and also because it offered good prospects for a study of undisturbed levels. Due to most of the open spaces being used for habitation, excavations were targeted within the agricultural fields around the island. Five units were excavated in different areas, of which three units provided promising results. The finds from this island were also similar to those discovered at Utheemu and Male', again with the exception of human bones and less pottery. One bead was also discovered on this island.

To sum up, this is an ongoing project and the findings and results of the first season are currently being studied. The second season of fieldwork will take place next year. At this point, the author would like to thank the project team at the University of East Anglia, United Kingdom; Department of Heritage, Maldives National Museum, Academy of Dhivehi Language, Boduthakurufaanu Memorial Center and all the atoll and island councils in the Maldives for their continuous support for this project.



Fig 1: Female grave found in trench 5 in Ha. Utheemu (Jaufar 2016)



Fig 2: Unit 3 in Ha.Utheemu (Haour 2016)



Fig 3: Excavations at K. Male' (Haour 2016)



Fig 4: Pot sherd from the excavations (Jaufar 2016)



Fig 5: Excavations at M. Veyvah (Haour 2016)



The team: Prof. Anne Haour, Shiura Jaufar and Dr. Annalisa Christie (from left to right)