

ORGANIZATIONAL CHANGE IN POLITICAL ECONOMY AND IDEOLOGY: TRANSITION
FROM THE EARLY HISTORIC TO PRE-ANGKORIAN PERIOD CAMBODIA, VIEWED FROM

THALA BORIVAT

A DISSERTATION SUBMITTED TO THE GRADUATE DIVISION OF THE UNIVERSITY OF
HAWAI'I AT MĀNOA IN PARTIAL FULFILLMENT OF THE REQUIREMENTS FOR THE
DEGREE OF

DOCTOR OF PHILOSOPHY

IN

ANTHROPOLOGY

December 2018

BY

PIPHAL HENG

Dissertation Committee:

Miriam Stark, Chairperson

Christian Peterson

James Bayman

Paul Lavy

Seth Quintus

Keywords: Cambodia, archaeology, organizational change, temple economy, pre-
Angkor, settlement patterns, state formation

To My Parents

Acknowledgement

The Khmer Rouge marks year zero, the end and the beginning, that continues to impact the course of most Cambodian lives. When they took over Cambodia in 1975, my parents were only one and two years away from a chance to pursue their BA education. Their dreams to become the first generation of their families to achieve higher education vanished. Instead, they were sent to work in mobile workforce unit whose tasks were to speed up dam constructions or rice harvest. Their perseverance to achieve their goals continued after this regime by investing in their children's education, all of whom held a B.A/S degree in various fields. Growing up in the 1980s, education was, and still is, viewed as the mean of upward mobility and unlike other tangible wealth like gold or money, knowledge is thief-proofed. Emphasis on education was echoed by propaganda banners across Siem Reap town and schools featuring "to learn and to teach is patriotism," a mean to retain both student and teacher enrolments. My parents gave me the privilege to dedicate most of my time to education. I was not allowed to skip school to work in the field or to help the family business. This dissertation is not only my personal achievement but also my parents', to whom this dissertation is dedicated too.

This PhD has been a long journey and its accomplishment is by no mean a solitary endeavor. It would not have been possible without the help and supports from families, friends, colleagues, and various national and international institutions. I owe my early intellectual development to Cambodia's Faculty of Archaeology-Royal University of Fine Arts (RUFA), a nursery where I studied and resided from 1997 to 2002. This multicultural and multi educational traditions exposed me to the construction of knowledge based on logics and evidence, which negates the traditional emphasis on textual memorization and recitation of the Cambodian education. Professors Michael Vickery, Son Soubert, Long Seam, and Pich Keo were some of the most accommodating teachers who encouraged me to challenge their teaching. I owe my early critical thinking skill to my late mentor, Michael Vickery, who taught Khmer history throughout the duration of my archaeological degree. He encouraged students to be critical of hypotheses, which were often recited as unchallengeable facts, by looking at primary and secondary sources. He took interests in my thoughts and asked that I wrote essay

assignments in English, so he could comment on both grammar and the topics. Sometimes in 1999 at the beginning of a class period, he said in Khmer: "*History is a novel. Coedès has his, I have mine, and you should have yours!*" This has been my guidance throughout my academic career as an archaeologist.

After graduation, I was fortunate to meet, befriend, and work with many scholars whose insights and assistance helped shape the course of my career. First and foremost, I thank Kyle Latinis, Sweechiang Choo, and Mina for their close friendship, supports, advice and encouragement. Kyle helped mentor and prepare me for both my early research, English, writing, and editing. With their support, I was awarded the Fulbright scholarship, which marks the beginning of this long journey. Drs. Bion Griffin, Mike Dega, Phon Kaseka, John Miksic, Dougal O'Reilly, and Naho Shimizu all have been instrumental in my early career.

My academic endeavor in the American higher education system began with Dr. Miriam Stark whose fieldwork in Cambodia I have participated since 2004. Dr. Stark has been instrumental not only toward my progress through the UHM program but also in developing my academic career. Her roles as a mentor, a teacher, a collaborator, a friend, and her commitment to capacity building for Cambodian and Southeast Asian students are sources of inspiration for me to pursue higher education and career as a professional archaeologist. As an international student, I am most grateful to have Dr. Stark as an advisor. Her guidance and mentorship helped me navigate the US education system as well as my adaptation to life in the US. With Dr. Stark's resources and supports, I have garnered multiple internal and extramural scholarships and funding for my research. Her guidance has contributed to my academic accomplishment including this dissertation research, my participation with other research projects, and publications.

I am most grateful toward my committee members Drs. James Bayman, Christian Peterson, Paul Lavy, Fred Blake (deceased), Seth Quintus whose honest feedback, discussions, patient, encouragement, resources, and guidance have been instrumental to the success of my degree. I thank Dr. Laim Kelly for his help as a transitional member for my PhD committee.

I would like to acknowledge the following agencies including National Science Foundation (grant #1332761), Friends of Khmer Culture, Inc., Center for Khmer Studies, UHM-

Arts & Science Student Research Awards, Moscotti, John Fee Embree Endowed Scholarship, Dai Ho Chun Fund for Graduate Fellowships, Research Corporation of the University of Hawaii, UHM-Department of Anthropology, the Greater Angkor Project (GAP), Khmer Production and Exchange (KPX), the University of Arizona AMS Laboratory, and the Field Museum's Elemental Laboratory. Their supports have been crucial to the success of my multi-phase dissertation fieldwork, analyses, and write up. Jeff Daigle and members of the US Embassy in Cambodia awarded me the Fulbright scholarship for my MA application in 2006. I am grateful to the Harvard-Yenching Institute, particularly Dr. Elizabeth Perry, Dr. Ruohong Li, Susan Scott, and Nam Nguyen for funding and assisting the first 3.5 years of my PhD program beginning in 2009.

My research could not have proceeded smoothly without the gracious support and facilitation of Cambodia's Ministry of Culture and Fine Arts: Excellencies Chuch Phoeurn, Minister Phoeung Sakona, former minister Him Chhem, Prak Sonara, Bong Sovat, Hap Touch, Heng Sophady, Mr. Voeurn Vuthy, Mr. Kong Vireak.

My research team has made this dissertation possible. These include Vitou Phirom, Ben Sokvat, Moug Chan Reaksmei, Vitou Phivat, Moul Kumnet, Heng Halavan, Chron Monika, Mak Duoeng, Som Thon, Chrai Chantha, Chap Sopheara, Hannah Arnhold, Chhor Sovannarith, Lanh Udom Reangsei, Seng Kompheak, and Phoeurn Revant. My other RUFA classmates including Chhay Rachna, Chap Sopheara, Chhay Visoth, Tep Sokha, Seng Sonetra, and Chan Sovichetra all have been helpful to my research and career through their friendship and collaboration.

Countless of friends and colleagues that I have met throughout my career including Michel Lorillard, So Malay, Alison Carter, Martin Polkinghorne, Joyce Clark, Peter Grave, Lisa Kealohfer, Damian Evans, Mitch Hendrickson, Roland Fletcher, Nicola Revire, Vong Sotheara, Hun Chunteng, and Bruno Bruguier to name a few have contributed greatly to this dissertation research. I am grateful to Dr. Aedeon Cremin for kindly proofread this dissertation. At UHM-Department of Anthropology, I thank Adam Lauer, Jesse Stephens, and Stephen Acabado and his family for their companionship, advise, beer, and assistance. I thank Shawn Fehrenbach whose friendship and role as my American culture translator helped integrate me into the American culture during my early years at UHM. Our shared academic journey at UHM and Cambodia between 2007-2012, vibrant discussions, academic writing, and funding applications

have helped shape my academic career. At Shinshu Kyokai Dormitory where I resided between 2007-2009, I thank uncle Del and auntie Myra, other Southeast Asian friends including Enyee Eng, Akaraphon Huabcharoen (café), Puangchon Unchanam (Baipo), and others for their companionship. My adaptation to life in Hawaii would have been a lot harder without them.

Last but not the least, I thank my spouse, Michelle Daigle, and son, Donovan (Dydy) Heng, for sharing this long journey with me. My siblings and cousins have been of great help in handling my belongings and research materials in Cambodia.

Abstract

Investigating the intersection between ideological shift and the early state formation is a perennial topic of archaeological inquiry, but most archaeological work until recently concentrated on either New World societies or on case studies from the Near East and South Asia. This rich comparative research base has yielded insights into social, economic, and ideological structures in the face of organizational change, but few examples have been included from East or Southeast Asia. This research focuses on developments in the lower Mekong basin (modern-day Cambodia) to understand the roots of the Angkorian state that flourished from the 9th to 14th centuries CE. Using the pre-Angkorian period to study early state development offers insights for Asian scholars and valuable comparative insights.

Documentary evidence, both internal (epigraphic) and external (Chinese), suggests that states emerged by the 6th/7th centuries CE in parts of the lower Mekong now associated with Cambodia. Chinese documents describe the rise of the Chenla kingdom. Such contemporary Tang dynasty descriptions coincided with the earliest appearance of a suite of new traditions: brick architectural shrines and temples, elaborate Indic statuary which these brick structures housed, and Khmer and Sanskrit dedicatory inscriptions on the doorways and rooms of these ritual public structures. Previous scholars have explained early state formation in Cambodia as reflecting largely either external influences (or primarily trade with China and India) or internal developments (and specifically, the rise of an agrarian elite who appropriated Indian religious ideology to legitimate their claims to power). Increasing attention to Cambodia's archaeological record suggests that both processes were at work in the pre-Angkorian world.

This study investigates the relationships between the introduction of Indic religious ideologies, their temples and organizational changes during the transition from the Early Historic to the pre-Angkorian periods by using a political economy model. Archaeological strategies are employed to investigate organizational changes associated with economic system, interaction, ideological shift, and political centralization. The economic model of agriculture and trade, new ideologies associated with the Indic-related temple, and social stratification, are best evaluated from the scope of pre-Angkorian temple economy to explain its state formation through the analysis of distributional surface data and excavated materials.

This research concentrates primarily on one pre-Angkorian regional center in northern Cambodia along the Mekong River in Stung Treng Province: Thala Borivat. A secondary center, Sambor in Kracheh, is investigated to provide a comparable settlement dataset. This region lies far from the Tonle Sap region where the Angkor temples later emerged and from the Mekong delta where first millennium states arose. Thala Borivat is strategically located between important upland resources to the north in modern-day Laos and the rich alluvial Mekong delta to the south. Yet no previous archaeological fieldwork has been undertaken to study settlement patterns in this area.

Table of Contents

Acknowledgement	iii
Abstract	vii
Table of Contents	ix
List of Tables	xxiii
List of Figures	xxvi
Chapter I. Introduction, Research Problem, and Rationale	1
I.1 Introduction	1
I.2 Research Questions	3
I.3 The Pre-Angkorian Period: Background	4
I.4 Major Northern Pre-Angkorian Centers	7
I.4.1 Sambor Prei Kuk (<i>Īśānapura</i>)	7
I.4.2 Wat Phu (<i>Liṅgapura/Śresthapura</i>)	8
I.4.3 Thala Borivat (<i>Nāgasthānapura</i>)	8
I.4.4 Sambor (<i>Śambhupura</i>) and Sambok	9
I.5 Research Area	11
I.6 Data Sources, Proxy Measures, and Analytical Procedures	13
Historical and Ethnohistorical Data	13
Artifact data	14
Settlement pattern data	15
Proxies	17

I.7	A Conventional Chronology	18
I.8	Broader Impacts of the Research	23
I.9	Dissertation Structure	23
	<i>Chapter II. State Models, Temple Economy, and Settlement Patterns</i>	<i>28</i>
II.1	Models of Early Southeast Asian State Structure: A Review	28
II.1.1	External Stimulation: “Indianization”	28
II.1.2	Internal Development	30
II.1.3	Religious Institution and Southeast Asian Early States	31
II.2	Temple Economy	32
II.2.1	Mesopotamian Temple Economy	33
II.2.2	Early Historic South Asian Temple Economy	34
II.2.3	Pre-Angkorian Temple Economy	35
II.3	Operationalized Temple Economy	36
II.4	Settlement Patterns, Community, and Centralization	37
II.4.1	Site, Settlement, and Local Community	38
II.4.2	Pre-Angkorian Community	39
II.4.3	Cambodia’s Ethnohistoric Community	39
II.4.4	Settlement Function, Integration, and Centralization	41
II.5	Summary	42
	<i>Chapter III. Research Areas, Data, and Research Methodology</i>	<i>44</i>
III.1	Administrative Setting	44
III.2	Environmental Setting	45

III.3	Data and Preliminary Research Methodology	46
III.3.1	Previous Research Strategies to Study the Pre-Angkorian Period	47
III.3.2	Unit of Analysis: Site Classification	50
III.3.3	Data Collection Strategies: Feasibility Studies (Phase I-2011)	51
III.3.3.1	Rice Field and Surface Collection.....	54
III.3.3.2	Levees and Mounds.....	57
III.3.3.3	Hand Auger Test	57
III.3.3.4	Road Development Project and Surface Exposure	58
III.4	The Refined Data Collection Strategies	59
III.4.1	Cartographic sources and remote sensing	60
III.4.2	Site Reconnaissance.....	61
III.4.3	Topographic Mapping.....	62
III.4.4	Surface Collection	62
III.4.5	Site Database	63
III.4.6	Excavation.....	64
III.5	Artifact Analysis	65
III.5.1	Ceramic Analysis	66
III.5.2	INAA Sample	69
III.5.3	Beads and Other Artifacts.....	69
III.6	Summary.....	70
Chapter IV. Results of the Thala Borivat Archaeological Project.....		71
IV.1	Settlement Configuration	71
IV.1.1	Ba Doem	72
	Ba Doem: Trapeang Cluster.....	72
	Ba Doem: Brick Features	74

Thala Borivat	76
IV.1.2 Site Destruction and Archaeological Opportunities.....	80
The Mekong Bridge and National Road 9 (NR9).....	80
Small Roads in Thala Borivat	83
IV.1.3 Sambor/Sambhupura (Kracheh)	84
IV.1.4 Sambok (Kracheh).....	86
IV.1.5 Site Reconnaissance Along the River Systems	87
The Mekong.....	88
The Sekong River: Siem Pang	89
The Sesan and Sre Pok Rivers	89
Prasat Ku.....	89
Phluk.....	90
Chuor Neakta.....	90
IV.2 Systematic Surface Collection.....	91
IV.2.1 Ba Doem	91
IV.2.2 Thala Borivat.....	96
IV.2.3 Sambor.....	98
IV.2.4 Sambok	99
IV.3 Excavation.....	100
IV.3.1 Thala Borivat.....	101
Trench 1: Kang Techo	101
Trench 2: Tuol Trapeang Khnar	103
Trench 3 and 5: Tuol Trapeang Khnar	104
Trench 4: Tuol Trapeang Kak.....	106
Trench 6: O Trel.....	108
Trench 7: O Trel.....	109

Trench 8: Tuol Neakta Kang Memay	111
IV.3.2 Ba Doem	112
Trench 9: Ba Doem	112
Trench 10: Hang Savat.....	113
Soil Trench 2 and 3 in Phum Hang Savat	115
IV.4 Inscription	116
IV.4.1 Stung Treng.....	117
IV.4.2 Sambor.....	119
IV.4.3 Sambok	120
IV.5 Chronology and Chronometric Date	121
IV.6 Summary Results.....	124
Spatial Data Collection	124
Systematic Surface Collection	125
Excavation	128
Artifacts	128
<i>Chapter V. Interpretation: Early Historic Communities 200 BCE-500 CE</i>	<i>131</i>
V.1 Chronological Indices	131
V.1.1 TB Phase I (c. 200 BCE-300 CE)	132
V.1.2 TB Phase II: Transitional Period c. 300-500 CE.....	133
Industrial Ware/Pinkware	133
Buffware	135
Kendi	136
V.2 Stung Treng Early Historic Communities	137
V.3 Early Historic Economy: Production, Consumption, and Interaction.....	140

V.3.1	Ceramics and Neutron Activation Analysis	140
	Ceramic Morphology	140
	INAA Results	141
V.3.2	Beads: IA-CP-MS Analysis.....	145
V.3.3	Craft Production and Consumption	146
V.4	Emergence of Sociopolitical Complexity	150
V.5	Summary.....	152
	Communities: Settlement Patterns	153
	Early Historic Economy.....	153
	Organizational Change: Social Stratification	154
	<i>Chapter VI. Interpretation: Pre-Angkorian Communities c. 500-800 CE</i>	<i>156</i>
VI.1	Data Sources and Interpretation.....	156
VI.2	Chronological Indices	158
VI.2.1	Ceramics	158
	Stung Treng Ceramics.....	158
	Sambor-Sambok Ceramics.....	159
VI.2.2	Brick Monument	160
	Stung Treng	160
	Temple and Temple Cluster	163
	Lintel.....	163
	Statuary	164
	Sambor	165
	Sambok.....	166
VI.2.3	Trapeang/Pond	166

VI.3	Pre-Angkorian Communities of Stung Treng and Kracheh (c. 500-800 CE)	167
VI.3.1	Stung Treng Settlement	167
	Physical Setting	171
VI.3.2	Sambor Pre-Angkorian Communities (c. 500-800 CE)	174
VI.3.3	Sambok Pre-Angkorian Communities (c. 500-800 CE)	176
VI.4	Pre-Angkorian Economy	176
VI.4.1	Agriculture	179
VI.4.2	Craft Production and Consumption	181
VI.4.3	Interactions	182
VI.5	Pre-Angkorian Period Centralization	182
VI.5.1	Settlement Hierarchy	183
VI.5.2	Temple Economy and Hierarchy	183
VI.5.3	Social Stratification and Centralization	185
VI.6	Summary	187
	Communities: Settlement Patterns	187
	Economies	188
	Centralization	189
	<i>Chapter VII. Modeling the Communities and Economies of the Pre-Angkorian Mekong-3S Region</i>	<i>191</i>
VII.1	Defining the Pre-Angkorian Mekong-3S Region	192
VII.2	An Ecological Model	192
VII.2.1	Lowland: Agriculture and Fisheries	193
	Lowland Settlements	194
VII.2.2	Highland: Swidden Agriculture, Fisheries, and Forestry Resources	195

Hinterland Settlements	196
VII.2.3 Mineral Resources Exploitation	198
VII.3 Modeling the Mekong Navigation	199
VII.3.1 Implication of the Mekong Navigation.....	200
VII.3.2 The Mekong River System and their Rapids.....	201
VII.3.3 Traveler Accounts	204
VII.3.4 A Navigation Model for the Middle Mekong	209
Food and Services.....	210
Trade and Interaction.....	210
Traffic Control	211
Powerful Spirits	211
VII.4 Pre-Angkorian Mekong Navigation.....	212
VII.4.1 Archaeological Sites	212
VII.4.2 Epigraphy	214
VII.5 A Pre-Angkorian Economic Model	216
VII.5.1 A Risk Reduction Model	216
VII.5.2 An Integrated Economic System	218
VII.6 Summary.....	220
The Pre-Angkorian Settlements: An Ecological Model.....	220
A Pre-Angkorian Navigation	221
A Pre-Angkorian Integrated Economies	222
<i>Chapter VIII. Synthesis, Discussion, and Conclusions</i>	<i>224</i>
VIII.1 Settlement (Re)Configuration and Organizational Changes.....	224
VIII.1.1 Early Historic Centralization (TB II c. 300-500 CE)	226

Settlement Patterns	226
Artifacts and Economy	228
VIII.1.2 Pre-Angkorian Centralization (TB III c. 500-800 CE)	230
Settlement Patterns	230
A Pre-Angkorian Integrated Economic System.....	234
VIII.2 Discussion: Centralization and State Formation	235
VIII.2.1 From Burial to Temple	235
VIII.2.2 Socioeconomic Centralization.....	236
VIII.2.3 Political Centralization in the Mekong-3S Region	238
VIII.2.4 The Pre-Angkorian State Formation and the Roles of Temple.....	240
Communal Temple	242
Elite Temple.....	244
VIII.3 Pre-Angkorian State and Economy Viewed from the Mekong-3S Region	245
VIII.3.1 Agriculture	245
VIII.3.2 Interactions and Exchanges	246
Interactions: Navigation and Pilgrimage	246
Exchange	247
VIII.3.3 Pre-Angkorian State Finance.....	250
VIII.4 Conclusions	255
“Indianization”	258
VIII.5 Future Research and Hypotheses Evaluation	261
<i>Appendix A: Variation of Name and Acronym.....</i>	<i>265</i>
<i>Variation of Place Names</i>	<i>265</i>
<i>Acronym.....</i>	<i>265</i>

Appendix B: Supplementary Note	267
Note 1: The name Thala Borivat	267
Note 2: Topographic Map.....	267
Note 3: Additional Chronology	269
Hoabinhian, Neolithic, and Bronze Age.....	269
Angkorian Period (802-1500 CE)	270
Note 4: Sambok.....	272
Note 5: Stung Treng 1998 and 2008 Censuses	272
Note 6: Brahmadeya and Devāgraha.....	273
Appendix C: Forms.....	274
Excavation Form.....	274
LOMAP Ceramic Analysis Form	275
Thala Borivat Archaeological Project 2014 Ceramic Analysis	280
Appendix D: Site Survey.....	284
Thala Borivat Road Cuts	284
Sambok: Site Description.....	284
Phnom Sambok/Wat Chambak Meas	284
Wat Thma Kre.....	285
Summary Description New Sites Located South of Thala Borivat.....	286
Tuol Ansang	286

Tuol Meas	286
Chrang Kraham	286
Koh Sralay	286
Kang Kngaok/Hup	286
Phum Kang Dei Sa	287
<i>Trimble GPS Field Form (Data Dictionary) 2011-2014.....</i>	288
<i>Site Form 2011-2013.....</i>	291
Surface Collection Form	292
Survey Form 2014 (Desktop Version)	293
Survey Form 2014 (iPhone Version)	294
<i>Sites Accessed in Each Phase</i>	295
<i>Appendix E: Surface Collection</i>	306
<i>Stung Treng Surface Artifacts</i>	306
Stung Treng Stoneware and Tradeware: Count	306
Stung Treng Stoneware and Tradeware: Weight	307
Stung Treng Earthenware: Count	308
Stung Treng Earthenware: Weight	309
Stung Treng: Other terracotta	311
Stung Treng Miscellaneous Artifacts: Count.....	312
Stung Treng Miscellaneous Artifacts: Weight.....	313
<i>Kracheh Surface Artifacts</i>	314
Sambor Stoneware and Tradeware: Count	314
Sambor Stoneware and Tradeware: Weight	314
Sambor Earthenware: Count	315

Sambor Earthenware: Weight	315
Sambor: Other terracotta	316
Sambor: Miscellaneous Artifacts	317
Sambok Surface Artifacts.....	317
Sambok Stoneware and Tradeware: Count.....	317
Sambok Stoneware and Tradeware: Weight.....	317
Sambok Earthenware: Count.....	317
Sambok Earthenware: Weight.....	318
Appendix F: Excavation Summary.....	319
Trench 1	319
Trench 1 Summary	319
Trench 1 Artifacts.....	325
Trench 2	328
Trench 2 Summary	328
Trench 2 Artifacts.....	332
Trench 3	334
Trench 3 Summary	334
Trench 3 Artifacts.....	336
Extension Trench 5	338
Trench 5 Summary	338
Trench 5 Artifacts.....	340
Trench 4	341
Trench 4 Summary	341
Trench 4 Artifacts.....	346

Trench 6	348
Trench 6 Summary	348
Trench 6 Artifacts.....	351
Trench 7	353
Trench 7 Summary	353
Trench 7 Artifacts.....	357
Trench 8	359
Trench 8 Summary	359
Trench 8 Artifacts.....	361
Trench 9	361
Trench 9 Summary	361
Trench 9 Artifacts	365
Trench 10	366
Note on Trench 10 excavation	366
Trench 10 Summary	367
Trench 10 Artifacts.....	370
Appendix G: AMS Analysis.....	372
Appendix H: INAA Analysis	376
Appendix I: Beads Analysis	387
Brief report on beads from Thala Borivat and Sambor	389
Potash glass.....	390
High-alumina mineral soda glass	391
Mineral soda glass with varying amounts of alumina and lime	391

Lead glass	392
Discussion.....	392
References Cited for Report on Beads	395
<i>Bibliography</i>	397

List of Tables

Table I-1. A General Cambodian Chronology	21
Table I-2. Angkor Borei Ceramic Chronology coalesced with the Historical Records	23
Table I-3. Communities of the Mekong-3S region during the Early Historic and pre-Angkorian period	25
Table II-1. "Indianization" in recent perspectives	29
Table II-2. Examples of two camps of theoretical perspectives on Southeast Asian temples	32
Table III-1. Examples of surveys involving the pre-Angkorian period in Cambodia, Vietnam, Thailand, and Laos	50
Table III-2. Site classification	51
Table III-3. The project's 4-phase data collection strategies 2011-2016	59
Table III-4. Cartographic sources employed by this project	61
Table III-5. Ceramic Classification for the Thala Borivat Archaeological Project	69
Table IV-1. Earthenware, Stoneware, and Tradeware ceramics collected from the Ba Doem Region.	95
Table IV-2. Earthenware, Stoneware and Tradeware ceramics collected from Thala Borivat.	97
Table IV-3. Surface Ceramics collected along the rivers in Stung Treng during Phase 3.	98
Table IV-4. Surface collection from Sambor	98
Table IV-5. Surface collection from Sambok	99
Table IV-6. Administrative location of the 10 excavation units	101
Table IV-7. Inscriptions found in Stung Treng	118
Table IV-8. Inscriptions found in Sambor	120
Table IV-9. Inscriptions uncovered around Sambok	121
Table IV-10. Calibrated AMS samples from Thala Borivat (OxCal v4.2.4)	121
Table IV-11. Thala Borivat general Chronology (T: Excavation Trench)	124

Table IV-12. Proportions of ceramic counts from surface collection and excavation trenches	129
Table IV-13. Earthenware count and proportion in each trench (T)	130
Table IV-14. Tradeware count and proportion in each trench (T)	130
Table V-1. Kendi Context in Thala Borivat	137
Table V-2. Early Historic Sites identified within the study area; 60% of these sites contain Pinkware	139
Table V-3. Thala Borivat earthenware INAA samples and their questions	142
Table V-4. Major INAA compositional groups of the pre-Angkorian earthenware from Angkor Borei, Prohear, Cheung Ek, Village 10.8, Phum Snay, and Thala Borivat (excluding outliers)	142
Table V-5. NAA compositional groups for each Thala Borivat's ceramic type	144
Table V-6. IACPMS results of beads from Thala Borivat	146
Table V-7. Distribution of Pinkware relative to other earthenware in Trench 6 per layer.	149
Table VI-1. Type of Brick Architecture and its associated dates and characteristics based on Stark et al (2007)	160
Table VI-2. The earliest evidence of brick use in Thala Borivat	161
Table VI-3. Early Historic settlements and evidence of continuity to the pre-Angkorian period	170
Table VI-4. Stung Treng region: Settlement sizes in each occupational sequence	171
Table VI-5. Cross-tabulation between soil productivity and a 1 km zone along the rivers (shaded row). (0 represents no overlapping areas)	172
Table VI-6. Cross-tabulation between site area and elevation within the main research area (shaded row). (0 represents none overlapping pixels)	172
Table VI-7. Pixel cross-tabulation of suitable area and site area (shaded row). (0 represents none overlapping pixels)	172
Table VI-8. Sambor settlement size (roundup) [A: Angkor, PA: Pre-Angkor]	176
Table VI-9. pre-Angkorian economies based on inscriptions from Stung Treng and Kracheh within the research areas	179

Table VI-10. pre-Angkorian stratified populations based on inscriptions from Stung Treng and Kracheh within the research areas dated between 550-804 CE	186
Table VII-1. Proportion of the Mekong-3S Region pre-Angkorian sites to Soil Productivity in Cambodia	194
Table VII-2. Navigational conditions along sections of the Mekong (Meshkova and Carling 2012; MRC 2012, 2015)	204
Table VII-3. Maximum Navigable Vessel Size (DWT, based on 100m-vessel), in the Mekong Basin (Adapted from: Sar 2010; See also: Hun et al. 2016; MRC 2012, 2015). The project locations are shaded.	204
Table VII-4. Traveler accounts of the Middle Mekong Navigation from the 17 th to 20 th centuries	209
Table VII-5. Van Wuysthof's stops along the Mekong and Citrasena-Mahendravarman's Inscriptions	215
Table VIII-1. Settlement Patterns and Organizational Changes within the Mekong-3S region	226
Table VIII-2. Estimated Early Historic settlements size	227
Table VIII-3. Pre-Angkorian settlement size. *A complex consists of multiple towers is counted as 1; ** the status of temple in Hang Khou Ban is reserved; *** Sites located outside the targeted area are not included.	231
Table VIII-4. Inscriptions contain the term “ājñā vraḥ kamratān añ” (royal edict), “ge ta ckop” those who collect tax, and “ge ta dap” those who block access.	253

List of Figures

Figure I-1. Project Location and major sites mentioned in the text	1
Figure I-2. Dated pre-Angkorian inscriptions 598-803 CE	6
Figure I-3. Heat map of the pre-Angkorian inscriptions clustered within a radius of 10 km. 1. Angkor Borei, 2. Go Thap, 3. Sambor-Sambok, 4. Thala Borivat, 5. Wat Phu, 6. Sambor Prei Kuk, 7. Angkor, 8. Phimai.....	7
Figure I-4. Lintels of unknown provenience housed in the National Museum: 1) Thala Borivat tradition, 2) Sambor Prei Kuk Style (not to scale).....	9
Figure I-5. Archeological map of Sambor (Leclère 1904:740)	10
Figure I-6. Sambok, Sambor, and Ba Chong-Stung Treng written here as “ruins of church at Boatiangh”. A map by a Dutch publisher, Joachim Ottens, possibly in the 18th century. The details were probably based on Van Wusthof’s account	10
Figure I-7. The main research area in Stung Treng lies within a one-km zone along the rivers. ...	11
Figure I-8. Sambor study area (the enclosed red line following roads and footpaths) and previously known sites based on CISARK 2014.....	12
Figure I-9. Sambok 2.2 sq. km survey area and previous known sites prior to 2014	12
Figure I-10. Research area in Stung Treng. The area surrounded by a black-dotted line was the proposed study area; the areas with red borders were the accessible areas with good surface visibilities. 1) Preah Ko, 2) Ba Doem, 3) Ba Chong, 4) Sala Prambuon Lveng, 5) O Trel, 6) O Khlong, 7) Tuol Neakta Kang Memay, 8) Tuol Khtum, 9) Tuol Meas, 10) O Chrang Kraham, 11) Ubran residence.	16
Figure II-1. Settlement cluster in the Mekong delta [top] and Angkor region [bottom] (Stark et al 2015).....	40
Figure III-1. Administrative context of the project area	44
Figure III-2. Project locations (red polygons) on the Cambodia Middle Mekong.....	45
Figure III-3. Distance matrix of ponds identified in Stung Treng and Sambor.....	51
Figure III-4. A low-resolution Google Earth satellite image (c.50m resolution) used as the basis for remote sensing in 2010. Two clusters of ponds correlated with temples reported from this region: Thala Borivat cluster is the left and Ba Doem cluster is on the right.....	52
Figure III-5. The 2011 Pilot Study’s two Survey Areas based on a Topographic USGS Map 1971 53	

Figure III-6. Topographic north-south profile of the Ba Doem region showing modern habitations, rice fields, and the pre-Angkorian temples of Hang Savat, Ba Doem, and O Pongro.	54
Figure III-7. 1) A buffalo-driven plow commonly used in Stung Treng; 2) A steel blade plow at Phum Samkhuoy can churn up between 20-30cm of soil	55
Figure III-8. Rice field patterns and surface collection units of Phum Samkhuoy on a 2000s-aerial photo	56
Figure III-9. Rice field patterns of Phum Samkhuoy on Google Satellite image acquired on 10/23/2015 showing a minimal expansion toward the east despite an increase in the number of households.....	56
Figure III-10. Overgrowth of thorny bamboos and shrubs occupied the uninhabited areas of the region.....	57
Figure III-11. 1) Hand auger survey at Tuol Dei It, Phum Samkhuoy 2011; 2) burned clay observed in the bore sample; 3) burned clay from a burned tree	58
Figure III-12. Preah Ko (Prasat Boran) pre-1970s with intact upper structure (CISARK 2010)	61
Figure IV-1. Results of the 2011 Phase I in Ba Doem region showing clusters of Trapeang overlaid on Google Earth satellite image.....	72
Figure IV-2: Road cut survey (solid lines) in Stung Treng 2011's Survey Area 2 and a reported colonial planned road (dotted line) in Ba Doem in the lower right. 1) Ba Doem; 2) Hang Savat; 3) Sre Ta Pan; 4) O Khlong; 5) O Pongro; 6) Tuol Trapeang Sima.....	73
Figure IV-3. Ba Doem Complex-Left: Sketch map by Henri Parmentier (1927a: 220); Right: 2006 map by Phon Kaseka and Oum Boramey (different scale)	75
Figure IV-4. Surface collection (numbered) and features observed in the Ba Doem region during Phase I-2011 (OpenStreetMap background)	76
Figure IV-5. Thala Borivat: Sites visited during Phase I 2011.....	77
Figure IV-6. Research area for Phase II based on 1-km buffer zone along the major rivers covering most known features. Note: Survey Area 1 and 2 from Phase I was combined. 1) Preah Ko; 2) Ba Doem; 3) Ba Chong; 4) Sala Prambuon Lveng; 5) O Trel; 6) Phnom Theat; 7) O Khlong	78
Figure IV-7. Left: 2064 Elevation points (blue) acquired through Phase II total station survey within Thala Borivat. Right: A topographic map generated using ArcGIS natural neighbor triangulation from the 2064 elevation points acquired in 2011. 1) Preah Ko, 2) Khtop, 3) Phnom Prahaong, 4) Sala Prambuon Lveng, 5) Trapeang Khnar, 6) Ba Chong, 7) O Trel.	78

Figure IV-8. Brick features and surface collection units of Phase II- 2012-2013 project. 1: Preah Ko, 2: Veal Ro-il footprint; 3: Phnom Prahong; 4: Trapeang Techo; 5: Prasat Charoek; 6: Prasat Pros/Khtop; 7: Tuol Angka Khmao; 8: Sala Prambuon Lveng; 9: Tuol Trapeang Khnar; 10: Tuol Trapeang Kak; 11: Ba Chong; 12: Koh Bay Samnom	79
Figure IV-9. Left: Thala Borivat total station’s elevation points 2012 (yellow triangle) and 2014 (orange circle). Right: Natural neighbor triangulation of the 2012-2014 elevation points (satellite image source: Esri).....	80
Figure IV-10. Sites and surface collection in the Thala Borivat region during Phase III 2014.....	81
Figure IV-11. pre-Angkorian pedestal parts and a Thala Borivat lintel located within the Early Historic burial ground at Phum O Trel Krom	81
Figure IV-12. Lintel and other structural elements of a bulldozed temple, Ben Sokvat and Chrai Chantha interviewed villagers who were panning for gold and beads, and beads looted from Phum O Trel Krom in 2012.....	82
Figure IV-13. New roads and road cut in Thala Borivat 2012-2014 (S: Section; ST: Soil Trench). 1: Preah Ko, 2: Veal Ro-il footprint; 3: Prasat Pros/Khtop; 4: Trapeang Techo; 5: Phnom Prahong; 6: Sala Prambuon Lveng; 7: Tuol Trapeang Khnar; 8: Tuol Trapeang Kak; 9: Ba Chong; 10: Koh Bay Samnom.....	82
Figure IV-14. Brick masonry of three temple platforms excavated during the construction of Road 2 in 2012. 1. “Ban Son Sen”; 2. Northern edge of Sala Prambuon Lveng; 3. Southern edge of Sala Prambuon Lveng Platform	83
Figure IV-15. Road cuts within three depressions, which mark the boundaries between three temple platforms. 1. Section 5: North of Sala Prambuon Lveng, 2. Section 2: South of Trapeang Kak, 3. Section 3: Between Trapeang Kak and Trapeang Khnar.	84
Figure IV-16. Road cut Section 5 on Sala Prambuon Lveng where brick and sand foundations suggested multiple modifications of this platform. Crewmembers, Vitou Phirom and Som Thon, were drawing the eastern profile of this backhoe trench.....	84
Figure IV-17. Mounds, trapeangs, and brick features identified in Sambor during 2014	85
Figure IV-18. Sambok 2.2 sq. km survey area and sites identified in 2014 (Google Satellite background).....	86
Figure IV-19. New sites reported along the river systems in Stung Treng	87
Figure IV-20. Chuor Neakta at the confluence of the Sesan and Sre Pok.....	91
Figure IV-21. Vitou Phirom and Sok Sovannarith conducting surface collection within the rice field of Phum Samkhuoy.....	92

Figure IV-22. The 2011 crewmembers (Vitou Phirom, Lanh Udomraingsey, and Por Savatdi) conversed with a villager, conducted surface collection, and recorded a GPS position along a road ditch in Ba Doem	92
Figure IV-23. Vitou Phirom retrieved artifacts from a soil trench's wall	93
Figure IV-24. Complete ceramics on the wall of a soil trench in Phum Hang Savat.	93
Figure IV-25. An almost complete Buffware kendi from Hang Savat's soil trench and glass beads from O Khlong (photo: Alison Carter).....	95
Figure IV-26. Ceramics collected from O Trel during Phase 1. 1 & 2) Flared rim, flat-based, and bowl sherds; 3) Pinkware sherds; 4) bowl and reduced ware sherds	96
Figure IV-27. A Buffware kendi was found at Phum O Trel and donated to the district office in 2010.....	96
Figure IV-28. Beads from O Trel (Photo: Alison Carter).....	96
Figure IV-29. Locations of Excavation trenches in Stung Treng.....	100
Figure IV-30. Trench 1; 1) Brick structure located at 1.5m below the surface; 2) Crewmembers screening through each bucket of excavated soil; 3) Eastern profile showing different modification of this temple mound.....	101
Figure IV-31. Trench 1's stratigraphic profiles.....	102
Figure IV-32. Trench 2; 1) A brick structure was found on the western profile and the bottom of the trench at 250cmbd; 2) Tree branches and other plant remains were found water-logged at 220cmbd; 3) Crewmembers excavating through the muddy-clay layers.	103
Figure IV-33. Trench 2's stratigraphic profiles.....	104
Figure IV-34. Trench 3 and extension Trench 5 located on Tuol Trapeang Khnar. 1) Moul Komnet prepared the profiles for photograph; 2) Intact brick masonry on the mound's surface; 3) Brick masonry with different arrangement in Unit3/5.....	105
Figure IV-35. Stratigraphic profiles and ground plan of Trench 3 and extension Trench 5	106
Figure IV-36. Trench 4 and soil trench on Trapeang Kak (1: west profile, 2: bottom layer of unit 4, 3: brick masonry within the soil trench looking east).....	106
Figure IV-37. Trench 4's stratigraphic profiles.....	107
Figure IV-38. Trench 6: 1) A pit outline, possibly, a burial; 2) Vitou Phirom and Moul Komnet measure the stratigraphic unit; 3) Heng Halavan, Chron Monika, and Chea wet-screened for beads and other artifacts in the Mekong.....	108

Figure IV-39. Trench 6's stratigraphic profiles	109
Figure IV-40. Trench 7 at Phum O Trel Krom. 1) South profile, 2) Trench bottom, and 3) Trench 7 viewed from the north	110
Figure IV-41. Trench 7' stratigraphic profiles	110
Figure IV-42. Trench 8 of Tuol Neakta Kang Memay. 1) Grave goods were placed between and below the limbs (left and right tibia and feet were the only remaining skeleton); 2) Trench location, the lower left (or top of the burial) was cut by an oxcart road; 3) Vitou Phirom and Som Thon chiseled around the burial feature.	111
Figure IV-43. Stratigraphic profiles and ground plan of Trench 8	112
Figure IV-44. Trench 9 at Ba Doem; 1) South profile, 2) Trench crew, 3) Mak Doeung preparing to draw profile	113
Figure IV-45. Trench 9's stratigraphic profiles	114
Figure IV-46. Trench 10 at Hang Savat; 1) West profile, 2) Trench crew: Chrai Chantha and Vitou Akphivat, 3) Soil Trench 2: Som Thon and Piphah Heng cleaning profile, taking soil sample, and additional collection.	114
Figure IV-47. Trench 10's stratigraphic profile	115
Figure IV-48. East profile of Soil Trench 2 in 2011 with a depression line of ceramics (left), which suggests that there was a pond here.	115
Figure IV-49. 1) Cluster of ceramics on the southern profile of Soil Trench 3 in 2011; 2) Ceramics clusters with brick rubble and cremated bone pieces on Soil Trench 2's eastern profile at 120cm below the surface; 3) Ashes and small brick fragments after the ceramics were removed.	116
Figure IV-50. Thala Borivat's chronology (a 3000 BP AMS date is excluded): TB1 (200 BCE-300 CE), TB2-Transitional Period (300-500 CE), and TB3 (500-800 CE) (OxCal v4.2.4)	122
Figure IV-51. Sites accessed and reported during Phase III 2014 in Kracheh and Stung Treng ..	126
Figure IV-52. 1408 ha area covered by full-coverage survey. 1) Preah Ko; 2) Ba Doem; 3) Ba Chong; 4) Sala Prambuon Lveng; 5) O Trel; 6) O Khlong; 7) Tuol Neakta Kang Memay; 8) Tuol Khtum; 9) Tuol Ansang; 10) Tuol Meas; 11) Town area	127
Figure V-1. AMS dates from Stung Treng associate with the Early Historic period	131
Figure V-2. Examples of the Reducedware from Thala Borivat Trench 6 and 7	132

Figure V-3. Common Early Historic ceramic types: 1) Pedestalled ware; 2) Carinated ware; 3) Bowl from Trench 8	132
Figure V-4. Flared-rimmed and Flat-based ceramics from the disturbed context of Trench 7's Layer 1 in O Trel	133
Figure V-5. Stone beads (and one clay bead) from O Trel in a villager's possession. Some of these were reportedly sold to tourists and similar artifacts were seen on eBay listed as from Laos (Alison Carter, pers.comm.)	133
Figure V-6. Examples of the Industrial/Pinkware from Trench 6	134
Figure V-7. Early Historic sites in Stung Treng region: 1) Chrang Kraham, 2) Tuol Meas, 3) Tuol Ansang, 4) Tuol Khtum (Kang Dei Sa), 5) Tuol Neakta (Kang Memay), 6) Ba Chong, 7) O Trel, 8) Phnom O Trel, 9) O Khlong, 10) Hang Savat, 11) Ba Doem.....	135
Figure V-8. Buffware rim sherds from Trench 6 Layer 3b.....	135
Figure V-9. West-East topographic profile of the Mekong from the Early Historic site of Tuol Meas to Tuol Khtum (elevation based on the SRTM-1arc second data)	139
Figure V-10. INAA compositional groups of the pre-Angkorian earthenware from Angkor Borei, Prohear, Cheung Ek, Village 10.8, Phum Snay, and Thala Borivat (n=213; excluding outliers)	143
Figure V-11. INAA compositional groups of the Thala Borivat earthenware (n=30) by regions.	143
Figure V-12. Thala Borivat beads of different colors	145
Figure V-13. Compositional groups of the Thala Borivat beads	145
Figure V-14. 1) Bronze artifact from O Trel Trench 6/Layer 3, 2) Bronze bell from O Khlong, 3) Bronze Bell from Phum Snay (Courtesy of Yasuda 2013)	147
Figure V-15. Slags from Trench 6 were found with Pinkware sherds (Note: pink burned clay on these slags suggest that they were molten and poured on a clay or soil surface)	147
Figure V-16. Brick rubble: A&B) Trench 7 Layer 1; C&D) Trench 6 Layer 3b	147
Figure V-17. Distribution of Pinkware, Brick rubble, and Slag in Trench 7	148
Figure V-18. Artifact distribution in Trench 6	148
Figure V-19. A) 'Fluid' slags from Trench 1/Layer 2 mixed with KGG, KBG, and tradewares from Yuan-Song and a Vietnamese 'Chocolate Base-ware' dated between the 12 th and 15 th centuries CE; B) Slags from Trench 1/Layer 4C with an AMS date of 419 to 560 CE	149

Figure V-21. Sandstone object, "sword", from O Trel reportedly found with burials.	151
Figure V-20. Surface earthenware distribution among the Early Historic sites. 1) Sites located south of Thala Borivat; 2) Sites located around Ba Doem; 3) O Khlong; 4) O Trel.....	151
Figure VI-1. AMS dates associate with the pre-Angkorian period.....	158
Figure VI-2. Pre-Angkorian Red-pained ware: A) Trench 3; B) Sambor Prei Kuk (B.P. Groslier collection, NMC); C) Hang Savat Collection 032-Bufferware with red paint remains on the surface.	158
Figure VI-3. Surface ceramics from Sambor and Sambok. A) Bufferware kendi of Collection 14; B) Pinkware of Collection 14; C) Earthenware of Collection 21; D) Earthenware of Collection 26 from Sambok	159
Figure VI-4. Different Lintel Traditions from Stung Treng c. 600-1200 CE	162
Figure VI-5. The Ba Doem Complex: A survey map conducted by Phon Kaseka and Oum Boramey in 2007 (left) and a topographic map of the terrace in 2014.	162
Figure VI-6. Concentration of large temple platforms around Sala Prambuon Lveng.....	163
Figure VI-7. Distribution of the Thala Borivat lintel tradition with one medallion and two arches: 1. Thala Borivat, 2) Sambor, 3) Khong, 4) Wat Phu, 5) Attapeu, 6) Wat Supat, 7) Sambor Prei Kuk, 8) Han Chey, 9) Wat Batheay, 10) Asram Maha Reusei (Angkor Borei), 11) Phnom Chngok, 12) Phaniet/Chanthaburi	164
Figure VI-8. Surya(?) from Ba Doem	165
Figure VI-9. Torso of a Devi from Ba Doem	165
Figure VI-10. Somasūtra from Anlong Prang: the 90-degree extension of the drainage suggests that it was off-center and relates to a double-chambered configuration.....	165
Figure VI-12. SPK style lintel, possibly came from Prasat Thma Kre, housed in Wat Thma Kre .	166
Figure VI-11. Ground plan of a brick structure on Phnom Sambok (Source: Parmentier 1927: PLXCVII; CISARK)	166
Figure VI-13. Early Historic (EH) and pre-Angkorian (PA) site distributions (surface collections and temples). 1) Tuol Meas, 2) Tuol Ansang, 3) Phnom Prasat, 4) Tuol Khtum Kang Dei Sa, 5) Tuol Neakta Kang Memay, 6) O Trel, 7) Sala Prambuon Lveng & Trapeang Khnar, 8) Ba Chong, 9) Preah Ko, 10) Kantuy Ko 11) Phnom Theat, 12) Ba Doem, 13) Hang Savat. No evidence of continuity for those Early Historic sites in white circle.	167

- Figure VI-14. Cluster of brick features in Thala Borivat. 1) O Trel, 2) Ba Chong, 3) Phnom Theat, 4) Trapeang Khnar, 5) Sala Prambuon/bei Lveng, 6) Phnom Prahong, 7) Trapeang Techo, 8) Prasat Khtop/Pros, 9) Prasat Charoek, 10) Veal Ro-il foot print, 11) two collection units with kendi spouts, 12) Brick structure, possibly, corresponds to Parmentier's report of a temple with TB style lintel; 13) Brick structures of Phnom Thala/Banan; 14) Preah Ko/Boran; 15) Koh Bay Samnom; 16) Kantuy Ko; 17) Upmong. A red polygon links dated pre-Angkorian sites located at the border of the Thala Borivat group.....170
- Figure VI-15. Settlement distribution within the suitable area of high soil productivity, lower elevation, and near the rivers. 1) Tuol Meas, 2) Tuol Khtum, 3) Tuol Neakta Kang Memay, 4) Phnom Theat, 5) Ba Chong, 6) O Trel, 7) Ba Doem r, 8) Ba Chong, 9) Sala Prambuon Lveng & Trapeang Khna, 10) Preah Ko 11) Phnom Prahaong and a footprint, 12) Prasat O Pongro.173
- Figure VI-16. The Śambhupura Settlements (A: Angkor, PA: Pre-Angkor): 1) Wat Tasor Maroy, 2) Vihear Kok, 3) Kamnap Trapeang Thma, 4) Tuol Trapeang Thma, 5) Kamnap Don Meas, 6) Kamnap Trapeang Prei, 7) Kamnap Trapeang Snoa, 8) Kamnap Ta Ouk, 9) Kamnap Anlong Prang, 10) Tuol It, 11) Group of Kamnap Ta King, 12) Group of Tuol Trapeang Khnar and Trapeang Prom, 13) Tuol Trapeang Anchanh, 14) Tuol Kruos, 15) No data (modern village)175
- Figure VI-17. pre-Angkorian and Angkorian Communities in Sambok. 1) K.122 of Citrasena, 2) Wat Thma Kre, 3) Prasat Thma Kre, 4) New brick features, 5) Phnom Sambok, 6) Boeng Sambok (outlier)176
- Figure VI-18. An example of rice-chaff tempered earthenware from Trench 1/layer 4b and charred rice from Tuol Angka Khmao179
- Figure VI-19. Floral remains from Trench 2/431-641 CE. 1) Coconut husk, 2) Piece of construction wood, 3) Gourd shell (possibly, bottle gourd), 4) firewood, 5) Bamboos180
- Figure VI-20. Joint-god inferred by K.1287 from Thala Borivat and K.360 from Ba Doem if Caṇḍeśvara and Caṇḍīśvara were the same god184
- Figure VII-1. Pre-Angkorian sites located within the medium to high soil productivity zones in Cambodia. No data available for Laos but it likely possesses a medium productivity because of the well-irrigated Gleyic Acrisols soil located along the rivers. 1) Phu Malong, 2) Wat Phu, 3) Attapeu, 4) Khon, 5) Siem Pang, 6) Thala Borivat, 7) Kampong Cham Kau, 8) Sambor, 9) Sambok, and 10) Phnom Sopoar Kalei.193
- Figure VII-2. 85%of pre-Angkorian sites identified in this region are located within 1km of the rivers and on islands of the Mekong. 1) Phu Malong, 2) Wat Phu, 3) Attapeu, 4) Khon, 5) Siem Pang, 6) Thala Borivat, 7) Kampong Cham Kau, 8) Sambor, 9) Sambok, 10) Phnom Sopoar Kalei, 11) Lboek Srut and Preah Theat Khvan Pir.195

Figure VII-3. Map of government licensed mining areas in northeast Cambodia from 1995 to 2014 compiled by Open Development Cambodia. 1) Phu Malong, 2) Wat Phu, 3) Attapeu, 4) Khon, 5) Siem Pang, 6) Thala Borivat, 7) Kampong Cham Kau, 8) Phnom It, 9) Sambor, 10) Sambok, 11) Phnom Sopoar Kalei, 12) Lboek Srut, 13) Preah Theat Khvan Pir, 14) Angkorian inscription of Koh Mayol, 15) Tak Nang, 16) Yang Prong. (15 and 16 are Cham temples c. 9 th -14 th centuries CE).....	199
Figure VII-4. Riverbed elevation of the Mekong from Chiang Saen to Phnom Penh, adapted from (Halls et al. 2013:46).....	201
Figure VII-5. Sections of river traffic. 1) Pakse-Khon, 2) Khon-Stung Treng, 3) Stung Treng-Krachech, 4) Kracheh-Kampong Cham, 5) Kampong Cham-Phnom Penh, 6) Phnom Penh-Vamnau (Mekong), 7) Vamnau-South China Sea (Mekong), 8) Phnom Penh-Vamnau (Bassak), 9) Vamnau-South China Sea (Bassak), 10) Phnom Penh-Kampong Chhnang, 11) Kampong Chhnang-Siem Reap, 12) Stung Treng-Siem Pang.	202
Figure VII-6. Boats with bamboo platform, staffed by 6 to 10 persons, designed to go through rapids with the help of oars, gaffe with iron hook, and ropes. The scene here possibly depicted the Preah Patang rapids north of Sambor (Garnier 1885:73).....	205
Figure VII-7. Locations of the Thala Borivat Style lintels with one medallion and two arches (triangle) and the inscriptions of Bhavavarman I and Citrasena-Mahendravarman (square). 1) Phaniet, 2) Banteay Mean Chey, 3) Ta Phraya , 4) Khao Rang , 5) Chong Sra Cheng, 6) Phimai, 7) Si Thep, 8) Khon Kaen, 9) Roi Et, 10) Wat Supat (Ubon), 11) Khan Tewda, Tham Prasat, Pak Don, and Phu Lakhon, 12) Phu Malong, 13) Ban Heui Na, 14) Wat Phu, 15) Attapeu, 16) Nong Sombat, 17) Khong, 18) Thala Borivat, 19) Sambor Prei Kuk, 20) Sambor, 21) Sambok, 22) Phnom Sopoar Kalei, 23) Han Chey, 24) Ba Theay, 25) Āḍhyapura/Prei Veng, 26) Angkor Borei (Asram Maha Reussei), 27) Phnom Chngok.....	213
Figure VIII-1. O Trel and O Khlong: Collection size and estimated settlement size	227
Figure VIII-2. Early Historic settlement size	227
Figure VIII-3. Early Historic settlement size in Stung Treng c. 200 BCE-500 CE	228
Figure VIII-4. Pinkware settlement size c. 300-500 CE	228
Figure VIII-5. Pinkware settlement size located on the confluences.....	229
Figure VIII-6. Stung Treng pre-Angkorian settlements	231
Figure VIII-7. Site size grouped into three large clusters. * Possibly, form a separate cluster...	232
Figure VIII-8. Left: number of temples within a settlement cluster; Right: temple density per square km	232

Figure VIII-9. Left: number of trapeang within a settlement cluster; Right: trapeang density per square km (*a separate settlement located east of the Early Historic site of O Khlong) ...233

Figure VIII-11. A. Relationship scheme between the community, temple, elite, and the state, B. Centralization occurs when the spheres of these four entities greatly overlapped, i.e., the communities and the elites merged with the temples and the state easily asserts direct power via this new entity254

Chapter I. Introduction, Research Problem, and Rationale

I.1 Introduction

By the mid-first millennium CE, large population centers established throughout the Mekong Basin emerged as legible polities in Cambodia's history (Figure I-1). Across Southeast Asia (SEA, hereafter), this phenomenon coincided with the appearance of a suite of new traditions including brick architectures, elaborate Indic statuary, and Sanskrit and vernacular inscriptions associated with these new structures. The temples became the epicenters of these

polities. Models based broadly on externally-stimulated and internal developments have been used to explain the nature and function of these early states. The first category model emphasizes the role of Indic religious and political ideology (universal monarch), as well as

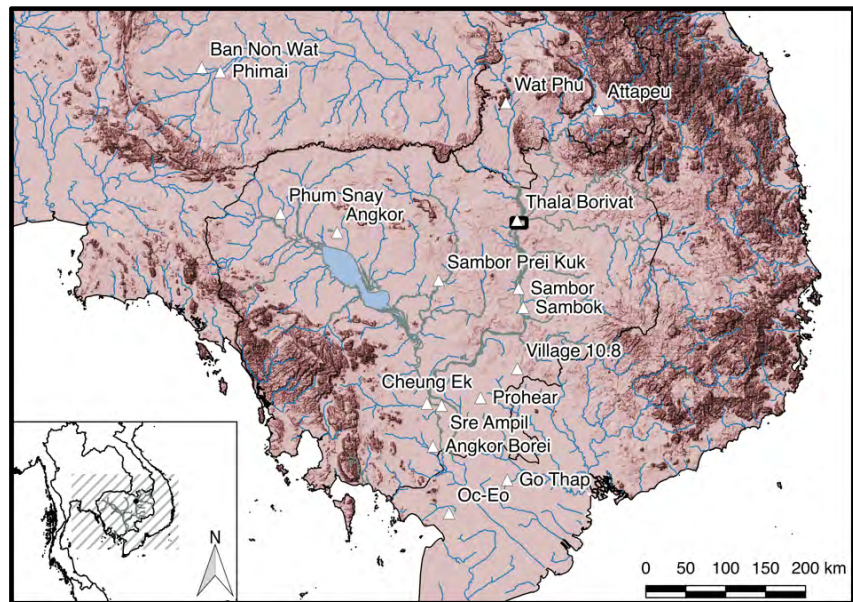


Figure I-1. Project Location and major sites mentioned in the text

writings, on early SEA societies (e.g., Christie 1995; Kulke 1990; Tambiah 1977; Wolters 1999a). The latter emphasizes the role of trade networks or agriculture in consolidation of wealth and power among the local elites as well as the dissemination of knowledge across the region. One of such models is the “*embryonic Asiatic state*” used to interpret the pre-Angkorian inscriptions, which emphasizes the reorganization of the agrarian economy based on lineages, gods, temples, and temple economy as the sources of the pre-Angkorian political power (Vickery 1998).

Archaeological research has repudiated the outdated model of “Indianization” and revealed that complex sociopolitical organizations predated the evidence of Indic religions and ideologies. Political economy models emphasizing trade—associated with prestige goods and

ritual economy—and agrarian economies become the preferred political economic models to explain the nature of these early polities (see Stark 2006). Fundamentally, all models converge and emphasize the role of Indic religions, cosmologies, ideologies, and their temple institutions in ritual economies (through prestige goods), surplus extraction, and in legitimizing early SEA rulers. The pre-Angkorian epigraphy c. 5th-9th century CE informed us about the Indic gods, temples, temple economy, elites and other sociopolitical classes who supported them. What was the role of temple and its Indic religions in forging Cambodia's early polities, and how does a political economy framework inform our knowledge of the pre-Angkorian period?

Nature of Data. The nature of the Cambodia's early polities remains obscure mainly due to the incomplete dataset (archaeological and historical data) pertaining to the transitions between the Early Historic “societies/polities” and the pre-Angkorian polities. A c. 200-year-gap of data between 400 and 600 CE creates uncertainties as to what extent the forward extrapolation from the archaeological mortuary data (e.g., Higham 2016) or the backward extrapolation from the historical data (e.g., Vickery 1998) is sufficient in explaining the pre-Angkorian state formation processes. This gap in data contributes to the debates on whether external or internal stimulations were responsible for the pre-Angkorian state formation and ultimately, on primary and secondary state formation processes as well as the role of Indic religious ideology.

Archaeological research, based on settlement patterns and political economy, in a pre-Angkorian center of Angkor Borei produce the most complete dataset that underlines continuity from the Early Historic communities to the pre-Angkorian polities (e.g., Stark 2016; Stark and Bong 2001). This dissertation research investigates whether similar process occurred in Thala Borivat and Sambor, two of the pre-Angkorian centers located on the Cambodia's Mekong River further north. Historians argue that the Thala Borivat center was part of a broader pre-Angkorian system that included multiple polities across the lower Mekong region (for review, see Lavy 2004, 157–63); to date, archaeologists have not participated in this discussion. Did these contemporary centers evolve independently and ultimately get absorbed by a dominant pre-Angkorian center? Or, did they coevolve through intensified interaction?

This study explores the role of temple, temple economy, and settlement configuration in early Cambodia's organizational change and state formation. Organizational changes associated with demographic, political, economic, and ideological centralizations occurring during the transition from the Early Historic to pre-Angkorian period are examined using a political economy model that blends a documentary-based temple economic model, as interpreted by historian Michael Vickery (1998), with archaeological regional settlement studies. This archaeological model provides a time-depth perspective on changes in settlement patterns, economy, and sociopolitics as proxies to state formation occurring between 200 BCE to 800 CE. This project analyzes the distribution of temples and artifacts in two of the pre-Angkorian centers of Thala Borivat and Sambor through surface mapping and collection, test excavations, and GIS-based analysis. This corpus of techniques is employed to investigate the pre-Angkorian communities, resource exploitation, temple economies, interactions, exchange, and the role of Indic religious ideologies via their temples in the pre-Angkorian organizational change.

The sociopolitical complexity in Thala Borivat and Sambor post-dated what occurred in the Mekong delta. However, parallel to the Mekong Delta, this sociopolitical complexity predated the evidence associated with temples and their Indic religions. Agrarian economy, trade, and social stratification also continued from the protohistoric into the pre-Angkorian communities. Yet, the major organizational shift associated with settlement expansion as well as economic and cultural integrations coincided with the appearance of temples. This evidence suggests that ideological shift was a major factor beside the demographic and economic centralizations. The appearance of some of the earliest inscriptions belonging to the pre-Angkorian rulers found associated with the temples of this region, also implies that political centralization occurred with or soon after the ideological shift.

I.2 Research Questions

Current archaeological data suggest a gradual evolution or transformation of the Iron Age burial sites dating from 200BCE to 300 CE into the sites of pre-Angkorian Hindu/Buddhist religious architecture (e.g., P. Heng 2016; Stark 2016). Historical data suggest that pre-Angkorian religious institutions were the locus of social evolution and that their temple economies mirrored those of the communities and elites who endowed them. Religious

institutions, i.e., the temples, are the index separating the Early Historic from the pre-Angkorian period. The temple institution has been primarily studied and interpreted based on textual and art/architecture historical data. Using archaeological strategies to study the role of religious institution blends materialist and ideological approaches and provides a holistic research strategy by examining: 1) organizational change at the local community level through settlement patterns, 2) relationships between different communities or centers and their respective economic patterns through a range of shared artifacts.

This research emphasizes the role of religious institutions in the organizational change, which led to the formation of the pre-Angkorian state based on data from Thala Borivat and Sambor. Archaeological strategies complement and extend our documentary and art historical knowledge of the pre-Angkorian period by allowing us to ask the following questions of the archaeological record:

- 1) In what ways is the process of organizational change from the Early Historic to pre-Angkorian period materialized in the archaeological record?
- 2) What were the driving forces behind this organizational change? What was the role of temple and temple economy in this organizational change?
- 3) What were the pre-Angkorian economic systems based on the pre-Angkorian Mekong centers?

The following section summarizes the historical background of the pre-Angkorian period and its prominent centers in the Middle Mekong region.

I.3 The Pre-Angkorian Period: Background

The history of pre-Angkorian early polities revolve around two polities, which the Chinese accounts called Funan (?-7th century CE) and Chenla (7th-9th century CE). Whether Funan was an “empire”, a confederation of multiple polities, or whether Chenla was the direct descendant of Funan is uncertain due to the ambiguity within the Chinese accounts as well as sparse internal records. Historians have warned about the application of the terms Funan and Chenla to reconstruct the Cambodian history due to errors and inconsistencies in the Chinese records (Jacques 1979; Vickery 2003). This research designates the period from c. 500 BCE to 500 CE as the “Early Historic” Period and from c. 500 to 800 CE Pre-Angkorian period. The terms

Funan and Chenla are used to refer to polities of the Mekong Delta and the north respectively assuming that there were contemporary and competing polities.

Complex sociopolitical organizations emerged during the Early Historic or the Iron Age communities extending from northeast Thailand to the Mekong Delta, and possibly, the Cambodia's Terre Rouge (e.g., Albrecht et al. 2000; Dega 1999; Haidle 2001; Higham 2015; Stark 2003a). Some of these communities were circular moated settlements concentrated in northeast Thailand but also found south in the Angkor region (e.g., O'Reilly and Scott 2015; O'Reilly and Shewan 2016). In the Mekong Delta, the Angkor Borei moated settlement marked the epicenter of the interconnected regional settlement systems of the Early Historic (Stark 2016). Archaeological artifacts, settlement systems, and documentary records provided by sites associated with this period suggest an economy dependent on trade interactions and intensive wet rice agriculture (Carter 2015; J. Fox and Ledgerwood 1999; Stark 2006a, 2006c; Van Liere 1980; Vickery 2003).

Due to sparse internal documentary records and archaeological data the Chinese accounts available from the 3rd century CE have been used to explain the nature of this state (see review in Vickery 2003). The development of the international maritime trade networks linking China to India and the Mediterranean was the main contributing factor to the formation of Funan (e.g., Coedès 1968; Pelliot 1903; Vickery 1998; Wolters 1967). The Chinese accounts from the 3rd century CE recorded early rulers as having the title *Hun* and *Fan*. By the 5th century CE, the ruler names in Chinese renditions match the Indic ruler title with suffix *-varman* recorded in a few internal inscriptions attributed to this period (Vickery 2003).

By the pre-Angkorian period, during the 7th century CE, the Chinese accounts claimed that another polity called Chenla from the north replaced Funan and the power shifted inland to the capital city of *Īśānapura* in Sambor Prei Kuk [SPK, hereafter] (Coedès 1968, 65–66; Jacques and Lafond 2004, 68–69). In contrast with the Early Historic period, historical and arthistorical studies eclipse the archaeological research because of the pre-Angkorian's rich epigraphic and arthistorical data. There has been little archaeological research has been made in the pre-Angkorian centers outside Angkor Borei (e.g., Chevance, Bâty, and Seng 2013; P. Heng 2012; Kubo et al. 2012; Pottier 2006a; Pottier and Bolle 2009). Local documentary records

in both Khmer and Sanskrit became more common during the pre-Angkorian period. Over 300 pre-Angkorian inscriptions dated between the 5th and 9th centuries have been recorded; only a quarter of them contains dates after 598 CE (Figure I-2) (Billard and Eade 2006; CIK 2017; Pou 2002; Vong 2010).

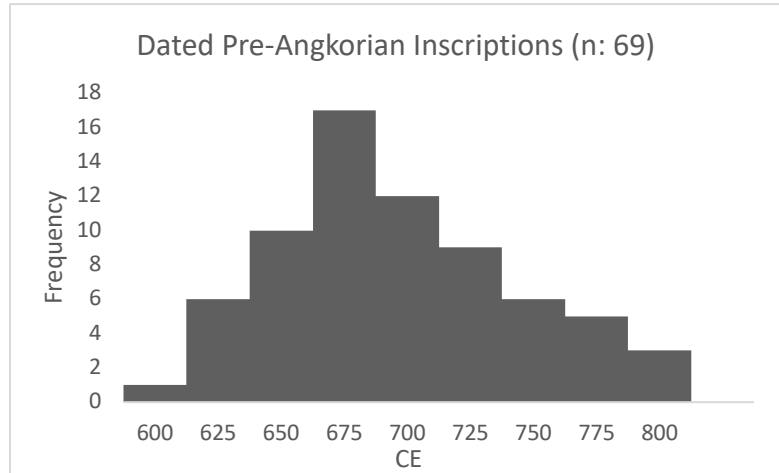


Figure I-2. Dated pre-Angkorian inscriptions 598-803 CE

The pre-Angkorian inscriptions record named rulers, endowments made to Hindu/Buddhist temples, temple economies, complex population divisions, but seldom political records. The elites, some of whom held state office, commonly bore the titles *Poñ* and *Mratāñ*. Based on these inscriptions, the pre-Angkorian economy was predominantly agrarian and temple economy formed the base for surplus extraction (Coedès 1968; Jacob 1993a; Jacques 1986; Vickery 1994, 1998). It is unclear, however, whether the recorded social stratifications continued directly from the stratified Early Historic societies inferred from the mortuary data; or, whether the pre-Angkorian *Poñ* was the same as the *Fan* Early Historic rulers of the Chinese accounts. Nonetheless, the economic resources (rice field, rice, draft animals, economic trees, workforces, etc.) possessed by these elites and recorded as endowments to the temples suggest continuity from the Early Historic economy informed by the mortuary data (Higham 2016:436-437).

Even though the political power shifted northward during the pre-Angkorian period, the inscriptions remained concentrated within the Delta, around the Early Historic centers in Ta Keo and Kampong Speu. These concentrations suggest that large populations remained in the south and that major concentrations coincided with the known pre-Angkorian centers (Figure I-3). Few of these pre-Angkorian centers have been identified outside the Mekong Delta; they include Thala Borivat, Sambor-Sambok, Wat Phu, Sambor Prei Kuk, and Angkor.

I.4 Major Northern Pre-Angkorian Centers

Historians place the original centers of Chenla polity during the Early Historic period in Wat Phu (Laos) or Thala Borivat prior to relocating south to *Īsānapura* (Bénisti 1968; Jacques and Lafond 2004: 67-79, Lévy 1970). Its early kings, *Bhavavarman I* (c. 550-600 CE) and *Citrasena-Mahendravarmān* (600-616 CE), left inscriptions

along the Mekong and Mun river systems (see Chapter VII.). Six of these inscriptions are located along the Mekong from Kracheh, Stung Treng, Wat Phu. These early kings have been called the “Dangrek Chieftains” whose center was at *Īsānapura* (Vickery 1998:71) and their territories seemed to overlap the distribution of the Thala Borivat lintel tradition (Woodward 2005, 45). Large pre-Angkorian centers discussed in this research include SPK, Wat Phu, Thala Borivat, and Sambor.

I.4.1 Sambor Prei Kuk (*Īsānapura*)

The 7th century CE Chinese accounts referred to the pre-Angkorian capital city as *I-she-na*, which corresponds to the epigraphic records of *Īsānapura*. This city reportedly contained more than 20,000 families (Coedès 1968: 71-76; Briggs 1951: 49). It is identified with Sambor Prei Kuk, located in central Cambodia, which comprises a large ceremonial complex surrounded by a dense residential district. This center is characterized by more than 250 brick monuments and 1500 trapeang (ponds) covering an area of approximately 60 square kilometers (Heng 2012). SPK, commonly associated with *Īsānavarman* (c. 616-635 CE), was the seat of the pre-Angkorian polity from at least 598 CE and lasted until c. 652 CE when the capital was moved to the Angkor region by *Jayavarman I* (c. 652-680 CE).

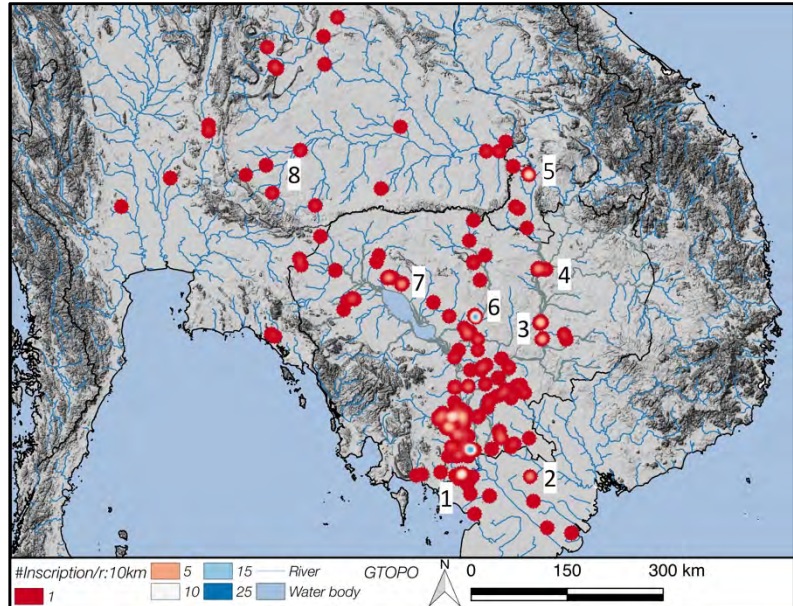


Figure I-3. Heat map of the pre-Angkorian inscriptions clustered within a radius of 10 km. 1. Angkor Borei, 2. Go Thap, 3. Sambor-Sambok, 4. Thala Borivat, 5. Wat Phu, 6. Sambor Prei Kuk, 7. Angkor, 8. Phimai

I.4.2 Wat Phu (*Lingapura/Sresthapura*)

Based on internal and external documents Wat Phu is regarded as the early pre-Angkorian capital of Chenla before it was moved to *Tśānapura* (Coedès 1918, 1–3, 1968, 65–66; Jacques and Lafond 2004, 68–69). Wat Phu is located in Champassak province (Laos), and is well-known due to its Angkorian structures and a series of pre-Angkorian and Angkorian inscriptions (e.g., Coedès 1968; Parmentier 1914; For a summary of research history of Wat Phu, see: Lorrillard 2013). One of the earliest inscriptions, K.365 dated to the 5th or 6th century CE, records the merits of a king named *Devanika* (Coedès 1956; Griffiths 2014). Recent research suggests a relationship between the early brick architecture of this area and *Mahendravarman* (600–616 CE) and his family (Lorrillard 2014, 206; Santoni and Hawixbrock 1998, 388, 1999, 400–401). Lintel of the Thala Borivat tradition have also been found from this area (see: Bénisti 1968; Lorrillard 2014; Santoni and Hawixbrock 1999).

I.4.3 Thala Borivat (*Nāgasthānapura*)

Some scholars suggest that Chenla’s capital was at Thala Borivat (e.g., Bénisti 1968; Lévy 1970; Woodward 2005). Yet, despite being located between two major pre-Angkorian centers of Wat Phu and Sambor, only four inscriptions were uncovered from Thala Borivat prior to the 1990s. Henri Parmentier (1927a, 1:214) argues that Thala Borivat was an “autonomous Khmer primitive art center.” Inventory surveys documented a series of brick religious monuments in Thala Borivat and Ba Doem (Aymonier 1901, 75–181; Lajonquière 1907, 56–64; Parmentier 1927a, 1:214–30, 1937, 624). An inscription, K.359 of *Bhavavarman I*’s (c. 550–600 CE) family is the second earliest record of Hindu religious texts of *Mahābhārata*, *Rāmāyaṇa*, and *Puraṇa* besides K.365 from Wat Phu (Barth 1885, 28–31).

Thala Borivat monuments are characterized by a double-chambered tower and a lintel tradition having only one central medallion connected to two intricately carved arches disgorged by two inward facing *makaras* (Figure I-4). The closely related lintel style is that of Sambor Prei Kuk, which has three medallions and four arches. The relative date of this tradition has been debated as to whether it pre-dated (Dalet 1944, 40) or post-dated SPK style (Dupont 1952, 67). Its ‘style’ status (i.e., a distinctive style or variation of SPK style) remains unresolved.

Mireille Bénisti (1968, 95) was skeptical of a 'style' status for Thala Borivat yet, dated this lintel tradition to the end of the 6th century CE due to similarities with the contemporary Indian lintel tradition. She associated this tradition with *Bhavavarman I* (c. 550-600CE) and suggested that Thala Borivat was the pre-Angkorian center of *Bhavapura* (for



Figure I-4. Lintels of unknown provenience housed in the National Museum: 1) Thala Borivat tradition, 2) Sambor Prei Kuk Style (not to scale)

discussion about this center see Vickery 1998:337–339, and Appendix B: Note 1 on the name Thala Borivat). This research uses the term “Thala Borivat lintel tradition” to refer to a variation of lintels having only one medallion and two arches, most of which concentrated in Thala Borivat.

I.4.4 Sambor (*Śambhupura*) and Sambok

Sambor (or *Śambhupura* recorded in an Angkorian inscription K.125/1001CE) became a major pre-Angkorian center during the 8th century CE based on K.124/803 CE, which traces four generations of rulers beginning with a king followed by three successive queens (Jacobsen 2003; Vickery 1998:379–381). Sambor refers to a cluster of brick structures, inscriptions, lintels, and statuary located along the Mekong river c. 50km south of Thala Borivat (Lajonquière 1902, 186–92; Leclère 1904) (Figure I-5). This area is marked by many large and small islands in the Mekong, some of which have brick architecture, and the largest series of rapids in Cambodia. The inscriptions and lintel traditions uncovered from here suggested that this center was contemporary and interacting with Thala Borivat along the Mekong (Parmentier 1927a). The area was known in an 18th century map as “Village of Rapids” (Ottens 1700s) (Figure I-6).

Another important pre-Angkorian settlement, Sambok, is located on the Mekong river at 20km downstream from Sambor and c. 5km below the first largest rapids called Kampi or Sambok. It is known for the *Citrasena* inscription K.122, which pre-dates c. 600 CE when he took the coronation name of *Mahendravarman*. It was written on a boulder submerged in the Mekong. Sambok was the second most important center in this area, after Sambor, during the post-Angkorian period and was popularized by the foundation chart of Wat Sambok (Leclère 1903) and the Dutch travel account by Van Wuysthoff (Kersten 2003; Van Wuysthoff and Garnier 1871). Sambok was featured with Sambor in at least two 18th century maps one produced by a Jesuit mission of Louis XIV (Chatelain 1719) and the other by a Dutch cartographer (Ottens 1700s), both of which were likely based on Van Wuysthoff's accounts.

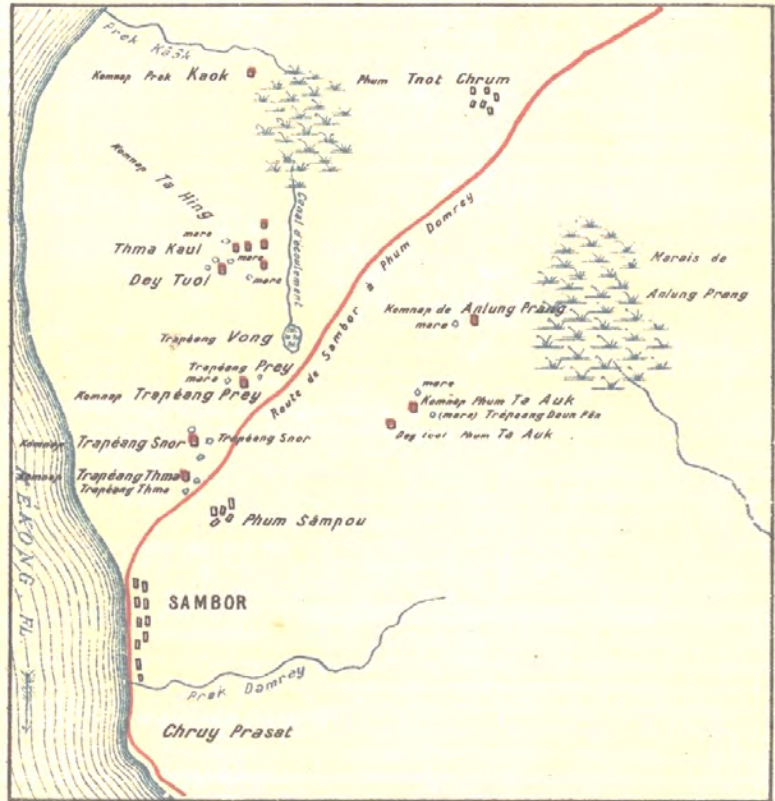


Figure I-5. Archeological map of Sambor (Leclère 1904:740)



Figure I-6. Sambok, Sambor, and Ba Chong-Stung Treng written here as “ruins of church at Boatiangh”. A map by a Dutch publisher, Joachim Ottens, possibly in the 18th century. The details were probably based on Van Wusthof's account

I.5 Research Area

The centers of Wat Phu, Thala Borivat, and Sambor are located within a different physical settings (e.g., higher elevation, narrow channels, islands, and rapids) of the Lower Mekong where the major hydrological contribution come from the Sekong, Sesan, and Sre Pok basins referred to as the 3S basins (Constable 2015; MRC 2003, 2005, 9). This dissertation project refers to this study area as the Mekong-3S basins.

This research examines organizational changes from the Early Historic period (200 BCE-500 CE) to the pre-Angkorian period (CE 500-800) from the perspective of the pre-Angkorian centers of Thala Borivat (Stung Treng) and Sambor (Kracheh). Based on the art historical and epigraphic data, the early phases of Thala Borivat, Sambor, and Sambok date firmly to the pre-Angkorian period. The distribution of some of the earliest inscriptions, statuary, lintels, and architectural decorations along the Mekong, Sekong (Attapeu, see: Lorrillard 2014, 208–9), and Sesan, suggests that the pre-Angkorian populations were interacting via the Mekong, Mun, Sesan, and Sekong. Inscriptions of this region recorded some of the earliest pre-Angkorian rulers and associated them directly with the dynasty that ruled in SPK. This region, thus, offers a prime location for research on the formation of the pre-Angkorian state outside the Mekong Delta. In Stung Treng, the two known clusters of pre-Angkorian religious monuments of Thala Borivat and Ba Doem offer

an ideal intensive testing ground between large and small ceremonial centers and their associated settlement configurations (Figure I-7).

The research in the contemporary settlements of Sambor and Sambok provides a comparative dataset for the similarities

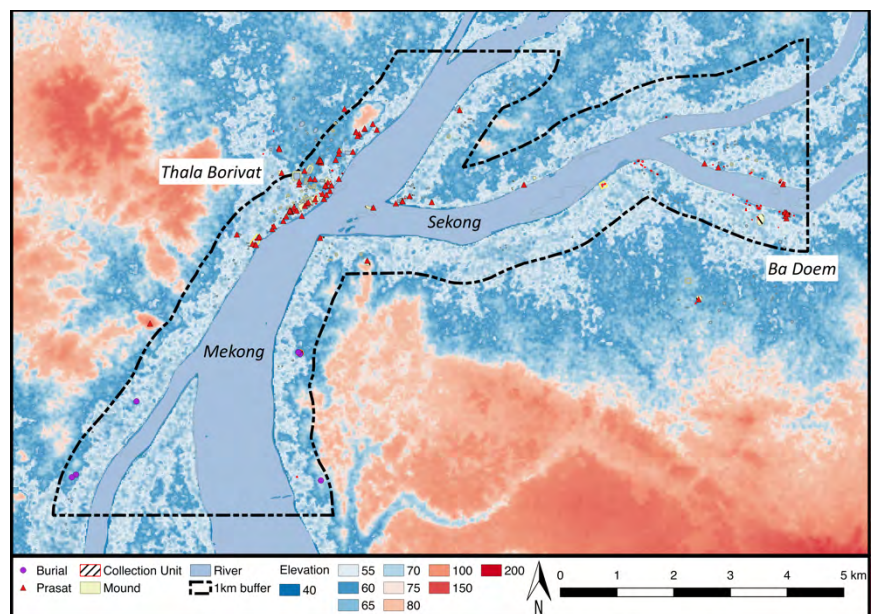


Figure I-7. The main research area in Stung Treng lies within a one-km zone along the rivers.

and differences between the settlement configurations of the Mekong. The results also include evidence for organizational change and interactions (**Error! Reference source not found.** and **Error! Reference source not found.**).



Figure I-8. Sambor study area (the enclosed red line following roads and footpaths) and previously known sites based on CISARK 2014

The research areas are situated within a barely navigable portion of the Mekong where rapids and rock outcrops characterize the river morphology upstream (Figure I-1). This key location provided the pre-Angkorian communities with ready access to myriad resources (e.g., agriculture, aquaculture, forestry, and trade) and services to travelers (e.g. accommodation, place of worship, food, guide, boat, and trade goods). The post-Angkorian accounts suggested that this strategic location allowed the local communities and elites to control the flow of trade goods, mineral extractions (gold and iron), and contacts with the tribal groups of the highlands.

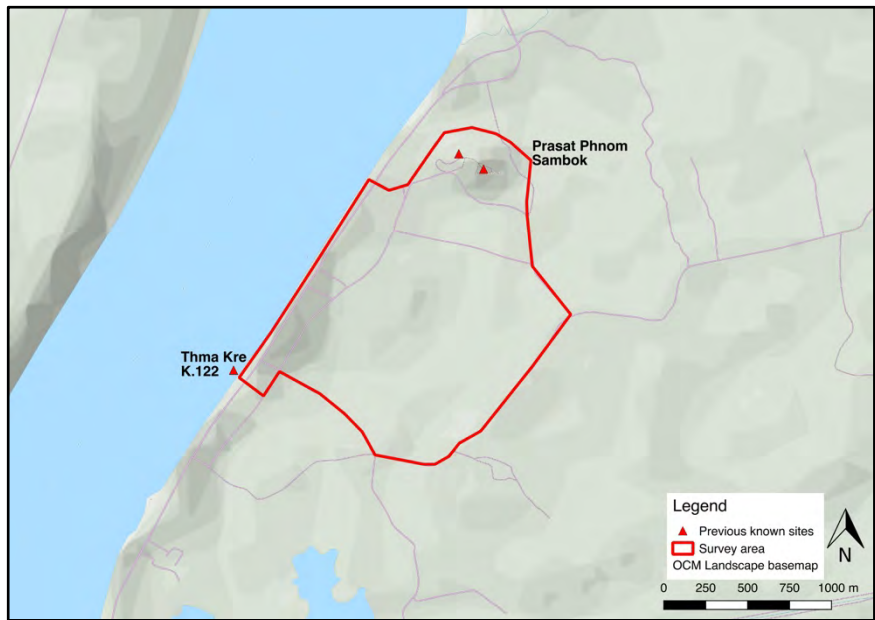


Figure I-9. Sambok 2.2 sq. km survey area and previous known sites prior to 2014

I.6 Data Sources, Proxy Measures, and Analytical Procedures

Studying pre-Angkorian political economy requires a different approach to previously-used frameworks for Island SEA emphasizing a trade-based model in which external forces stimulate the internal growth of sociopolitical complexities (e.g., Junker 1993, 1999). Archaeologists generally rely on middens and mortuary data patterning (e.g., personal ornaments and mortuary offerings) to infer sociopolitical differences in a population, particularly of the prehistoric period (e.g., Haidle 2001; O'Reilly 2003; O'Reilly and Shewan 2015a; Reinecke, Vin, and Seng 2009; Yasuda 2013). However, most pre-Angkorian settlements lack these data sources and instead contain monumental architecture; residential areas and their middens remain elusive, and the modal mortuary practice involved cremation. Most prestige goods from the pre-Angkorian periods are associated with corporate religious activities (e.g., religious sculpture, and ritual paraphernalia, etc.), rather than with elite individual interments (e.g., Le 2006, 2007, 2011; Slaczka 2012; Stark 2006a, 2006c). Hence, settlement patterns, temples, and utilitarian commodities (earthenware ceramics) are the main data sources available to study the political economy of the pre-Angkorian period.

Understanding organizational shift and the process of the state formation requires data collection in three primary domains a) historical and ethnohistorical data; b) artifact data and controlled chronology; and c) settlement data. Information acquired from each data category is compiled into multiple GIS layers that can be combined to produce a holistic perspective of settlement evolution, economics and politics of the area, and organizational change.

Historical and Ethnohistorical Data

Historical and ethnohistorical data from different periods also provide an important comparison to the archaeological data. Historical and ethnohistorical data are used as baseline information to reconstruct the region's long-term history and political economy. These data include inscriptions, and historical accounts concerning the political economy of the period, geophysical settings, ethnohistorical (primarily colonial) accounts of settlement, navigation, and the political and economic potential of the area (e.g., Aymonier 1895; Garnier 1885; Garnier and Delaporte 1996; Guérin 2001; Guérin and Chhom 2014). Ethnohistorical data also provide a recent Cambodian settlement template to compare and contrast with the historical and

archaeological settlement patterns and their associated political economies (Ebihara 1977; Delvert 1961; Stark 2006c; Vickery 1998).

The inscriptions suggest that the pre-Angkorian temple economy mirrors that of the communities and elites who endowed them, and that temple economy was practiced throughout the pre-Angkorian world. The presence of a temple is, thus, proxy to its temple economy and supporting communities, elites, and their economies. The ethnographic data also support this hypothesis where large and rich communities can afford to have more temples; while small and poor communities could barely afford to have one (Delvert 1961:214-215). Cross-cultural analysis of the temple economies in Mesopotamia and South Asia also provides a comparative framework to understand the relationship between the communities, their sociopolitical economies, and the temples (e.g., Baines and Yoffee 1998; Coningham 2001; Fogelin 2006; Ray 1986; Shaw 2013; Singh 1996; Trigger 2003; Willis 2009).

Artifact data

This research uses artifact data as proxies to technological evolution, interaction, integration, specialization, and chronology. For instance, the degree of shared technological traditions such as ceramic traditions or artistic traditions implies interaction, exchange, and social integration between two or more regions. B.P. Groslier (1981, 14–15) reported fine-paste earthenware ceramics from Sambor Prei Kuk, and these “fine Buffware” have been described and dated from the Angkor Borei settlement. Other ceramics such as the Reduced ware and Fine Orangeware have been reported from Angkor Borei and the Mekong Delta (Bong 2003, 233–36; Fehrenbach 2009; Stark 2000, 77–80, 2003b, 219–20). Dating Thala Borivat deposits with these ceramics bracket the use history of Buffware in this northern region. If the artifact assemblages are contemporary, then finding similarities between them could indicate interaction between the centers or integration into a single polity. Conversely, identifying discrete artifact assemblages could suggest independent development among pre-Angkorian polities in the lower Mekong basin.

Controlled chronology and ceramic analyses use both excavation and surface survey materials. AMS dating and ceramic chronology are compared with records from Angkor Borei (Fehrenbach 2009; Stark et al. 1999; Stark 2000). Thala Borivat yields ceramics types

comparable to other settlements in Cambodia dated to the Early Historic and pre-Angkorian period. These data provide a diachronic perspective of local settlement evolution as well as interaction patterns (e.g., trade or shared culture), based on comparison of material culture between this area and other contemporary centers.

Settlement pattern data

Location-based models and artifact analysis are used to analyze the spatial patterning of temples and to infer their economic potential such as control over productive agricultural lands (informed by contemporary inscriptions as well as historical data) as well as control over the flow of trade goods and people. Few mainland Southeast Asian archaeologists have undertaken settlement pattern studies to investigate early settlement systems (e.g., C. Evans, Chang, and Shimizu 2016; Mudar 1993; Stark 2006c; Stark et al. 2015; Welch 1989; Welch and McNeill 1991). Only three such projects have been done in Cambodia: one in the Mekong Delta and two in the Angkor Region (D. Evans 2007; Gaucher 2003; Hendrickson 2007; Stark 2006c). Research in both areas recorded features associated with habitation settlements, but defining ancient settlements remains problematic. This project examines the evolution of the settlement systems using archaeological features (e.g., ponds, mounds, temples, and surface artifacts) and ecological variables such as soil types, current farmlands, elevation, and river systems. The role of different economic strategies, organizational change, and ultimately, state formation is suggested based on the results of these data.

The region's low surface visibility, lack of a ceramic chronology and a reliable site inventory, and the sensitivity of using shovel test probes hindered the planned methodological transfer of the systematic pedestrian survey inspired by research outside Cambodia (e.g., Drennan et al. 2003; Drennan and Peterson 2006; Parsons, Hastings, and Matos Mendieta 2000; Peterson and Drennan 2005; Sanders, Parsons, and Santley 1979). This research relied instead on GPS mapping and a targeted total-station-based topographic mapping to identify and map all archaeological features (see also: Stark 2006c). A series of surface collection surveys that followed surface disturbances (e.g., road construction, domestic activities, and water-born erosion) were made concurrently with the mapping survey, complemented by examinations of looted Early Historic burial sites or temple sites reported by the villagers inside

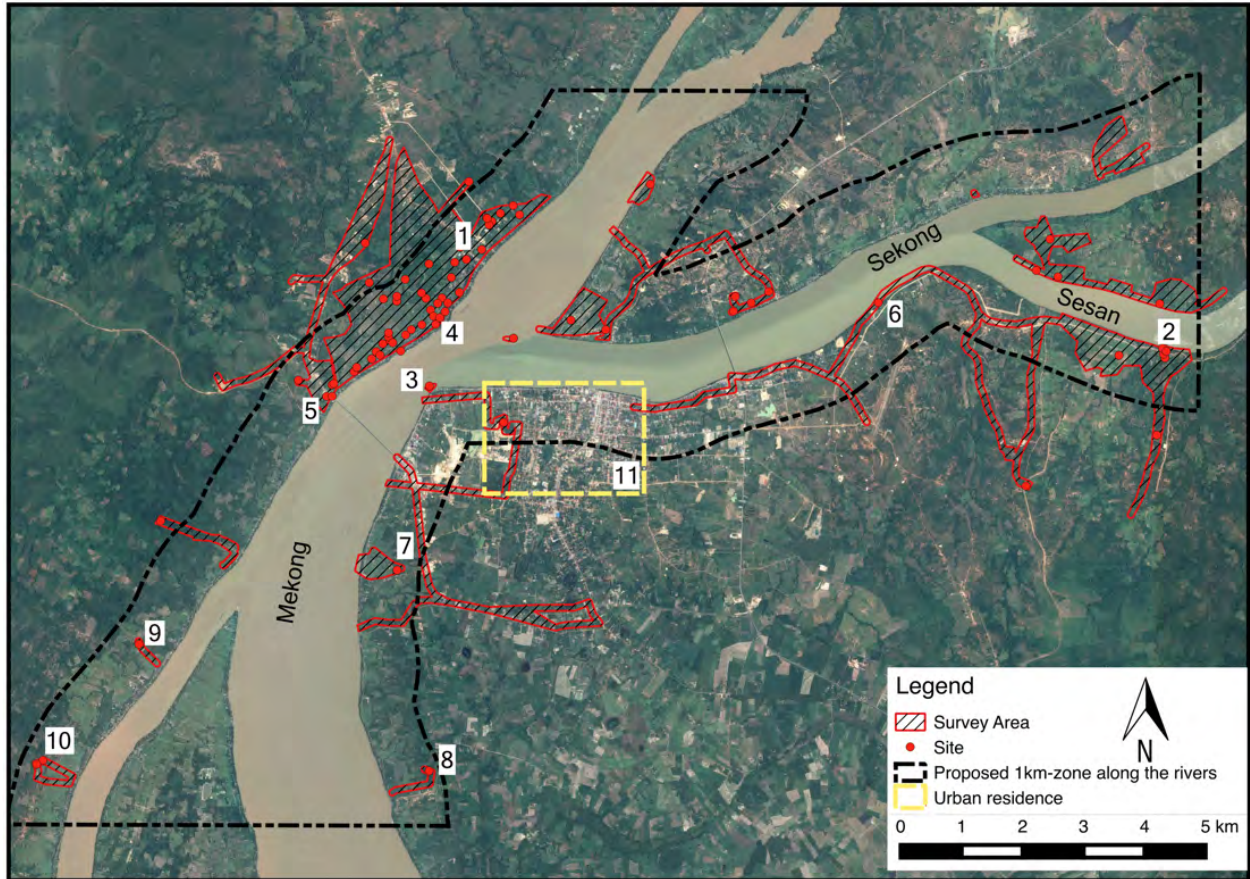


Figure I-10. Research area in Stung Treng. The area surrounded by a black-dotted line was the proposed study area; the areas with red borders were the accessible areas with good surface visibilities. 1) Preah Ko, 2) Ba Doem, 3) Ba Chong, 4) Sala Prambuon Lveng, 5) O Trel, 6) O Khlong, 7) Tuol Neakta Kang Memay, 8) Tuol Khtum, 9) Tuol Meas, 10) O Chrang Kraham, 11) Urban residence.

and outside the main research area (Figure I-10). Ten test excavations followed the results of these surveys and were placed to retrieve dating samples and ceramic chronology in Stung Treng.

In Stung Treng, archaeological fieldwork was focused on an area that contains two documented clusters of pre-Angkorian religious monuments: Thala Borivat and Ba Doem; work also investigated the interstitial area. These two clusters offer an ideal testing ground between large and small contemporary ceremonial centers and their associated settlement systems. In Kracheh, the surface survey focused on clusters of brick monuments in Sambor and Sambok to produce a comparable dataset with Thala Borivat. Additionally, a general site reconnaissance survey was made of sites reported along the Mekong, Sesan, and Sekong.

Proxies

Determining a general settlement size depends on surface archaeological ceramic distribution and site size (mound surface area, temple area, pond area) as proxies. Due to the nature of the data, their spatial distribution is used to delineate general settlement size instead of calculating site area and serve as the base to define small or large settlements. This research assumes that settlements comprising more temples, mounds, ponds, and larger temple complexes represent a supra-community or an 'urban center'; and that settlements having fewer temples, mounds, ponds, smaller temple complexes represent smaller hinterland communities. This research argues that changes in settlement configuration are proxies to organizational changes as a whole and that the settlement nucleation observed in the research area represents centralization resulting from changes in economics, politics, and ideologies.

The patterns of spatial relationships (i.e., distance) between the archaeological features (e.g., temples, mounds, ponds, and surface artifacts) that constitute the pre-Angkorian communities and other socioenvironmental attributes such as sacred places (e.g., mountains, rock outcrops, rapids), travel routes, fertile lands, rivers, and other ecological settings are proxies to different types of economies (agriculture and trade) and interactions (e.g., Coningham et al. 2007; Drennan and Peterson 2006; Parsons, Hastings, and Matos Mendieta 2000; Shaw 2004). The settlement pattern data suggest that agrarian, trade, and river traffic likely played important roles in the research area. Expanding the settlement database by incorporating the fieldwork data with CISARK's inventory data, and then combining survey-based research with environmental data in the GIS database allow this research to investigate a more nuanced series of relationships between different centers.

Contrasted with the settlement patterns of the Mekong Delta, which are clustered around small tributaries away from the major rivers (see Stark 2006c), the settlements of the Mekong-3S region are located in proximity to large rivers. This configuration is similar to the other pre-Angkorian sites located along the Mekong and Sekong in Laos as well as those of located along the Mun river system in northeast Thailand (see: C. Evans, Chang, and Shimizu 2016; Lorrillard 2014; Santoni and Hawixbrock 1999). The data suggest that, despite its inland location, the pre-Angkorian period economy relied on both agriculture, through combinations

of wet and dry rice as well as gardening, and regional trade along the Mekong and its tributaries. The economic profile of the Mekong-3S region's settlement systems is examined by addressing the relationship between settlement, temple, and the environmental resources (land and water). This region, particularly Thala Borivat, offers an ideal case study in which both agrarian and trade strategies supported the pre-Angkorian polity.

I.7 A Conventional Chronology

The chronological paradigm in Cambodia has been dictated by the Angkorian period and historical accounts so that each periodization is defined relative to the Angkorian period. For instance, the pre-Angkorian and post-Angkorian periods. The Cambodian history is still best known for its successive rulers compiled by the French scholars based on local inscriptions and Chinese accounts (e.g., Barth 1882; Briggs 1951; Coedès 1968; Finot and Coedès 1926; Jacques 1986; Jacques and Lafond 2007; Pelliot 1903, 1951; Vickery 1998). Another aspect of periodization revolves around the evolution of artistic styles such as statuary, lintels, and monumental constructions, which are sometimes attached to dated inscriptions (e.g., Bénisti 1964, 1966, 1968, 1969, 1974; Boisselier 1955, 1966; Coral-Rémusat 1940; Dalet 1939; Dupont 1952, 1955; Giteau 1975; Lavy 2004; Stern 1927, 1934, 1938). Archaeological periodization, particularly the Early Historic period, in general was referred to from a historical perspective. For example, the association of Oc-Eo, excavated in the 1940-50s, to Funan and "Indianization" (e.g., Boisselier 1966; Coedès 1968; Malleret 1959b, 1960, 1962).

Whether the pre-Angkorian period characterizes a unified state or multiple polities, the areas stretching from northeast Thailand, southern Laos, Cambodia, and southern Vietnam share many pre-Angkorian traits. These include inscriptions in both Khmer and Sanskrit and architectural and sculptural styles, all of which suggests that there were intense interactions between these regions. This territory can be termed the 'pre-Angkorian civilization' akin to the Mesopotamian Uruk period, the formative Mayan civilization, as well as the first Urbanization period of the Gange valley. This project uses the chronological terminology "Early Historic period" (200 BCE-500 CE) and "pre-Angkorian period" (500-800 CE). A conventional periodization of Cambodia can be summarized in Table I-1 below:

Period		Date	Sources/Activities	References
Prehistory	Hoabinhian	8000-3000 BCE	<ul style="list-style-type: none"> - Chopper and chopping, flake tools - Forager - Laang Spean 	(J.-P. Carbonnel and Saurin 1974; Forestier et al. 2014, 2015; S. Heng et al. 2015; Higham 2002)
	Neolithic-Bronze Age	3000-500 BCE	<ul style="list-style-type: none"> - Introduction of agriculture - Polished stone tools - Complex ceramic designs - Introduction of bronze - Appearance of social complexity - Laang Spean, Samrong Sen, Memot circular earthwork, Mlu Prei, Koh Ta Meas 	(Albrecht et al. 2000; Dega 2001; S. Heng 2008; Higham 2002; Lévy 1946; Ly 2002; Mansuy 1902; Mourer 1988; Pottier 2006b; White 1995; Zeitoun et al. 2012)
Early Historic/Iron Age Period	Early Iron Age/Early Early Historic	500-200 BCE/0 CE	<ul style="list-style-type: none"> - Introduction of iron - Agricultural intensification - Complex bronze technology (Dong Son drum) - Reduced ware horizon (including Phimai Black) - Complex trade networks - Large settlements, some are enclosed by moats - Clear social hierarchy and different access to wealth - Increase violence and warfare (?) - Emergence of chiefdoms 	(Higham 2002; O'Reilly 2003; O'Reilly and Shewan 2016; Pottier, Bolle, et al. 2004; Stark 2001)
	Late Iron Age/Late Early Historic /Protohistory	200 BCE/0 CE - 500/600 CE	<ul style="list-style-type: none"> - Intensified maritime trade network - Emergence of states or "empire" associated with Funan of the Mekong delta - Large structures like the walls of Angkor Borei and a series of canals linking it to other settlements including Oc-Eo at 80km south - Territorial expansion 	(Briggs 1951; Coedès 1968; Lavy 2004; Stark 1998, 2000, 2001, 2006a; Stark and Bong 2001; Vickery 1998)

			<ul style="list-style-type: none"> - Formal contact with China and India - “Indianization”: adoption of Indic religions - Temple construction at the end of this phase - Sparse written records and Chinese accounts 	
Historic Period	Pre-Angkor	500/611-803 CE	<ul style="list-style-type: none"> - Date based on the earliest inscription with date K.600/611CE and the last inscription K.124/803-804CE with mixed pre-Angkorian and Angkorian components - Brick temples, some are large groups like the capital of Īśānapura at SPK - Existence of ascribed and achieved statuses among local elites (poñ and mratañ) - Economy shifted to rely primarily on agriculture - Possibly, contain multiple competing polities 	(e.g., Briggs 1951; Coedès 1968; Jenner 1982; Vickery 1998; Wheatley 1983; Wolters 1974)
	Angkor/ Classical/ Medieval Period	802-1435/6 CE	<ul style="list-style-type: none"> - Start date was reported by the 11th century inscriptions referring to the coronation of Jayavarman II - End date is conventionally based on the date of Āyudhyā occupation of Angkor reported in the chronicle - Diverse craft production and consumption, e.g., stone and metal statuary and stoneware ceramics - Complex state bureaucratic system - Territorial expansion 	(Briggs 1951; Coedès 1968; D. Evans 2007; Fletcher et al. 2008; Fletcher and Evans 2012; Groslier 1979; Hendrickson 2010; Lustig 2009a; Lustig, Evans, and Ngaire 2007; Polkinghorne 2008; Pottier 2006a; Stark et al. 2015; Vickery 1985, 1998, 2004a)

			- Mega religious and public structures such as temples, walls, reservoirs, bridges, and highways	
	Post-Angkor	1431/32-1863CE	<ul style="list-style-type: none"> - Angkor ceased to be the capital city - Central power moved south - Economy shifted toward trade - Not enough research, fewer written records - Sometimes called the “Dark Age” - Theravāda Buddhism became state religion - Shift in emphasis away from stone to wooden architecture - Conventionally ended with the French Protectorate (1863-1953). 	(e.g., Briggs 1951; Coedès 1968; Giteau 1975; Groslier 1962, 2006; Stark 2006b; Thompson 1997; Vickery 1977, 2004b)

Table I-1. A General Cambodian Chronology

Additionally, research in the Mekong Delta has generated a ceramic template comparable to other ceramic traditions in Southeast Asia. Angkor Borei is one of the earliest centers located in the Mekong Delta, a substantial distance from Thala Borivat (c.380 km by river), yet it provides the best sequence from the Early Historic to pre-Angkorian periods. The chronometrically-anchored Angkor Borei ceramic chronology links technologically discrete ceramic traditions to three basic phases with a date range beginning c.500 BCE (AB Phase I: 500–200 BCE) and ending c.600 CE (AB Phase III) (Bong 2003; Fehrenbach 2009; Stark 2000, 2003b). These phases can be synchronized with the Cambodian historical records, starting from the third century CE Chinese accounts and the pre-Angkorian inscription corpus by adding another Phase IV, which is the historic pre-Angkorian period (Summarized in Table I-2).

Period	Date	Diagnostic Ceramic	Funan	Chenla
Early History	Phase I: 500–200 BCE	- Reduced Ware Horizon	Early Historic Communities	Early Historic Communities
Late Early History/ Protohistory	Phase II: 200 BCE– 300 CE	- Reduced Wares - Orange-slipped Ware and Vat Komnou wares - Cord-marked carinated ware	- Hun rulers: Hun-t'ien and Hun-p'an-houang - Fan rulers: Fan-che-man, Fan Kin-cheng, Fan Chan, Fan Chang, Fan Siun (240- 285? CE) - Invasions of other polities - International trade - Formal relation with India (north) and China	Vassal of Funan
	Phase III: 300–600 CE	- Fine Buffware kendi - Fine-Paste Ceramics - Brick architecture	- <i>Jayavarman</i> (c. 470-514 CE) - <i>Rudravarman</i> (514-5xx CE) - Foundation of Hindu- Buddhist temples	- Devanika, Sarvabhauma, Viravarman (?) - Bhavavarman & Citrasena (550-600 CE) - Foundation of Hindu temples - Citrasena- Mahendravarman (600- 616 CE) - Territorial vassals (K. 151, K. 349N)
Pre-Angkor	Phase IV: 600–800 CE	- various kendi forms - Red-slipped or painted ceramics - Brick architecture	- <i>Poñ</i> and <i>Mratāñ</i> in Khmer inscriptions - Īśānavarman (616-637 CE) - Bhavavarman II (637-652 CE) - Jayavarman I (652-680 CE) - Jayadevī (680-725? CE) - Jayavarman II (770-835 CE)	

I.8 Broader Impacts of the Research

This dissertation project contributes to the archaeological literature in four folds. First, understanding the nature of pre-Angkorian state formation is crucial in refining frameworks of early state formation in Southeast Asia. This topic has been traditionally dominated by historians and epigraphers and confined mainly to the historical period due to nature of the dataset, which consisted mainly of inscriptions and Chinese accounts. Second, few research has been based on the political economic framework to interpret early SEA states. Most research tend to rely on the ideological perspective of statecraft, which is an important factor; however, it contributes to a general tendency of emphasizing the role of the upper social strata and aspects of 'high culture' in history reconstruction. The archaeological political economy framework provides a broader perspective on the interactions between the elites and the communities as a whole in the state formation processes.

Third, this study contributes to the research corpus focusing on the role of the institutionalized religion and temple economy in the ancient states. Despite its obvious relationship with the emergence of sociopolitical complexities, particularly chiefdoms and states, the role of temple economy has been largely concentrated in Mesopotamia because of its abundance written records. The role of temple economy developed in this research provides a comparative template with other ancient civilizations of South and Southeast Asia, and others. Fourth, there have been few systematic archaeological settlement pattern analyses in SEA. Cambodia particularly has been lagging behind other regions such as Mesoamerica, East Asia, and to a certain degree South Asia. This research contributes yet another comparative perspective on the relationship between settlement patterns, political economy, religious ideological changes, and organizational change in general.

I.9 Dissertation Structure

The next Chapter II. provides a summary background to models explaining the origins and functions of early SEA states. Temple institution is the unifying characteristic of early SEA states emphasized by these models. A political economy model that blends the documentary-based temple economy and regional settlement studies is most suitable to study organizational

change and the emergence of the pre-Angkorian state. The subsequent sections then provide a general background to the pre-Angkorian temple economy and its application by historian Michael Vickery. Since the emergence of sociopolitical complexity can only be understood at a regional scale, a regional settlement model and its derived political economic relationship is the most suitable approach to the Mekong-3S region. This approach allows for a reconstruction of the pre-Angkorian communities, their economies, and the relationship between these communities and temples as well as their evolutions through time.

Chapter III. provides details of and rationales for the data types as well as a set of methodological approaches or data collection techniques. This chapter begins by situating the research area within an administrative and environmental context. Then, it goes on to outline the type of data recovered during and after the field research. These include site data (mounds, temples, trapeangs, surface collection units, and burials), ceramics, art historical data, cartographic data, historical data, and other data. Data recovery techniques including pedestrian survey that followed surface disturbance, topographic mapping, surface collection, excavation, and artifact analyses are presented in the succeeding sections of Chapter III.

Chapter IV. reports the outcome of each methodological approach employed during the 4-phase field research from 2011 to 2016. The results include spatial data, surface collection, excavation, artifact analysis, and a general chronology. Similar to the settlement configuration reported from the Mekong Delta, settlements of the Mekong-3S region comprise levees, mounds, ponds, and temples but no moat-mounds. These settlements are concentrated within a 1km-zone along the major river systems on the wetlands suitable for agriculture and river traffics, similar to those in the Delta. The surface collection data suggest that most ceramics occurred near the ponds or the temples, which indicate that most pre-Angkorian communities were located around these features. Materials collected from both survey and excavation comprise mostly earthenware ceramics, beads, stoneware, slags, human bones, and plant remains dated from the 3rd century BCE to the 17th century CE.

Based on these data, the communities of the Mekong-3S region can be divided into three phases summarized in Table I-3:

Phase	Phase Name	Date	Communities
TB I	Early History	200 BCE-300 CE	- Small agricultural communities located primarily along the Mekong and Sesan
TB II	Early History - Transition	300-500 CE	<ul style="list-style-type: none"> - Increased evidence of interactions (e.g., beads and ceramics) with other regions, including the Mekong Delta - Settlements began to cluster around the major confluences in Stung Treng - Only one Early Historic community located in Sambor - Intensive interaction was likely responsible for the introduction of the brick temple c. 500 CE
TB III	Pre-Angkor	500-800 CE	<ul style="list-style-type: none"> - Settlements and temples clustered and expanded into the uninhabited regions of Thala Borivat and Sambor - In Stung Treng, half of the TB II settlements continued to be occupied during the pre-Angkorian period - The economic settings remained similar to the early phase - Integration the economic potentials of the lowland-highland ecosystems by expanding into the highlands

Table I-3. Communities of the Mekong-3S region during the Early Historic and pre-Angkorian period

Chapter V. focuses primarily on the reconstruction of the Early Historic communities c. 200 BCE-500 CE and their economy around Stung Treng, based on both excavation and surface collection data. The first settlement nucleation occurred c. 300 CE and coincided with the spatial distribution of Pinkware ceramics near the Mekong-Sekong and the Sekong-Sesan confluences and spread south to Sambor. These communities relied on an agrarian economy based on their proximities to the wetlands as well as evidence of rice chaff used to make ceramics. Bead and ceramic analyses suggest the Mekong-3S region was brought into the regional maritime networks linking the South China Sea to the Indian Ocean during the Early Historic period. Settlement size and uneven distributions of discrete artifacts such as Pinkware,

glass beads, and Fine Orangeware combined with the reports of high looting intensity within the large sites suggest that social stratification emerged at least around 300 CE.

Chapter VII. focuses on reconstructing the pre-Angkorian communities and economies c. 500-800 CE based on a combination of settlement pattern, excavation, surface collection, art historical, and epigraphic data. In Thala Borivat between c. 500 and 700 CE, the settlement size expanded to c. 150 times the size of the Early Historic period settlement at O Trel. The communities of this period nucleated around and expanded with the temples. Some of these brick temples were built atop the Early Historic burials, which suggest continuity in local populations and also a transformation from ancestor worship into the later Indic-related religious institutions. This evidence suggests that there was an organizational shift associated with the introduction of temple and Indic religious ideologies. The pre-Angkorian settlements were multi-functional and multi-component centers based on ceramics, brick structures, ponds, and burials. Its ritual and habitation districts are interspersed and contain brick foundations and ceramic debris.

The settlements also expanded beyond the wetlands into the hinterlands located further inland at an elevation greater than 70 masl where dry rice or swidden agriculture remains the predominant practice of this region. The settlement locations and plant remains uncovered from the excavated context of Trench 2 support the epigraphic records that the pre-Angkorian communities of this region were based on an agrarian economy that combined wet and dry rice agriculture as well as garden crops including betel nuts, coconuts, and gourds. Shared material culture such as red-painted ware and lintel traditions also suggests that there were interactions with other pre-Angkorian centers, particularly the neighboring Sambor and Wat Phu.

Chapter VIII. synthesizes the fieldwork results to model the pre-Angkorian communities of the Mekong-3S region. This chapter expands the scope of this research to include Kracheh, Stung Treng, Champassak, and Attapeu in Laos. It situates the pre-Angkorian communities within a general ecological highland-lowland condition, which corresponds to different economic resources (e.g., wet rice, fishery, dry rice, forestry and mineral resources). Ethnohistoric data indicate that these resources have been exploited by the post-Angkorian and

modern communities. The distribution of temples in both the lowland along the river and the highland, and the epigraphic data suggest that the pre-Angkorian communities of TB-Phase III (500-800 CE) integrated both lowland and highland economic settings. Settlement spatial distribution and historical data suggest that boat travel along the Mekong and its tributaries began at least by c. 500 CE and that the Mekong-3S region pre-Angkorian communities were active participants in the river traffic by providing services as well as controlling the flows of trade. These rivers also allowed greater integration of the Mekong-3S region pre-Angkorian communities as indicated by shared art traditions and the distribution of inscriptions of *Bhavavarman I's* families. One advantage of such integration was the movement of food as a risk management strategy to compliment the wet rice and dry rice cultivation, particularly during the period of crop failures.

Chapter VIII. provides a detailed discussion – responding to the research questions to illuminate the nature of the Mekong-3S pre-Angkorian communities and ultimately, pre-Angkorian state development. Changes in settlement configurations correspond to two organizational changes, occurred during TB 2 c. 300-500 CE and TB 3 c. 500-800 CE, and are related to ideological, socioeconomic, and political centralizations. The succeeding sections discuss settlement expansion and the role of local communities and temples as proxy to the process of state formation. It synthesizes the archaeological data with the historical accounts to reconstruct the nature of pre-Angkorian communities, the economy, as well as their relationship with the temple institution at a regional level. The relationships between the capital and the regional centers is approached by emphasizing the role of the temple economy, trade and interactions, as well as state ideology as means of the state appropriation. This chapter concludes by providing a narrative of pre-Angkorian state formation using information from both the Mekong Delta and the Mekong-3S region. The last section proposes future research and evaluates of the hypotheses put forward in this dissertation.

Chapter II. State Models, Temple Economy, and Settlement Patterns

This chapter begins with a summary of early SEA state models, their problems, and implications on the studies of the pre-Angkorian state formation. Despite the different emphasis on ideology or political economy, these models share their emphasis on temple and temple economy. Thus, a temple economic model offers a venue to probe organizational change associated with the adoption of Indic temple into the pre-Angkorian communities. Documentary records from Mesopotamia, early historic South Asia, and the pre-Angkorian period suggest that temple economies mirror the community's sociopolitical economy. This research assumes that the presence of a temple, even without inscriptions, is also an indicator of the temple economy and its supporting communities, as informed by the other pre-Angkorian inscriptions.

The scope of this study is to explore material evidence of interactions between the pre-Angkorian communities at a regional scale as well as the spatial relationship between temple structures and settlements. Settlement patterns studies could trace the relationship between the pre-Angkorian communities, their physical environments, and economies. The archaeological construction of the pre-Angkorian communities, supported by the 5th century Chinese accounts and contemporary ethnographic communities, comprise mounds, temples, and ponds. Spatial and temporal change in the settlement configuration is an indicator of organizational change at the regional and political level.

II.1 Models of Early Southeast Asian State Structure: A Review

Previous studies of early Southeast Asian and particularly Cambodian state formation have generated rich insights that few archaeologists have yet tested. These models can be grouped in to two broad categories, i.e., externally-stimulated and internal development.

II.1.1 External Stimulation: "Indianization"

Early scholars contended that the emergence of early Southeast Asian polities was a process of secondary state formation and externally stimulated by neighboring civilizations in India and China (Stark 2006a). Such contact involved interactions through either religious ideology or trade, or both; hence, the controversial term "Indianization" (See discussion in: Bentley 1986; Brown 2004, 183–99; Coedès 1966, 39–75, 1968, xv–xxi; Christie 1995, 236–37;

Ian Glover 2016; Higham 2002, 287–96; Kulke 1990; Lavy 2004, 5–60; Mabbett 1977a; Reynolds 1995; Vickery 2000, 1998, 51–60).

“Indianization”/Hinduization	Sources
Implantation of Indian state craft on tribal culture similar to the modern hill tribes of northeast Cambodia, known as Phnong, whose societies were perceived as stagnating.	Georges Coedès (1966:39–75, 1968:xv–xxi)
Introductions of wet-rice agriculture	B.P. Groslier (1960, 7–13)
Urban genesis	Paul Wheatley (1983, 263–363)
Cultural convergence	Hermann Kulke (Kulke 1990; Christie 1995; Ian Glover 2016)
A variable of adaptation to produce social change	Charles Higham (2002:295)
“Indigenization of Indic elements” or “cultural parallelism with adapted elements of an Indic façade”	Vickery (1998:154)
Sanskritization and Brahmanization	Bronkhorst Johannes (2011); Ian Mabbett (1977a, 1977b); and Sheldon Pollock (1996)

Table II-1. “Indianization” in recent perspectives

Recent scholarship in history, art history, and archaeology has shifted the focus to indigenous agency in the process of “Indianization” (See Table II-1). Additionally, recent archaeological research on contacts between SEA and South Asia has firmly situated contacts with South Asia during the 4th to 1st centuries BCE and continued to intensify until the 1st to 4th century CE prior to the emergence of regional kingdoms and local inscriptions (Bellina and Glover 2004, 72–80; Calo et al. 2015, 394; Carter 2015, 748–53; Ian Glover and Bellina 2011, 41). South Asian artifacts such as knob-base bronze bowls, carnelian lions, stone and glass beads found across prehistoric sites in both Mainland and Island SEA suggest that contacts primarily involved ritual and prestige items, which likely contributed to the sociopolitical complexities among early SEA communities. Indian sources relative to SEA suggest that intense interactions involving state crafts and ideologies occurred after the 4th century CE and that “Indianization” took place after the Gupta dynasty formulated a coherent sociopolitical model, which was eventually adopted by polities of South India and SEA (M. L. Smith 1999). These data

suggest that although contacts with South Asia occurred since the 4th century BCE, clear evidence of “Indianization,” that is the adoption of Indic religious ideologies, only occurred after the 4th century CE. The following section summarizes a series of internal development-based models applied to SEA early state formation.

II.1.2 Internal Development

Diverging from the ‘Indianist’ model, scholars, particularly those who work outside Cambodia, have characterized early Southeast Asian states as galactic polities (Tambiah 1977), theatre states (Geertz 1980), *maṅḍalas* (Wolters 1982, 1999a, 1999b), or examples of the Asiatic Mode of Production (AMP) (Friedman 1975; Friedman and Rowlands 1977; Sedov 1963, 1978; Tichelman 1980; Vickery 1986, 1998). Virtually all models emphasize the segmentary characteristic (with emphasis on core and peripheries) and internal development processes based on control over agricultural tribute systems through rituals, personal ties, or lineages (See discussion in: Christie 1985, 1986; Vickery 1998, 7–17).

These Southeast Asian models bear some parallels to the segmentary state model that Aidan Southall (1988) developed for pre-state African systems or to Durkheimian models of mechanical and organic solidarity applied to the Mayan and Mesopotamian civilizations and to the AMP and Feudal models used to explain Mesopotamian and South Asian political systems (See: Adams 1965; Allchin 1995; Gary M. Feinman 2017; Gary M. Feinman and Nicholas 2017; J. W. Fox, Cook, and Demarest 1996; Lal 1984; Morrison 1994; Willey 1965; Trigger 2003). That many early Southeast Asian polities resembled segmentary and unitary states – with qualities of both network and corporate models – challenges scholars studying Southeast Asian state formation (Junker 2004).

These models lack spatial and temporal characteristics to explain the complexities of the pre-Angkorian period. There are many similarities between the models outlined above despite their emphases on different modes, i.e., segmentary is based on lineage, the AMP on land ownership and rituals, and the galactic polities on rituals. While Galactic Polities and *maṅḍala* lack the economic factors, Vickery’s AMP insufficiently addressed the Indic ideological factor (See: Brown 1996, 2004; Christie 1985, 1995; Lavy 2003, 2004). Ian Mabbett (1971, 38–39) opined that the notion of *maṅḍala* is not ‘geographic/cartographic’ but of ‘government’, that is

politics and diplomacy (cited in Stuart-Fox 1994, 136). Manguin (2000, 82–83) reconstructs a *mandala* diagram extrapolated from a *Śrīvijayan* inscription as a series of satellite concentric circles centered upon a central place where the rulers resided. He argues that each concentric circle represents center located along the river systems (which are geographically, linear!).

The problem then is how this concept materialized on the ground since large sociopolitical complexities, either states or chiefdoms, express themselves at both the community and regional levels (e.g., Adams 1981; Drennan and Peterson 2006; Kowalewski 2008; Kowalewski et al. 1983; Sanders, Parsons, and Santley 1979). Vickery (1998) attempted to address these spatial and temporal issues through the locations of the regional inscriptions. The remaining task is for archaeologists to address change in the settlement systems through time, which Stark (2006c, 2006a) approaches through regional survey across the Cambodia’s Mekong Delta.

II.1.3 Religious Institution and Southeast Asian Early States

The unifying factor among the models outlined above is the emphasis on religious institution or temple. Whether temples represent indigenous or Indic elements, economic or religious undertakings, communities or state projects, all scholars agree that SEA’s first millennium CE temples were the manifestation of the elites’ power, state centralization, and production centers (Table II-2).

Ideology-cosmology Model	Political Economy Model
The Angkorian temples constitute a ‘superstructure’ of both ancestral worship and Hindu/Buddhist gods sanctioning both the “cult of soil” for wet rice cultivation and the status-quo of the king as “Master of the surface below” (Groslier 1959, 1974, 1979)	Introduction of new agricultural technologies (wet rice agriculture), which produced surplus to sustain the Indian immigrants, the agents of “Indianization” (Groslier 1960, 4–13)
Early SEA states emerged with “ceremonial urban centers” characterized by Hindu temples (Wheatley 1983)	Angkorian temples were the redistribution and symbolic centers linking regional centers to the capital via the temple network (Sedov 1963, 1978) (see also: K. R. Hall 1985, 1992, 2011, 162)

The centralization of the Javanese state corresponded to increased centralized temple constructions during the 8 th and 9 th centuries CE (Christie 1986, 74, 87)	The pre-Angkorian temples were surplus production centers allowing the pre-Angkorian state formation (Vickery 1998)
Temples were the “magico-political force field” radiating from the political center of the kingdom that constitute the “ritual policy” and ideology associating imperial rulers to the cosmic kingship (Kulke 1990, 14–15)	The pre-Angkorian and Angkorian temples were state apparatus in territorial expansion (land reclamation projects) as well as labor consolidation and management (Sahai 2012, 339)
Cambodian temples and images are the symbols of, and means to, power vis-à-vis the symbol of state centralization (Brown 1996, 195–96; Lavy 2003, 2004)	Contemporary Bali temples play a managerial role in irrigation water distribution (Hauser-Schäublin 2003; S. Lansing et al. 2009; Scarborough, Schoenfelder, and Lansing 1999)

Table II-2. Examples of two camps of theoretical perspectives on Southeast Asian temples

Temple institution comprises two basic functions, i.e., ideology and economy, which form the bases of the debates on “Indianization” as well as different approaches to reconstruct a history of Cambodia (Table II-2). On the one side, scholars such as George Coedès and Claude Jacques argued that the inscriptions only concern religious affair and not economic; while on the other, Leonid Sedov and Michael Vickery considered the inscriptions as predominantly economics in nature (See Vickery 1998:2-7). Temple economy and its relationship with the communities and agriculture is the unifying concept fusing these hypotheses and is archaeologically testable.

This research employs a two-tiered model to study the pre-Angkorian state formation: 1) Temple economic model constructed primarily using epigraphic data interpreted by Michael Vickery; and 2) Reconstruction of the pre-Angkorian “communities” through settlement patterns and political economy.

II.2 Temple Economy

The following sections illustrate that temple and its economic structure mirror the socioeconomic and political settings of the communities and polities who support them. In most cases, temple affairs concerned the local communities and operated independently of

state control. The temple is the center of the communities providing an arena for the community politic and economic affairs relative to the state bureaucracy. Nevertheless, the relationships between the temple institution, its economies, and the state are indicators of the community or of the state itself. For examples, the expansion of temples is proxy to state prosperity and centralization or vice-versa. Studying the relationship between local communities, temple, and the state and its changes through time offers a promising approach to study state formation.

As temple economy is concerned with how the temple manages its economic resources and its relationship with the social whole, operationalizing temple economy archaeologically is quite challenging without textual evidence. In this section, two examples of temple economy from Mesopotamia and South Asia are used to offer a comparative perspective with the pre-Angkorian temples. The scope of temple economy focuses on both the material aspect of religion (i.e., economics, relative to its surrounding settlements and societies) and the ideological aspects associated with the temple. Temple economy, thus, provides a combination of multiple archaeological approaches to early societies in terms of politics, economics, and ideology. Data from temple institutions provide proxies to the palace institution or the state in general in terms of how politics and economics were structured within these institutions.

Examples from Mesopotamia and South Asia suggest that despite having a close relationship with the state, the temple institution transcends political dynasties and generally outlasted the state itself. The accounts of temple economy concern the temple institution, that is the corporate religious activities, rather than the state institution. Even though there were relationships between the two, temple economy emphasizes mostly the role of temples in economic activities and rarely that of state politics.

II.2.1 Mesopotamian Temple Economy

The studies of temple economies have mostly been limited to Mesopotamia where documentary sources are abundant, and the scholarship began much earlier (Postgate 1992). Debates over the origins of this institution revolve around communal ownership, storage management, risk reduction, identity construction, as well as its role to counter-balance to

expanding royal power (e.g., Makkay 1983; Foster 1981; Trigger 2003; Yoffee 1995, 2005). The temple institution was one of the three “great household” (temple, palace, and estate) of an Oikos economy (e.g., G. J. Stein 2004; Ur 2010; Yoffee 1995). The Mesopotamian temple institutions were successful corporations of agriculture, trade, and investment and possessed large tracts of agricultural lands, large labor forces, craft specialists, as well as personnel from various social strata controlling religious and secular affairs (e.g., Adams 1966; Bromberg 1942; Foster 1981; Kozuh 2008; Postgate 1992; Rothman 1994; Van de Mieroop 1999). The temple predated the palace institution or the state; however, both had a similar organization and means of production (Trigger 2003: 327).

II.2.2 Early Historic South Asian Temple Economy

South Asian temple economy and its evolution are not well-formulated compared to the Mesopotamian, particularly in archaeological approach. Evidence of an institutionalized religion is sporadic due to unreliable sources, spread across the subcontinent and into Sri Lanka. Nonetheless, the epigraphic records of donations to both Buddhist and Hindu temples became more prominent at least from the 1st century BCE onward (Ray 1986; Singh 1996; Shimada 2013). The inscriptions not only provide information pertaining to the religious institution itself, but they also reflect the contemporary socioeconomic, and sometimes political settings, their regional variations, and changes through time. Donors often recorded their social backgrounds including genders, occupations, wealth, and sociopolitical status (e.g., Brancaccio 2010; Heitzman 2004; Ray 1986; Schopen 2004; Singh 1996; Spink 2006; Thapar 2002).

The main aspect of the South Asian temple economy, land grants to temples/gods (*devāgraha* or *devadāna*) and Brahmins (*brahmadeya*), has been associated with state decentralization (i.e., segmentary state) because it has been considered as an alienation of the state’s properties rights, via tax exemption, to the Brahmins and temples (e.g., Heitzman 1987b; K. R. Sarkar 1978; Sharma 1958; B. Stein 1980; Thapar 2002, 291–97). However, the increasing trend in land grants coincided with the development and expansion rather than the decline of regional polities from the *Sātavāhana* to the *Ikṣvāku* (3rd century BCE–4th century CE) to the *Gupta* and the *Vākāṭaka* (4th-6th centuries CE) and southward to the *Pallava* (6th-9th centuries CE) (Ray 1989; Sharma 1958; Willis 2009). This trend in increased land grants also

coincided with the reformation of institutionalized religions under the *Gupta* during the 5th century CE, particularly the inclusion of the central image of gods and Buddha to the temple/monastery (e.g., Brown 2011; Huntington 1985; Lavy 2014; Rhi 2003; Willis 2009). After their consecration, the Gupta period temples and gods became parts of everyday life or “*juridic personalities*” subjected to the law (tax duties) and entitled to offerings such as food, flowers, incense, perfumes, hymns, land and revenues (Willis 2009: 125-149).

Similar to the Mesopotamian temples, the early historic South Asian temples also operated independently of the state and political power. Nonetheless, their prosperities reflected the community and state prosperity as a whole. When the temple institution spread from the *Gupta* heartland to South India during the 3rd and 6th centuries CE, it became the center of political and economic activities and formed core of commercial transactions and agricultural development all of which served as the basis for political expansions of the *Pallava* and *Cōla* (Champakalakshmi 2002; K. R. Hall and Spencer 1980; Heitzman 1987a; B. Stein 1980).

II.2.3 Pre-Angkorian Temple Economy

The pre-Angkorian inscriptions provide an abundant resource relative to temple economy. These include religious endowments from various elite groups, division of labor, land transactions, economic resources (rice fields, working animals, fruit trees, cloth, etc.), and, conflicts of interests (joint revenues). However, they rarely offer insights into the relationship between the temple and the state (e.g., inheritances and familial relationships, rights and court proceedings, or taxation). The pre-Angkorian temples were surplus production agencies of the pre-Angkorian natural communities (Sahai 2012:339; Vickery 1998:311). Vickery (1998: 309) attributed the pre-Angkorian state formation or centralization to royal control over the temple surpluses.

The pre-Angkorian inscriptions indicate that four interactive units were responsible for the pre-Angkorian state formation, i.e., the community, the elite, the temple, and the state (Vickery 1998: 309-313). Since the pre-Angkorian inscriptions almost always concern temple economy, the presence of a temple or religious architectural feature also represents: 1) the existence of temple economy, 2) the elites and communities who endowed the temple, and 3) the community’s economy, which comprised similar aspects of temple economy. The

community and the temple were spatially and economically related, as are modern settlements. This is archaeologically testable through regional survey.

II.3 Operationalized Temple Economy

Studying temple economy is challenging without textual supports. Even in civilizations where there are written records, few evidence of temple economic activities materialized in the archaeological records (see Smith 2004:86). Nonetheless, religious institutions and their temples occupy crucial roles in shaping ancient civilizations from complex chiefdoms including Hawai'i and Cahokia (e.g., Earle 1987; Pauketat et al. 2002; Kirch, Mertz-Kraus, and Sharp 2015) to state societies such as Maya, Aztec, Egypt, Mesopotamia, to South and Southeast Asia (e.g., Adams 1966; Sedov 1978; M. E. Smith 2004; M. L. Smith 2006; Trigger 2003).

Temples are indices where the sizes and elaborations of the monuments imply the degree of hierarchies held by a center and the power of its elites, e.g., large and elaborated temples are restricted to large centers and associated with the central patron gods and rulers. In early civilizations including the Early Dynastic Mesopotamia, Old Kingdom Egypt, Classic Maya, Late Aztec, Inka, and Shang, major temples were associated with the ancestral cult of the royal lineages (Trigger 2003). A large temple is regarded as a form of specialization restricted mainly to the urban center or city (e.g., Childe 1950; Isendahl and Smith 2013; M. L. Smith 2006; M. E. Smith 2009; Wheatley 1979). In Mesopotamia, although the temple predated the palace or the state since the Ubaid period, the expansion of the temple estates and economies coincided with the rise of royal power (Makkay 1984; Trigger 2003: 202). The temple institution evolved alongside the formation of sociopolitical complexities (Yoffee 2005; Trigger 2003; Adams 1966).

Archaeologists use spatial and temporal patterning as well as physical characteristics of temple relative to habitation and ecological resources to infer centralizations. This approach emphasizes the spatial arrangement within a settlement system, correlation of temple size between minor or major centers, community or corvée labor investment, elite's control over agricultural production, control over trade flows, and identity construction (e.g., Adams 1965; Baines and Yoffee 1998; Earle 1987; Hauser-Schäublin 2011; Inomata and Aoyama 1996; Kirch,

Mertz-Kraus, and Sharp 2015; Kolb 2012; S. Lansing et al. 2009; Lucero 2003; Mulrooney and Ladefoged 2005; Rice 2009; Willey 1965; Yoffee 2005).

Settlement pattern studies offer a promising venue to study temple economy and make inferences about the community and state political economy as a whole.

II.4 Settlement Patterns, Community, and Centralization

This research employs a regional settlement model to explore the relationships between 1) the pre-Angkorian communities and their social and physical environments; 2) the pre-Angkorian settlement patterns (civic and ceremonial features); and 3) a model of the pre-Angkorian economy. This framework provides an economic rubric for the communities located along the Mekong River and its evolution from the Early Historic to pre-Angkorian period.

Settlement studies often emphasize the relationship between the settlement patterns and their physical environments (soil productivity, river, precipitation, slope, elevation, etc.) as bases for subsistence economies, sources of raw materials, as well as interactions and trade/exchange. Demographic, economic (agriculture, trade, and craft), and political centralization can be inferred based on combinations of such relationships (e.g., Drennan, Quattrin, and Peterson 2006; Inomata and Aoyama 1996; Oka and Kusimba 2008; Parsons 1991). The relationships between agriculture, craft production, trade, and emergence of sociopolitical complexities is commonly applied to early SEA states (e.g., Fletcher et al. 2008; Higham 2004, 51–57; Junker 1999; Manguin 2004; Mudar 1995; Stark 2006c; White and Eyre 2011).

Spatial patterning of religious architectures including Buddhist monasteries and *stūpa* have been used to infer organizational changes associated with religious change, interactions, agricultural and trade intensification, urbanization, and the establishment of monarchical systems across Early Historic South Asia (e.g., Coningham et al. 2007; Fogelin 2006; Morrison 1995; Ray 2017; Shaw and Sutcliffe 2003). Similar approaches and interpretations have been applied to SEA religious architectures (e.g., Bronson 1977; John Stephen Lansing 2007; Murphy 2013b; Stark 2016; Thompson 1998).

This research evaluates change in settlement patterns via spatial patterning of the pre-Angkorian communities and temples. Centralizations associated with demographic, ideology,

economy, or politics are then considered, using data derived from an economic model reconstructed from the ecological settings, temple and community economy discussed in the previous sections, and archaeology.

II.4.1 Site, Settlement, and Local Community

Settlement studies involve community reconstruction, particularly sociopolitical and economic interactions, which can be inferred through 1) settlement patterns, 2) demographic reconstruction, 3) distance-interaction, and 4) communal labor manifested in civic and ceremonial features, as well as agricultural feature (e.g., Earle 2001; Freter 1994; Gerritsen 2006; Peterson and Drennan 2005; H. T. Wright 2000). Many of these approaches revolve around whether the definition of “site,” or settlement, could represent meaningful human communities, which influences diverse theoretical and methodological approaches elsewhere and in Cambodia.

Cambodia’s Archaeological “Site.” The archaeological features in Cambodia commonly comprise mounds, *trapeang* (ponds), *baray* (reservoirs), and *Prasat* (temples), roads, moats, stone bridges, ceramic kilns, circular earthworks, etc. “Site,” named after a village or an administrative center, is the most common classification for these features and is used to designate places containing archaeological remains. Site size often ranges from as small as a few square meter architecture to several square km like Angkor, Angkor Borei, and Sambor Prei Kuk. For Angkor, “site” has expanded to refer to a “region” that includes both “a collection of religious monuments and walled enclosures, and a sprawling, low-density settlement complex, connected to a more densely populated urban core by a vast network of infrastructure” (D. Evans and Fletcher 2015).

Although “site” has ill-defined boundaries, Damian Evans (2007, 145–46) argues that the notion of ‘site’ or ‘settlement’ with a boundary is required to analyze spatial patterning in a large scale area like Angkor. In the Mekong Delta, Stark (2006c, 105) reports that some mound clusters or “sites” contain surface artifacts, while others lack any archaeological remains. These two examples suggest an underlying assumption that a “site” or settlement, which contains features such as temple, mound, and trapeang, is synonymous with the pre-Angkorian and Angkorian communities. A pre-Angkorian settlement or local community, then, can be defined

as an area with continuous components comprising any of these features including mound, moated-mound, trapeang, architectures, and/or artifact clusters. The boundary of these settlements is where the artifact and feature distribution ceases to be recognizable.

II.4.2 Pre-Angkorian Community

This research uses a combination of both traditional “site” (mounds, ponds, artifact clusters, and architectural features or temples) to identify a settlement or “local community” as has been done in many places, e.g., Valley of Oaxaca, Junin (Peru), Chifeng, and Angkor (see discussion in: Drennan et al. 2003, 214–16; Stark 2006c, 104–5). Temples and hydraulic features like trapeangs (ponds) or barays are proxies for the pre-Angkorian settlements or local communities. The Chinese accounts of the Liang Dynasty (early 6th century CE) described the pre-Angkorian communities as clustering around trapeangs (Pelliot 1903, 269) and the pre-Angkorian inscriptions often recorded land boundaries using the trapeangs (e.g., K.561/681 CE), which were commonly associated with the local élites, *poñ* and *mratāñ* (Vickery 1998:297-298). Some early inscriptions also refer to the foundation of a sacred reservoir associated with the temple (e.g., Jacob 1993a, 1993b; Vickery 1998).

The archaeological “local community” based on a distance-interaction principle is in practice appropriate for reconstructing the pre-Angkorian settlement, which comprises a combination of mounds, moated-mounds, architectures, and trapeangs (ponds) (e.g., D. Evans 2002; Hendrickson 2007; Stark 2006a, 2006c; Stark et al. 2015; Lorrillard 2014) (Figure II-1). These settlements can be referred to as ‘local communities’ or hamlets in a broader sense since multiple features are generally clustered or fused into a large mound.

The description of contemporary rural Cambodia’s settlements, their surrounding social and physical environments, and the Wat (Buddhist pagoda) parallels the pre-Angkorian settlements informed by the inscriptions, and the archaeological settlement patterns in Cambodia.

II.4.3 Cambodia’s Ethnohistoric Community

In the 1950s, French geographer, Jean Delvert (1961:204-220) identified three types of settlement in rural Cambodia: isolated dwelling, *Phum* (hamlet) or a cluster of homes, and elongated settlement along the road. A *Phum* generally consisted of 10 to 50 houses

surrounded by small rice fields and lotus ponds (*trapeang*) (Delvert 1961, 205–6).

Anthropologist, May Ebihara (1977, 52), describes a 1960s *Phum* as “physically,” a cluster of homes surrounded by rice fields. The living areas consist of kitchen, gardens, trees, and plots of open land located close to the rice fields, which form boundaries between different communities. The *Phum* is a social unit where kinship and neighborly ties construct a communal identity and a political-administrative unit under a village chief.

These ethnohistoric descriptions suggest that the contemporary Cambodian *Phum* covers a range of settlements from a single house to a cluster of several hundred houses. Their occupants were tied together or split by kinships, economic opportunities (land, market),

cooperative work (e.g., *trapeang*, canal, house construction, harvest, etc.), religious beliefs, as well as environmental constraints (e.g., flood, river, hill, etc.). There is no definable boundary. In large settlements composing of many *Phums*; they are sometimes, but not always, recognizable by a concentration of closely-spaced affluent large and attractive houses at the centers; poorer houses were built further apart toward the boundaries (Delvert 1961:214-215). The Wat (Buddhist monastery) was the ‘center of the communities’ or the “*true communal house*” where education, major festivals, celebrations, funerals, and other rituals took place (Delvert

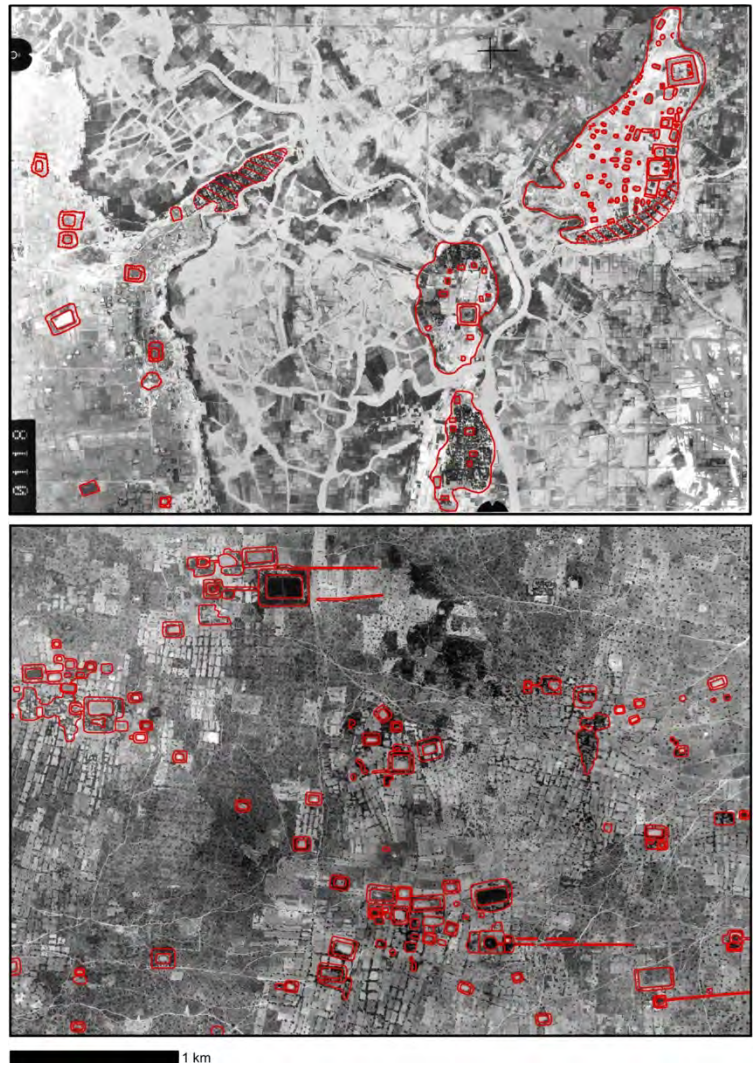


Figure II-1. Settlement cluster in the Mekong delta [top] and Angkor region [bottom] (Stark et al 2015)

1961:219). The Cambodian Wat was founded by one or several *Phum*, not *vice-versa*, and its numbers correspond to both the size of the population size and wealth of its supporting communities.

II.4.4 Settlement Function, Integration, and Centralization

The modern settlements or *Phums* described in the above, designate the settlement patterns of a local community, which comprises ponds, rice fields, houses, and the temples. These patterns correspond well with the archaeological features of both pre-Angkorian and Angkorian Cambodia, and the archaeological 'local community' based on distant-interaction principal (see: Drennan, Berrey, and Peterson 2015, 52–68; Peterson and Drennan 2005).

Several underlying characteristics are applicable to the archaeological settlements:

- 1) Ponds and temples are reliable proxies to local communities and are remotely identifiable.
- 2) Settlement size implies population size and economy of a local community. Large settlements are wealthier and more populous than the smaller ones.
- 3) Wealthier communities could effort elaborate temples and comprise a denser settlement at the center. This characteristic could correspond to a nucleated pattern of features (mounds, ponds, or temples) or dense artifact clusters (resulted from tightly spaced houses) located at the center of a settlement. Large and wealthy settlements have larger and more elaborated religious architectures than the smaller settlements.
- 4) Poor communities are defined by isolated farm houses or large spacing between houses. This pattern could correspond to a light artifact concentration, fewer number of ponds and temples, and large space between these features.

Integration and centralization. The ethnohistoric examples suggest that the centripetal force that binds the occupants of each settlement include physical environment (flood zones, river, soil productivity), economic (agricultural land, travel routes, hydraulic projects), social (kinship, neighborhood), ideological (temple, beliefs), and political (administrative unit, elite-sponsored public projects). Large settlements comprise many of these functions, which are the centripetal forces drawing a larger population. These characteristics correspond to the archaeological central place, the nexus of interactions where diverse specialized activities take place. Smaller settlements with lower population are often characterized by peripheral

agricultural communities lacking specialized functions such as religious temples or elite-sponsored projects (roads, ponds, or canals). These small settlements are considered lower tiered settlements or hinterlands.

These characteristics can be operationalized through regional settlement pattern studies outlined in the previous section.

II.5 Summary

Chapter II problematizes models applied to early SEA states due to their limited spatial and temporal characteristics, which are insufficient to explain the scale and complexities of the pre-Angkorian state formation. Despite their shortcoming, these models share their emphasis on the role of temple, either ideological or economic, in early SEA states. Temples are nodes of settlements, economically dynamic in agriculture and trade. They possess means and forces of production and provide hosts for identity construction and legitimization of power. The temple economy mirrors that of the community who endowed the temple.

The physical evidence of a pre-Angkorian temple or brick architecture is also evidence of the temple economy and communities supporting that temple. Spatial and temporal change associated with settlement configuration (mound, temple, and trapeang) is an indicator of the overall organizational change. For instance, the introduction/adoption of the Indic temple not only suggest religious-ideological change, but also economic and settlement reconfiguration to accommodate this new system. The archaeological settlement approach is suited to reconstructing and exploring the relationships between the pre-Angkorian communities, temples, the physical environment, and temple economy. This approach involves multiple steps:

1. Settlement System

- a. Pre-Angkorian community reconstruction (temples and habitations)
- b. Spatial and temporal change leading to the pre-Angkorian period as well as the introduction of temple institution
- c. Physical environment: proximity to fertile land for agricultural economy and proximity to trade routes, as indices of economic reconstruction

2. **Material culture** (ceramics, beads, sculptural, and architectural designs) used to suggest interactions and socioeconomic or political centralization
3. **Ethnohistorical models** based on the early 17th and 20th century accounts and the pre-Angkorian inscriptions are used to compare and contrast the archaeological data.

Chapter III provides general characteristics of the study areas, their physical environment, as well as the research strategies and data sources employed to investigate the temple economic model outlined in this chapter.

Chapter III. Research Areas, Data, and Research Methodology

Chapter II outlined the research framework to study pre-Angkorian state formation based on community and temple economy reconstruction. Chapter III outlines rationales of the data collection methods employed by this project. It begins with the administrative and environmental settings of both research areas, Stung Treng and Kracheh, which formed the basis for practical data collection methods. Then, it proceeds to discuss the type of and condition of data and recovery strategies including unit of analysis, pedestrian survey, surface collection, topographic mapping, excavation, and artifact analysis.

III.1 Administrative Setting

Locations are described using contemporary Cambodian territorial administration, i.e., *Khet* (province), *Sruk* (district), *Khum* (commune), and *Phum* (village or hamlet). This project covers two provinces located along the Mekong, Stung Treng and Kracheh (Figure III-1). Both Thala Borivat and Ba Doem are located in Stung Treng, while, Sambor and Sambok are located in Kracheh. Thala Borivat refers to an area located on the confluence of the Mekong and Sekong Rivers where most brick architecture was reported. This area spans two districts of Thala Borivat and Stung Treng and covers multiple *Khum* and *Phum*. Ba Doem refers to *Khum* Sam Khuoy where another cluster of brick architecture was documented. This *Khum* covers multiple villages or *Phum* including Ba Doem, Sam Khuoy, Hang Savat, and Sre Ta Pan. A broader term ‘Stung Treng region’ is used to refer to archaeological sites located around Stung Treng town and covered by this study.

This project concentrated mainly in Stung Treng around two large settlements, Thala Borivat and Ba Doem. Sambor and

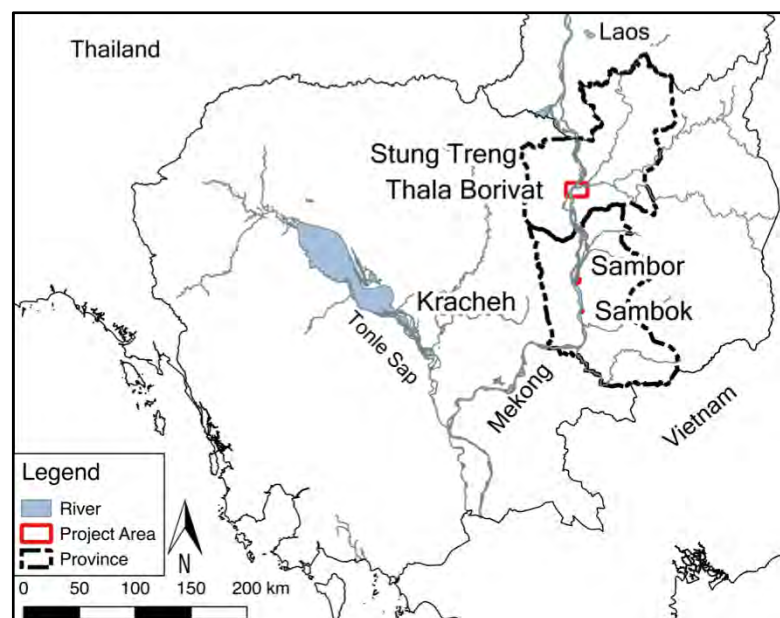


Figure III-1. Administrative context of the project area

Sambok were used as case studies to compare the results of settlement patterns reconstructed using the remotely sensed data, CISARK data, and surface collection data (Figure III-2). The pre-Angkorian settlement characteristics reconstructed from this research were then applied to sites reported by CISARK and by Michel Lorrillard (2014: 193-196) located on the Mekong river in southern Laos and northern Cambodia. Aspects of the pre-Angkorian communities and economies are reconstructed at a regional level.

III.2 Environmental Setting

The research area is located in a series of depressions, formed between multiple elevated plateaus, where the Mekong and its major tributaries run their courses. The major tributaries include the Sesan (formed in Kantum massif, Vietnam), Sekong (descent from the Boloven plateau, Laos), and Sre Pok (originating in Dalac plateau, Vietnam). These three rivers, collectively known as the 3S basins, converge east of Stung Treng prior to merging with the Mekong in Stung Treng town (Alabouvette 1973; Constable 2015; Contri 1973; Langle 1973; MacQuarrie et al. 2013). Over 25% of the mean annual flow volume of the Lower Mekong basin came from the 3S rivers. Smaller tributaries of streams and ravines also provide water into these large river systems. The annual rainfall of this region is between 1824 and 3211mm (MRC 2005, 9–17). These river systems traverse diverse ancient alluvial terraces interspersed with different types of rock formations as well as the alluvial systems (Meshkova 2012). Sandstone, rhyolite, andesite, and granite strata exposed by these rivers create multiple rapids, starting from Sambok or Kampi in Kracheh upstream. Young alluvium, a highly fertile soil, occurs in the Mekong islands and the

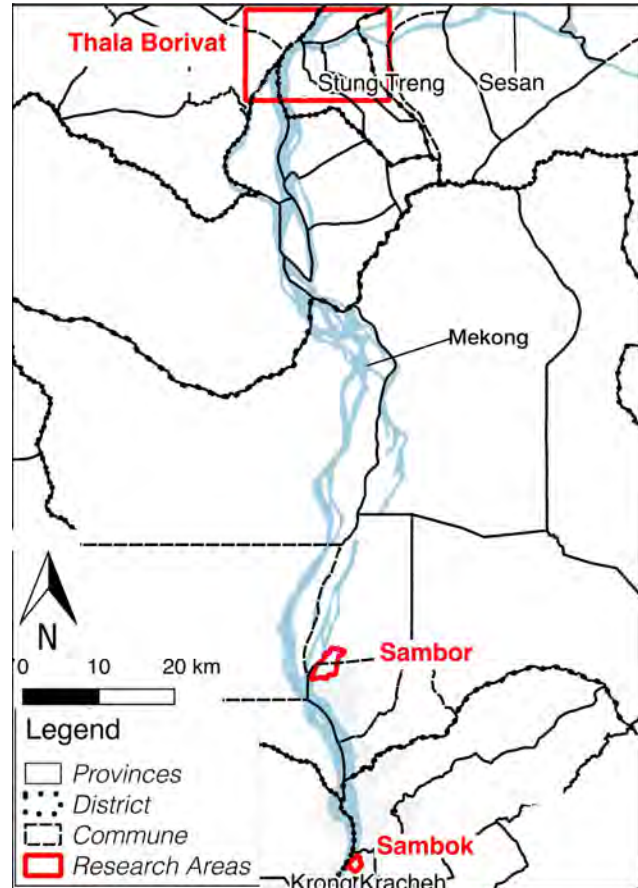


Figure III-2. Project locations (red polygons) on the Cambodia Middle Mekong

narrow strips along its watershed where current rice fields and gardens of various crops are located.

The area is covered by dense and clear forests, bamboos, and sub-vegetation of grasses, which are interrupted by a narrow strip of rice fields located along the rivers and rows of bamboo and thorny plants following the ravines (within 50-60m elevation). The dense forested areas are located along the large and small tributaries of the main rivers (JICA 2003). The pre-Angkorian and Angkorian temples, like the modern settlements, are found on levees and mounds near the modern rice fields. This region is historically known for its various ethnic groups practicing swidden agriculture living in the upland areas (e.g., Aymonier 1895; Baird 2010a; Guérin 2001, 2003; Leclère 1903; Meyer 1965).

This physical environment provided the pre-Angkorian populations with ready access to various resources such as agriculture, aquaculture, forestry, and trade (Anonym 1913a; Baran et al. 2014; Henri 1916; Hortle et al. 2004; JICA 2003). Thala Borivat, Sambor, and Sambok, are strategically located within a portion of the Mekong that is difficult to navigate due to the rapids and rock outcrops (Aymonier 1895; Garnier 1885; Garnier and Delaporte 1996; MRC 2012).

III.3 Data and Preliminary Research Methodology

The bulk of pre-Angkorian data consists of dated and undated religious monuments, statuary, and inscriptions. In contrast with archaeological materials of the Early Historic period, pre-Angkorian data lack prestige goods found in burial contexts such as personal beads and gold ornaments, partly due to cremation burial practices and partly to a lack of archaeological coverage. Prestige goods of this period (e.g., ritual paraphernalia such as statuary or carvings made of stone or precious metals) are commonly associated with religious activities and temples, which emphasizes a corporate aspect of pre-Angkorian society (e.g., Le 2011; Le 2015; Reinecke, Vin, and Seng 2009; Stark 2006b; Stark 2006a; Stark, Sanderson, and Bingham 2007; Vickery 1998). Settlement patterns (e.g., mounds, *trapeangs*, religious architecture) and utilitarian commodities (e.g., earthenware ceramics) are the main data sources available to study the political economy of this period. Previous research outlined in Chapter I.5 documented brick architecture, lintels, and inscriptions in Thala Borivat, Sambor, and Sambok.

Despite lacking a comparable ceramic chronology, the study area's data sources and chronological pattern are similar to those of Angkor Borei and other pre-Angkorian centers.

The methodologies employed in this research revolve around the delineation of 'communities', their spatial distribution, interactions, and chronology at a regional level outlined in Chapter II.4. The paragraphs below outline the methodologies used by other projects to delineate the pre-Angkorian communities, and those employed by this research to study pre-Angkorian communities along the Mekong River.

III.3.1 Previous Research Strategies to Study the Pre-Angkorian Period

Different approaches have been applied to the study of settlement patterns and its implication on sociopolitical processes leading to the formation of the Angkorian civilization. Early data collections in Cambodia focused on documenting sites, which are almost always associated with religious structures and large hydraulic features (Aymonier 1900, 1901, 1904; Lajonquière 1902, 1907, 1911; Parmentier 1927a, 1927b, 1935). Inventory survey persists among temple-focused research, particularly in Angkor and in the countrywide inventory conducted by the collaborative project between the Ministry of Culture and Fine Arts (MoCFA) and the École française d'extrême-orient (EFEO). While regional scale settlement surveys have been conducted by EFEO and GAP (primarily in Angkor), only LOMAP and NAGA research projects (and to some extent, GAP) carried out systematic surface collections within a 1.5 m circle and opportunistic collections (Table III-1) (e.g., Cisark 2018; Evans 2002; Evans et al. 2013; Fletcher et al. 2003; Fletcher, Evans, and Tapley 2002; Gaucher 2001; Gaucher 2002; Hendrickson 2007; Hendrickson 2010; Hendrickson and Evans 2015; Mam et al. 2004; Phon 2011; Phann et al. 2007; Pottier 2006; Pottier and Bolle 2009; Pottier et al. 2004; Stark 1998; Stark 2001; Stark 2003; Stark et al. 1999; Stark, Sanderson, and Bingham 2007; Stark et al. 2015).

Inventory survey is also common in southern Vietnam and southern Laos where pre-Angkorian and Angkorian remains are located (e.g., Dao 1998; Le 2006, 2011, 2015; Lorrillard 2013, 2014; Manguin and Vo 2000; Santoni and Hawixbrock 1998, 1999; Santoni and Souksavatdi 1996; Souksavatdi 1998; Vallerin and Manguin 1997; Vo 1998, 2003). In contrast, systematic approaches to data collections including both excavations and surveys have been introduced in northeast Thailand since the 1980s-1990s. That research often concentrate

around moated settlements, burials, habitation mounds, religious architectures, and surface scatters (see C. Evans, Chang, and Shimizu 2016; Higham 2002; Mudar 1993; Murphy 2013b, 2013a; Welch 1985, 1998; Welch and McNeill 1988). The most recent regional survey was conducted in the Upper Mun Valley (C. Evans, Chang, and Shimizu 2016).

Project*	Location	Scope	Methods	Reference
LOMAP	Mekong delta/Ta Keo	Settlement patterns, chronology	Topographic map, aerial photos, satellite images, ground survey, site mapping, interview, excavation, opportunistic surface collection	Stark 1998; Stark 2001; 2003; 2007; Stark et al. 1999
NAGA	Kampong Cham, Stung Treng, Kracheh	Settlement patterns, chronology	Topographic map, ground survey, and excavation	Mam et al. 2004; Phon Kasek, pers.comm.
RAC	Phnom Penh, Kandal, Kampong Thom	Site-based chronology, settlement patterns	Ground survey, site mapping, and excavation	Phon Kaseka 2011; and pers.comm.
GAP	Angkor	Settlement patterns, hydraulic features, temples	Satellite images, low-level ultra-light, ground survey, site mapping, large and small-scale excavations, paleo-environmental core, some surface collection	Evans 2002; Evans et al. 2013; Fletcher et al. 2003; Fletcher et al. 2006; Hendrickson 2007; 2010; Hendrickson and Evans 2015; Stark et al. 2015
CISARK (MOCFA-EFEO)	Cambodia (Laos,	Inventory survey	Reconnaissance, ground-truthing previous inventory and local	Phann et al. 2007

	Thailand, Vietnam)		ministerial reports, interview	
MAFAKATA (EFEO)	Angkor	Settlement patterns, site-based historical archaeology, mounds, hydraulic features, temples	Aerial photos, survey, large-scale excavations, surface collection (rare or unreported)	Gaucher 2001; 2002; Pottier 2006; Pottier et al. 2004
EFEO-Laos	Wat Phu, Laos	Settlement patterns, site-based historical archaeology, mounds, hydraulic features, temples	Inventory survey, large- scale excavations	Hawixbrock 2010; Lorrillard 2014; Santoni 1994; Santoni and Souksavatdi 1996; Santoni and Hawixbrock 1998, 1999
EFEO, VISS, VIA	Mekong Delta	Temple-based historical archaeology	Inventory survey, large- scale excavations	Dao 1998; Le 2006; Manguin and Vo 2000; Vallerin and Manguin 1997; Vo 1998; Vo 2003
KBAP; PSKAS; Stephen Murphy	Khorat Plateau/ Thailand	Site distribution, settlement patterns, surface collection	Remote sensing, pedestrian surveys	Evans, Chang, and Shimizu 2016; Murphy 2013a; Murphy 2013b; Welch and McNeill 1991; Welch 1998

* LOMAP: Lower Mekong Archaeological Project; NAGA Research Group; RAC: Royal Academy of Cambodia; GAP: Greater Angkor Project; CISARK: Carte interactive des sites archéologiques khmers (Ministry of Culture and Fine Arts- École française d'extrême-orient); EFEO/MAFAKATA: École française d'extrême-orient/Mission archéologique franco-khmère sur l'aménagement du territoire angkorien; VISS: Vietnam Institute of Social Sciences; VIA: Vietnam Institute of Archaeology; KBAP: Khorat Basin Archaeological Project; PSKAS: Phon Songkhram Archaeological Survey

Table III-1. Examples of surveys involving the pre-Angkorian period in Cambodia, Vietnam, Thailand, and Laos

III.3.2 Unit of Analysis: Site Classification

As summarized in Table III-1 above, Cambodia's pre-Angkorian archaeological record is biased toward visible archaeological mounds and ponds through airborne and spaceborne remote-sensing technologies as well as ground-truthing, thus lacking a sense of off-mound habitation and pre-Angkorian agrarian land use (Stark 2006c; Stark et al. 2015, 1440, 1442). However, in Stung Treng region and areas located along the Mekong, these features are more obscured than those located in the delta and the central plains. Access to water resources, terrain morphologies, tree covers, and agricultural practice may influence this obscured pattern.

As discussed in Chapter II.4, this dissertation research defines settlement as a continuous area with evidence of past human activities characterized by any of these features or sites: artifact clusters, mounds, architectural features, and hydraulic features (trapeangs, canals, embankments). The settlement identification was done post-hoc in the lab. While 100m is a common rule of thumb for archaeologist to define a separate site, a distance matrix analysis of ponds in Thala Borivat and Sambor indicates that the distances between ponds bunch together from 100 m to 250 m (Figure III-3). A “local community” or a “settlement” is defined simply as a cluster of features located closer together at distance lesser than 250m. Settlements or local communities are considered separate if the distance between them is greater than 1 km. These characteristics help explore the relationship between temples and communities as well as between regional settlements through time (see Chapter VIII.2).

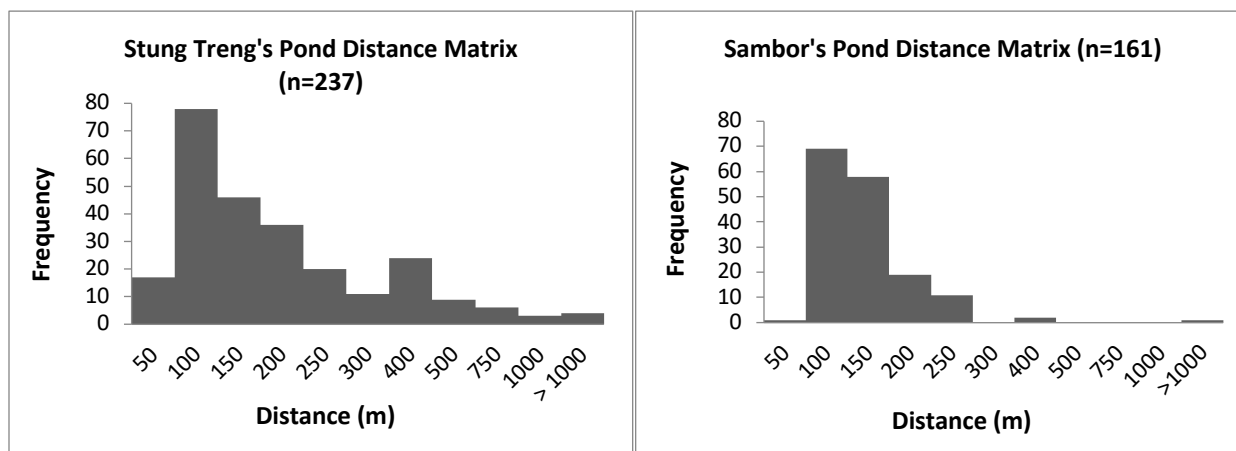


Figure III-3. Distance matrix of ponds identified in Stung Treng and Sambor

In Cambodia, the application of this unit of analysis and the methodology associated with it varies depending on the location and scope of the project (See Table III-1). These differences create difficulties in comparing settlement patterns between each region. Moreover, the Cambodian houses were made of perishable materials and research at the household scale remains in its infancy (Baty et al. 2005; Stark et al. 2015). Table III-1 summarizes five primary site types or feature classes employed in this research:

Feature Class	Definition
Mound	Corresponds to the Khmer term <i>tuol</i> (or Lao term <i>put</i> used in parts of Stung Treng) refers to elevated area with or without archaeological artifacts
<i>Prasat</i>	Standing or collapse monumental architecture
Brick feature	Areas with brick scatters or rubble without clear association with a monumental architecture
<i>trapeang</i>	Ponds or reservoirs
Burial	Early Historic sites where evidence of burials reported and/or confirmed
Surface Collection	Area where the number of surface artifact is greater than one

Table III-2. Site classification

III.3.3 Data Collection Strategies: Feasibility Studies (Phase I-2011)

This research attempted a methodological transfer of systematic full-coverage survey employed in the archaeological literatures outside of Cambodia (e.g., Drennan 2006; Drennan et al. 2003; Drennan, Berrey, and Peterson 2015; Peterson and Drennan 2005). A pilot study conducted in 2011 combined with further trials and errors during the successive research

phases suggested that a methodological transfer was impractical. However, disregarding the steep slopes faced by Parsons and his colleagues in Junin, Peru, their field descriptions and methodological approaches are very similar to the conditions encountered during this research (Parsons, Hastings, and Matos Mendieta 2000).

The pilot project began with compiling known sites, topographic maps, and remote sensing data based on a low-resolution Google Earth satellite image. Most archaeological sites in southern and northern Cambodia can be remotely identified by ponds, moats, embankments, and mounds. However, few pre-Angkorian temples outside the Mekong delta are moated (e.g., P. Heng 2012; Shimoda and Shimamoto 2012). *Trapeangs*—particularly those with embankments—were the only features identifiable on Google Earth satellite images of Stung Treng (2010-2014). By 2011, a set of digitized aerial photograph mosaic (1:25000) taken in the 2000s was acquired; most features, however, remained unidentifiable under tree covers and habitations. Only ponds were visible on this mosaic, which renders remote sensing as an impractical technique for this region. Preliminary studies of site inventory and satellite images

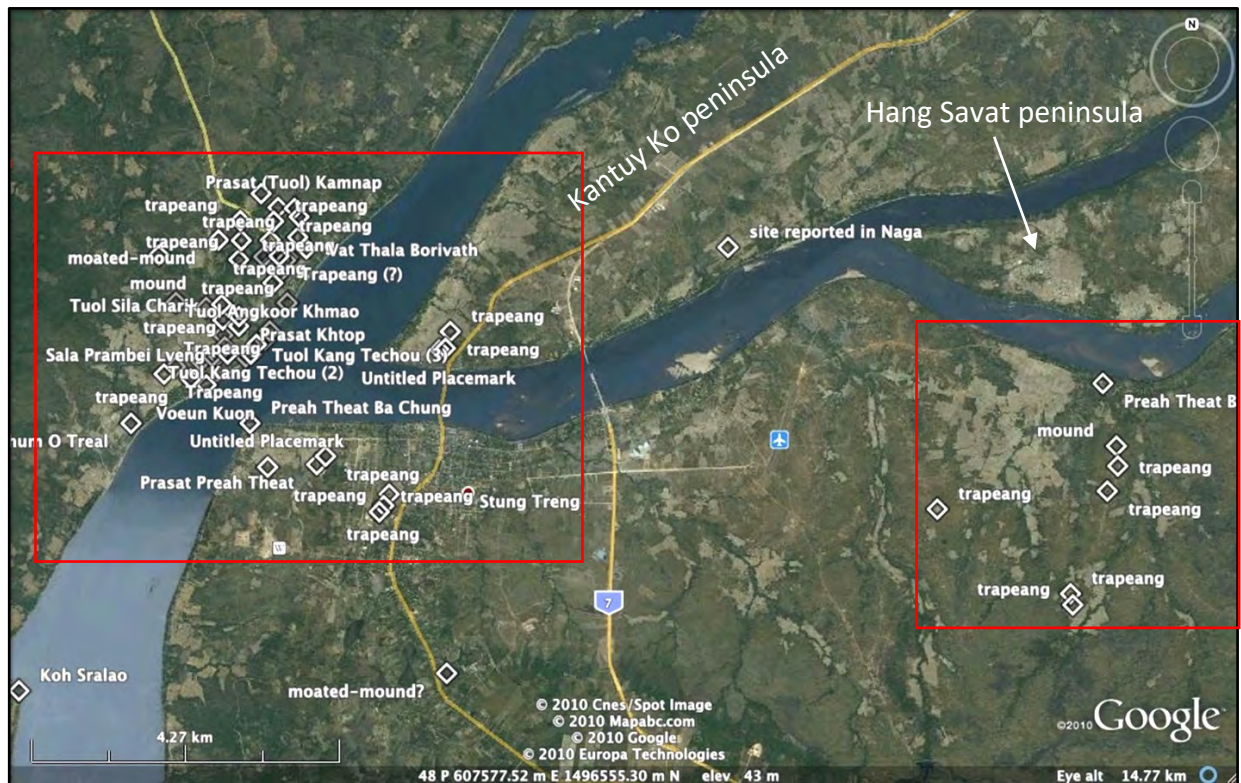


Figure III-4. A low-resolution Google Earth satellite image (c.50m resolution) used as the basis for remote sensing in 2010. Two clusters of ponds correlated with temples reported from this region: Thala Borivat cluster is the left and Ba Doem cluster is on the right.

indicated two settlement clusters of Thala Borivat and Ba Doem identified by brick architecture, mounds, ponds, and moats (Figure III-4). Assuming that each brick architectural concentration represents a pre-Angkorian community, these clusters provide an ideal testing ground to understand the differences and similarities between large and small communities.

Two research areas, Survey Area 1 (Thala Borivat) and Survey area 2 (Ba Doem), were defined using the 1971 USGS topographic (Figure III-5). The pilot project concentrated primarily within the c. 12 square km- Survey area 2 (Ba Doem) and comprised a ground-truthing survey involving surface and site reconnaissance, systematic surface collection, and GPS records. The first tasks were to visit known sites reported by CISARK, to interview the head of the Khum and villagers, and to visit several ponds identified on the aerial photos. Continuing habitation was expected to affect the surface condition of many archaeological distributions that the surface ceramics in this area may represent the entire cultural sequences since continued farming and landscape modification likely churned up artifacts from the lowest strata. Four crew members walked across the survey area to identify surface artifacts.

The Ba Doem region is characterized by two contrasting landforms, i.e., levees/mounds and low-lying terrains with an elevation difference between 1m-2m. Modern habitations and archaeological features in Ba Doem are predominantly located on the levees along the Sesan and Sekong rivers (Figure III-6).

Mounds and small levees formed along smaller ravines and streams tributaries (O Ba Doem and O Samkhuoy) are currently unoccupied and covered by shrubs and bamboo forest. Low-lying terrains around the villages are being used as rice fields.

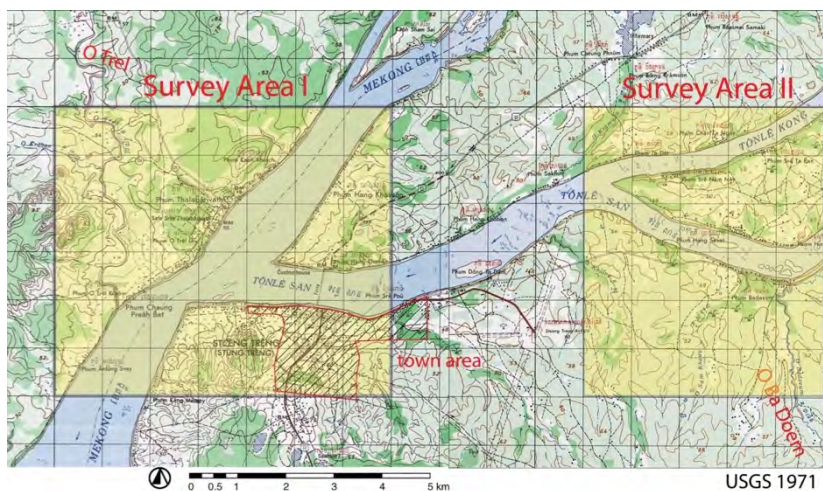


Figure III-5. The 2011 Pilot Study's two Survey Areas based on a Topographic USGS Map 1971

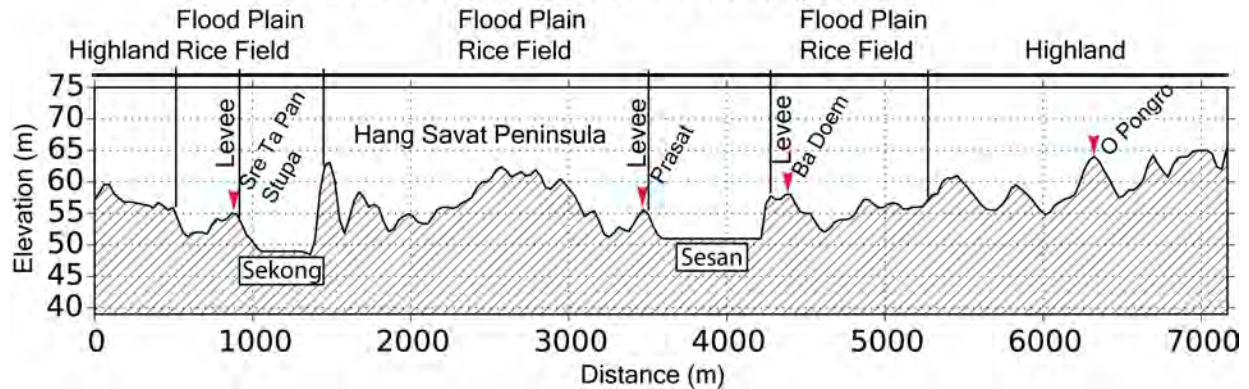


Figure III-6. Topographic north-south profile of the Ba Doem region showing modern habitations, rice fields, and the pre-Angkorian temples of Hang Savat, Ba Doem, and O Pongro.

III.3.3.1 Rice Field and Surface Collection

Archaeologists have studied the impact of plowing (commonly by machinery) on artifact distribution and surface collection within the plow zone such as decrease in density due to lateral and vertical movement (e.g., Odell and Cowan 1987; Roper 1976; Shott 1995). Within the plow zone, wet rice fields constitute one of the challenging areas for archaeological survey because of several concerns about the visibility, canal dredging, as well as lateral and vertical movement of artifacts (Barnes 1986; Mudar 1995). Mudar (1995, 167) reported that visibility within the rice fields in Lam Maleng, Thailand, was very poor while the ground was not plowed and the research focus was shifted to field bunds. Surveys in China addressed these issues by employing multiple methods (e.g., shovel and auger transect as well as surface collection) to probe the subsurface artifacts within the rice fields (Flad et al. 2013).

Methods applied during Phase I research (Summer 2011) comprised a crew of three archaeologists walking along a north-south line between 30-50 m apart across the rice fields in Phum Samkhuoy. When a sherd was found, crew members stopped and intensively searched for more sherds within the field, bunds, and its adjacent fields. If more than two sherds were found¹, the field or collection unit was marked on a laminated sheet of aerial photo, and a GPS

¹ Originally, a threshold was defined as between 2 and 50 sherds. However, road construction projects in this area had exposed a lot of large sherds. Since the ceramics of this region is practically unknown, the upper limit of the collected ceramics within a collection unit was removed.

location was taken. The artifacts were bagged and given a sequential tag or collection number. If there were only one sherd, the crew kept moving toward the end of the line. The process was repeated until the rice field area (50 ha in Phum Samkhuoy) was covered.

Rice fields in this area are primarily rain-fed, although most are subjected to seasonal flood during the rainy season. Their surface visibility was mediocre throughout the fieldwork duration (June-July 2011) because most fields were plowed prior to the start of the project. The traditional plow driven by oxen or buffalos, which can churn up 20-30cm of topsoil was still used (Figure III-7). The wooden plow has a steel blade, which allows for a less drastic landscape



Figure III-7. 1) A buffalo-driven plow commonly used in Stung Treng; 2) A steel blade plow at Phum Samkhuoy can churn up between 20-30cm of soil

modification since the tilted soil remains at the same place. Hoes were used to construct bunds by removing topsoil along the bunds (a common practice in Cambodia). Although bunds are shared between different owners, the soil is generally taken from the side that the farmer owns to avoid boundary conflict. Our observations suggested that there was no difference in artifact distribution between bunds and fields since lateral movement was minimal.

Most artifacts occurred in the fields or on bunds located near/on mounds and levees where the substrata were disturbed. A few fields contained 5-10cm of rainwater; however, it was clear enough to see the ground surface. Interviews with field owners confirmed our observation that sherds only occurred on or near mounds, which were converted to rice fields (Figure III-8 and Figure III-9). Subsequent visits after this pilot study during the drier period of November 2011 to May 2014 suggest that surface visibility was much lower because grass and

hay were left in the fields and the soil became hardened after the fields were drained and rice harvested.

Additionally, the national censuses conducted in 1998 and 2008 indicated that the number of households within the survey area only increased by 10-15% in most villages, except in Phum Samkhuoy where the number of households doubled in 2008. Since the population of this area remains small and the use of mechanical equipment was limited to grain extraction and husking, not plowing or leveling the fields, the landscape had been minimally altered.

Although it had been over 10 years since the aerial photos were taken in the 2000s, most fields surveyed remained almost exactly the same.

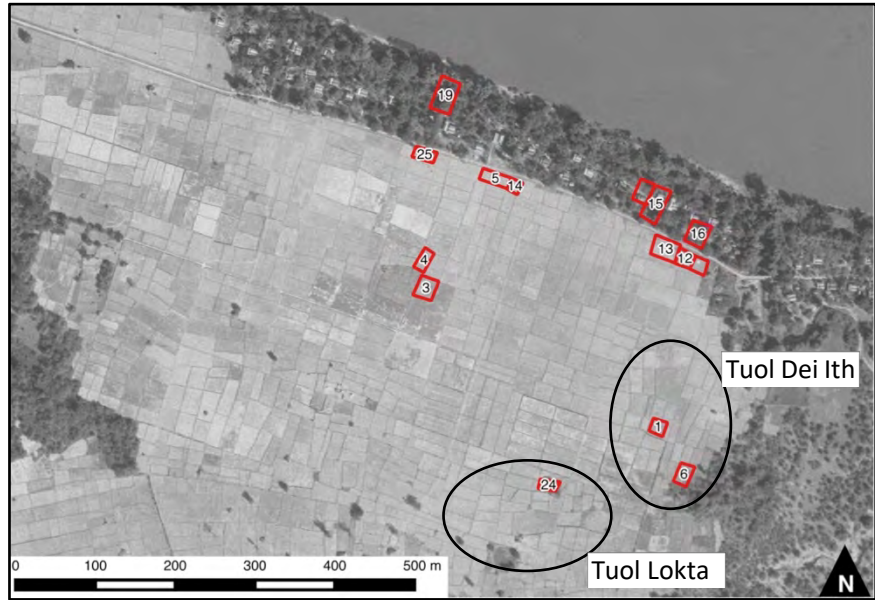


Figure III-8. Rice field patterns and surface collection units of Phum Samkhuoy on a 2000s-aerial photo

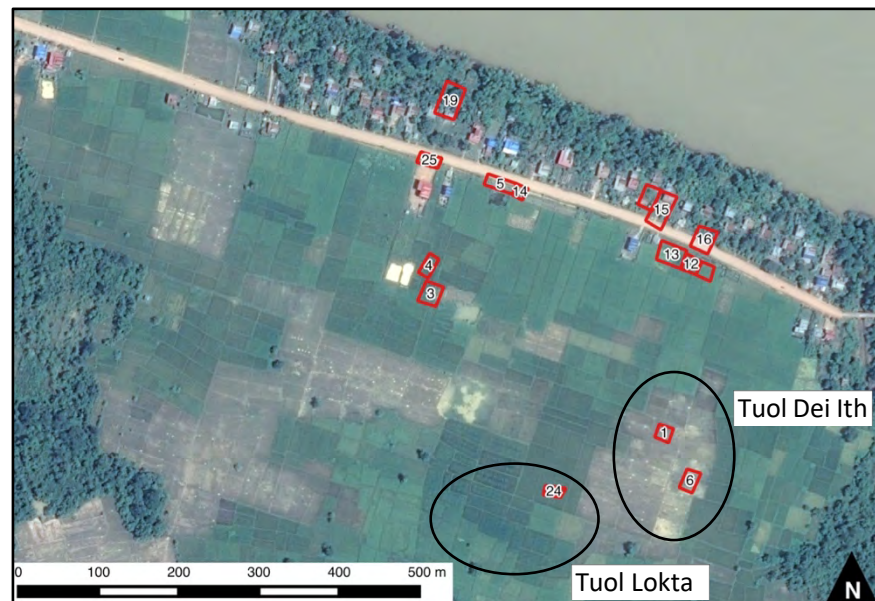


Figure III-9. Rice field patterns of Phum Samkhuoy on Google Satellite image acquired on 10/23/2015 showing a minimal expansion toward the east despite an increase in the number of households.

III.3.3.2 Levees and Mounds

Mounds and levees in the Ba Doem region can be divided into two zones: the riverine zone where contemporary settlements are concentrated, and the non-riverine zones of uninhabited areas overgrown with shrubs and bamboos (Figure III-10).



Figure III-10. Overgrowth of thorny bamboos and shrubs occupied the uninhabited areas of the region

Only a small portion of the non-riverine zone was used as gardens or rice fields. The surface visibility was extremely poor due to leaves, roots, and tree covers. A few areas had slightly better visibilities because the surface was disturbed by water-borne erosions along foot paths, animals, and farming. This condition rendered the collection methods applied in the rice field impractical because the majority of this area was inaccessible. The surface collection strategy was to walk along the foot paths and clear vegetation. Reconnaissance into this uninhabited area suggested that there was less chance (zero sherds were found!) to find surface artifacts outside of the current villages.

Within the riverine zone, the crew acquired the owners' permission to inspect their properties. The surface visibility was also poor due to garden, small vegetation, raised house platform, and sweeping. However, subsurface disturbances such as toilet pits, wells, gardens, and riverbank erosions exposed ceramics dating from the pre-Angkorian to Angkorian periods. Interviews were also conducted with landowners to confirm whether they had seen ceramics when they dug a pit to plant trees or burn rubbish. A property fence or mound area was used as collection unit.

III.3.3.3 Hand Auger Test

A series of hand auger test was conducted during Phase I-2011 in Phum Samkhuoy to test the viability of this method on subsurface remains. Tuol Dei Ith—which was partly converted to rice fields and gardens—and its surface ceramics (collection 1 and 6 in Figure III-8 and Figure III-9) offered a good testing ground. The crew started at the center of a rice field at the western

edge of this mound and proceeded east toward the stream of O Samkhuoy. Each borehole represents a collection unit. 15 boreholes or collection units with a consistent depth of 1.30m were placed across this mound without significant stratigraphic variations and ceramics. Most of the subsurface remains uncovered were brick or burned clay particles (<1cm) or in most cases dust. This



Figure III-11. 1) Hand auger survey at Tuol Dei It, Phum Samkhuoy 2011; 2) burned clay observed in the bore sample; 3) burned clay from a burned tree

burned clay may have resulted from the practice of field or shrub burning prior to farming. Examples of freshly burned shrubs and bamboos produced similar burned clay particles at the roots (Figure III-11).

The auger was thus considered not beneficial given the time and resources—two persons and 15 to 30 minutes per each borehole—spent within this trial process. The auger test was thus decommissioned from future research phases. A shovel test probe would have been an excellent technique to replace the hand-auger test. However, as it might raise suspicions of treasure hunting, efforts were shifted toward surface disturbances from farming, road constructions, and pits.

III.3.3.4 Road Development Project and Surface Exposure

Multiple road development projects had been undertaken in this research area since 2006 (as reported by Oum Boramey and Phon Kaseka). Road construction involved excavating one or two 1 m to 1.5 m ditches with depths ranging from 0.5 to 1m on each side of the road. Several new ponds or soil trenches were excavated down to 2.5m for road fill. These ditches and soil trenches provided great potentials for this field research because they were dug into the archaeological strata, exposing subsurface artifacts of different periods.

To compensate for a low visibility, road cuts and soil trenches were used as primary survey transects and collection units. If ceramics were found within these units, the crew expanded to cover a 50-m radius looking for surface artifacts (see details in Chapter IV.1.1 and Figure IV-2). With the characteristics outlined above, it is likely that ancient habitations, similar to the present, were located on mounds and levees to avoid seasonal floods and to access the rivers. Since these new roads were built on levees and in one case penetrated deep into the overgrowth across the survey area, it is likely that most habitation areas were fully covered by surveying this method.

III.4 The Refined Data Collection Strategies

Based on the primary results described above, the designation of ‘Survey Area 1’ and ‘Survey Area 2’ was no longer necessary since the space between both areas cut by backhoe trenches was fully surveyed with the exception of the modern urban center. The surface collection strategies were adjusted to follow the topographic mapping, surface disturbance, and areas with brick features located within a 1-km zone along the rivers. The research project comprises four phases with different scope and activities summarized in Table III-3:

Phase	Scope	Location	Duration
I	Feasibility Study: full-coverage survey, surface collection, and hand-auger test	Ba Doem	June-July 2011
II	Combination of full-coverage and site-based survey, surface collection, and topographic mapping	Thala Borivat	December 2012- November 2013
III	Excavation, full-coverage and site-based survey, surface collection, and topographic mapping	Stung Treng region, Siem Pang, Sambor, Sambok,	February-May 2014
IV	Post-fieldwork Artifact analysis	Siem Reap	June-July 2015; June-July 2016

Table III-3. The project’s 4-phase data collection strategies 2011-2016

III.4.1 Cartographic sources and remote sensing

No major cartographic sources were available for this area at the start of this project in 2009-2011 beside the topographic maps of the 1970s and 1990s (Table III-4). Only low-resolution Google Earth Spot images ($\geq 50\text{m}$ -resolution) were accessible before 2014.

Type	Visible features	Sources	Availability
Inventory map	Photographic data, descriptions of features, gps locations	CISARK (www.cisark.mocfa.gov.kh)	2010
Inventory map	MGRS-USGS 1960s site location and descriptions of features	NAGA (Mam et al. 2004)	2014
Geography and Site inventory	Descriptions of features with approximate location, habitation, travel routes	(Aymonier 1895; Guérin and Chhom 2014; Kersten 2003; Lajonquière 1911; Leclère 1904, 1908; Mam et al. 2004; Van Wuysthoff and Garnier 1871)	2010
Topographic map	Elevation, river, large ponds, land use	JICA (1/100000), USGS map 1972 (1/50000)	2010
Digital administrative boundaries and rivers	Elevation, river, large ponds, land use	JICA, Open Development Cambodia; Global Administrative Areas (www.gadm.org)	2010
Soil type and mineral resources	Shapefiles of soil fertility, mining license, and copper resources	Open Development Cambodia, FAO, Save Cambodia's Wildlife's 2006 Atlas Working Group, USGS	2014
Aerial photos	Ponds, rice field, habitation	MoUP	2011
Satellite image (Digital Globe, CNES, Airbus, SPOT Image)	Ponds, rice field, habitation	30 to 15 meter resolution provided by Google Earth (2010-2017) and Bing Map (2016-2017) via QGIS Open Layers	2010-date

World Imagery	Ponds, rice field, habitation	Esri, DigitalGlobe, GeoEye, i-cubed, USDA FSA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo, and the GIS User Community	2017-2018
Topographic map	3D terrain topography	Open Street Map; Google Map via QGIS Open Layers	2011
Geographic map	Approximate site location	Antique map collection	2015
SRTM 1 arc second (c. 30-m resolution)	Digital elevation model (DEM)	USGS-NGA-NASA 2015 via Earth Explorer and Map Surfer (a QGIS layer)	2015

Table III-4. Cartographic sources employed by this project

III.4.2 Site Reconnaissance

Site survey was made both inside and outside of the main target areas around Thala Borivat, Ba Doem, Sambor, and Sambok. The scope of this survey was to ground-truth sites reported to contain bricks, ceramics, or lootings that are located along the Mekong, Sekong and Sesan. The majority of locals in this area are farmers, fishermen, and loggers with extensive knowledge of their surrounding environments. Bricks have been sought after and recycled at least since the early 1900s where sites in Thala Borivat were reported as “brick quarries” (Parmentier 1927a, 1:214). Many brick structures were completely dismantled including the upper structure of Prasat Preah Ko, which was dismantled during c. 1976-1977 by the Khmer Rouge (Figure III-12). Recent extensive land-grabbing fueled by



Figure III-12. Preah Ko (Prasat Boran) pre-1970s with intact upper structure (CISARK 2010)

increased population in the 1990s ensured the possibility that brick architecture was found within the previously forested areas.

Within the target areas, locations of brick feature were used as 'nodes' or research boundary markers of the pedestrian survey. Outside of the main research area, site visitations and surface collections were undertaken in areas accessible by land routes and, in some instances, by boats.

III.4.3 Topographic Mapping

The total station survey was conducted in Thala Borivat and Ba Doem during Phase II and III. The mapping procedure was not grid-based but rather following changes in the topographies as well as noticeable shapes of mounds and trapeangs. The crew started by marking a zero-datum point within a secured location then a gps coordinate was acquired using a 2008 Trimble handheld unit (the accuracy was low due to tree covers). The total station was setup and oriented north using a handheld compass. The crew moved toward different roads where the visibility was good and multiple elevation points were recorded on each side of the road. Brick features and trapeangs were marked in the total station, notebook, gps coordinates were taken, and surface ceramics were collected if available. Errors such as misplaced datum, orientation, and elevation based on different cartographic projection system were identified and corrected on site as well as during the data processing (see Appendix B Note 4). A total of 607 ha (or c. 4.8 km SW-NE x 2 km NW-SE) was mapped in Thala Borivat; while only 4.3ha was covered for Ba Doem concentrated on the main temple cluster.

III.4.4 Surface Collection

Due to the surface conditions observed during Phase I (see previous section III.4), three surface collection strategies became the most suitable for this region. The first, was to follow a series of newly excavated roads, ditches, and ponds where artifacts were exposed. The second, was to conduct the surface collection alongside the total station survey in Thala Borivat and around Prasat Ba Doem. The area covered by this survey fall within roughly 10-30m resolution, if not higher, that most of Thala Borivat (except in the overgrowth) was thoroughly surveyed. In the third approach, crewmembers were assigned to locate brick features (walking, taking boats, and driving motorcycles depending on the distance from a starting point). Once a feature was

found, crewmembers looked for surface ceramics within a 100m-diameter of the feature. The process continued to the nearby features and the total area covered approximates the previous method. Rice field, property boundary, and—in some cases—the entire mound surface is considered a collection unit. A pond or soil trench is considered as a collection unit if a collection was made there.

Although the Angkorian stoneware chronology is acceptable (See Appendix B: Note 5), the problem facing this study was that no pre-Angkorian ceramic chronology existed beyond LOMAP's work in the Mekong delta (See: Table I-2) (e.g., Bong 2003; V. Chhay 2007; R. Chhay, Heng, and Chhay 2013; Desbat et al. 2008; Ea 2010; Fehrenbach 2009; Stark 2000). Most pre-Angkorian centers remained to be studied. A relative date indicator of the pre-Angkorian ceramic assemblage is the lack of stonewares and tradewares, which only appeared after the 9th century CE. However, the ceramic assemblage-based periodization is imprecise since some sites are multi-component. It was thus impossible to provide ceramic dating on-the-fly during each fieldwork. Ceramic analysis became a major part of the Phase IV research (see Chapter IV).

III.4.5 Site Database

Each site and surface collection was given a sequence number starting from 1, which restarted at every phase of the project. If the surface collection was made at a site with brick features, then the same ID number was used. Each brick feature of a cluster located within the same vicinity were given an additional sequential number; for example, a cluster of Site ID 20 contains 5 features, each of them was named 20.1, 20.2, 20.3, 20.4, and 20.5. This was because it was unclear whether these features were separate structures or just looted debris.

Site information was recorded in the GPS units, notebooks, and on smart phones. A general site database contains records of each "site" properties including name, GPS location, site class (mound, *trapeang*, brick feature, *Prasat*), artifact, and a general condition. The database was originally designed as a Trimble Geo Explorer dictionary recorded directly on the GPS units then transferred and converted to ESRI shapefile (.shp) and Comma Separated Value (.csv) editable using QGIS (occasionally, ArcGIS) and Microsoft Excel. The projection was set to WGS 1984 Zone 48N. In 2014, a simple database was designed, based on the Trimble database, to utilize the File Maker Go on the iPhone, which provides the ability to use its GPS function

(unprojected WGS1984). This smartphone application required a short time to fill out a pre-configured site database during the field surveys (see Appendix D).

III.4.6 Excavation

A series of 1x2m excavation trenches were placed across the Stung Treng region after the surface survey covered most of Stung Treng region. The trenches were selected based on: 1) Surface ceramics with a deep chronology; 2) Located within a brick architectural compound to investigate usage of the ceremonial areas; 3) Avoiding visible brick masonry, which is time-consuming and potentially triggering brick looting; 4) Avoiding sensitive area, e.g., active looted site and population centers where rumors about “state-funded looting” of gold and statuary would harm the project and the safety of crew members.

The small trench size was used to minimize unintentional damage to the site as well as maximize the productivity of the crewmembers by allowing two to three units to be opened simultaneously. Hoes, shovels, and custom-made trowels were used to excavate the subsurface artifacts, which could reach 2m-2.5m below the surface. A 1x1 cm screen fitted into a 1x1m metal frame was used to retrieve artifacts. A finer screen (1x1mm) was used to wet-screen the previously screened soil to retrieve smaller beads and potential faunal remains. Workmen were hired, if available, to help with moving and screening the back dirt.

Each trench was marked using 20cm nails with white string and a handheld compass for orientation. A datum stick level was setup at the highest corner of the unit and the surface was photographed after the vegetation removal. The excavation proceeded at a 10cm level or stratigraphic unit (SU). When the 10cm below the datum (cmbd) level was reached, the crew recorded the data into a print-out form to summarize the SU. The data include soil color (Munsell color chart), soil fabric (loam, clay, sand, silt, sticky, soft, hard, etc.), artifact type, photograph number, and short description of the SU. Then a photograph was taken of the bottom of the SU or the top of the next SU with a north arrow and a small board detailing unit and SU number, and date. Only artifacts forming recognizable clusters such as large partially reconstructible pots, beads, unidentified materials, or soil matrix features were carefully recorded, mapped, photographed, and removed. All artifacts uncovered during excavation and

from screening were collected, bagged, and labeled by each SU. They were transported back to the lab for cleaning, drying, sorting, counting, weighing, recording, and photographing.

Each trench followed a conventional naming system, i.e., project name, trench number, SU number, and bag number each information is separated by a period (.). For example, artifacts collected during the excavation project in 2014 from Trench 6, at SU10 carried a label written Thala2014.T6.10.

III.5 Artifact Analysis

Artifact analysis was the focus of Phase IV, post-fieldwork analysis from 2004 to 2006. Artifacts collected from the 3-phase fieldwork were transported to Siem Reap where most analyses took place. The majority of artifact processing such as wash, sort, count, weight, and photograph were carried out at the Robert Christie Research Center-Siem Reap from June 2014.

Ceramics were the majority of artifact class recovered from the 3-phase fieldwork. Other artifact categories do occur in smaller quantities including beads, slags, stone tools, bronze, iron, ecofacts, and small pieces of human bones. Additional analyses on ceramics were done by the Khmer Stoneware Production and Exchange (KPX) for Neutron Activation Analysis (INAA), beads by Dr. Alison Carter for laser ablation-inductively coupled plasma-mass spectrometry (LA-ICP-MS), and Dr. Cristina Castillo for pollen samples.

Analysis Procedure. Artifacts were washed and placed in zipped plastic bags and labeled. Another label plastic tag was placed inside a smaller zipped bag and then placed inside the ceramic bags. Both labels contained information about the project's location, trench number, stratigraphy unit, date, and bag number. During the analysis, the ceramics in all bags were re-grouped into different classification. Each ceramic type was separately placed in a different labeled-bag and tag; then put inside the original bag. Additionally, an alpha-numerical number identifying artifact category was assigned to each of these bags. Each artifact type was subject to counting and weighing, all of which were written on the tag. This information was recorded into a notebook. Finally, the information on these notebooks was digitized into Microsoft Excel spreadsheet. Each MS-Excel worksheet contained ceramic data from different trenches and surface collection.

III.5.1 Ceramic Analysis

In 2011, a classification of earthenware ceramics developed by Dr. Miriam Stark for LOMAP (for detail, see Fehrenbach 2009) was used. However, it was too detailed and time consuming for the purpose of this research, which is to produce a comparative ceramic template between this region and the other pre-Angkorian centers such as Angkor Borei and Sambor Prei Kuk. During June to December 2014, a preliminary sorting process was applied to the excavated materials using a classification based on paste and texture such as inclusion of sand and minerals. This was a modified classification scheme produced for GAP's ceramic analysis by Miriam Stark, Piphah Heng, and Rachna Chhay (Appendix C: Thala Borivat).

By the end of this process, it was clear that the categories were too rigid to be practical for the ceramics collected from Thala Borivat and were then simplified (Appendix C). For example, the classification of fine sand and coarse sand tempers does not correspond to a general typology. A bowl is a common form associated with the Early Historic period and comprised both fine sand and coarse sand tempers (e.g., those from Unit 6 to Unit 9). It is likely the result of sand formations in the river where sand was quarried. For the purpose of this dissertation project, the classification of fine-sand (8d), coarse-sand (8e), and sand-with-minerals (8f) tempers are combined into a sand temper (8-sand) (Table III-5).

Category	Code	Ceramic Group	Description
1	KS	Stoneware or Unglazed stoneware	Khmer stoneware
2	KBG	Khmer Brown-Glazed ware	Glazed ware now known to come from Buriram in Northeast Thailand, Cheung Ek, and Toap Chey in Cambodia.
3	KGG	Khmer Green-Glazed	Includes, but may not be limited to, Kulenware
4	TH	Thai ceramics	Thai ceramics dated between 15 th -17 th centuries CE
5	CH	Chinese ceramics	High-fired ceramics and porcelains
6	VN	Vietnamese ceramics	Vietnamese ceramics that post-date the 15 th century CE

7	KGE	Khmer Glazed Earthenware or Kok Phnov ware (KPNware)	Earthenware or high fired ceramics with transparent or glassy glaze and/or ash-glaze. As of 2014, there are only two known production centers, Kok Phnov and Kok Bei.
8	E	General Undiagnostic Earthenware	Ware fired at low temperature; commonly a utilitarian ware.
8a	8a	Untempered or regular earthenware	This group mainly consists of ceramic with fine clay paste that is generally mixed with little to no temper. Temper can consist of sand (less than 20% of the paste), ground-terracotta (less than 20%), and others. These tempers do not make up more than 20% of the paste.
8b	8b	Industrial ware or Pinkware	This type is very common across this area with Iron Age occupations. Though we have found similar ware within the lower layers of Trench 1 and 9. It is very likely that most of the industrial wares are pink exterior and black interior. The paste can consist of moderate to high rice-chaff contents although some occur with very little temper. It bears similar characteristics to the Reduced Ware group. The likely scenario is that the ware was exposed to a very high heat that made the exterior and sometimes the interior exposed to oxygen while the inner paste and the interior face still retains the original Reduced ware color.
8c	8c	Rice Chaff-tempered ware	Mixed mostly with rice chaff (greater than 20%)
8-sand	8d to 8f	Sand-tempered ware	This category is a simplified combination of the sand-tempered ceramics 8d-8f. This include fine sand, coarse sand, and the combination of sand and mineral tempers. The paste was likely resulted from mixing river sand from this area, which is fine and rich in feldspar particles

			depending on the location. This ware type is generally finished by wiping the exterior to achieve a smoother look.
8g	8g	Ground-terracotta (grog) tempered ware	Unless the ground-terracotta represents more than 30% of the paste. Sometimes sand is also added to the texture.
8h	8h	Mineral without sand	generally, the paste contains white minerals (feldspar and other types of stones). Sherds fall within this category when the minerals represent more than 50% of the surface or paste.
9	HiFi	High fired ware	Ware possessing earthenware paste, forms, and color but fired at a higher temperature; sometimes called “biscuit ware” (e.g., Darith 2010). This category should be avoided as much as possible. It is recommended that ceramics that fall into this group be re-assigned to either stoneware or earthenware based on form and paste, i.e., although, KPN ware or KGE was fired at a really high temperature, its paste and form does not imitate Angkorian stoneware that we know. Rather they retain forms, which are generally associated with cooking pots or other kitchenware likes water-fetching vessel (Ka-am). As for the paste, it contains more pores and more sand or other tempers.
10	RW	Reduced Ware	Iron-Age/ Protohistory burnished black ware
11	FOW	Fine Orangeware	Wheel-thrown very fineware common to the Delta. Surprisingly, we have pieces of this ware from Trench 7 in the looted context (50cm)
12	FBW	Fine Buffware	This ware appears commonly as Kendi, although other kendis have fine to coarse sand temper like others.

97	B	Brick or fired clay	Associated with baked clay materials with or without shape, e.g., brick, kiln walls, or kiln supports.
98		Sherds smaller than 2 cm ²	Generally, sherds of this size are undiagnostic; unless, they are tradeware or glazed stoneware
99	UnId	Unidentifiable ceramics	Pending further investigation
Modern			Modern ceramics

Table III-5. Ceramic Classification for the Thala Borivat Archaeological Project

A reassessment was made during June-July 2015 of all ceramics found from Thala Borivat and was finalized during June-July 2016. Photographic documentation was not possible until June-July 2015 when the crew finished photographing all of the surface ceramics. Photographing the excavated materials was not concluded until August 2016.

III.5.2 INAA Sample

The Khmer Production and Exchange (KPX) offered an INAA analysis on 184 Khmer stoneware and 30 earthenware samples uncovered by the Thala Borivat Archaeological project. Samples were prepared by sawing small piece (2-5 square cm) of a large sherd. Sample preparations involve removing glaze and old surfaces with a tungsten carbide high-speed burr and crushing the cleaned sample. One gram of the powdered sample was subjected to the INAA test. The leftover crushed samples are stored in numbered vials at the University of New England for future reference or analysis. The test results allow for a principal component analysis, which enables the clustering of samples with similar geochemical data. These clusters are then cross-referenced with other contextual data such as kiln and geological fingerprints to establish possible origins and interactions between the production and consumption centers. (For details, see Grave et al. 2015)

III.5.3 Beads and Other Artifacts

The analysis of bead samples was conducted by Dr. Alison Carter. The analysis took place in the Elemental Analysis Facility at the Field Museum of Chicago, Illinois. LA-ICP-MS was selected because it is virtually non-destructive and requires no sample preparation (See Carter

2013, 130–32). The results were combined with Dr. Carter’s analyses of beads from other Early Historic sites in Cambodia using principal component analysis. Other artifacts (such as stone tools, slags, iron, bronze, bone, and wood) or non-artifacts (sandstone and laterite chips or pebbles) were processed following the same general procedure as the ceramics, e.g., sorting, weighting, and photographing.

III.6 Summary

Chapter III outlines the methodological approach to data collection within the research area during the 4-Phase fieldwork from 2011 to 2014. An attempt to transfer the full-coverage methodological approach from outside of Cambodia was not possible due to the region’s low surface visibility and social constraints. The archaeological survey in Stung Treng and Kracheh was adapted to the ground condition such as rice fields, mounds, and levees, all of which influence the patterns of habitations and artifact distributions. Due to low surface visibility caused by vegetation and modern habitations, this research employed a combination of full-coverage survey by following the topographic mapping and site-based survey by locating features such as mounds, ponds, and temple and by following surface disturbances (road constructions, looted areas, and recently dug pits) to recover surface artifacts.

The excavation followed the survey results where subsurface artifacts provided a deep chronology. Site classification for this region is composed of temple (*Prasat*), brick feature, mound, trapeang, and burial. The artifacts uncovered during the fieldwork comprise mainly ceramics, beads, slags, and few human bones and plant remains. Each artifact class was counted, weighted, and photographed. Some were selected for INAA and LA-ICP-MS analyses.

Chapter IV reports the outcome of each methodological approach during the process of the 4-phase research.

Chapter IV. Results of the Thala Borivat Archaeological Project

This chapter reports the results of each methodological approach employed throughout the 4-phase research outlined in Chapter III. . The fieldwork began with a feasibility study during Phase I (2011) to evaluate a methodological transfer of a full-coverage pedestrian survey from outside of Cambodia. It involved terrains and site reconnaissance and surface collection within the Ba Doem region where rice fields and shrubs dominated the landscape. Low visibilities rendered the methodological transfer impractical (see Chapter III.3.3). Following the surface disturbances caused by multiple road constructions and searching around brick architectures became the most productive approaches.

Phase II (2012-2013) combines topographic mapping, site reconnaissance, and surface collection in Thala Borivat to counter low surface visibilities caused by vegetation and modern habitations. During Phase III (2014), topographic mapping, site survey, and surface collection continued in Thala Borivat. Ten excavation units were simultaneously placed across Stung Treng where surface artifacts suggest a deep chronology. Site reconnaissance and surface collection were also conducted at Sambor-Sambok (Kracheh) and at sites reported to be located along the Mekong, Sekong, Sesan rivers in Stung Treng. Finally, Phase IV (2015-2016) concerned mainly on artifact analyses.

The following sections describe the results of settlement patterns, surface ceramics, and excavation in Stung Treng, Kracheh, and along the river systems.

IV.1 Settlement Configuration

Similar to the pre-Angkorian settlements documented in the Mekong Delta, the settlement configuration of Stung Treng and Kracheh comprises mound, trapeang, and temple. The geographical constraints of this region (e.g., access to fertile land, water and communication routes, and other resources) produces cluster of settlements representing communities, which are predominantly located on the levees. The following sections explore the extent and settlement patterns of this region beginning with a smaller center of Ba Doem and the results of a topographic mapping survey conducted in Thala Borivat to reconstruct settlement configuration in detail. Limited areas in Sambor, Sambok, and smaller temple sites

located along the Mekong, Sekong, and Sesan were surveyed to produce a comparative settlement template.

IV.1.1 Ba Doem

The Ba Doem complex provided an initial methodological testing for both a pedestrian survey and a systematic surface artifact collection. This area comprises two sets of terrain, levee/ mounds and the adjacent low-lying rice fields. Brick rubble and intact brick masonry were reported on mounds and levees formed along the major rivers. Modern habitations are located on the levees due to access to river routes (prior to the improvement of land routes), water, and adjacent rain-fed rice fields located within a rich temporary flooded alluvial wetland. Since the 2000s, field expansion began slowly toward a higher elevation dominated by shrubs and bamboos.

Ba Doem: Trapeang Cluster

Remote sensing analysis, based on a low-resolution Google Earth satellite image and an early 2000s aerial photo mosaic acquired before the fieldwork, identified three trapeang clusters (Figure IV-1). Two of these clusters, Cluster 1 and Cluster 2, form two linear patterns, and Cluster 3 creates a nucleated pattern in the Hang Savat peninsula.

Cluster 1 is located south of Phum Ba Doem within the overgrowth. A footpath leading to the rice fields located further south cut through this cluster. The surface visibility was extremely low. No artifact was observed along the waterborne erosion of the footpath, ranged from 20 to 50cm below the surface. Only two of these trapeangs had an embankment, which



Figure IV-1. Results of the 2011 Phase I in Ba Doem region showing clusters of Trapeang overlaid on Google Earth satellite image.

suggested that storing water was not the primary purpose and that their soil was removed for other purpose. The arrangement of these trapeangs on each side of the path implied that they were excavated to build a road heading south of the village. It is a common practice in Cambodia that soil trenches or ponds are excavated for road fill. Villagers had vague memory of a road planned

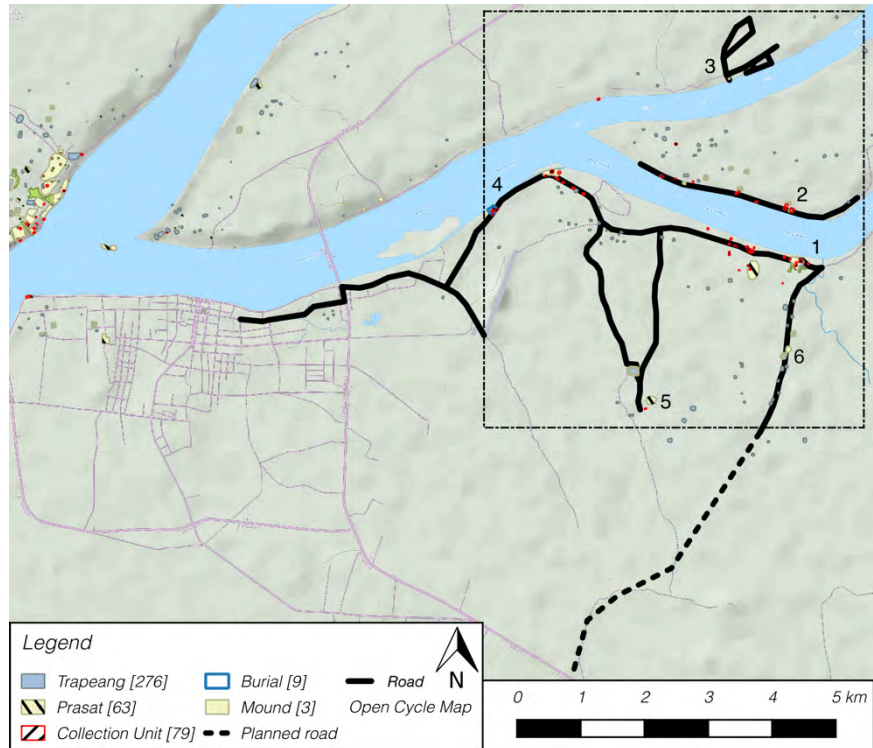


Figure IV-2: Road cut survey (solid lines) in Stung Treng 2011's Survey Area 2 and a reported colonial planned road (dotted line) in Ba Doem in the lower right. 1) Ba Doem; 2) Hang Savat; 3) Sre Ta Pan; 4) O Khlong; 5) O Pongro; 6) Tuol Trapeang Sima

during the colonial period to connect Phum Ba Doem with the NR7, south of Stung Treng town (Figure IV-2: *dotted line*). The direction of this trapeang alignment fits this road and may explain the absence of surface artifacts along the footpath because the pre-Angkorian settlements were confined to the levee. Had the ancient habitations spread to this trapeang Cluster 1 area, we would expect to see artifacts excavated from these ponds on the footpath. However, only Tuol Trapeang Sima, (*Nong Sim*, in local Laotian dialect) located at 1.5 km south of the village, comprised fragments of bricks and a piece of sandstone slab on the surface (Figure IV-2-6). Whether this brick feature was a pre-Angkorian temple marking the southernmost extend of the Ba Doem settlement or the later period stupa was unclear.

Cluster 2 is located west of Phum Samkhuoy, along the road linking Stung Treng town to the east along the Sesan. It exhibits a similar linear pattern to that observed in the Cluster 1, which is likely related to a road construction. This road predated the 1920s when Parmentier (1927a, 1:214) suggested that it was probably an ancient road linking Stung Treng to Ba Doem.

However, there was no datable material for this road since most of the trapeangs are only located in Phum Samkhuoy and not in Stung Treng town. No surface artifacts were observed.

Cluster 3 is located in Hang Savat peninsula and forms a nucleated pattern. Most of these trapeangs have embankments, which implies that they were intended to be reservoirs. This peninsula contains the most productive rice fields, owing to its alluvial deposition from the Sekong and Sesan, and attracts a larger settlement than Phum Ba Doem or Sam Khuoy. Three brick features were identified along the Sesan levee facing Ba Doem. New soil trenches excavated to build a road crossing Phum Hang Savat exposed many pre-Angkorian earthenware and very few Angkorian stoneware sherds. The trapeangs in this cluster, particularly those located near the Sesan levee, could date to the pre-Angkorian period because they are located close to the brick structures and soil trenches containing pre-Angkorian ceramics. This Cluster 3 poses another question on whether the pre-Angkorian Hang Savat population was larger than the Ba Doem population because only two trapeang are found located to the immediate east of the Ba Doem temple complex.

Ba Doem: Brick Features

Based on the inventory surveys conducted between the 1880s to 1920s (Aymonier 1895, 1901; Lajonquière 1907; Parmentier 1927a), CISARK reported several structures, which were coded alphabetically from A to Z, associated with the Ba Doem complex and a new mound, Tuol Ith (or *Put Dinki* in local Laotian dialect), located in Phum Samkhuoy. Although Parmentier (1927a, 1:220) provided a sketch map of this 2 ha complex, he was skeptical of the work conducted by M. Houël, a protectorate's custom officer in Stung Treng who was entrusted by the EFEO to conduct "archaeological research" prior to Parmentier's arrival in Stung Treng (Figure IV-3: left). The research was so obscure that Parmentier's description fits the local tales of the French looting the temples.

It is difficult to verify Parmentier's sketch of the Ba Doem complex because: a) it is unreliable, b) most brick temples in this region have been so heavily looted that only fragments of bricks remained for some of the temples, and c) it requires a large horizontal excavation to trace the exact shape of each structure. The survey conducted by Phon Kaseka and Oum Boramey in 2006 (*pers.comm.*) suggested that there were three vaguely defined groups, north,

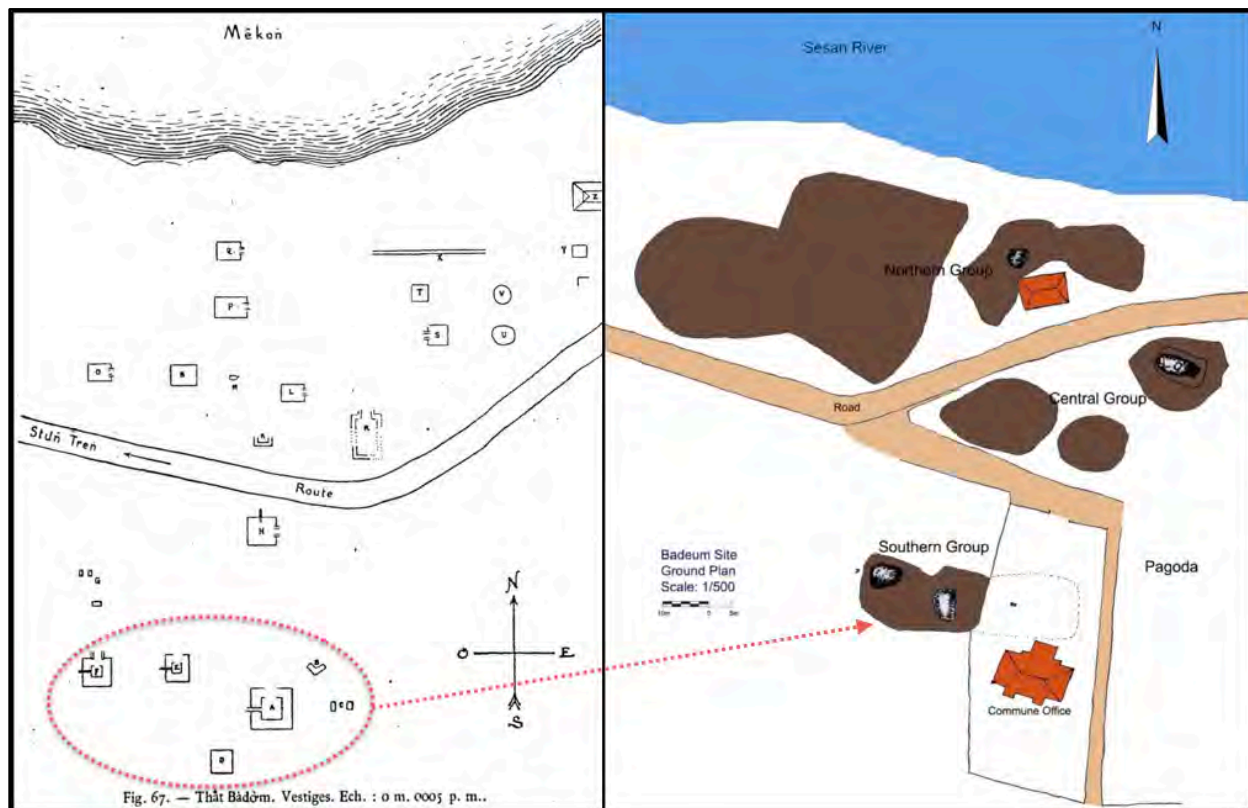


Figure IV-3. Ba Doem Complex-Left: Sketch map by Henri Parmentier (1927a: 220); Right: 2006 map by Phon Kaseka and Oum Boramey (different scale)

central, and south (Figure IV-3). The northern group consists of two large mounds of which the eastern portion contains a brick shrine. The central group comprises a standing structure, a doorframe, and a mound. The southern group is composed of a row of three temples aligning east-west, possibly related to Parmentier's feature A. The eastern tower was bulldozed in 2006 to make the Sala Khum (commune office) (Oum 2006). Two inscriptions and a lintel currently housed in the National Museum were reportedly taken from this southern group. Four additional brick features (Kamnap O Pongro in Samkhuoy and three Prasat Kamnap in Hang Savat) and a recent stupa (c. 16th-19th centuries) in Phum Sre Tapan, located on the north bank of the Sekong, were identified through Phase I fieldwork (Figure IV-4).

The interviews and pedestrian survey in this area firmly established the spatial distribution of archaeological features located within the modern villages of Phum Samkhuoy, Ba Doem, and Hang Savat. Most of these features are located within a 1-km zone along the rivers and form a cluster around the Ba Doem complex. One exception was Prasat O Pongro,

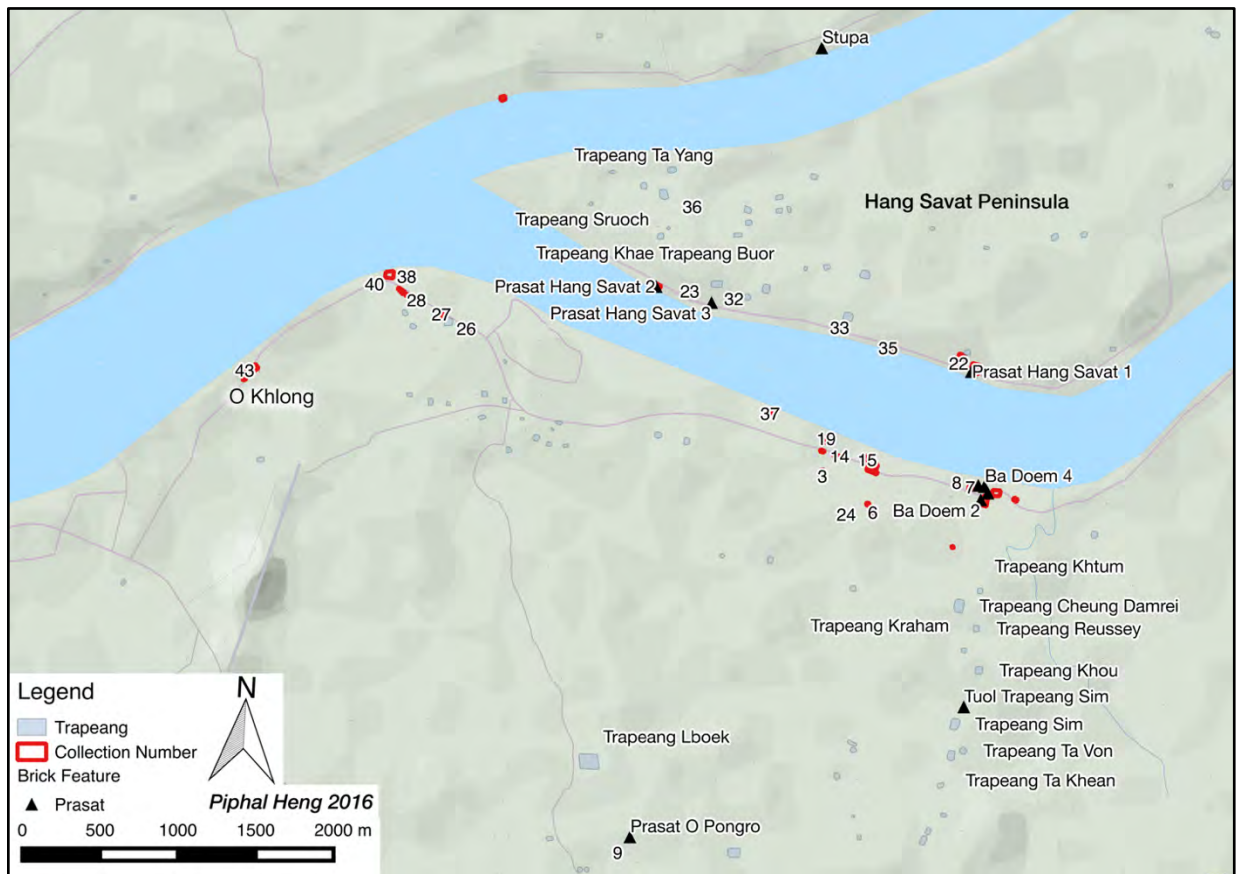


Figure IV-4. Surface collection (numbered) and features observed in the Ba Doem region during Phase I-2011 (OpenStreetMap background)

which is located near a ravine at 3 km south of the Sesan river. This temple and its surrounding ponds likely represent a separate local community from Ba Doem.

Thala Borivat

In Thala Borivat, site reconnaissance and surface survey spanned Phases 1, 2, and 3.

Phase I-2011. The Survey in Thala Borivat began after Ba Doem mainly to ground-truth the CISARK and NAGA's data and surface conditions. The spatial distribution of 22 documented brick features, was the primary focus. Four undocumented features (three brick features and trapeang Techo [Baray/Lboek]) were recorded during this phase (Figure IV-5).

This survey suggested that Thala Borivat's settlement patterns were also composed of mounds, brick features, and trapeangs and concentrated on the levees. The trapeang were clustered around brick features but without discernable patterns because they were obscured by modern habitation and land use. A detailed topographic mapping survey was the best

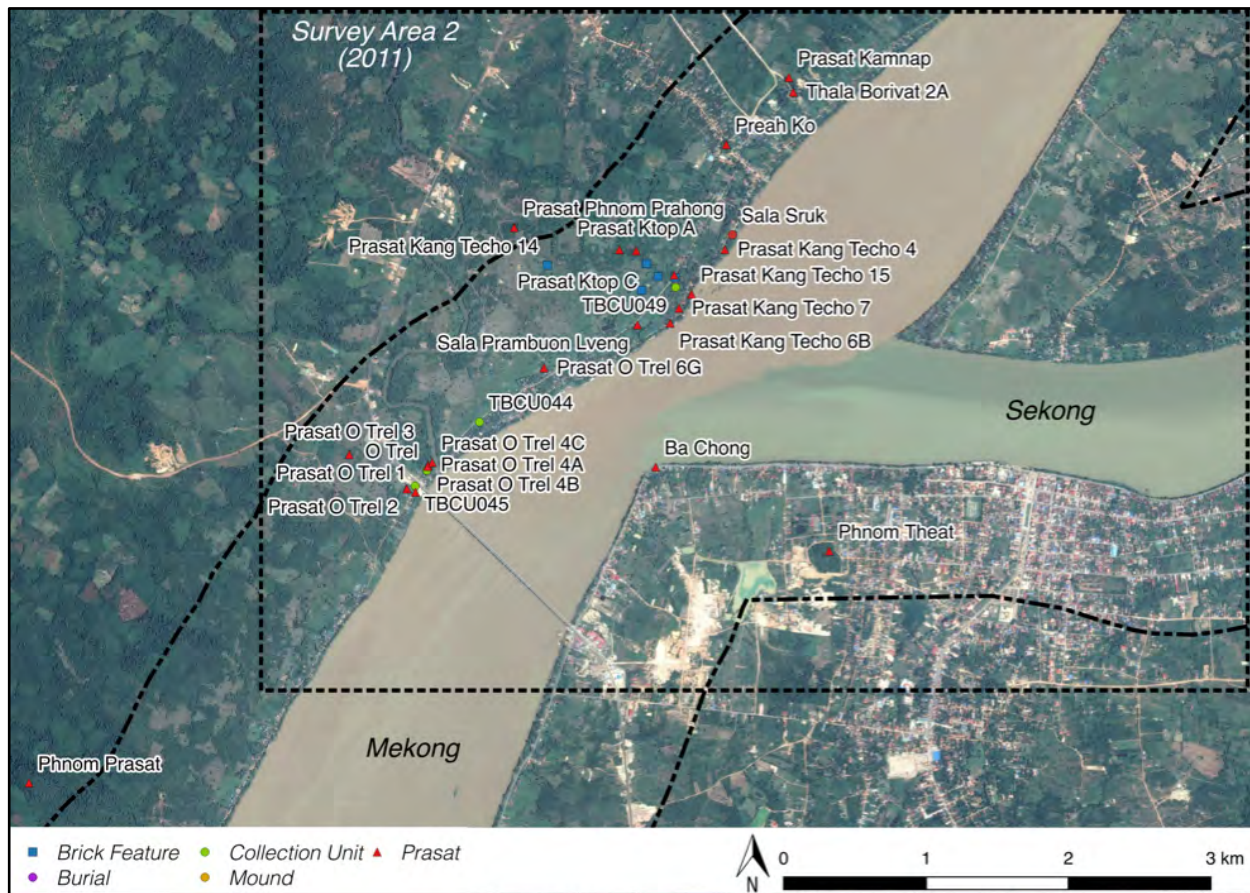


Figure IV-5. Thala Borivat: Sites visited during Phase I 2011

solution employed in the Phases II and III. Phase I's results combined with site data reported by the Naga research project (Mam et al. 2004; Oum 2006) narrowed the geographic focus to a 1-km zone along the rivers where most sites are located (Figure IV-6). This enabled us to combine Survey Area 1 and 2.

Phase II (December 2012-January 2013). Recording new sites (temple, mound, pond), topographic mapping, and surface ceramic collection were conducted simultaneously within Thala Borivat. Crew members walked along with a total station, which required two to three persons dedicated to mapping; while two other scanned the surrounding area for surface artifacts and brick features.

Topographic Mapping. The primary target of this field season was to cover the main temple cluster area located on the levee. The crew started from Prasat Preah Ko, moved toward the two main roads and smaller footpaths with good visibility. Multiple elevation points were recorded on each side of the roads. Brick features and trapeangs were marked in the total

station, gps coordinates were taken, and surface ceramics were collected. Some sections of this area were inaccessible due to thick vegetation, particularly within the northwest section.

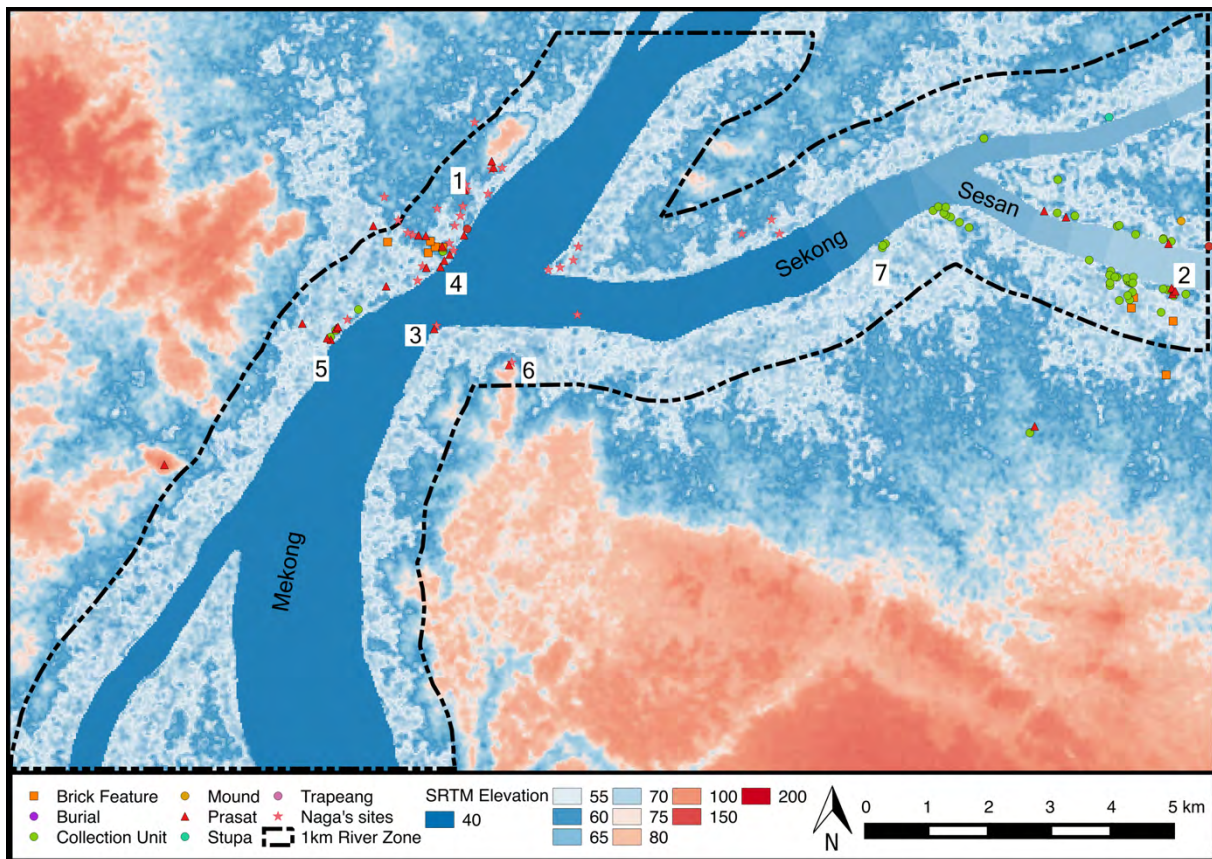


Figure IV-6. Research area for Phase II based on 1-km buffer zone along the major rivers covering most known features. Note: Survey Area 1 and 2 from Phase I was combined. 1) Preah Ko; 2) Ba Doem; 3) Ba Chong; 4) Sala Prambuon Lveng; 5) O Trel; 6) Phnom Theat; 7) O Khlong

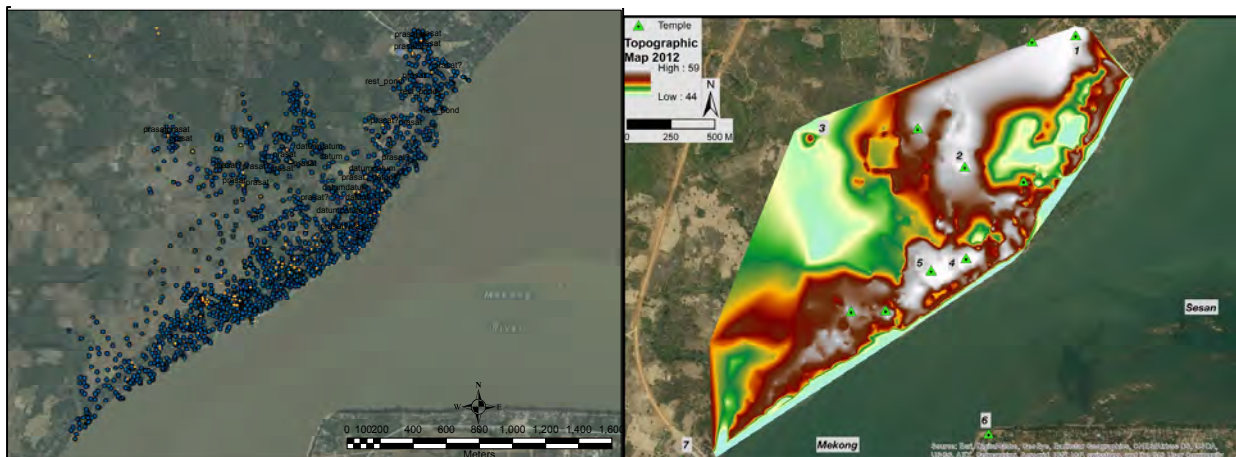


Figure IV-7. Left: 2064 Elevation points (blue) acquired through Phase II total station survey within Thala Borivat. Right: A topographic map generated using ArcGIS natural neighbor triangulation from the 2064 elevation points acquired in 2011. 1) Preah Ko, 2) Khtop, 3) Phnom Prahong, 4) Sala Prambuon Lveng, 5) Trapeang Khnar, 6) Ba Chong, 7) O Trel.

The mapping survey recorded 2064 elevation points in a c. 3.75 square km (Figure IV-7). Due to missing elevation points within the inaccessible areas, edge effect occurred in the topographic triangulation process. Nonetheless, this topographic map of the survey area suggested that the archaeological features were predominantly located on elevated areas of levees and mounds.

Settlement Patterns. Seventy-five large and small brick features were recorded in Phase II. Most were brick rubble and intact masonry exposed by the current habitations, road constructions, and decades of brick looting activities. The topographic mapping suggested that many brick features sit atop artificial rectangular mounds or platforms concentrated around Sala Prambuon Lveng (Figure IV-8). These platforms were possibly modified from a paleo-levee, which is located c. 230 m inland and ran parallel to the current levee. Further geoarchaeological survey is needed to understand the geomorphology of this region. Some trapeangs were

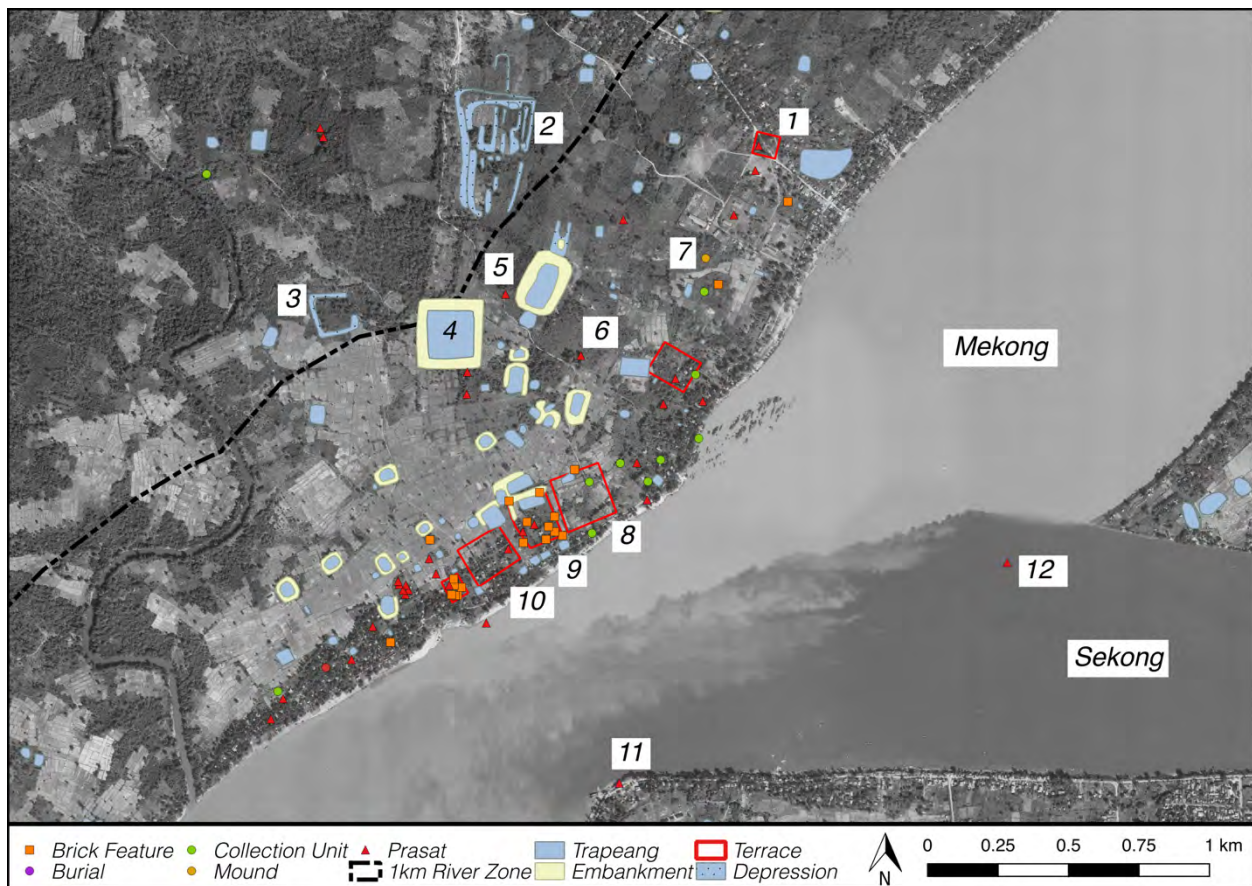


Figure IV-8. Brick features and surface collection units of Phase II- 2012-2013 project. 1: Preah Ko, 2: Veal Ro-il footprint; 3: Phnom Prahong; 4: Trapeang Techo; 5: Prasat Charoek; 6: Prasat Pros/Khtop; 7: Tuol Angka Khmao; 8: Sala Prambuon Lveng; 9: Tuol Trapeang Khnar; 10: Tuol Trapeang Kak; 11: Ba Chong; 12: Koh Bay Samnom

recorded during the mapping survey; most were located using Google Earth satellite images and the 2000 aerial photographs. These trapeangms had no datable materials; however, they concentrated mainly within the modern rice fields adjacent to the temples, which suggested that both belonged to the pre-Angkorian period.

Phase III: Topographic Map and Site Reconnaissance. The topographic mapping was designed to complete the area northeast and west of Prasat Preah Ko, not covered during Phase II. The same methodology applied to this phase, i.e., mapping, site reconnaissance, and surface collection, were conducted simultaneously.

Two hundred elevation points were added within this low visibility area and produced a complete map of area containing brick features (Figure IV-9). Additionally, 115 elevation points were taken at Ba Doem, which also appeared to be another large rectangular platform. An additional 20 brick features were recorded within Thala Borivat (Figure IV-10). All had been looted and reduced to piles of brick rubble or large pits.

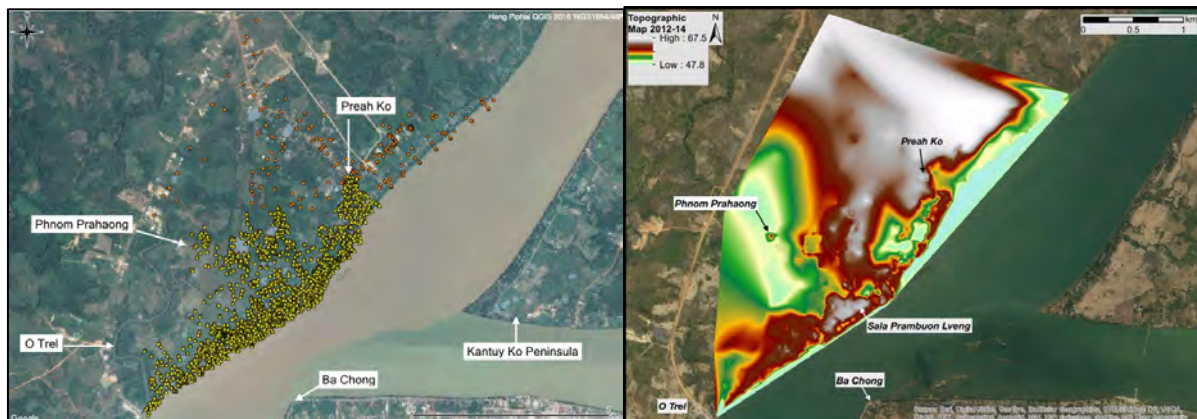


Figure IV-9. Left: Thala Borivat total station's elevation points 2012 (yellow triangle) and 2014 (orange circle). Right: Natural neighbor triangulation of the 2012-2014 elevation points (satellite image source: Esri).

IV.1.2 Site Destruction and Archaeological Opportunities

The Mekong Bridge and National Road 9 (NR9)

Road constructions damaged most archaeological features in the study area. In 2013, the National Highway (NR9) linking Stung Treng and Preah Vihear provinces and Road 2 both damaged many sites in Thala Borivat. Four brick features were recorded in O Trel during Phase I, one of them had a Thala Borivat tradition lintel and the other had a pre-Angkorian pedestal (Figure IV-11). NR9 required a large bridge over the Mekong and across the Early Historic site of

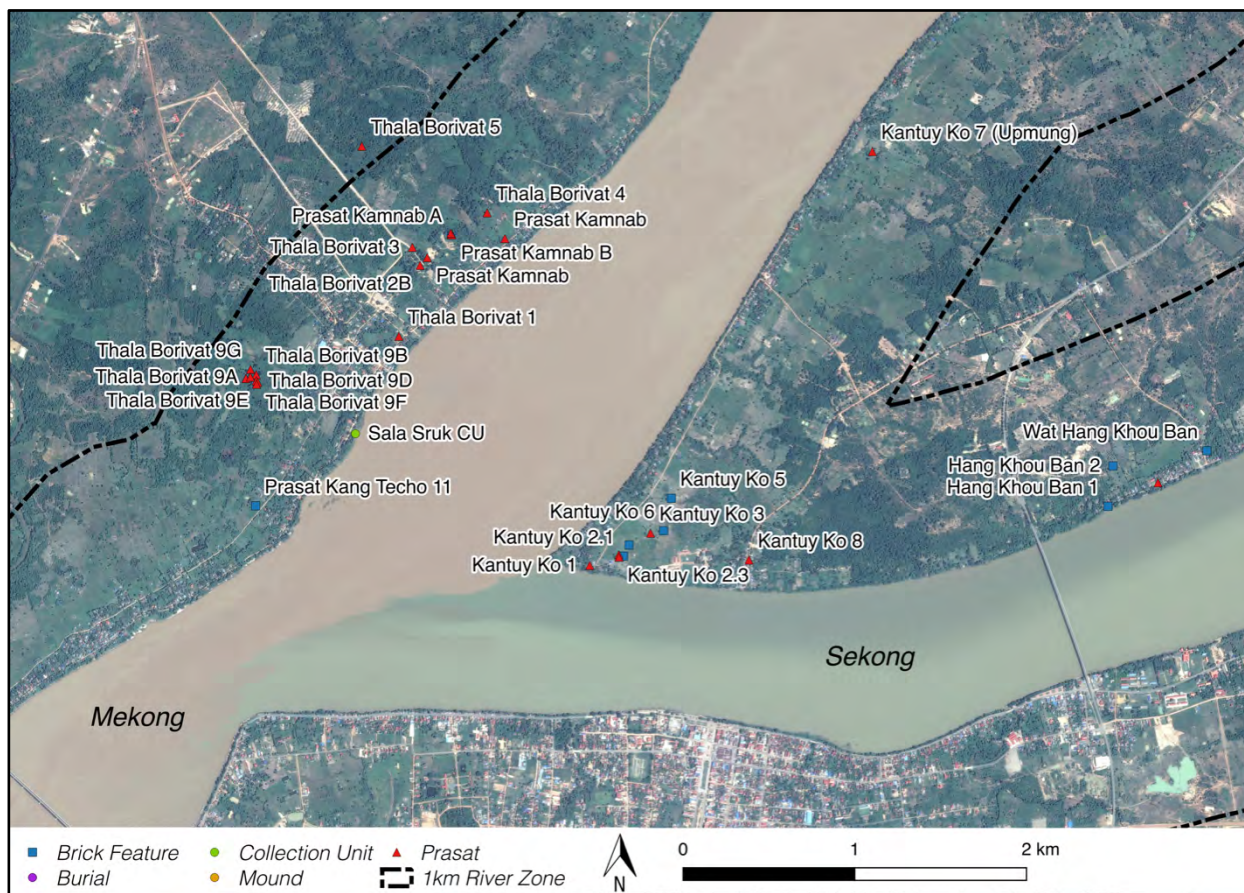


Figure IV-10. Sites and surface collection in the Thala Borivat region during Phase III 2014.

Phum O Trel Krom. Workmen bulldozed a 4-5 ha area where a pre-Angkorian temple and many Early Historic burials were destroyed. A Thala Borivat lintel, a *somāsutra*, and doorjambs from this temple were stored at a villager’s property (Figure IV-12). The size of this structure was unknown since it had already been destroyed prior to the fieldwork. Gold jewelry and copper ingots were reportedly found and sold to the local market.



Figure IV-11. pre-Angkorian pedestal parts and a Thala Borivat lintel located within the Early Historic burial ground at Phum O Trel Krom

A new wave of looting followed this construction where villagers dug a series of small pits and wet-screened in the river (Figure IV-12). Beads and gold were found and sold at the Stung Treng market, while sherds were discarded on the bank. Gold was reported to include

jewelry (earring, beads, and pendants) as well as the so-called “fish-egg gold”, which was possibly natural. A nearby mountain was quarried for road fill and reportedly contained similar burials with beads and gold. However, no artifact was observed during our investigation of two of these quarries; though much of the surface (up to 4m of the top soil) was already excavated.



Figure IV-12. Lintel and other structural elements of a bulldozed temple, Ben Sokvat and Chrai Chantha interviewed villagers who were panning for gold and beads, and beads looted from Phum O Trel Krom in 2012

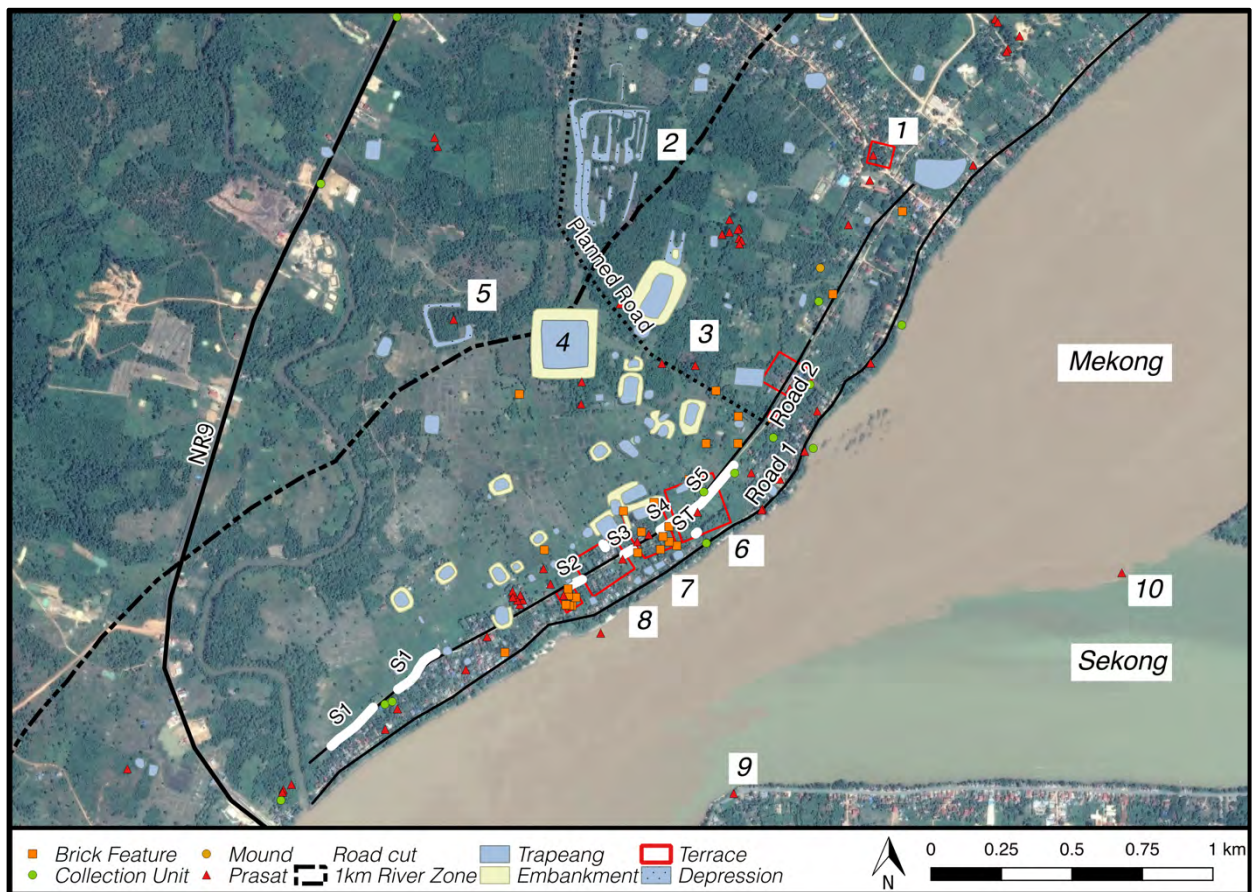


Figure IV-13. New roads and road cut in Thala Borivat 2012-2014 (S: Section; ST: Soil Trench). 1: Preah Ko, 2: Veal Ro-il footprint; 3: Prasat Pros/Khtop; 4: Trapeang Techo; 5: Phnom Prahong; 6: Sala Pambuon Lveng; 7: Tuol Trapeang Khnar; 8: Tuol Trapeang Kak; 9: Ba Chong; 10: Koh Bay Samnom

Small Roads in Thala Borivat

Thala Borivat town and its gridded roads were commissioned in the 1960s when some of the sites were bulldozed. Five brick and laterite masonry features were found under Road 1. During Phase II, Road 2 was being reconstructed by excavating sections of ditches (c. 800m) along this road (Figure IV-13 and Appendix D: Thala Borivat Road Cuts). Ditches were made through rice fields adjacent to the levee (Section 1), depressions between large temple platforms (Section 2, 3, and 5), and across the temple platforms of Trapeang Khnar and Sala Prambuon Lveng (Section 5). No artifact was observed on the walls of Sections 1-4, which suggests that there was no habitation off the levee or within the spaces between large temple platforms. Section 5 provided the most data about large temple platforms including:

- 1) Large platforms likely surrounded a brick wall or retaining wall. Brick masonry was exposed at the limit of both Trapeang Kak and Sala Prambuon Lveng. Their surface brick rubble formed linear lines following the contour of these platforms. (Figure IV-14: 2, 3, and Figure IV-26: S4, S5)



Figure IV-14. Brick masonry of three temple platforms excavated during the construction of Road 2 in 2012. 1. "Ban Son Sen"; 2. Northern edge of Sala Prambuon Lveng; 3. Southern edge of Sala Prambuon Lveng Platform

- 2) No artifact was observed within the depressions

between large platforms. However, a few sherds were seen at the end of Section 4 toward the edge of another mound located east of Sala Prambuon Lveng (Figure IV-15).

- 3) Surface ceramics were collected from Sala Prambuon Lveng; however, none was observed from the backhoe trenches. The walls of an 8 x 8 x 2m soil trench, excavated at the southern portion of this temple platform, comprised small gravels, commonly found in the natural

soil in Thala Borivat, at c. 20cm below the surface. The profiles were sterile, except for a few tiny sherds observed within the surface layer. This stratigraphy suggested that Sala Prambuon Lveng was built atop a natural levee. These backhoe trenches ran really close to the standing temple structure. The sand-filled foundation pits observed on the stratigraphy suggested that there were multiple modifications to the brick structures (Figure IV-16).

IV.1.3 Sambor/Sambhupura (Kracheh)

The research in Sambor was designed to provide a comparative dataset of large pre-Angkorian settlements located along the Cambodia's upper Mekong river. Since Sambor shares the Thala Borivat lintel tradition, it was expected to have

a similar settlement configuration. A small crew went to Sambor from April to May 2014 to study a 9-square-km area covering temples reported in CISARK. The research boundary was defined using river and streams, for the west, north, and east boundaries, and road sections for the southern boundary. The crew started by verifying the CISARK data and interviewing the



Figure IV-15. Road cuts within three depressions, which mark the boundaries between three temple platforms. 1. Section 5: North of Sala Prambuon Lveng, 2. Section 2: South of Trapeang Kak, 3. Section 3: Between Trapeang Kak and Trapeang Khnar.



Figure IV-16. Road cut Section 5 on Sala Prambuon Lveng where brick and sand foundations suggested multiple modifications of this platform. Crewmembers, Vitou Phirom and Som Thon, were drawing the eastern profile of this backhoe trench.

locals for new sites. Upon visiting a site, the crew walked around the area looking for surface artifacts. Surface visibility was very low due to vegetation. Similar to Stung Treng, a new road was made across this research area where some soil trenches and ditches were excavated. Most surface ceramics came from these backhoe trenches.

Eight brick temples were located based on the CISARK inventory and fifteen other mounds, seven of which contained brick features, possessed surface artifacts. 162 trapeangs were remotely identified from satellite images (Bing Map and Google Earth) (Figure IV-17). Many of them were ground-truthed within the research boundary. Unlike the Thala Borivat terrains, Sambor has a relatively narrow levee (c. 60m-150m) where the modern villages are located. The only brick features located on the levee was Wat Sorsor/Tasor Maroy (100-pillared Vihear) where an inscription K.124/803CE was found. Most sites were located on large natural mounds far from the levee.

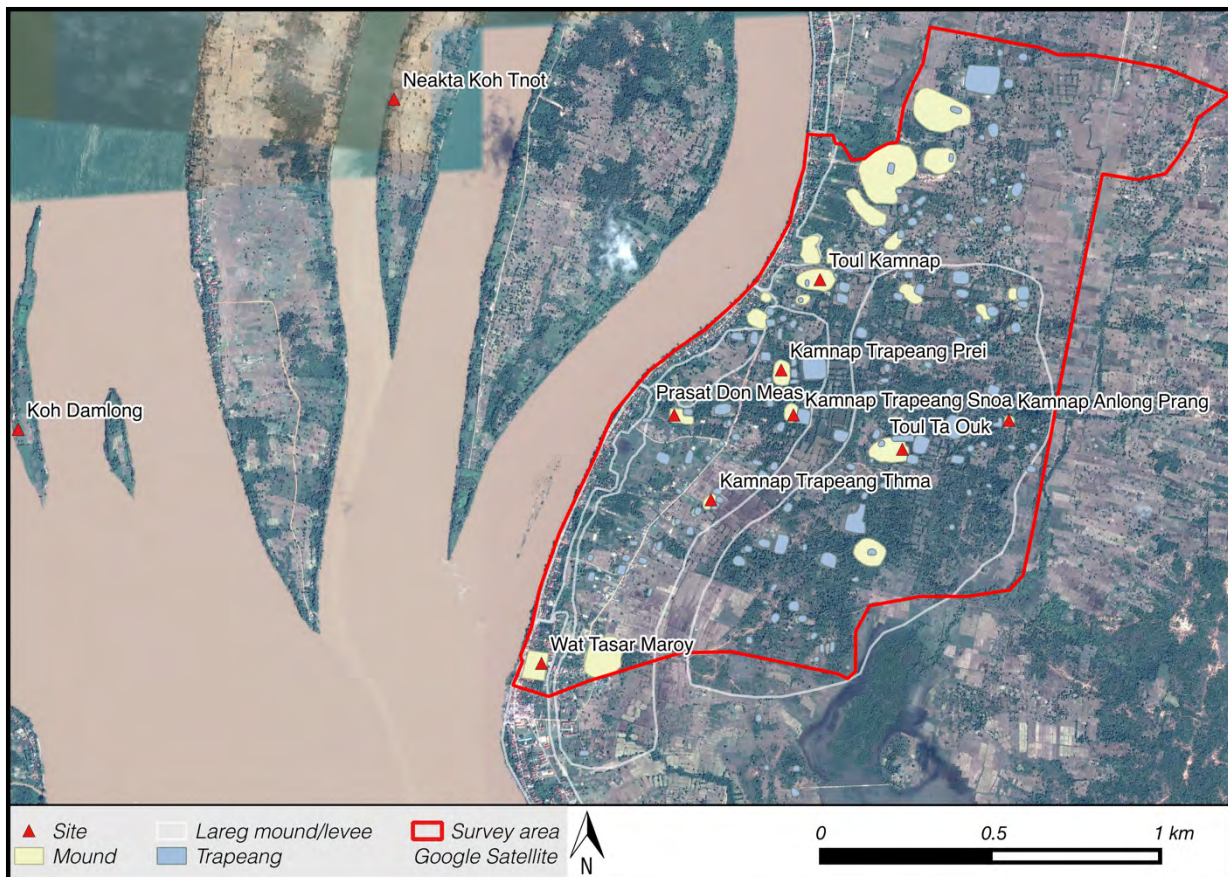


Figure IV-17. Mounds, trapeangs, and brick features identified in Sambor during 2014

An additional pre-Angkorian brick temple of Prasat Don Meas, which appeared to be an arrangement of multiple collapsed brick towers was identified. The main difference from Thala

Borivat was the high concentration of trapeang, 157 located within the research area, around the temples and on large mounds in Sambor. This pattern suggest that habitations were located among the temples and trapeangs.

IV.1.4 Sambok (Kracheh)

The study area in Sambok, c. 2.2 square km, was located between Phnom Sambok to the north and Wat Thma Kre to the south, both of which contain pre-Angkorian remains (Figure IV-18). The western boundary was the Mekong; while the eastern boundary was a new road built around Boeng Sambok linking Wat Thma Kre to Phnom Sambok. The remote sensing analysis using satellite images (Google Earth and Bing Map) did not identify any visible archaeological features. Contrasted with the patterns observed at Thala Borivat and Sambor where trapeang clusters were discernable from the satellite images, Sambok lacked this characteristic. This factor may result from the smaller settlements concentrating predominantly on the levee, as water was easily accessible from the Mekong and a natural lake-swamp, also



Figure IV-18. Sambok 2.2 sq. km survey area and sites identified in 2014 (Google Satellite background)

called Boeng Sambok. Previous research identified two sites in this area, i.e., Phnom Sambok or Wat Chambak Meas and Thma Kre where Citrasena’s inscription K.122 was found (Cisark 2018). K.926, K.927, two new inscriptions and the majority of artifacts stored in Wat Thma Kre and a spirit house in front of it possibly all came from a new temple, Prasat Thma Kre, located within Phum Thma Kre (See Chapter IV.4.3 and Appendix D: Sambok site description).

IV.1.5 Site Reconnaissance Along the River Systems

Site visitations along the river systems (Mekong, Kong, Sesan) in Stung Treng were made during Phase III (Figure IV-19). Previous research identified multiple brick temples located in southern Laos along the Mekong and Attapeu along the Sekong. In Cambodia, east of Stung Treng, a brick temple of Kampong Cham Kau was located on the upper reach of the Sesan, and unverified brick features were reported along the Srepok (Aymonier 1895, 1:1–31, 117–44, 1901, 157–81; Cisark 2018; Lajonquière 1907, 56–90; Lorrillard 2014, 191–96; Parmentier

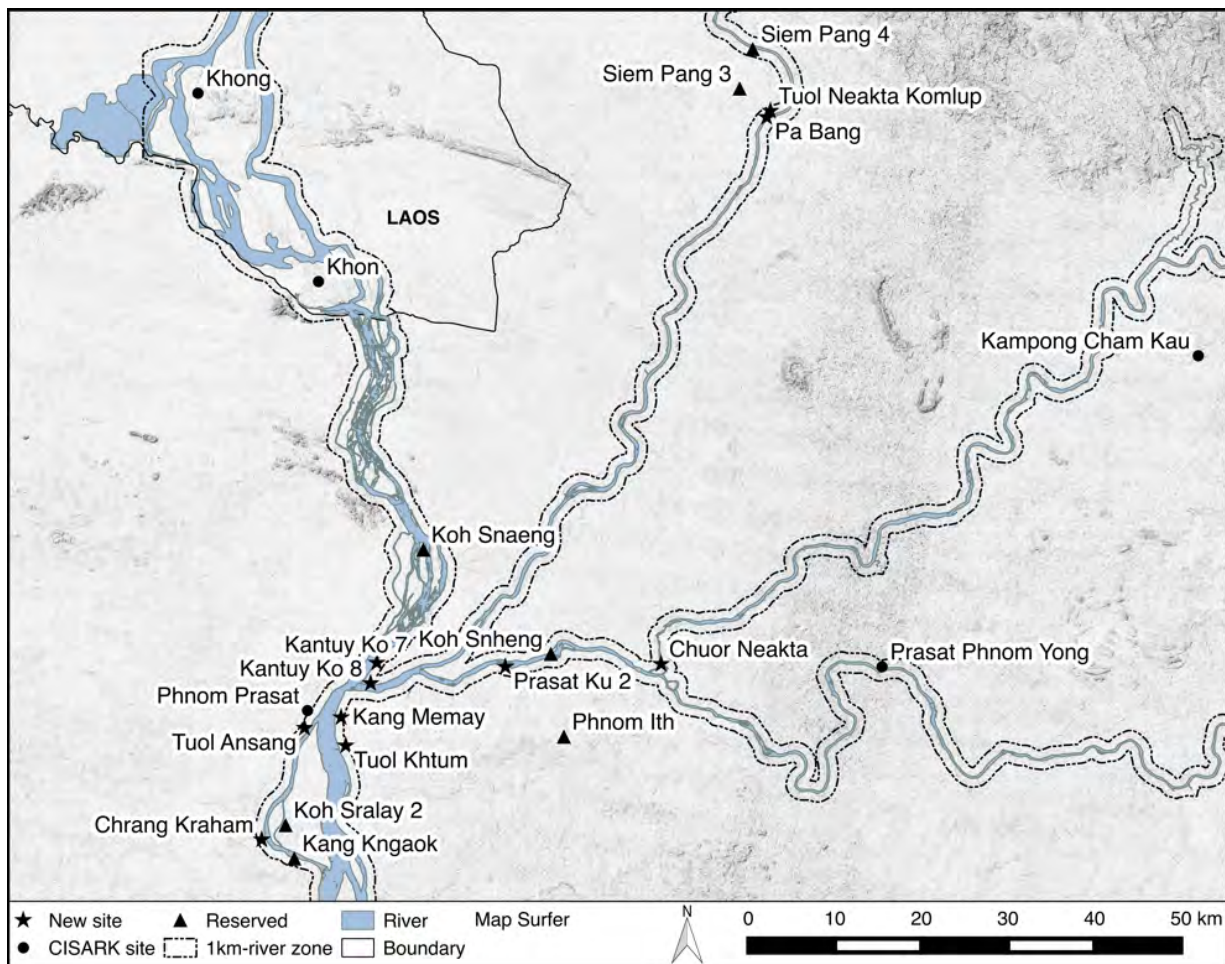


Figure IV-19. New sites reported along the river systems in Stung Treng

1927a, 1:214–31; Santoni and Hawixbrock 1998, 1999). The majority of these sites belong to the pre-Angkorian period. No intensive survey has yet been undertaken along these river systems in Cambodia. Aymonier's teams had traveled along the Mekong and the Sekong but did not mention any site along these rivers in Cambodia (Aymonier 1895; Guérin and Chhom 2014). The purpose of this phase's research was to provide a provisional prospect of sites located along these river systems.

The crew visited some sites reported downstream from Thala Borivat, Siem Pang (on the Sekong River), and at the confluence of the Sesan and Sre Pok rivers. Information about these sites was obtained from interviews on where bricks or ceramics were reported. Approximate locations of inaccessible brick features were obtained from satellite images (Figure IV-19).

The Mekong

Downstream from the Khon Falls (Laos), in Preah Romkel, there was an unverified report of brick features and stone carvings. Fifteen km upstream from Thala Borivat in an island of Koh Snaeng, our crewmember, Som Thon who used to plow the fields there during the 1980s, reported that there was a brick structure. These reports suggested that there are possible brick features located along the Mekong between Thala Borivat and the Khon Falls.

On the east bank of the Mekong, across from Thala Borivat, at Phum Kang Dei Sa (near Tuol Khtum) located at c. 4km south of Kang Memay, a villager had collected four shouldered stone axes from rice fields located at c. 100m east of the village. The date and extent of these polished axes is unknown, as two others were found in the Ba Doem region and one in Thala Borivat (possibly from a soil quarry near O Trel). None of these axes were found or reported from O Trel's Early Historic burials.

South of Thala Borivat, there is a notable 2km gap between the last temple recorded in O Trel and the temple of Phnom Prasat located downstream. Neither interviews nor partial pedestrian survey between these temples yielded any brick feature. It was unclear whether Phnom Prasat and O Trel belonged to the same community despite a few trapeangs being identified at 500m southwest of Phum O Trel. No brick feature was reported further downstream; however, three Early Historic burials contemporary with O Trel were located. These include Tuol Ansang, Tuol Meas, and Tuol Chrang Kraham located at 4.5km, 7km, and

18km respectively from O Trel. These burials were located on natural mounds at 500-600 m from the levee. Ceramics collected from these sites shared similarities with those found at Phum O Trel and at Tuol Neakta Kang Memay. No Pinkware was observed in these sites. Two other sites were reported but not accessible; one was Koh Sralay where a farmer had found pieces of Angkorian brown-glazed stoneware. The other was a brick structure located at Phum Kang Kgnaok, c. 20km on a straight line or 25km following to river from O Trel. (See additional information in Appendix D)

The Sekong River: Siem Pang

Siem Pang is the largest town located on the west bank of the Sekong river at c. 80km northeast of Stung Treng town (Figure IV-19). Stung Treng's MoCFA inventory reported of a sandstone pedestal there. Our visit identified a collapsed brick feature (Siem Pang 1) located at c. 250m west of town where the pedestal was located. Brick remains of another possible structure (Siem Pang 2), which may have collapsed into the river, was observed on the river bank. The locals reported to having seen statuary in the river here. Two other unverified brick features were also reported: one (Siem Pang 4) is located at c. 8km upstream on the river and the other (Siem Pang 3) at c. 5-7km inland to the northwest of town. The deep inland location of Siem Pang 3 is similar to Prasat O Pongro and Prasat Ku observed along the Sesan river.

No diagnostic artifacts or art styles were found to assign a secure date to these features. A large stretch of villages along the Sekong river, between Stung Treng and Siem Pang, remained inaccessible during this fieldwork because the only access was by boat.

The Sesan and Sre Pok Rivers

There were two known temples within this river system east of Stung Treng, i.e., Prasat Ku 1 and Kampong Cham Kau. The last temple is located c. 110 km upstream from Thala Borivat and where the pre-Angkorian statues of Viṣṇu and Śiva currently housed in the National Museum were found. Three more brick features were reported during our site visits.

Prasat Ku

A series of small rapids are located at c. 7km upstream the Sesan from Ba Doem. Prasat Ku 1, which was reported to have a Type 1 lintel (either Thala Borivat tradition or SPK style), is

located at 400m south of the riverbank². The temple was built attached to a rock formation, garnering its *Svayambhu liṅga* or natural *liṅga* quality. Another brick tower (Prasat Ku 2) located on the riverbank was reportedly standing until the Khmer Rouge dismantled it for bricks and has been recently bulldozed by the road construction³.

Phluk

A brick feature was reported on a small island of Koh Snheng located near the northern bank of the Sesan at c. 12km from Ba Doem. A villager reported of an intact brick masonry at the western end of this island, which was flooded during this fieldwork. Another brick structure, Phnom Ith, was reported by another villager to locate at c. 5-7km south of the village within a sugarcane plantation. The brick structure was reportedly built on a small hill next to a small waterfall. The site was inaccessible; though the interpolation placed it at 13.483715 latitude and 106.179058 longitude (<http://binged.it/1NAMA1o>). This location is significant since it is located further inland from the river similar to the anchored-temple, Prasat O Pongro at Ba Doem, which was located at 2.5km from the river.

Chuor Neakta

The name derives from a massive exposed bedrock, which creates the most dangerous rapids and obstacle for travelers along the Sesan river, located at the confluence of the Sesan and Sre Pok (c. 24km from Ba Doem). The rapids require skilled navigators to weave through its dangerous paths to avoid hitting the bedrock. Rapids of the Mekong and its tributaries are believed to host the spirit or Neakta, one of the most famous is this Chuor Neakta where many boats sunk, and people drown. It might not be a coincidence that many of the pre-Angkorian

² Though Parmentier (1927a) likely did not reach this temple, he offered a second-hand report that it was still standing and bearing a 'Type 1' lintel. Throughout his book, he specified the difference between Sambor Type 1 (Sambor Prei Kuk style), which has four arches and three medallions, and the Thala Borivat variation, which has only two arches and a single medallion. Since the lintel of Prasat Ku was not specified, it was likely a Thala Borivat lintel tradition.

³ The construction of the current road had bulldozed most of this structure in 2007. What remained were brick rubble and a fragment of a sandstone slab (currently stored at a village south of the road).

temples are located near these rapids. During our observation at Chur Neakta. Only one brick fragment was seen near the Neakta's hut (rebuilt in the early 2000s). Two stone objects, one possibly an axe and the other a half-broken disk [*Viṣṇu cakra?*] were collected (Figure IV-20).

IV.2 Systematic Surface

Collection

As noted in the previous

Chapter III, this research attempted to transfer a systematic surface collection method from outside Cambodia. Low visibility and the nature of surface exposure made a consistent systematic collection method impractical. The crew followed road cuts, backhoe trenches, the total station mapping survey, and areas around brick features to look for surface artifacts. Since the type of artifacts and ceramic chronology of this region was unknown, the crew collected everything larger than 5 square centimeters. A collection unit was defined as an area with more than one sherd and the size was based on property or field boundaries, or mound surface.

The paragraphs below describe the surface collection methods and ceramics collected in the four research areas of Ba Doem, Thala Borivat, Sambor, and Sambok throughout Phase I, II, and III (2011-2014).

IV.2.1 Ba Doem

Ba Doem was the pilot study area for a full-coverage surface collection survey during Phase I. The surface collection was designed to systematically covered both rice fields and mounds (or levee) in Ba Doem. An initial general site survey outlined above was made to identify the boundary markers of this research area. These include trapeangs, brick features, and surface artifacts, which represent human activities and settlement extent. The survey



Figure IV-20. Chur Neakta at the confluence of the Sesan and Sre Pok

began in Phum Samkhuoy then spread out to cover Phum Ba Doem, Hang Savat, Sre Ta Pan, and finally a section of Phum Dong Ta Dam (Sangkat Srah Reussey, Krong Stung Treng).

The crew started by walking in the rice fields adjacent south of Phum Samkhuoy (Figure IV-21). Three crew members spaced at 50m apart walked along a north-south line across these fields. Eleven collections were made from this 57ha area, which account for 70 of 1376 sherds or 0.615kg of 13.1 kg or around 5% of the total ceramics collected in the Ba Doem region. Most sherds found in those fields were located on or closer to mounds (Tuol Dei Ith and Tuol Lok Ta) and levees. Only two collection units of six sherds were located in rice fields without any visible mound nearby.



Figure IV-21. Vitou Phirom and Sok Sovannarith conducting surface collection within the rice field of Phum Samkhuoy

After the rice fields, the crew started to walk along the road ditches and within the villages of Phum Samkhuoy and Ba Doem (Figure IV-22). Most of the 23 collections came from the ditches. The surface survey was extended along a new road construction project linking Phum Samkhuoy to the NR 7 (see: Figure IV-2). This road was built on an elevated ground covered by the overgrowths south of the



Figure IV-22. The 2011 crewmembers (Vitou Phirom, Lanh Udomraingsey, and Por Savatdi) conversed with a villager, conducted surface collection, and recorded a GPS position along a road ditch in Ba Doem

Samkhuoy's rice fields. Two deep ditches (c. 1.5m) were excavated into the natural rock substrata toward Trapeang Lboek, Prasat O Pongro, and Tuol Trapeang Pir. No ceramics were

seen along this road. Some sherds appear on the surface (not from the road construction) near Prasat O Pongro (Collection 9).

Similarly, low surface visibilities occurred at the Hang Savat peninsula. Most of these ceramics came from the newly excavated soil trenches (Figure IV-23, Figure IV-24), bank erosion, and rice fields located on mounds and levees.

A total of ten collection units was made, including an additional no collection 'collection unit' in Phum Sre Tapan where a stone axe was found off the Sekong river bank, which also contained tiny undiagnostic ceramics. Sherds collected from these soil trenches were large pieces, some were almost complete. They were, however, so fragile

due to their fresh exposure that most pieces continued to break into smaller pieces and some sherds and surface treatment turned to dust.

Another focused area was on the levee along the main road linking Stung Treng to Ba Doem. A 35ha portion of this levee, which belonged to the former Stung Treng governor, was inaccessible because it was fortified and guarded. Nonetheless, along the road, ceramics remained absent until the crew reached the levee located at the confluence of the Sesan and Sekong where eight collection units were made (Figure IV-4: Collection 26-30 and 38-40). Villagers reported that there were brick fragments at this river banks and that a sculpture of



Figure IV-23. Vitou Phirom retrieved artifacts from a soil trench's wall



Figure IV-24. Complete ceramics on the wall of a soil trench in Phum Hang Savat.

two broken feet on a pedestal had been found⁴. This report suggests that there may have been a brick structure here (possibly collapsed into the river); though not a single fragment of brick was seen during this survey. A few pre-Angkorian kendi spouts were found mixed with Angkorian stoneware and Chinese tradeware sherds (11th-13th centuries). Three trapeangs were located here (near the *trapeang* Cluster 2), which may belong to a settlement of ca. 30ha.

No artifact was observed west of this point until the crew crossed a stream called O Khlong located in Phum Dong Ta Dam. Many earthenware sherds appeared along the road ditches and three collections (41-43) were made. A villager reported that this area was intensely looted during the 1980s after the Khmer Rouge (confirmed by people in Stung Treng). Gold and bronze ornaments and different types of beads were found with human bones. It was reported that of all the looted sites in Stung Treng, O Khlong contained the most gold which could explain the scale of destruction. Some bronze ornaments such as rings and bracelets were reported to have a set of bronze buffalo horns, reminiscent of the Early Historic artifacts from Phum Snay and Prohear (Domett, O'Reilly, and Buckley 2011, 252–53; Reinecke, Vin, and Seng 2009, 51–66). The most recent road construction exposed sherds, beads, and bone fragments, associated with a burial. Two blue beads and earthenware sherds were scattered on the surface. The most distinctive sherds were a thick and crudely made Industrial ware or Pinkware. Most sherds were rims and necks and mostly fine paste—sometimes containing rice chaff— and pink in color (some are black).

A total of 1387 sherds or 16.3 kg of ceramics was recovered from the Ba Doem region, most of which came from levees and mounds (Table IV-1). Earthenware was the most common category at 94% followed by Angkorian Khmer stoneware and tradeware (mostly 12th-17th century Chinese) at 3% each. Earthenware comprised mainly sand tempered-ceramics, Buffware (mainly Kendi), and Pinkware. Additionally, three beads and a small bronze bell were collected from O Khlong (Figure IV-25). Other artifacts such as a stone axe, an almost complete KBG vessel, and fragments of statuary were recorded but not collected. Additionally, 187 sherds

⁴ It was taken to Wat Leu in town and reported to be later acquired by the supreme patriarch who took it to Phnom Penh.

(4.2kg) were collected from Soil Trench 2 and 3 in Hang Savat (collection 22-23) during Phase III because of their fresh exposure from erosion during the excavation of Trench 10.

Ba Doem: Surface Earthenware				
Type	Phase 1	Phase 3	Total	%
E8a	0	2	2	0
E8b	59	0	59	5
E8c	2	0	2	0
E8sand	981	41	1022	79
E8g	5	135	140	11
E8h	1	0	1	0
E9	0	0	0	0
E10	7	0	7	1
E11	0	0	0	0
E12	64	0	64	5
Total	1119	178	1297	100

Ba Doem: Surface Stoneware and Tradeware				
Type	Phase 1	Phase 3	Total	%
KS	26	0	26	29
KBG	9	0	9	10
KGG	9	0	9	10
TH	1	0	1	1
CH	45	0	45	50
VN	0	0	0	0
Total	90	0	90	100

Table IV-1. Earthenware, Stoneware, and Tradeware ceramics collected from the Ba Doem Region.



Figure IV-25. An almost complete Buffware kendi from Hang Savat's soil trench and glass beads from O Khlong (photo: Alison Carter)

The surface survey results suggested that most ceramics were concentrated on the levees along the Sesan River and its smaller tributaries of O Samkhuoy and O Ba Doem. Our observations on the surface disturbances located along this road to Stung Treng as well as roads within Stung Treng town did not find any surface artifacts.

IV.2.2 Thala Borivat

The surface collection survey in Thala Borivat took place incrementally from an opportunistic collection in Phase I to systematic collection following the topographic mapping and backhoe trenches during Phases II and III.

Phase I. Like the Ba Doem region, Thala Borivat settlements concentrated on the levee/mounds adjacent to the low-lying rice fields. The surface visibility was extremely poor. Six opportunistic collections in Thala Borivat came from surface disturbances such as water-borne erosion, a new excavated pond, and a heavily looted area in Phum O Trel Krom. At O Trel, Pinkware found at O Khlong (in Ba Doem Figure IV-4) was found in large quantity with various types of pottery including flared-rim jars, flat-based vessels, bowl, carinated ware, pedestalled ware, and Buffware kendi (Figure IV-26-27).

The locals here and in Stung Treng reported that Phum O Trel and O Khlong were the primary targets of looting activities during the 1980s because of their gold (both ornaments and the fish-egg gold, described as tiny gold beads without hole). Beads of different sizes and colors were found interred with



Figure IV-26. Ceramics collected from O Trel during Phase I. 1 & 2) Flared rim, flat-based, and bowl sherds; 3) Pinkware sherds; 4) bowl and reduced ware sherds



Figure IV-27. A Buffware kendi was found at Phum O Trel and donated to the district office in 2010

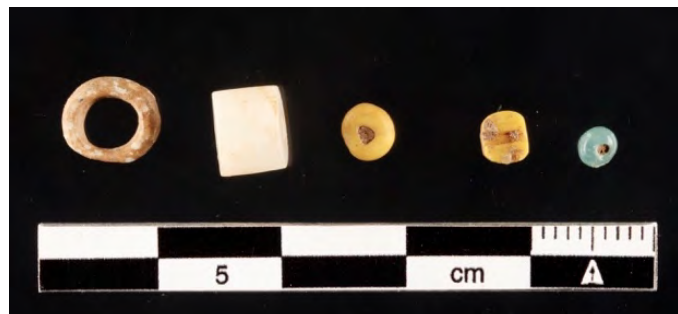


Figure IV-28. Beads from O Trel (Photo: Alison Carter)

burials. Five beads were collected from the O Trel (Figure IV-28).

In Phase I, 123 sherds or 4.2 kg of both earthenware (85%) and stoneware and tradeware (15%) were collected from Thala Borivat in 2011. Earthenware comprised sand-tempered ceramics, Pinkware, Reduced ware, and other ceramics (Table IV-2). Most ceramics dated from the Early Historic to the Angkorian period. The only Angkorian stonewares from here were roof tiles found near a brick temple.

Phase II (2012-2013). Fourteen surface collections were made following the total station mapping. Most came from surface disturbance by current residential activities such as farming, surface leveling, or animals. Other collections came from road ditches. Like Ba Doem, the surface artifacts in Thala Borivat occurred close to the brick features and concentrated in the elevated areas such as levees and mounds. They were rarely found in higher terrains far from the Mekong. 57% of these ceramics, dated from the pre-Angkorian to post-Angkorian periods, was sand-tempered earthenware and 43% was a combination of Khmer stoneware and tradeware ceramics (Table IV-2).

Thala Borivat: Surface Earthenware					
Type	Phase 1	Phase 2	Phase 3	Total	%
E8a	1	0	15	16	4
E8b	16	1	9	26	6
E8c	0	0	0	0	0
E8sand	84	218	47	349	86
E8g	0	0	13	13	3
E8h	0	0	0	0	0
E9	0	0	0	0	0
E10	2	0	0	2	0
E11	0	0	0	0	0
E12	0	0	0	0	0
Total	103	219	84	406	100

Thala Borivat: Surface Stoneware and Tradeware					
Type	Phase 1	Phase 2	Phase 3	Total	%
KS	11	65	2	78	42
KBG	5	50	3	58	31
KGG	0	13	0	13	7
TH	0	0	0	0	0
CH	2	33	1	36	19
VN	0	1	0	1	1
Total	18	162	6	186	100

Table IV-2. Earthenware, Stoneware and Tradeware ceramics collected from Thala Borivat.

Phase III-2014. Ten surface collections of 129 sherds or 1.2 kg were made in Stung Treng (Table IV-1). Only five Khmer stoneware and a Chinese ware came from the Sala Sruk Thala Borivat. Two of the surface collections came from areas with brick features in Thala Borivat. The

rests came from sites located along the river systems. A total of 592 sherds or 18.85 kg of surface ceramics was collected from Thala Borivat, which comprises 69% earthenware and 31% stoneware.

Stung Treng Ceramics		
Type	Phase 3	%
E8a	1	1
E8b	14	10
E8c	54	40
E8sand	67	49
Total	136	100

Table IV-3. Surface Ceramics collected along the rivers in Stung Treng during Phase 3.

Sambor Ceramics					
Earthenware			Stoneware		
Type	Phase 3	%	Type	Phase 1	%
E8a	27	2	KS	108	46
E8b	14	1	KBG	24	10
E8c	54	4	KGG	82	35
E8sand	971	77	TH	0	0
E8g	37	3	CH	21	9
E8h	2	0	VN	0	0
E9	55	4	Total	235	100
E10	0	0			
E11	0	0			
E12	96	8			
Total	1256	100			

Table IV-4. Surface collection from Sambor

category at 42% followed by Khmer Brown-Glazed at 31%, Khmer Green-Glazed at 7% and tradeware at 20% (mainly, Yuan Dynasty).

Additionally, four other surface collections comprising 136 sherds or 0.9 kg, were made along the rivers in Stung Treng (Table IV-3, Chapter IV.1.5).

IV.2.3 Sambor

Twenty-three surface collections were made in Sambor during Phase 3-2014 (Table IV-4). Like Stung Treng, most collections came from the disturbed surfaces such as new ponds, roads, and farming within the modern villages. Of the 19.2kg ceramics, earthenware was the most common followed by Khmer stoneware and Chinese tradeware. Similar to the Thala Borivat ceramic assemblage, sand tempered ceramics (E8sand) were the dominant category followed by Buffware (E12), chaffed tempered-ceramics (E8c), and Pinkware (E8b). Another common category was the high-fired ceramics (E9), which likely belonged to the Angkorian period. Though the date range for KBG and KGG is between 9th to 13th centuries CE, the disparity between the frequency of 85% KGG and 25% KBG constitutes the early phase, pre-12th century CE, of Khmer stoneware production where fine green-glazed ceramics were most common and known to produce in the Angkor region. Based on the morphology and

decorations, most KBG was likely imported from Cheung Ek, west of Phnom Penh. A finer date resolution for these ware groups is not currently possible due to their long-term production. Chinese ceramics compose of two date range: 1) Song–Yuan 12th-14th centuries CE and 2) Qing 18th-19th centuries CE.

Evidence for the post-Angkorian period between the 15th to 19th centuries was curiously absent from our collection units. It is possible that most of the post-Angkorian settlements were concentrated on levee along the river, under the modern habitations. Traveler’s accounts from Van Wuysthof in 1640 CE to Aymonier in the 1880s (Aymonier 1895; Kersten 2003; Van Wuysthoff and Garnier 1871) only mentioned habitations along the river, which concentrated around Wat Sasor Maroy, and those of the minorities located further inland. The settlement patterns between the pre-Angkorian and post-Angkorian then were thus quite different than previously assumed.

IV.2.4 Sambok

The crew conducted five surface collections here during Phase III-2014. One of these collections was at Boeng Sambok, a 1.5ha rectangular trapeang with embankment, located at 4km east of Wat Thma Kre outside the research area. This trapeang was likely associated with a different community where a few trapeangs can be seen on the satellite image. The other four collections were made in the vicinity of Phnom Sambok exposed by gardening, water-borne erosion, and road construction.

Most ceramics (70% or 0.9kg) were earthenware, including two kendi spouts; followed by unglazed Khmer stoneware and KGG (Table IV-5). Despite the absence of Pinkware, the composition of the earthenware categories was similar to that of Sambor. Collection 27 on Phnom Sambok 1 comprises mostly unglazed Angkorian roof tiles, which suggested that there were Angkorian wooden structures built around the pre-Angkorian brick

Sambok: Earthenware			Sambok: Stoneware		
Type	Phase 3	%	Type	Phase 1	%
E8a	15	13	KS	14	58
E8b	0	0	KBG	1	4
E8c	4	3	KGG	8	33
E8sand	88	75	TH	0	0
E8g	4	3	CH	1	4
E8h	0	0	VN	0	0
E9	6	5	Total	24	100
E10	0	0			
E11	0	0			
E12	0	0			
Total	117	100			

Table IV-5. Surface collection from Sambok

tower. Tradeware and KBG were absent within the research area. However, both ware types (one of which is a Song Dynasty white porcelain) appeared at Boeng Sambok c. 4km to the east.

The ceramics assemblage provides a date range of 7th-10th centuries for the Sambok area, which overlaps with the inscriptions dated between the 6th and 9th centuries CE. The data suggest that there were possibly two settlements, Sambok containing the pre-Angkorian and early Angkorian components and Boeng Sambok containing late Angkorian component (post-11th century).

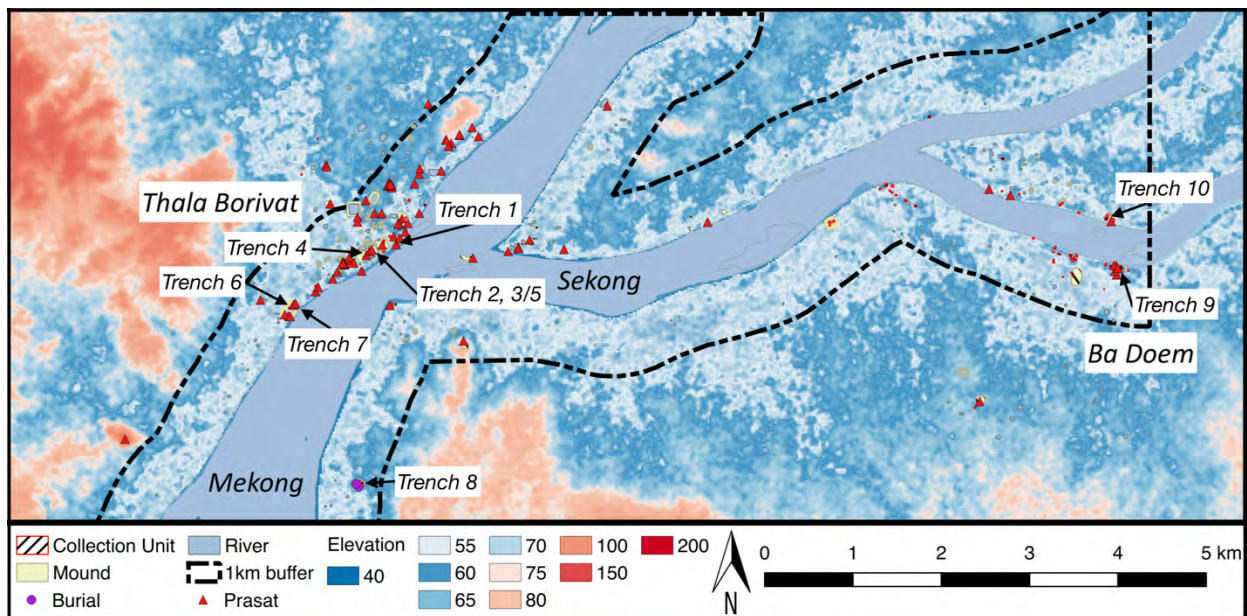


Figure IV-29. Locations of Excavation trenches in Stung Treng

IV.3 Excavation

Ten excavation trenches were placed across Thala Borivat and Ba Doem (Figure IV-29). Six of these trenches were located in the temple compounds (Thala Borivat, Trapeang Khnar, Trapeang Kak, Ba Doem). Three others were placed in two Early Historic burial sites, and one in a possible pre-Angkorian cremated burial ground in Phum Hang Savat (Table IV-6). Major sites such as Preah Ko, Sala Prambuon Lveng, and Ba Chong were avoided due to their low surface artifacts and their proximity to large population centers (see Appendix F for details).

Trench	Site	Phum	Khum	Sruk
1	Kang Techo	Kang Techo	Thala Borivat	Thala Borivat
2	Tuol Trapeang Khnar	Kang Techo	Thala Borivat	Thala Borivat
3/5	Tuol Trapeang Khnar	Kang Techo	Thala Borivat	Thala Borivat
4	Tuol Trapeang Kak	O Trel Leu	Thala Borivat	Thala Borivat
6	O Trel	O Trel Krom	Thala Borivat	Thala Borivat
7	O Trel	O Trel Krom	Thala Borivat	Thala Borivat
8	Tuol Neakta	Kang Memay	Stung Treng	Stung Treng
9	Ba Doem	Ba Doem	Sam Khuoy	Sesan
10	Hang Savat	Hang Savat	Sam Khuoy	Sesan

Table IV-6. Administrative location of the 10 excavation units

IV.3.1 Thala Borivat

Trench 1: Kang Techo

This trench was selected based on a long chronology revealed by Phase II surface collection. It was placed on the slope between a temple mound and a dried trapeang. The crew started on February 18 and finished on March 04, 2014 after reaching the sterile layer at 250 cmbs. The upper strata appeared to be disturbed due to the presence of plastics and cloth mixed with various Angkorian stoneware, tradeware, and brick rubble. Stoneware decreased with depth; while brick rubble, and earthenware increased. This is a good indicator of the pre-Angkorian strata.

A brick feature running across the unit



Figure IV-30. Trench 1; 1) Brick structure located at 1.5m below the surface; 2) Crewmembers screening through each bucket of excavated soil; 3) Eastern profile showing different modification of this temple

(east-west) was found at 150 cmbs (Figure IV-30). The southern portion comprised compacted brick rubble and sandy clay, which allowed crewmembers to reach a sterile layer at 250cmbs, while leaving the brick masonry intact. This brick feature appeared to be part of a retainer wall of a platform or a temple. The excavated section was possibly the interior of this platform. Prior to its construction, there was a 40cm cultural layer where small earthenware sherds and charcoals were found. A mixture of compacted sandy clay and brick rubble was added atop this layer, then four layers of brick were laid on the exterior. Finally, a 20cm layer (Layer 4a-4b) of brick rubble was compacted as a surface of this foundation (Figure IV-31).

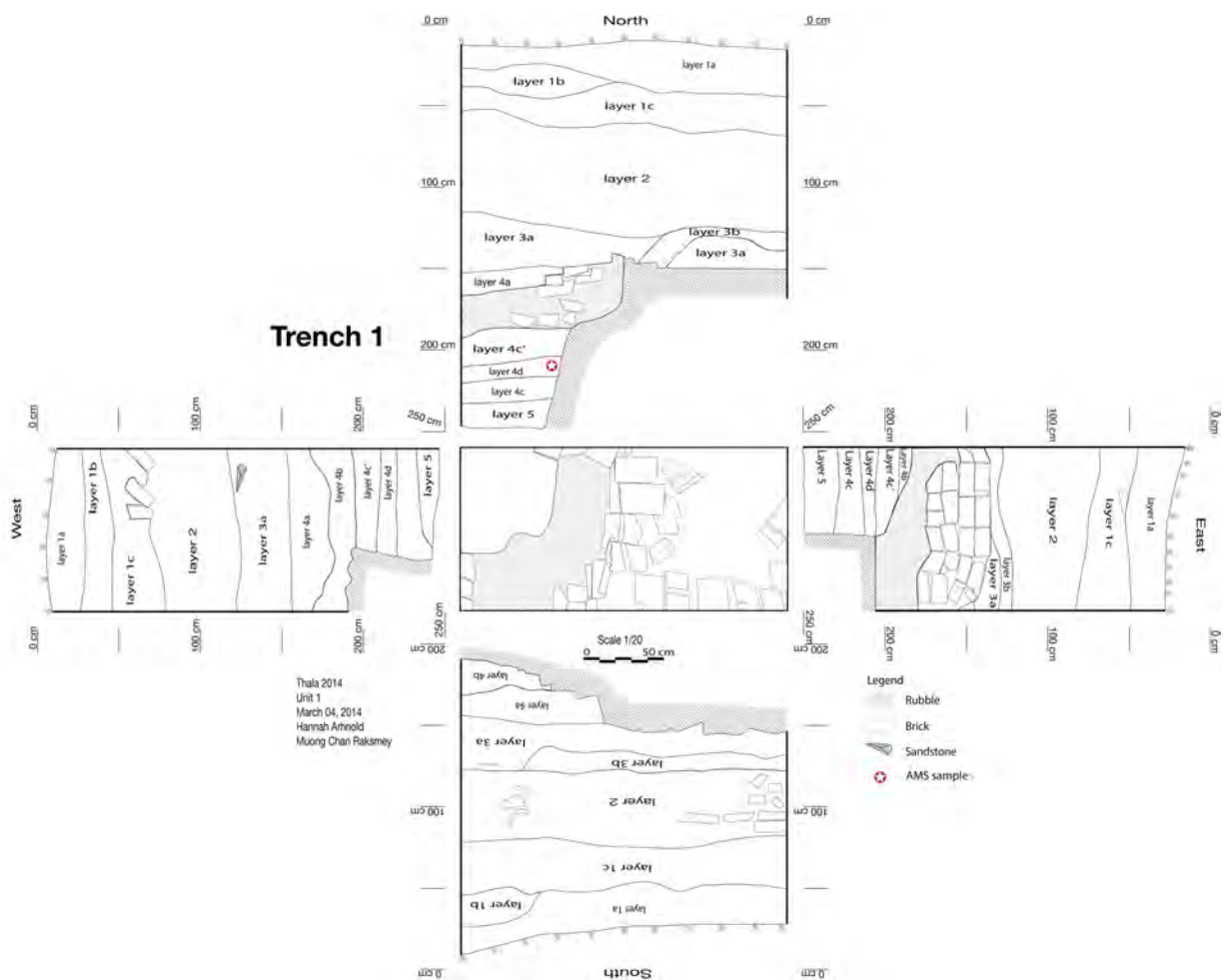


Figure IV-31. Trench 1's stratigraphic profiles

Since there was no stoneware found within or above this brick feature, it was most likely a pre-Angkorian structure. An AMS date on a charcoal sample located within the lowest brick layer provides a date range between 419 to 560 CE. Continuing occupation and

modification of this area was evident by Angkorian stoneware, Chinese and Vietnamese tradeware ceramics dated from the 11th to 17th centuries CE found within Layer 1, Layer 2, and on the surface.

Trench 1 yields 774 sherds (6.3kg); 79% were earthenware; Khmer stoneware and tradeware were at 9% each, and the other 3% were modern and unidentified ceramics from Layer 1 and 2 (Appendix F: Trench 1). Layer 2 contained 31 slags (904.1g) mixed mainly with the Angkorian ceramics (see Chapter VI.4.2).

Trench 2: Tuol Trapeang Khnar

This trench was placed on the temple platform of Trapeang Khnar, near where the landowner excavated a well in 2003 that unearthed many ceramics. A sandstone structure, which is similar to the *Nandi maṇḍapa* (bull cella) of Sambor Prei Kuk tower S2, suggests a relative date within the reign of *Isānavarman* (616-637 CE). This structure was probably related to the southernmost brick feature of this large platform.

The crew excavated on February 19 and finished on March 19, 2014 after reaching the depth of 315 cmbd (Figure IV-32). A brick structure was found on the west profile at 40cmbd. By 140 cmbd, the water started to seep into the trench. By 160 cmbd, the foundation of the brick feature, made of brick rubble and stone, ended. The 20cm stratigraphic unit could not be applied in



Figure IV-32. Trench 2; 1) A brick structure was found on the western profile and the bottom of the trench at 250cmbd; 2) Tree branches and other plant remains were found water-logged at 220cmbd; 3) Crewmembers excavating through the muddy-clay layers.

these water-logged clay layers and the crew excavated based on change in soil color and texture. The soil color and texture (strong brown, muddy, smell of bio decay, lots of charcoals) in these layers resemble the pond's bottom. Between 220-250 cmbd, many pieces of well-preserved plants, bamboos, and coconut husk were retrieved.

This trench provided an excellent evidence of a pond modification where a section was reclaimed and the organic materials at the bottom were buried. The AMS analysis of the plant remains provides a date range of 431 to 641 CE; while a charcoal sample associated with the upper brick feature dated between 649 to 875CE (Figure IV-33).

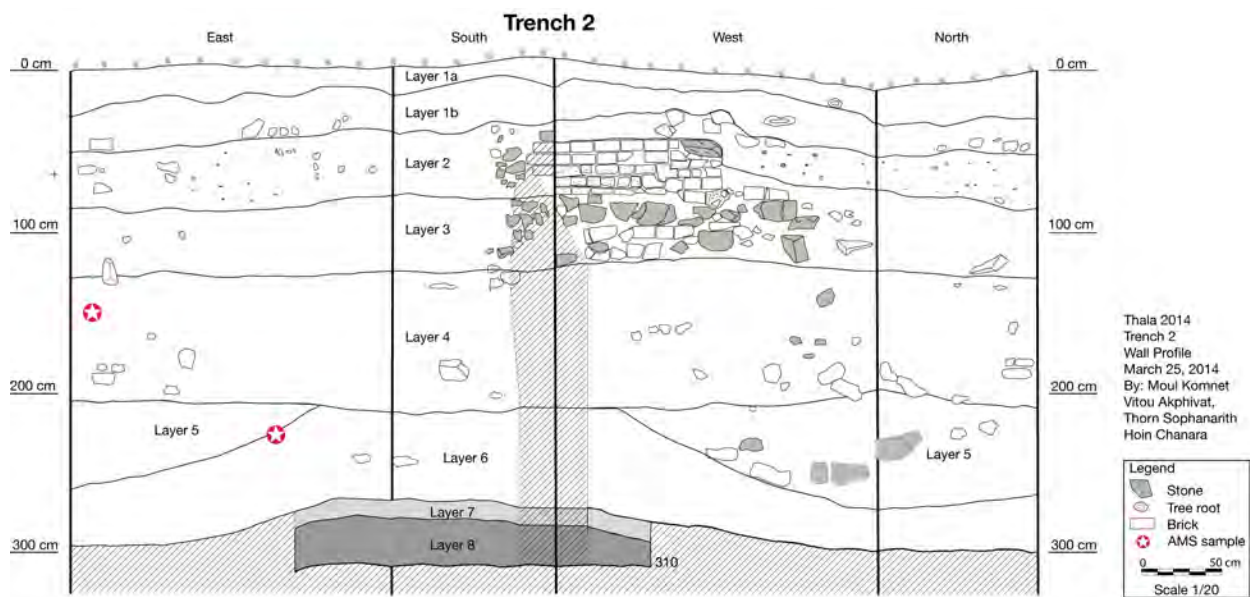


Figure IV-33. Trench 2's stratigraphic profiles

Trench 2 yields 253 sherds (3.245kg) (Appendix F: Trench 2). Only one Song Dynasty tradeware came from Layer 1; while the rest were earthenware comprised mainly of sand, grog, and mineral tempered ceramics. Most ceramics came from Layer 3, 4, and 5 before this section of the pond was filled for an additional brick structure. This ceramic assemblage is securely sandwiched between 431 to 641 CE and 649 to 875 CE.

Trench 3 and 5: Tuol Trapeang Khnar

Trench 3 and its extension, Trench 5, were also placed on Tuol Trapeang Khnar to inspect the subsurface brick structure exposed on the surface. From the surface, the alignment of brick rubble and intact brick masonry seemed to suggest the presence of a brick wall on top

of this rectangular platform. The units could shed light on the spatial arrangements and modifications of this platform (Figure IV-34).

The presence of the 4m intact brick floor suggests that a large section of this platform was paved. The ceramic data imply that the brick structure dated to the pre-Angkorian period and continued to be used until the 12th-14th centuries CE when the



Figure IV-34. Trench 3 and extension Trench 5 located on Tuol Trapeang Khnar. 1) Moul Komnet prepared the profiles for photograph; 2) Intact brick masonry on the mound's surface; 3) Brick masonry with different arrangement in Unit3/5

tower collapsed and buried both the pre-Angkorian and Angkorian ceramics. A scenario explaining a low wall of brick rubble on the surface of this platform is that the ancient inhabitants of this platform cleared the debris from the collapsed tower and piled them to form a wall. Likewise, this mixture of brick rubble and ceramics of different periods could come from brick looting activities (Figure IV-35).

Brick fragments and rubble were prominent throughout the excavation of these two units. The surface was disturbed by the landowner who used this area to raise pigs. Many modern debris such as plastic, cloth, and wood occurred throughout Layer 1. The soil matrix began to change color from 30 cmbd in Layer 2 and mixed with a few Angkorian stoneware. At 70 cmbd, multiple layers of intact brick masonry were uncovered.

A total of 92 sherds (0.61g) was uncovered from this unit (Appendix F: Trench 3 and 5). Most ceramics were earthenware sherds, some of which dated to the pre-Angkorian period, and Chinese tradeware (celadon and Qingpai) dated between the 12th to 14th centuries CE. This evidence suggests a long-term occupation of this temple platform.

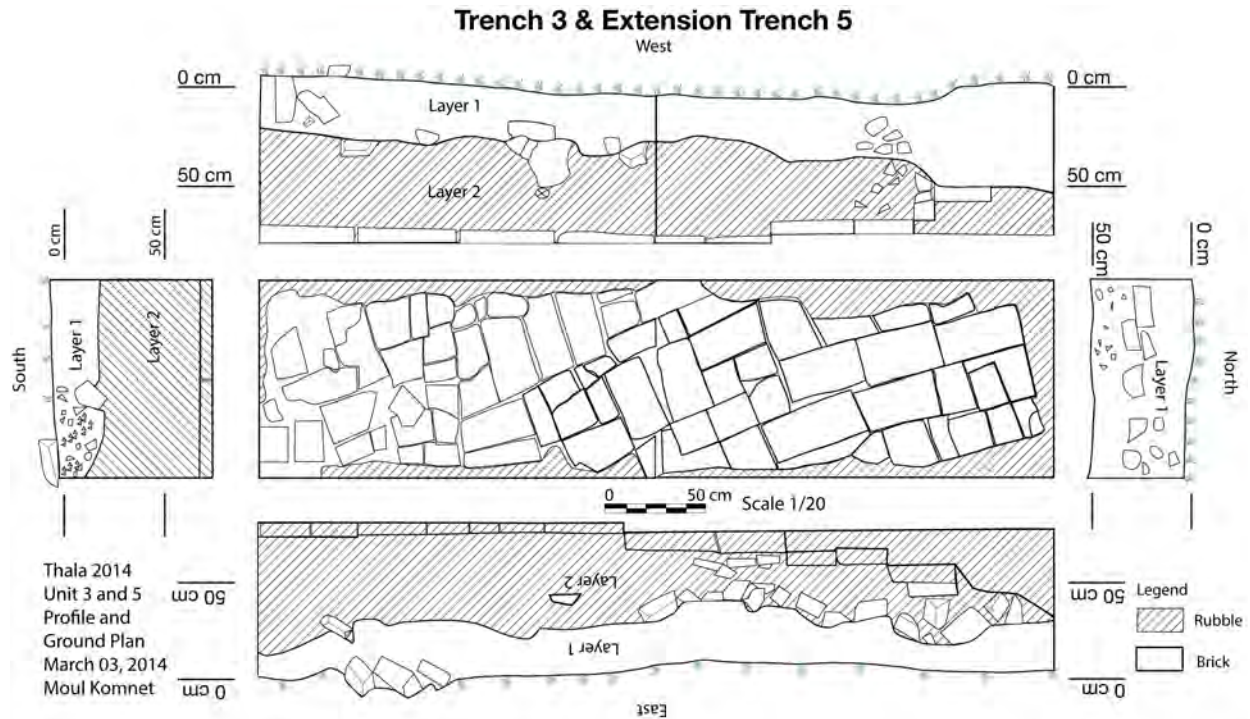


Figure IV-35. Stratigraphic profiles and ground plan of Trench 3 and extension Trench 5

Trench 4: Tuol Trapeang Kak

Trench 4 was placed on another rectangular platform mound, Tuol Trapeang Kak, located to the immediate south of Tuol Trapeang Khnar. A brick rubble mound, presumably a tower, is located at the northern section of this platform. A surface collection made during Phase II comprised the Angkorian stoneware (Khmer green-glazed and brown-glazed ware) and Chinese blue and white (Song Dynasty).

A 7x13m soil trench excavated on the western edge of this mound in 2013 exposed a series of brick layers (between 5 and 8), which forms a 1m-depression oriented north-south in the middle of the trench (Figure



Figure IV-36. Trench 4 and soil trench on Trapeang Kak (1: west profile, 2: bottom layer of unit 4, 3: brick masonry within the soil trench looking east)

IV-36). This brick masonry suggested that part of this platform was paved. However, due to limited exposure its form and function is unknown. No diagnostic artifacts were seen on the profiles. Trench 4 was placed to probe the foundation of the brick structure as well as the chronology of this platform, to test whether the subsurface artifacts consist of a pre-Angkorian component.

Despite a few complete and fragments of brick uncovered throughout the 220cm strata, no intact brick masonry was found in this trench (Figure IV-37). Layer 1 to 3 belong to the Angkorian period where Khmer stoneware, Song and Yuan Dynasties tradeware, and earthenware ceramics occurred. Layer 4 was possibly a natural surface where the top part contains small undiagnostic ceramics and a red painted sherd, which generally belongs to the pre-Angkorian period. Hard laterite cementation occurred from 200cmbd to 220cmbd when it was impractical to excavate. A large charcoal sample retrieved from Layer 4 produced an AMS date range between 3628 to 3125 BCE, which is an outlier compared to the other AMS dates.

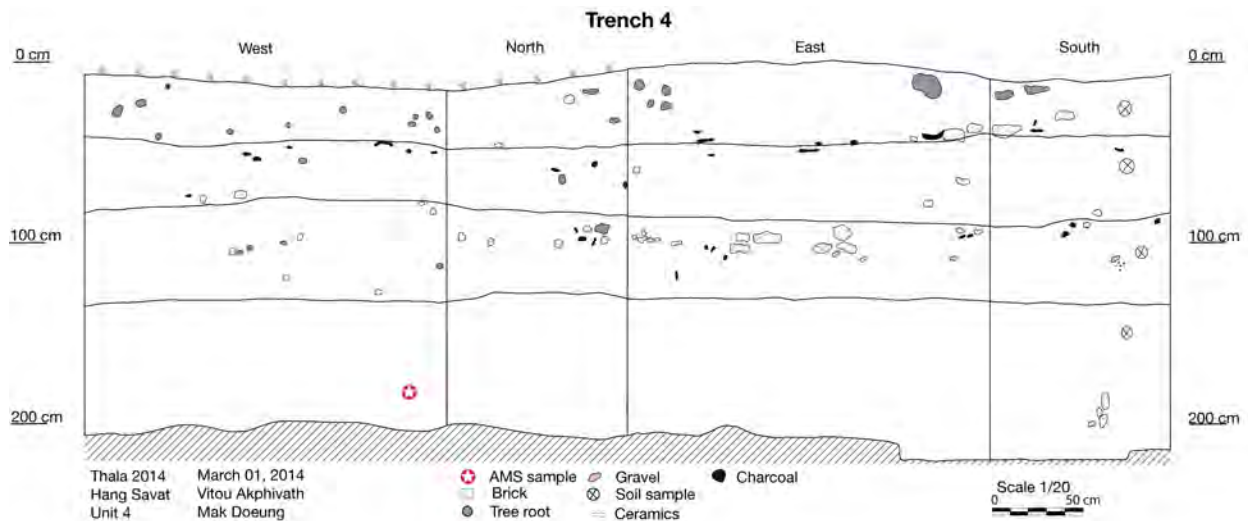


Figure IV-37. Trench 4's stratigraphic profiles

Although the pre-Angkorian ceramics occurred at the bottom layers, whether the platform of Tuol Trapeang Kak belong to the pre-Angkorian period remains uncertain. A total of 436 (4.68kg) sherds were uncovered from Trench 4 of which sand tempered-earthenware was the majority (Appendix F: Trench 4).

Trench 6: O Trel

Trench 6 was placed in an Early Historic settlement of Phum O Trel Krom (Figure IV-38). The surface collections made in 2011 and 2012 suggested a long-term occupation from BCE 500 to the 11th century CE. Data from this trench provide a solid evidence of a local communities during the transition to the pre-Angkorian period. The trench was located in a rice field recently converted into a home. It was reportedly undisturbed by any looting activities.



Figure IV-38. Trench 6: 1) A pit outline, possibly, a burial; 2) Vitou Phirom and Moul Komnet measure the stratigraphic unit; 3) Heng Halavan, Chron Monika, and Chea wet-screened for beads and other artifacts in the Mekong.

At least two phases of activities could be observed in this trench (Figure IV-39). The first phase associated with a disturbed burial whose burial pit was excavated into the natural clay Layer 5. Layer 4 within this pit contained many sherds, tiny bone fragments, brick fragments, beads, and charcoals. An AMS date from a charcoal sample produced a date range of 138 to 380 CE. Layer 3 and 2 above it contains thick sherds belong to the industrial Pinkware group and pieces of iron slags. Beads, brick fragments, other types of ceramics, and charcoals were found mixed in this layer. This suggests that there was metallurgical activity during Phase 2. Whether the burial ground was still functioned during Phase 2 was not clear. The increase presence of brick fragments links this phase to temple construction that disturbed the Early Historic burials. An AMS sample from this layer produces a date range between 355 to 538 CE. This trench contained no archaeological evidence of occupation after the pre-Angkorian period.

A total of 1826 sherds (12.26kg) was uncovered from Trench 6 along with 42 beads and 13 slags (0.22kg). Sand tempered-ceramics were the dominant category followed by Pinkware and Buffware (Appendix F: Trench 6). Most of these ceramics came from Layer 3 (c. 355 to 538

CE), which represents the most active phase, possibly associated with the transition into the pre-Angkorian period.

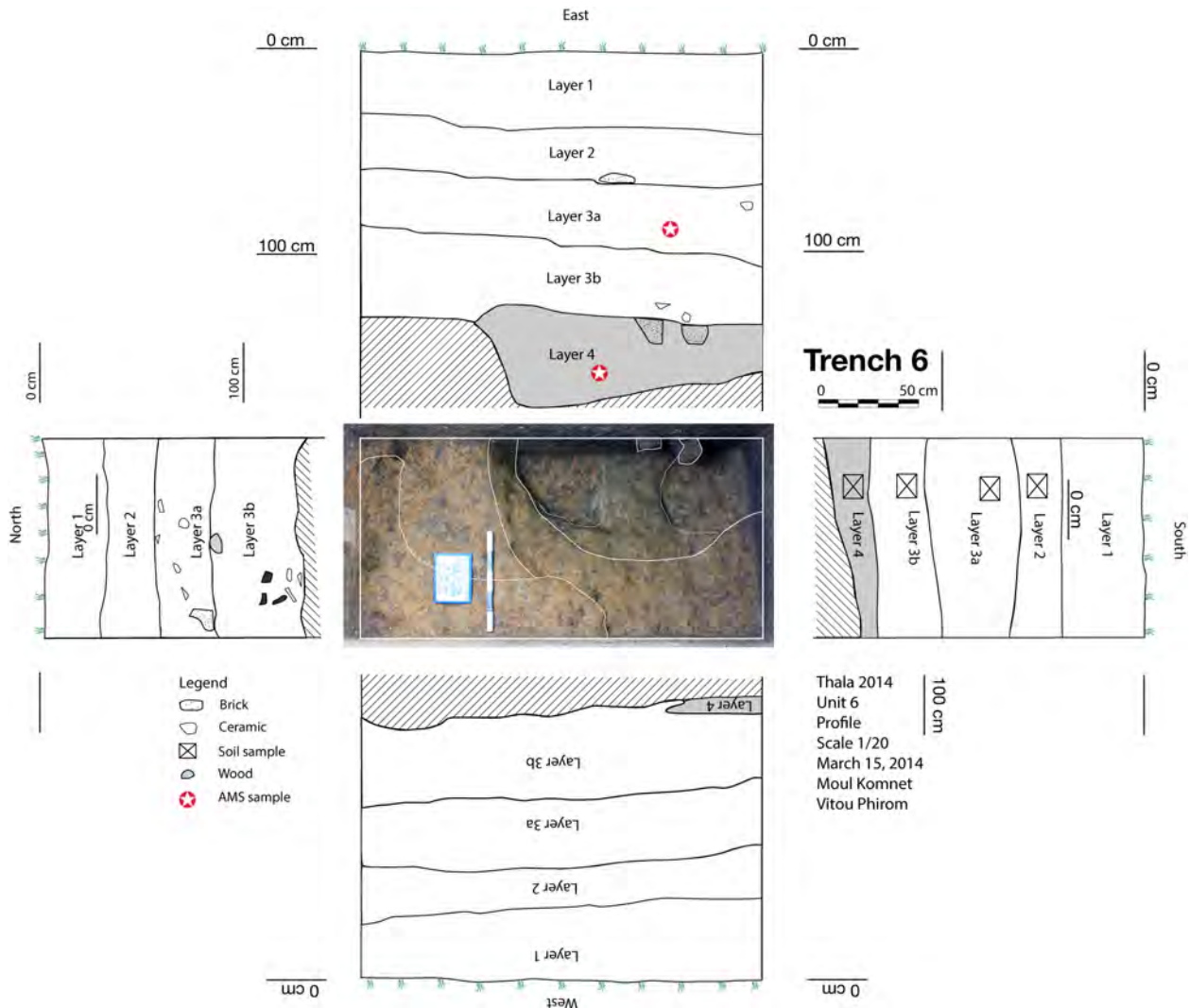


Figure IV-39. Trench 6's stratigraphic profiles

Trench 7: O Trel

Similar to the previous trench, Trench 7 was excavated to retrieve radiometric dating sample associated with the Early Historic period burials (Figure IV-40). Phase I surface collection in this location comprised a specific flared-rim ceramics resemble those found from Koh Ta Meas in the west Baray with an associated date of 1000 BCE (Feature 2 of the bottom figure in Pottier, Sachara, et al. 2004, 175). Trench 7 offers a radiometric chronology associated with this ceramic type and of the burials.

This lot was a heavily looted area where many looted pits were located, some of which reportedly yielded gold jewelry. The landowner had the surface leveled to make a vegetable garden. As a result, the top 50cm of Trench 7 or Layer 1 contained a variety of sherds from the looted context. Layer 4 was a natural clay layer correspond to Layer 5 of Trench 6. Above it, Layer 3 was



Figure IV-40. Trench 7 at Phum O Trel Krom. 1) South profile, 2) Trench bottom, and 3) Trench 7 viewed from the north

the earliest cultural layer where ceramic sherds, slags, charcoals mixed in the matrix. Layer 2a and 2b belong to part of a pit excavated into Layer 3 and were identified at the southwest corner of the unit. Pieces of human skull, ceramics (including the flared-rim ceramics), and charcoal contributed to these layers' dark gray color. A charcoal sample from Layer 2b dated between 171 BCE to 46 CE, which is the earliest date making O Trel contemporary with other Early Historic communities of Angkor Borei, Phum Snay, Prei Khmeng, Trapeang Phong, and northeast Thailand (Figure IV-41).

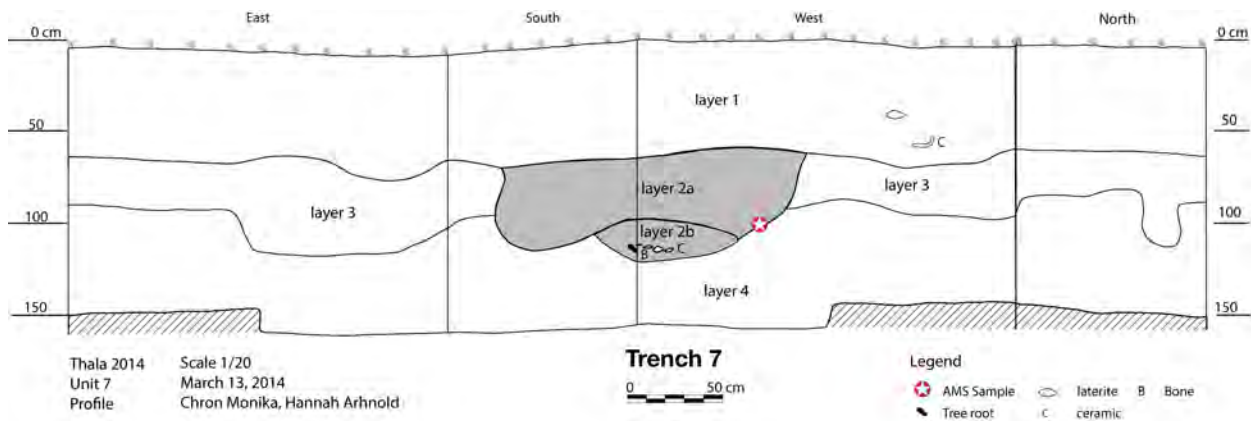


Figure IV-41. Trench 7' stratigraphic profiles

A total of 4648 sherds (39.07kg) was uncovered with 113 slags (4.1kg), most of which were in the disturbed context of Layer 1. The majority of these ceramics were sand and grog

tempered earthenware. Yet, due to its disturbed context, Trench 7 yielded the most diverse ceramics types including Buffware, Fine Orangeware, Reduced ware, and Pinkware dating between 100 BCE and 500 CE (Appendix F: Trench 7).

Trench 8: Tuol Neakta Kang Memay

During a site visitation to Tuol Neakta at Phum Kang Memay, sherds from multiple complete pots and bone fragments were observed in a footpath. Upon a closer inspection, a pair of tibia was exposed on the surface. Trench 8 was placed as a salvage excavation for this burial, which would have been destroyed further by waterborne erosion and herds of cows grazing on bones. Unlike other trenches, Trench 8 was setup following the burial orientation at 170 degrees. The size of the remaining burial was small enough to be covered by a 1 x2m trench (Figure IV-42).



Figure IV-42. Trench 8 of Tuol Neakta Kang Memay. 1) Grave goods were placed between and below the limbs (left and right tibia and feet were the only remaining skeleton); 2) Trench location, the lower left (or top of the burial) was cut by an oxcart road; 3) Vitou Phirom and Som Thon chiseled around the burial feature.

The crew started to excavate on March 12 and ended on March 14, 2014. The burial itself was already exposed and the deepest section was toward the north at 28cmbd. The soil matrix was extremely hard to excavate because of sandstone cementation. The burial was badly damaged that only 20-25 cm of tibias and portion of the right fibula were preserved. Bones of the right and left feet were severely disintegrated and cemented with the sandstone formation.

A carinated pot and a bowl were placed between both legs; while another carinated pot, two bowls, and a pedestaled-ware were placed below the feet. Two blue beads were found within a mixture of sherds from four different pots. Carbonized nodules, possibly from rice

(pending identification), were observed within these pots. A charcoal sample produced an AMS date range of 79 to 247 CE. No Pinkware was uncovered from this burial, which implies either a different community function or different dates between these Early Historic communities.

(Figure IV-43)

A total of 367 sherds (4.99kg), all of which were sand tempered-ceramics, were uncovered from this burial. These sherds belong to 1 pedestalled ware, 3 bowls, and 2 carinated vessels (Appendix F: Trench 8). One of these carinated vessels contained two glass beads (see Chapter V).

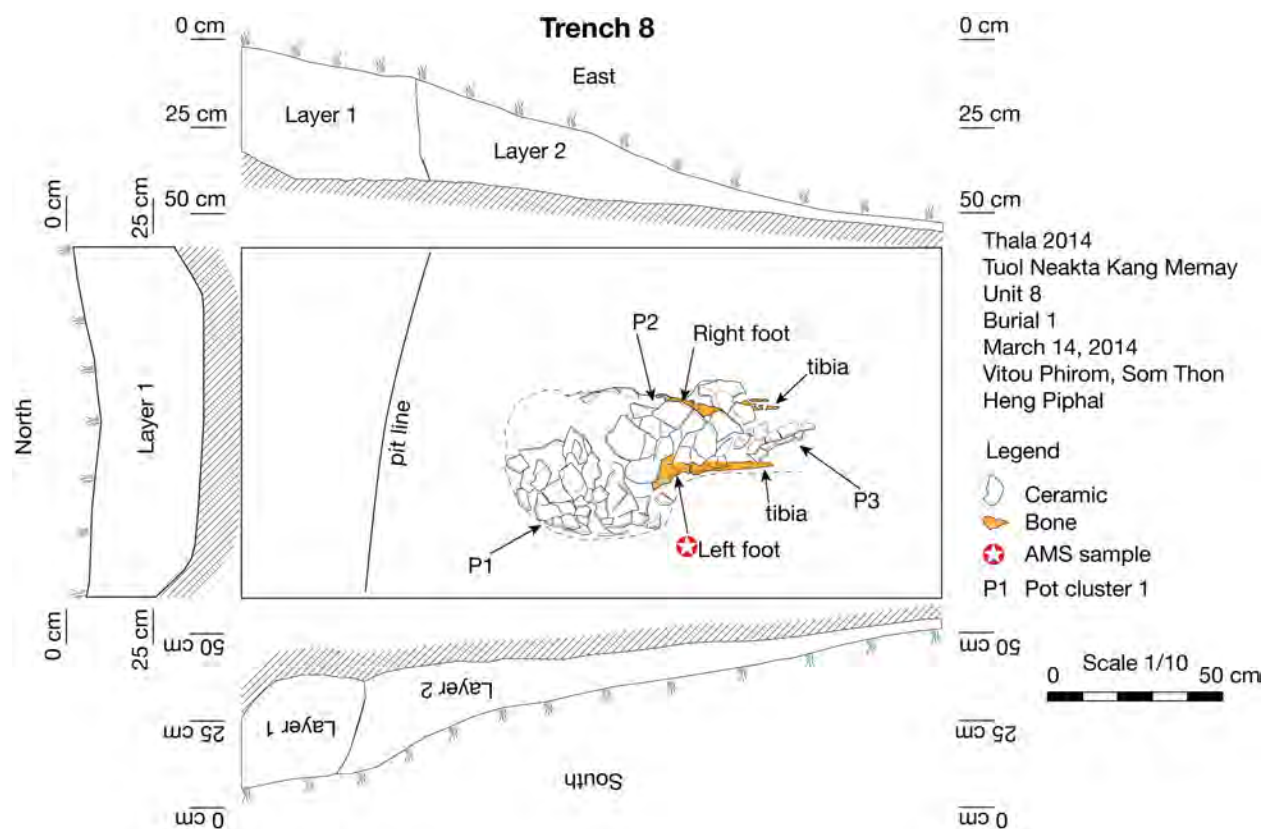


Figure IV-43. Stratigraphic profiles and ground plan of Trench 8

IV.3.2 Ba Doem

Trench 9: Ba Doem

Phase I surface collection at the Ba Doem complex comprised many pre-Angkorian earthenware from spoils of a new toilet pit behind the Sala Khum. Trench 9 was placed a few meters from this toilet and followed a north-south slope of the Ba Doem mound's southern

edge. It was expected that the location would provide information of the mound construction as well as usage since waste tends to be discarded at the edge of mound (Figure IV-44).

The excavation started on March 17 and finished on March 24, 2014. The trench comprised four main layers associated with different phases of activities. Layer 4 was the sterile layer associated

with the original surface of the levee which sat at 140cmbd. Layer 3 was the first cultural layer where small sherds and pieces of burnt clay were observed. The foundation of the current mound was possibly made during this phase when a depression was made at the southern portion of the mound. This depression was later filled with small charcoals, bricks, and earthenware sherds. An AMS analysis on a charcoal sample from this layer produces a date range of 251 to 398 CE. The Early Historic phase associated with Pinkware and some brick fragments occurred within this context. Layer 2 was the temple phase since there were more brick fragments mixed with earthenware sherds. Layer 1 was the mound surface (Figure IV-45).

A total of 389 sherds (2.63kg), all of which were earthenware, was uncovered from Trench 9 (Appendix F: Trench 9). Most of them came from Layer 2. Pinkware occurred from Layer 3 and 2 with the associated date of 251 to 398 CE, which marked the earliest date of this ware type since none was found in Trench 8 of 79 to 247 CE.

Trench 10: Hang Savat

Trench was placed at the eastern edge of the soil Trench 2 excavated in 2011 as part of the community's road construction. There were many large partially reconstructible sherds collected from here during Phase I. A 90-degree oriented trench was placed adjacent to a cluster of ceramics, which appeared on the eastern profile of this soil trench. Complete



Figure IV-44. Trench 9 at Ba Doem; 1) South profile, 2) Trench crew, 3) Mak Doeung preparing to draw profile

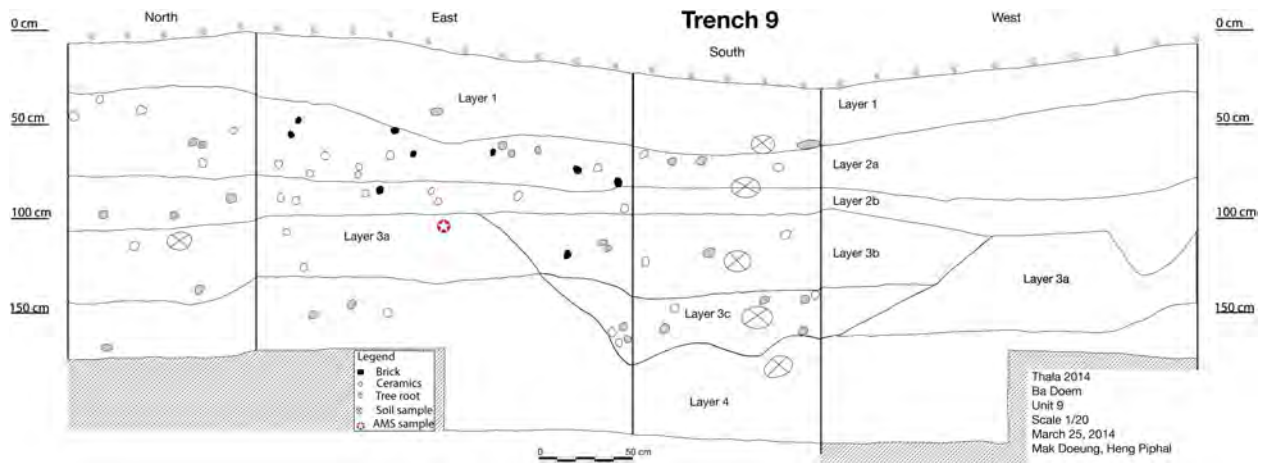


Figure IV-45. Trench 9's stratigraphic profiles

ceramics were expected from this trench to provide a basis for the Thala Borivat ceramic typologies. Due to time constraint and an unfriendly landowner, this trench was excavated based on the natural layer, i.e., obvious change in soil coloration and texture (Figure IV-46).

Large sherds were rare in this 3-layered unit. Smaller sherds, brick rubble, some charcoals, and gravels were found mixing throughout Layer 2 and 3 (Figure IV-47). There were no cultural activities observed in Layer 3 at 130cmbd. A small pit with dark colored soil and where most artifacts came from occurred at the northwest-half of this trench. The soil texture (i.e., dark sticky clay-loam for the cultural layer and hard reddish-brown clay for the sterile

layer) is quite similar to that of Trench 9 located across the river. An AMS date associated with a charcoal sample retrieved from Layer 3 has a date range of 652-769 CE, contemporary with the latest brick feature of Trench 2 at Tuol Trapeang Khnar.

A total of 753 sherds (4.94kg), all of which were earthenware, was uncovered from Trench 10 (Appendix F:



Figure IV-46. Trench 10 at Hang Savat; 1) West profile, 2) Trench crew: Chrai Chantha and Vitou Akphivat, 3) Soil Trench 2: Som Thon and Piphal Heng cleaning profile, taking soil sample, and additional collection.

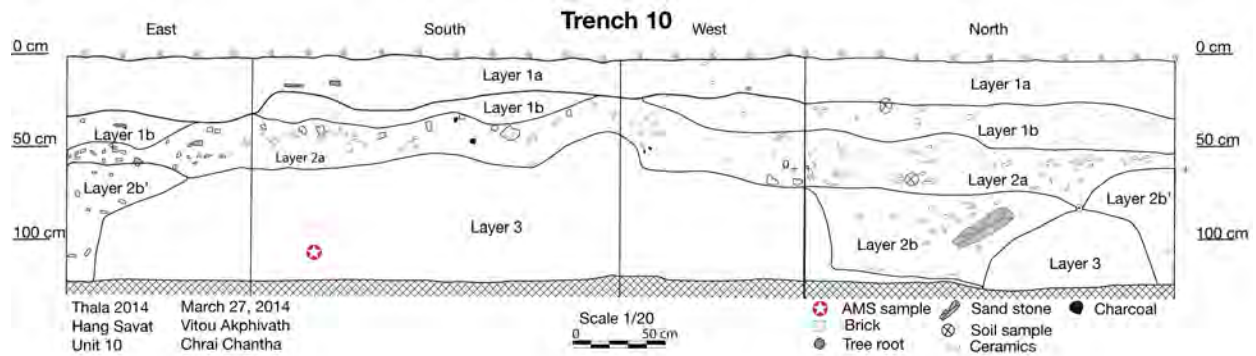


Figure IV-47. Trench 10's stratigraphic profile

Trench 10). Sand and grog tempered ceramics were the most abundant followed by non-tempered and Buffware kendi.

Soil Trench 2 and 3 in Phum Hang Savat

The crew cleaned and photographed profile sections of the Soil Trench 2 and 3 (herein, ST2 and ST3) during the excavation of Trench 10. Large and partially reconstructible ceramics, including *kendis*, of the Phase I surface collection #22 and #23 came from here. The east profile of ST2 in 2011 appeared to show a layer of small ceramic sherds forming a depression line, which resembled a bottom of a trapeang (Figure IV-48). Large ceramics seen on the profiles of these trenches appeared to concentrate within a series of multiple small pits (the landowner provided a similar description). Four clear examples were seen on the east and southwest profile of the ST2, and the south profile of ST3.

Two hypotheses could explain the concentration patterns of these large ceramics, i.e., trash pits, or burial trenches. After cleaning the profiles, two common layers were observed: 1)



Figure IV-48. East profile of Soil Trench 2 in 2011 with a depression line of ceramics (left), which suggests that there was a pond here.

a c. 50cm surface layer; and 2) At c. 100 cm below the surface, was a dark layer mixed with ash and tiny bone fragments, possibly cremated ashes, mixed with ceramics and brick rubble. (Figure IV-49)

The second hypothesis that these pits were burials supported by the cremated ash and also the mixing of complete *kendi* and other types of potteries. This combination was a common

burial practice of the Early Historic period observed from Angkor Borei in the delta to Phum Snay and Prei Khmeng to the northwest. These two soil trenches, thus, provided the earliest evidence of a cremation burial ground within a pre-Angkorian period temple, which is generally linked to Hindu or Buddhist practices.

IV.4 Inscription

Previous research has grouped the inscriptions from Sambor and Sambok into either two distinct zones of I and L (Jacob 1979) or a single zone 'I' (Vickery 1998: 94-105) due to their geography and similar contents. However, Stung Treng was not included because there were no Khmer inscriptions at the time of these research. Vong Sotheara (2011) reported of four new inscriptions in Stung Treng. Five new pre-Angkorian inscriptions were uncovered during Phase III-2014. Three of them were found in Kantuy Ko (Stung Treng) and were written in Sanskrit, the Hindu religious text of this period. Two others came from Thma Kre (Sambok) and were both written in Khmer.

Based on these new inscriptions, this research includes Stung Treng in Vickery's group I due to their proximities and long chronology from c. 550 to the Angkorian period.



Figure IV-49. 1) Cluster of ceramics on the southern profile of Soil Trench 3 in 2011; 2) Ceramics clusters with brick rubble and cremated bone pieces on Soil Trench 2's eastern profile at 120cm below the surface; 3) Ashes and small brick fragments after the ceramics were removed.

IV.4.1 Stung Treng

Twelve inscriptions have been found in Stung Treng; four of which were found by this project (See Table IV-7). None of these inscriptions have dates. Paleographically, ten of them

Site	Inscription	Date/Period	Content	Reference
Preah Ko?	K.359	550-600 CE	<i>Hiraṇyavarman</i> , nephew of <i>Bhavavarman I</i> , installed god <i>Tribhuvaneśvara</i> (Śiva) and the Sun god, donated <i>Rāmāyaṇa</i> , <i>Purāṇa</i> , and <i>Bhārata</i> .	(Barth 1885, 28–31; Sahai 2008)
Ba Doem	K.360	Pre-Angkor	Fixed offering (butter, sugar, rice, areca nuts) to Śiva during the <i>Bhagavat</i> ceremony, construction of a brick chamber for god <i>Caṇḍeśvara</i> , long stone wall.	IC5:61
Ba Chong	K.474	Pre-Angkor	<i>Śivapāda</i>	IC2:145
Ba Doem	K.1257	700-800 CE	Donation of laborers, cows, buffalos, and areca trees by a <i>Yajamāna Vraḥ Sukhamatī</i> to god <i>Suvarṇeśvara</i> . The grouping of laborers was only common after the 8 th century.	(Vong 2011)
Prasat	K.1287	Pre-Angkor	Donation of laborers, rice, metal objects, cows, coconut tree, and areca trees a pa-añ (poñ?) to gods <i>Suvarṇaliṅga</i> , <i>Caṇḍīśvara</i> , and <i>Diṅgeśvara</i> . The title Pa-añ only appeared in K.28 from Prei Phkoam (transcribed as <i>Pu 'añ</i> in IC II: 24) and K.79/644CE, possibly from Ta Keo (IC II:69-72). <i>Va Pa-añ</i> appeared to	

			be a personal name as well as "male labor of <i>Pa-añ</i> " in K.748/614 CE.	
Sila Charoek	K.1288	Pre-Angkor	List of laborers	
Koh Bay Samnom	K.1289	Pre-Angkor 700-800 CE	Partly legible, contains a place called <i>brah tirtha</i> or the water ford	
Sila Charoek	New	Pre-Angkor	Illegible, written on an ablution pedestal like K.474	Thala Borivat Archaeological Project
Trapeang Khnar	New	Pre-Angkor	Sanskrit, short, damaged, illegible	
Kantuy Ko 3	New	Pre-Angkor	Sanskrit, short, damaged, illegible	
Kantuy Ko 2	New	Pre-Angkor	Sanskrit, illegible	
Kantuy Ko 1	New	11 th century	Court proceeding of a land conflict	
Thala Borivat	K.473	Angkor	Illegible	CISARK

Table IV-7. Inscriptions found in Stung Treng

are pre-Angkorian. K.359, an account of Bhavavarman I's family (c. 550-600 CE), was recorded by Aymonier and his Khmer assistants to be stored in Wat Thala Borivat⁵. The exact origin of this inscription was not clear since villagers reportedly removed it from either Sala Prambuon Lveng or Prasat Khtop or Preah Ko. Aymonier was convinced that it came from the latter due to its proximity. The inscription was reported to be written on a square sandstone block, similar to two new inscriptions from Trapeang Khnar and Kantuy Ko. Two inscriptions of Citrasena-Mahendrarvarman (post-600) written on two ablution pedestals, K.1173 and K.1174, were found in association with brick temples in a large settlement complex east of Wat Phu (Lorrillard 2014, 197; Souksavatdi 1998, 17–19; Santoni and Hawixbrock 1998, 3). In fact, the Sambor Prei Kuk K.442/*Isānavarman* (616-637 CE), Tham Prasat K.509, Surin K. 377, Khon Kaen K.1102, Roi Et K.1280 were all written on Nandin pedestals (Lorrillard 2014, 197). Further south, K.600/611 CE

⁵ The exact location was not clear, although the description suggests that it was not the location of the current Wat. My guess is the location of the current Sala Sruk where multiple sandstone debris still lie scattered in the yard.

from Angkor Borei was also written on a pedestal. This practice was likely common during the early 7th century CE.

IV.4.2 Sambor

Nine inscriptions were found at Sambor (Table IV-8), mostly by Adhémard Leclère (1904). A new inscription, Ka.173/K.1338, was reportedly removed from Koh Damlong and stored in Wat Tasar Moroy (Vong Sotheara, pers.comm.). This inscription belongs to a series of pre-coronation *Citrasena* inscriptions along the Mekong in Kracheh and Kampong Cham. His later inscriptions, after 600 CE, use the coronation name of *Mahendravarman*.

Site	Inscription	Date/Period	Content	Reference
Koh Damlong	Ka. 173/ K.1338	Pre-600 CE	Installation of a liṅga by Citrasena	Vong Sotheara
Trapeang Prei	K.127	684 CE	Endowment by a Mratāñ <i>Vidyākīrti</i> to VKA <i>Amareśvara</i> followed by another endowment by a Mratāñ <i>Íśvaravindu</i> to VKA <i>Suvarṇṇaliṅga</i>	IC2:89
Kamnap Ta King	K.129	600-800 CE	Endowment of laborers, rice fields, cows, and buffalos to VKA <i>maṅḍaleśvara</i> by a poñ	IC2:83
Trapeang Thma	K.133 and K.480	600-800 CE	lists donation from a <i>mahānavāha</i> on one section and from a mratāñ <i>Rudravindu</i> to Śri <i>Vimaleśvara</i> on the other section	IC5:81-82
Anlong Prang	K.132	693 and 707 CE	Endowment to a goddess <i>Vidyādhāraṇī</i> by a physician in 693. He passed away in 707 CE at the age of 83.	IC2:85; date amended by Billard and Eade
Wat Tasar Moroy	K.124	803/804 CE	Endowment to Śrīmad <i>Āmrātaka</i> by queen <i>Jyeṣṭhāryā</i>	IC3: 171; Billard and Eade 206: 405
Kamnap Ta King	K.125	1001 CE	<i>kaṃrateñ jagat Śaṃmbhupura</i>	BEFEO 28: 140-144

Trapeang Prei	K.128	1204 CE	Named the reigning ruler, Jayavarman VII, relative to a donation to <i>kaṃrateñ jagat Śralāyatana Cuñ</i>	IC2:87-88
Wat Tasar Mo Roi	K.928	Post-Angkorian	Illegible	

Table IV-8. Inscriptions found in Sambor

IV.4.3 Sambok

Seven inscriptions have been reported from Sambok, two of which were found during Phase IV 2014 (Table IV-9). The earliest inscription is the submerged boulder inscription of K.122 of *Citrasena* (c. 550-600 CE). Most inscriptions refer to the endowments of Śiva, Viṣṇu, and Harihara. It is possible that *Suvarṇṇaliṅga* of K.926/624 CE and K.127/684 CE (Sambor) was the same god (Vickery 1998: 103). However, K.1287 from Thala Borivat also lists a god of the same name, which appears to be a generic name for a golden liṅga.

Site	Inscription	Date (CE)	Content	Reference
Thma Kre	K.122	550-600 CE	Installation of a liṅga by Citrasena	(Finot 1903, 212–13)
Phnom Sambok	K.429	600-800 CE	Short Sanskrit verse	(Finot 1912, 183)
Phnom Sambok	K.430	600-800 CE	donation of a <i>Poñ</i>	IC6:43
Prasat Thma Kre	K.926	624 CE	Establishment of a <i>Śaṅkaranārāyaṇa</i> and donation of laborers from <i>Poñ Prajñākīrtti</i> to a VKA Śrī <i>Suvarṇṇaliṅga</i> to be joint with <i>Śaṅkaranārāyaṇa</i>	IC5:20
Prasat Thma Kre	K.927	710 or 729 CE	donation of rice fields from <i>Poñ Vrau Kros</i> to VKA <i>Śaṅkarnārāyaṇa</i>	IC5:22
Prasat Thma Kre	new	600-800 CE	List of laborers, possibly relates to K.926	

Prasat Thma Kre	new	700-800 CE	It contains a mixed Angkorian lexical elements similar to K.124/803 CE and lists a donation by a Mratāñ	
--------------------	-----	------------	---	--

Table IV-9. Inscriptions uncovered around Sambok

IV.5 Chronology and Chronometric Date

Ten charcoal samples were sent to the University of Arizona AMS Laboratory (See Appendix G). Excluding the outlier sample from Trench 4, the resulted 2 sigma dates range from 171 BCE to 875 CE, well within the expected Early Historic and pre-Angkorian periods (Table IV-10).

Lab #	Sample ID	T	Site	¹⁴ C age BP	1σ CE	2σ CE	mu	Outlier
B10188	Thala14.4.13	4	Trapeang Kak	4629±51	-3511 to -3354	-3628 to -3125	-3425	Yes
B10191	Thala14.7.6	7	O Trel	2049±37	-111 to 3	-171 to 46	-66	No
B10192	Thala14.8.1	8	Kang Memay	1842±35	130 to 220	79 to 247	173	No
B10190	Thala14.6.10	6	O Trel	1766±37	230 to 334	138 to 380	271	No
B10193	Thala14.9.6	9	Ba Doem	1709±30	260 to 387	251 to 398	329	No
B10186	Thala14.6.6	6	O Trel	1623±31	391 to 531	355 to 538	447	No
B10185	Thala14.1.21	1	Kang Dejo	1565±30	429 to 539	419 to 560	486	No
B10183	Thala14.2.12	2	Trapeang Khnar	1500±34	539 to 608	431 to 641	558	No
B10194	Thala14.10.4	10	Hang Savat	1315±34	660 to 764	652 to 769	705	No
B10185	Thala14.2.10	2	Trapeang Khnar	1292±55	665 to 769	649 to 875	735	No

Table IV-10. Calibrated AMS samples from Thala Borivat (OxCal v4.2.4)

Five occupational phases were identified using a combination of ceramic chronology, inscriptions, art historical data, and AMS dates (Table IV-11 and Figure IV-50) [See Appendix A: Note 5 for additional chronology]. Evidence of the substantial communities in Stung Treng began in the Early Historic period TB Phase I (c. 200 BCE-300 CE). By the transitional TB Phase II (c. 300-500 CE), the settlements nucleated near the major river confluences. Ceramics and beads

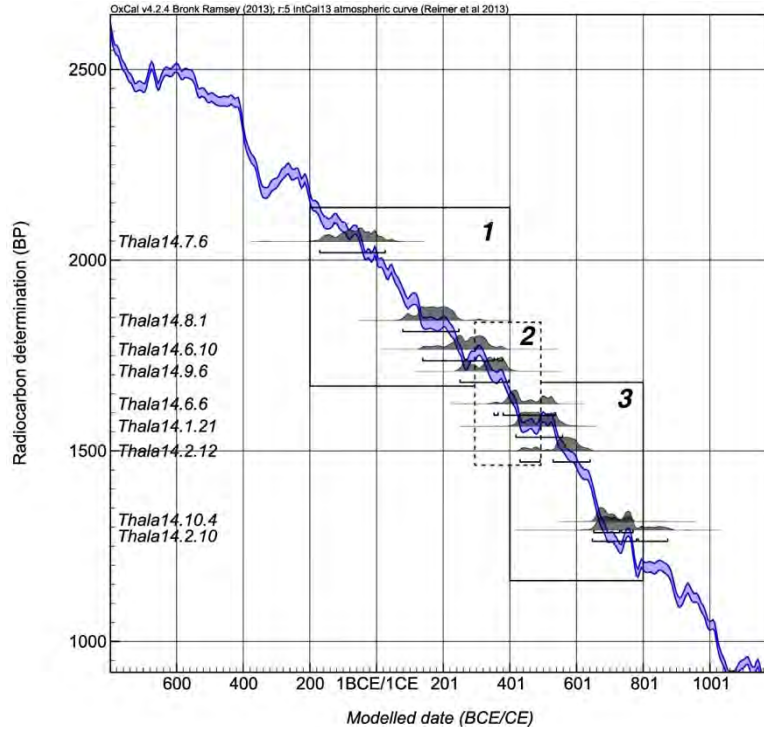


Figure IV-50. Thala Borivat's chronology (a 3000 BP AMS date is excluded): TB1 (200 BCE-300 CE), TB2-Transitional Period (300-500 CE), and TB3 (500-800 CE) (OxCal v4.2.4)

from Phase I and II suggest that there were interactions with other regions including the Mekong delta through the Mekong, by which the monumental religious architecture was likely introduced to Stung Treng by the end of Phase II.

The pre-Angkorian TB Phase III (500-800 CE) marked a rapid settlement expansion (habitations and temples) in Thala Borivat (150 times larger than the preceding period settlement). TB Phase IV (c. 800-1500 CE) and TB Phase V (c. 1500-1900 CE) are characterized by the continuity and decline in settlement size in Thala Borivat, which was eventually abandoned toward the end of the 1800s.

Phase-Date	Phase	Diagnostic material	Inferred activities	AMS Date	Cross-correlation with other Settlements
TB I	Early Historic	<ul style="list-style-type: none"> • Pedestal bowl (Trench 8) 	<ul style="list-style-type: none"> • Trade • Settlement on levees 	T7: 171 BCE to 46 CE;	Angkor Borei, Phum

<p>c. 200 BCE – 300 CE</p>		<ul style="list-style-type: none"> • Orange-slipped ceramics (Trench 7, surface) • Cord-marked carinated pot (Trench 8, surface) • Bronze artifacts • beads 	<ul style="list-style-type: none"> • Burials on mounds inland • Large settlements contain both burials and houses? 	<p>T8: 79 to 247 CE ; T6: 138 to 380 CE</p>	<p>Snay, Prohear</p>
<p>TB II c. 300 CE– 500 CE</p>	<p>Early Historic/ Transitional Period</p>	<ul style="list-style-type: none"> • Fine Buffware • Industrial ware • Sand-tempered ceramics 	<ul style="list-style-type: none"> • Earliest brick construction • Settlement expansion within major center • Abandonment of some Early Historic settlements • Metallurgical activities • Trade • Agriculture (chaff) 	<p>T9: 251 to 398 CE T6: 355 to 538 CE T1: 419 to 560 CE</p>	<p>Angkor Borei, Phum Snay</p>
<p>TB III c. 500 CE – 800 CE</p>	<p>Pre-Angkorian</p>	<ul style="list-style-type: none"> • Thala Borivat tradition lintels • Sambor Prei Kuk and Prei Khmeng styles lintels • K. 359/Bhavavarman I • Various kendi forms • Red-painted ware 	<ul style="list-style-type: none"> • Agriculture • Interactions with other pre-Angkorian centers • Metallurgical craft 	<p>T2: 431 to 641 CE T10: 652 to 769 CE T2: 649 to 875 CE</p>	<p>Sambor Prei Kuk</p>

TB IV c. 800 CE – 1500 CE	Angkorian	<ul style="list-style-type: none"> • Stoneware (Cheung Ek, Brown-Glazed, Green-Glazed) • Chinese ware (Yuan Dynasty celadon, Song Dynasty white porcelains) • Epigraphy 	<ul style="list-style-type: none"> • Agriculture • Interactions with other Angkorian centers • Reduction in settlement size • Metallurgical activities 	N/A	Angkor
TB V c. 1500 CE – 1900 CE	Post-Angkorian	<ul style="list-style-type: none"> • Thai ceramics (Sawankhalok) • Chinese ceramics (Ming-Qing Dynasties blue and white porcelains) • Vietnamese ceramics • Traveler accounts and chronicular evidence 	<ul style="list-style-type: none"> • Agriculture • Active trading activities • Further reduction in settlement size • Controlled by Champassak Kingdom, then Siam, and returned to Cambodia 	N/A	Angkor

Table IV-11. Thala Borivat general Chronology (T: Excavation Trench)

IV.6 Summary Results

This Chapter reports the outcome of each methodological approach employed during the 4-phase field research from 2011-2016. The overall results can be summarized as follow:

Spatial Data Collection

The spatial data collected in 2011 indicated that most sites (e.g., brick features, trapeangs, and surface ceramics) are concentrated within a 1-km-zone of the main rivers, which became the survey boundary for the succeeding fieldworks. Due to the complex surface patterns at Thala Borivat, Phase II focused on a topographic mapping campaign to reconstruct a micro-

elevation model of this area, which is subjected to perennial floods. The expected results were a topographic map that includes a contour level of 20cm-50cm intervals, brick features, trapeangs, and surface collection units. This mapping project allowed crew members to cover the most detailed systematic surface collection in Thala Borivat.

Despite the poor visibility caused by thick vegetation and modern habitations, a 4-square-km-area was mapped. Artifacts tended to concentrate between 30 and 100 cm below the surface. Most temples documented were located along the river and dated to the pre-Angkor period. Some of them had evidence of 11th and 12th centuries occupations. It was unclear, however, whether Angkorian period temples were also built in Thala Borivat. A spatial and topographical analysis provided insights to the decision making on locating the settlements near the large rivers while sustaining less damage from their annual flood. The early settlements of this region bore similar characteristics to those in the delta, i.e., low lying terrains or wetlands subjected to seasonal flood, most likely because of the fertile lands. Most habitations and temples were placed on mounds and levee near the rivers, which provide access to traffics, agricultural and aquatic resources.

Phase III research involved site reconnaissance along the major rivers in Stung Treng where more than 50 new archaeological features were recorded (Figure IV-51). These include habitation mounds, burial mounds, and brick architectural features. This area experienced extensive looting of burial goods (especially gold jewelry and beads); bricks and sandstone objects are being used as net sinkers and sharpening stones.

Systematic Surface Collection

The 2011 surface survey results indicated that most ceramics concentrated on the levees along the main rivers and their tributaries. These ceramics appeared in proximity to brick features and trapeangs clustered along the rivers. These factors suggest that most settlements are generally located around brick features and trapeangs. The low-lying rice fields were less likely inhabited due to seasonal inundation from the river. The settlement patterns in Ba Doem and Thala Borivat comprise both linear and nucleated settlements, which are composed of mounds, monumental architecture, and trapeangs, typical of the pre-Angkorian settlement seen in the Mekong Delta.

Since most ceramics were collected from the levees, several factors were considered as to whether these ceramics represent the ‘true population’ of the ceramic distribution of this region. As most backhoe trenches (from road construction) were located on the levees and ran parallel to the rivers, the surface collection may have been skewed toward the levees. Yet, most of the low-lying rice fields contain no ceramics, hence no habitation, unless these fields were located on mounds or close to the levees. Additionally, some roads, foot paths, and other surface disturbances (e.g., farming and waterborne erosion), which traversed through the elevated areas far from the levee and under the overgrowths, were surveyed. No subsurface artifacts were observed on these disturbed surfaces, which suggests ancient settlement was unlikely located there. It is highly likely that the current dataset represents a close approximation of the ancient spatial ceramic distribution. That is, little evidence of ancient occupation was overlooked.

By Phase III, it was clear that the best approach to surface survey was to follow recent road constructions, the reports of lootings for brick or gold, and the location of trapeangs identified on the satellite images. A total of 1408.4 ha was covered by pedestrian survey in Stung Treng (Figure IV-52). There was only one

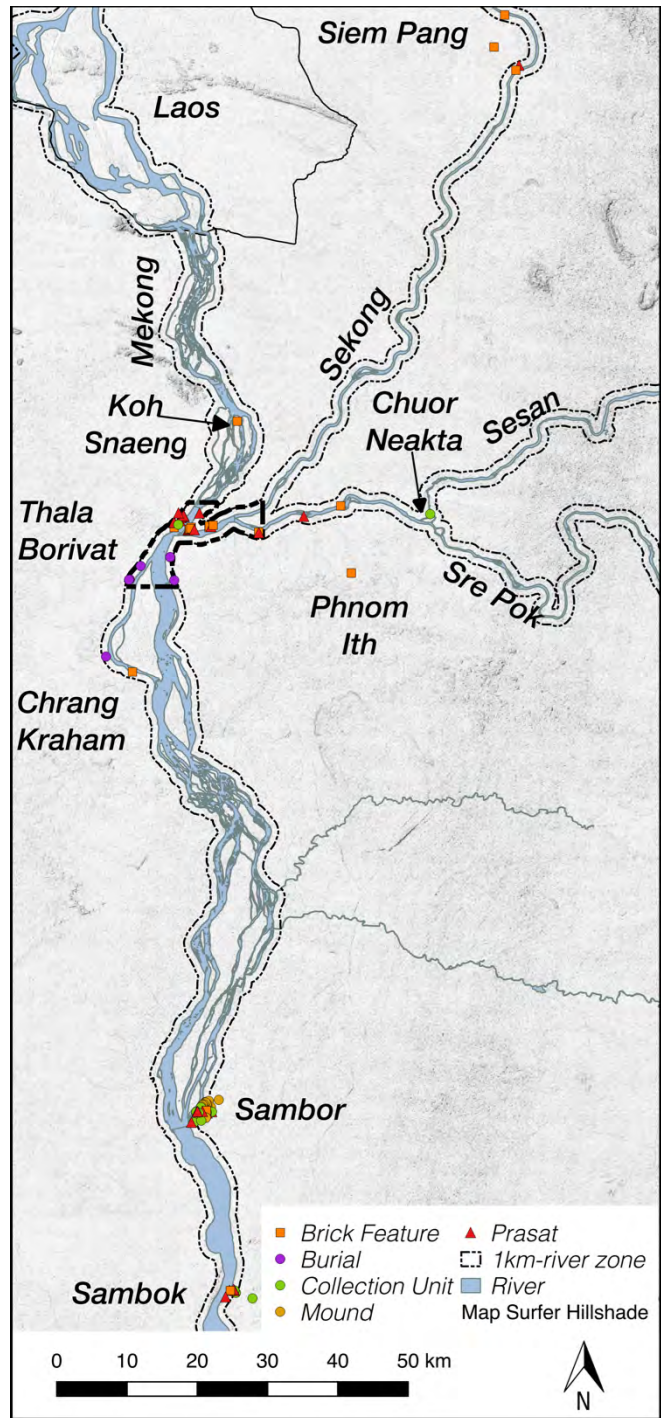


Figure IV-51. Sites accessed and reported during Phase III 2014 in Kracheh and Stung Treng

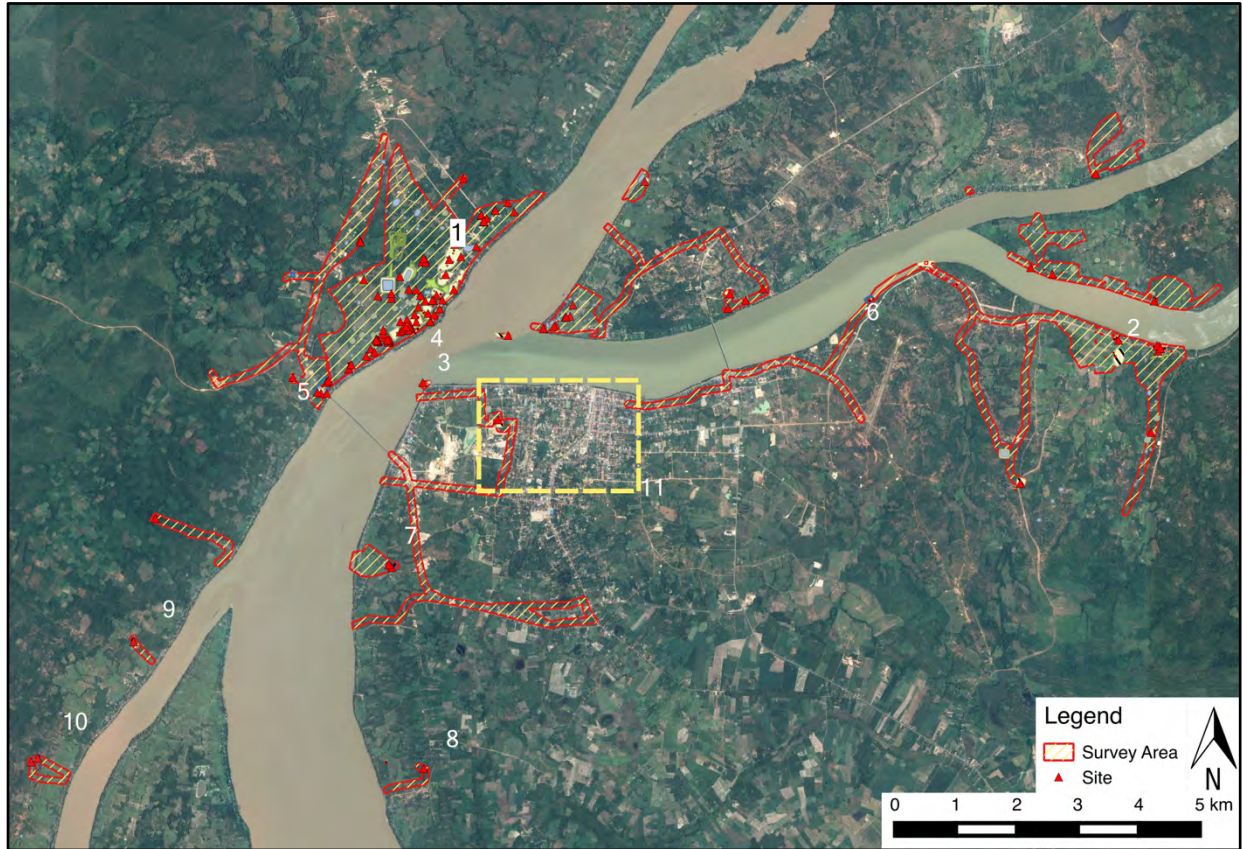


Figure IV-52. 1408 ha area covered by full-coverage survey. 1) Preah Ko; 2) Ba Doem; 3) Ba Chong; 4) Sala Prambuon Lveng; 5) O Trel; 6) O Khlong; 7) Tuol Neakta Kang Memay; 8) Tuol Khtum; 9) Tuol Ansang; 10) Tuol Meas; 11) Town area

recent construction project in town near the levee; however, no artifacts were observed. It is quite possible that the modern town area, where the levee is very narrow, was not the focal point of habitation since it is subjected to more severe seasonal flood than Thala Borivat and Kantuy Ko peninsula. This explains why the only two sites, Ba Chong and Phnom Theat, are located on this side of the Mekong.

Most ceramics occurred near the brick features, which became the surface survey's starting point. It was practically impossible to see any surface artifacts under the overgrowth. Even within the current habitation, the visibility was zero unless the ground was disturbed. It was thus practical to follow recent road constructions, wells, ponds, water erosion on footpaths, or any kind of modification to the surface. A total of 4,004 pieces or 64.5 kg of artifacts were collected from Stung Treng and Kracheh.

Excavation

Ten excavation units were placed in Stung Treng. Nine excavation trenches were located in proximity to the temple structures and within the habitation area where surface ceramics were collected. Trench 8, within a burial mound, was a rescue excavation to retrieve a burial that was being disturbed by a footpath and rain water. These excavated units yielded a total of 11,736 pieces or 126.12 kg of artifacts.

Excavation Trench 10 in Hang Savat yields the first evidence of a pre-Angkorian cremated burial dated between 652 to 769CE. By the Angkorian period, particularly by the 11th and 14th centuries CE, both Chinese ceramics (Song white porcelain, Yuan celadon) and Angkorian stoneware were found mixed with brick rubble atop the pre-Angkorian temples. Some of these pre-Angkorian temples had already collapsed by the Angkorian period and some may have been repurposed to serve predominantly as habitations during the Angkorian period because more ceramics of this periods were found on the surface. There were very few examples of known post-Angkorian ceramics (post CE 1500), especially trade ware, which suggests the decline of Stung Treng region.

Artifacts

The surface surveys in Stung Treng and Kracheh yielded 3747 sherds (57.4kg), 9 beads, and other artifacts (Table IV-12; see details in Appendix E). Earthenware sherds account for 4.6kg, Khmer Stoneware 16kg, and Tradeware 0.82kg. The ten excavation trenches yielded 78.8kg, 44 beads, and 172 slags (5.32kg). Of these, earthenware accounts for 76kg, Khmer Stoneware 2.1kg, and Tradeware 0.71kg [see Appendix F]. Stoneware and tradeware belong to the period between the 12th-17th centuries and are not the focus of this dissertation.

Approximately 20-30% of earthenware can be dated with certainty between 200 BCE-800 CE. This factor resulted from a combination of the limited understanding of the pre-Angkorian ceramics outside the Mekong Delta and the fact that only a few complete ceramics were uncovered from the study area. Chronometrically-anchored earthenware is possible with limit paste characteristics such as the Reduced ware, Fine Orangeware, Buffware, Pinkware, and chaff-tempered ware. Most earthenware, however, were sand-tempered (both fine and coarse sands) grouped into E8sand. Sand-tempered ceramics from the excavated contexts

Type	Surface	%	Type	Surface	%	Type	Excav.	%	Type	Excav.	%
E8a	61	2	KS	226	42	E8a	96	1	KS	16	9
E8b	113	4	KBG	92	17	E8b	697	7	KBG	71	38
E8c	114	4	KGG	112	21	E8c	47	0	KGG	13	7
E8sand	2497	78	TH	1	0	E8sand	6724	71	TH	0	0
E8g	194	6	CH	103	19	E8g	1633	17	CH	80	43
E8h	3	0	VN	1	0	E8h	28	0	VN	7	4
E9	61	2	Total	535	100	E9	20	0	Total	187	100
E10	9	0				E10	15	0			
E11	0	0				E11	2	0			
E12	160	5				E12	68	1			
Total	3212	100				E13	108	1			
						Un-ID	11	0			
						Modern	21	0			
						Total	9470	100			

Table IV-12. Proportions of ceramic counts from surface collection and excavation trenches

indicated that the technique persisted from the Early Historic period (bowls, pedestalled-ware, and carinated ware) to the Angkorian and post-Angkorian periods. Yet, the limited spatial distribution of the Angkorian stoneware and tradeware (mainly within Thala Borivat and Sambor), suggests that most of the sand-tempered ceramics likely belonged to the pre-Angkorian period (Table IV-13 and Table IV-14).

In sum, the fieldwork results suggested that region's two contrasting landforms, lowland and highland, appeared to influence the past and present settlement patterns. Most settlements (surface artifacts, mounds, trapeangs, and brick architecture) were located on the levees along the major rivers. Similar patterns were observed in the Champassak-Wat Phu area as well as the Mun river systems (e.g., C. Evans, Chang, and Shimizu 2016; Lorrillard 2014; Santoni and Hawixbrock 1998, 1999; Souksavatdi 1998). However, in contrast with other known centers such as Angkor Borei, Sambor Prei Kuk, and Wat Phu where a large part of the settlements was enclosed by a moat and/or wall, the Thala Borivat and Sambor settlements were irregular in shape and comprise a series of rectangular mounds and ponds stretched along the banks of the Mekong and the San Rivers.

Ceramics from both surface and excavated contexts suggested that this area has been occupied since 200 BCE until the Angkorian and post-Angkorian periods when the settlements

Type	T1	T2	T3	T4	T5	T6	T7	T8	T9	T10	Total	%
E8a	9	2	6	2	0	17	37	0	1	22	96	1
E8b	0	0	0	0	0	548	62	0	87	0	697	7
E8c	16	0	0	0	0	5	17	0	9	0	47	0
E8sand	526	144	30	386	15	1096	3653	365	249	260	6724	71
E8g	35	90	24	15	2	89	871	0	40	467	1633	17
E8h	1	15	0	0	0	5	7	0	0	0	28	0
E9	7	0	0	1	0	10	0	0	0	2	20	0
E10	0	0	0	0	0	2	13	0	0	0	15	0
E11	0	0	0	0	0	0	2	0	0	0	2	0
E12	16	0	0	0	0	47	3	0	0	2	68	1
E13	0	0	0	0	0	7	98	0	3	0	108	1
Un-ID	6	1	0	0	0	0	3	0	1	0	11	0
Modern	20	0	0	0	0	1	0	0	0	0	21	0
Total	636	252	60	404	17	1827	4766	365	390	753	9470	100

Table IV-13. Earthenware count and proportion in each trench (T)

Type	T1	T2	T3	T4	T5	T6	T7	T8	T9	T10	Total	%
KS	15	0	0	1	0	0	0	0	0	0	16	9
KBG	47	0	3	21	0	0	0	0	0	0	71	38
KGG	10	0	1	1	0	0	1	0	0	0	13	7
TH	0	0	0	0	0	0	0	0	0	0	0	0
CH	62	1	4	9	4	0	0	0	0	0	80	43
VN	4	0	3	0	0	0	0	0	0	0	7	4
Total	138	1	11	32	4	0	1	0	0	0	187	100

Table IV-14. Tradeware count and proportion in each trench (T)

began to decline. The Early Historic burials, in most cases, were located at c. 0.5km to 2km inland from the rice fields and levees. Data such as ceramics, brick structures, and burials suggested that Thala Borivat was a multi-functional and multi-component center. Its ritual and habitation districts were interspersed and contain brick foundations and ceramic debris.

Chapter V incorporates the data from the 4-phase fieldwork to reconstruct the settlement patterns and economies of the Early Historic communities in Stung Treng from 200 BCE-500 CE.

Chapter V. Interpretation: Early Historic Communities 200 BCE-500 CE

This chapter uses the survey and excavation data to reconstruct the settlement patterns and economies of Stung Treng Early Historic communities c. 200 BCE-500 CE. Spatial and temporal distributions of sites and artifacts in Thala Borivat and Sambor are used to reconstruct the characteristics and economies of these communities. This period coincided with the Angkor Borei Phase II c. 200 BCE-300 CE. Clear evidence of the Early Historic communities in Stung Treng appeared along the Mekong River by c. 200 BCE and displayed evidence of interaction with the Mekong Delta populations, which suggest that they were parts of a regional trade network. Intact Early Historic data from Thala Borivat is scarce due to looting and limited excavations. Nevertheless, data provided by both surface survey and excavation indicate that the Early Historic communities lived along the major river systems.

The following sections begin with reconstructing the Early Historic period chronology based on a combination of artifacts and AMS dates. The Early Historic communities are defined based on sizes of the surface artifact distribution. Inferences about their economies, including agriculture and trade interactions, are made based on ceramic technologies and imported glass beads.

V.1 Chronological Indices

The context of this period came from four excavation trenches, 6 to 9. Five AMS samples date this period between 200 BCE and 500 CE (Figure V-1). The artifact assemblage, particularly ceramics uncovered through both excavation and surface collection allows for a refined

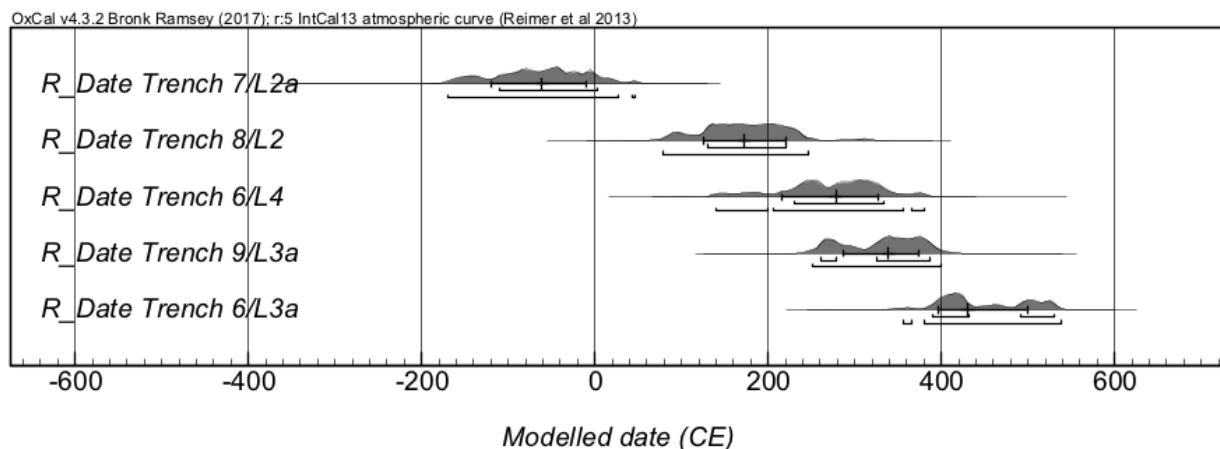


Figure V-1. AMS dates from Stung Treng associate with the Early Historic period

chronology subdividing into: TB Phase 1, Early Historic Period c. 200 BCE to 300 CE, and TB Phase 2, Transitional Period c. 300 to 500 CE.

V.1.1 TB Phase I (c. 200 BCE-300 CE)

This Phase I corresponds to the early sequences of Angkor Borei (AB1 and AB2) and the early sequence of Phum Snay⁶. The AMS dates from Trench 7, Trench 8, and Trench 6 provide an arbitrarily defined timeframe between 200 BCE and 300 CE. In Angkor Borei, the primary ceramic tradition of this period was the Reduced Ware horizon (e.g., Fehrenbach 2009; Fehrenbach and Glascock 2011; Stark 1998, 2000). In Thala Borivat, only 15 sherds/ 100g of excavated ceramics can be classified as Reduced ware due to their black and burnished surface treatment (Figure V-2). The most common ceramic categories are pedestalled-ware, bowl, and cord-marked carinated ware (Figure V-3).

Another fine burnished ware type of flat-base and large flared-rim vessels is restricted to O Trel (Figure V-4). Most of these sherds came from surface collection in O Trel and a few came from an undisturbed burial context of Trench 7 with an associate date of 171 BCE to 46 CE. Their high quality (thin and burnished) and limit distribution to O Trel imply that these flared-rim and flat-base ceramics may have been a status symbol among these early communities. Other

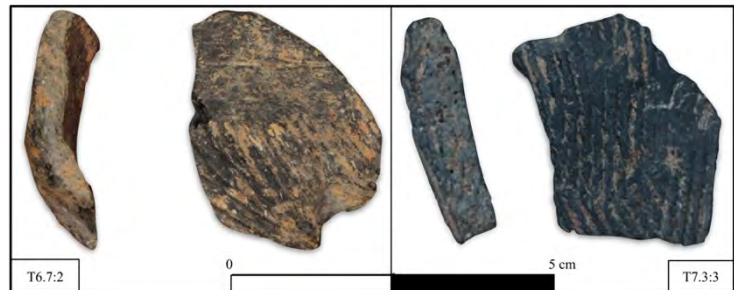


Figure V-2. Examples of the Reducedware from Thala Borivat Trench 6 and 7



Figure V-3. Common Early Historic ceramic types: 1) Pedestalled ware; 2) Carinated ware; 3) Bowl from Trench 8

⁶ There are currently two radiocarbon dates available: 2256±30 BP or c. 300BCE (O'Reilly, Domett, and Pheng 2006, 213) and 380±40 BCE (Yasuda 2013, 140, 315)

generic ceramics comprise mostly sand-tempered ceramics. Stone beads looted from O Trel, possibly belong to this phase (Figure V-5).

The most distinct characteristic of this phase is the lack of *kendi*, or spouted vessel. However, several sherds from an orange-slipped vessel, the distribution of which is limited to the Mekong Delta, were found within the looted context

of Trench 7. Similar type of fine Orangeware *kendi* with impressed comb design was reported at Phum Snay with an associate date of 80-240 CE (Yasuda and Chuch 2008). This vessel is one of the earliest evidence of contacts with the Mekong Delta (See: Fehrenbach 2009, 139; Stark 2000, 76–81, 2003b, 217).

V.1.2 TB Phase II: Transitional Period c. 300-500 CE

This period corresponds to AB-Phase III (300-600 CE) and the later phases of Phum Snay. Three AMS dates from Trench 6, Trench 9 are associated with this period. The ceramic types illustrated above continue to appear throughout the Early Historic sites. The main characteristics of this period include the appearance of the Industrial ware or Pinkware, larger site, and wealth differentiation.

Industrial Ware/Pinkware

These ceramics were crudely made with thick walls. The paste consists of moderate to high rice-chaff; although some have little to no temper. The paste texture is very similar to the Reduced Ware group, though the latter is a lot thinner. No complete example was uncovered.



Figure V-4. Flared-rimmed and Flat-based ceramics from the disturbed context of Trench 7's Layer 1 in O Trel



Figure V-5. Stone beads (and one clay bead) from O Trel in a villager's possession. Some of these were reportedly sold to tourists and similar artifacts were seen on eBay listed as from Laos (Alison Carter, pers.comm.)

Thick everted rims were the most frequent and other sherds were pieces smaller than 5 sq. cm. Those having chaff tempered paste were large porous black sherds. Most are pink on the exterior—hence, the name Pinkware—and black on the interior. They were possibly exposed to a very high



Figure V-6. Examples of the Industrial/Pinkware from Trench 6

temperature causing the exterior, and sometimes the interior, to be deoxidized while the inner paste and the interior still retain the black color. (Figure V-6)

This ware type was found in 60% of the Early Historic sites. In Trench 9 (Figure V-7: 11), Pinkware has an associated date of 251 to 398 CE. They occur in Trench 6 (Layer 3 and 4) with the associated dates of 138 to 380 CE and 355 to 538 CE (Figure V-7: 7). However, these wares likely post-date Trench 8 with an associated date of 79 to 247 CE since none was found from either the excavation unit or surface collection of Tuol Neakta Kang Memay (Figure V-7: 5). No Pinkware was found within the intact context of Trench 7 dated from 171 BCE to 46 CE. Another surface collection at O Chrang Kraham (Figure V-7: 1) located across the Mekong from Tuol Neakta comprised similar ceramics to Trench 8; yet, no Pinkware. This factor suggests that Pinkware was the intermediary ceramic type between the Early Historic and the pre-Angkorian phase. It represents the first shared ceramic type between Stung Treng and Sambor (Anlong Prang's Collection 14). Whether Sambor represents an intrusion from the north is subjected to further investigation since none of the other collections there produced comparable Early Historic ceramic sequences.

The function of this ware type is unknown. However, the crude shape, thick walls, fine-paste or rice chaff ceramics are often associated with metallurgical activities such as smelting. Pinkware appeared to cluster around the pre-Angkorian settlements near the major

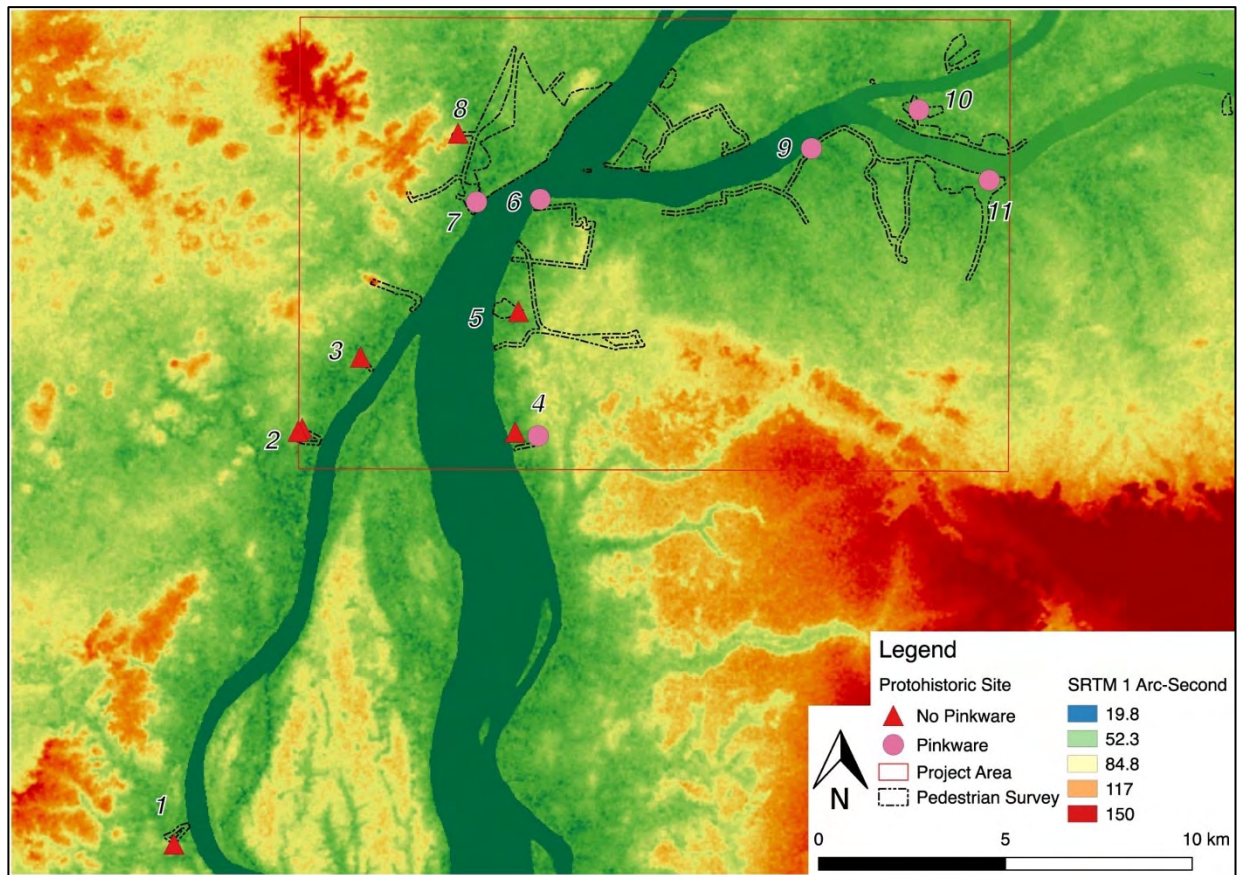


Figure V-7. Early Historic sites in Stung Treng region: 1) Chrang Kraham, 2) Tuol Meas, 3) Tuol Ansang, 4) Tuol Khtum (Kang Dei Sa), 5) Tuol Neakta (Kang Memay), 6) Ba Chong, 7) O Trel, 8) Phnom O Trel, 9) O Khlong, 10) Hang Savat, 11) Ba Doem.

confluences. Their presence suggests the earliest settlement cluster occurred c. 300 CE within the major confluences and the interaction expanded down south to Sambor.

Buffware

Buffware appeared predominantly within Trench 6/Layer 3 with an associate date of 138 to 380 CE and started in Trench 1's Layer 4 dated between 419 to 560 CE (Figure V-8). In Trench 9, a single piece in Layer 4 dated between 251 to 398 CE. These dates fall within the Angkor Borei Phase II c. 300-600 CE when Buffware emerged. Only seven sherds, belong to the same pot collected from Tuol Neakta Kang Memay, bear similarities with the Buffware



Figure V-8. Buffware rim sherds from Trench 6 Layer 3b

including buff color and fine paste. An almost completed Buffware kendi was found by villager in O Trel likely belong to this phase (Figure IV-27).

The appearance of Buffware, particularly Kendi, coincided with the terminal phase of the Early Historic sites in Cambodia (Fehrenbach 2009; Fehrenbach and Glascock 2011; Stark 2000, 2003b). For instance, they were found associated with the terminal phase of the Early Historic burials in the northwest (e.g., Phum Snay, Krasaing Thmei, Kok Treas) and Prei Khmeng in Angkor, as well as the latest sequence of Angkor Borei.

Kendi

Kendi, a spouted vessel, is perhaps the best indicator of interregional interaction in early Southeast Asia (e.g., Fehrenbach 2009; J. N. Miksic 2003; Rooney 2003; Sullivan 1957). Though its origin is unclear, Kendi appeared across Southeast Asia in the early centuries CE and was not part of the Early Historic ceramic traditions in Cambodia or northeast Thailand (e.g., Higham 2002, 2007; O’Reilly, Domett, and Pheng 2006; O’Reilly and Shewan 2016; Stark 2003b). In Angkor Borei, Kendi appeared very early during ABII (200BCE-200CE)—particularly the Fine Orangeware or Vat Kumnou Ware of which the distribution is limited to the Mekong Delta. Nevertheless, a similar ware type was found in Thala Borivat and one in Phum Snay outside of the Mekong Delta. In Stung Treng, kendi appears with the Buffware ceramic within TB phase II (300-500 CE) (Table V-1).

Location/Trench	AMS Date	Context
O Trel Surface collection	Phum Snay 80-240 CE	Sherds of Fine Orangeware were found in looted context of Trench 7. These wares occurred in Angkor Borei during AB Phase II c. 200BCE-300 CE.
O Trel Trench 6	138 to 380 CE 355 to 538 CE	Only one spout is identified within the interface between disturbed Early Historic burials and pre-Angkorian temples.
Kang Techo Trench 1	419 to 560 CE	Two kendi spouts were found within a 50cm series of Layer 4 where brick fragments were crushed and mixed with small sherds as a foundation of another brick structure.

Hang Savat Trench 10	652 to 769 CE	Multiple kendi, Buffware and sand-tempered, were collected from the surrounding three soil trenches. Three spouts were found in Trench 10.
-------------------------	---------------	--

Table V-1. Kendi Context in Thala Borivat

V.2 Stung Treng Early Historic Communities

Around ca. 200 BCE, a series of ten Early Historic settlements were located along the Mekong and the Sesan in Stung Treng. Two other settlements were unconfirmed—because they were demolished by laterite quarrying activities—but were reported to contain similar burial goods including ceramics, beads, and gold. These settlements comprise artifact clusters derived from ground disturbing activities including decades of looting, road construction, and domestic activities. The excavations of Trench 6, 7, 8, and 9 confirmed the surface results and produced a chronometrically-anchored ceramic technologies, which formed a basis for dating other Early Historic settlements in Stung Treng and Sambor (Table V-2). These settlements are proxies for the Early Historic communities located in the study area.

#	Settlement	ha	Early Historic Context
1	O Trel	4	<ul style="list-style-type: none"> - Burials heavily looted during the 1980s and recently in the 2000s due to “large quantities” of gold - Trench 6 Burial with context disturbed during the pre-Angkorian period - Grave goods include bowls, beads, and bronze - Reduced ceramic, Pinkware - Possibly relates to the burnished fine ware - Stone beads - Sandstone tool, “sword”
2	Tuol Neakta	2.1	<ul style="list-style-type: none"> - Tuol Neakta was looted during the 1980s only “small quantities” of gold were reported and the looting did not last long - Trench 8 has partly intact burial
3	Ba Doem	0.2	<ul style="list-style-type: none"> - Similar artifacts with Trench 8 - Reducedware is not clear, mixed with Pinkware - Pinkware

4	Ba Chong	0.45	<ul style="list-style-type: none"> - Collected at the surface of the erosion - Similar artifacts with Trench 8 - Pinkware
5	O Khlong	2	<ul style="list-style-type: none"> - Burials, like O Trel, were heavily looted during the 1980s due to “large quantities” of gold - Grave goods include gold jewelry, bronze (some are reported to be ring with buffalo horns appeared at Phum Snay), beads, Pinkware, Buffware
6	Hang Savat	0.11	<ul style="list-style-type: none"> - Accidental find due to a small pit dug prior to fieldwork - The size is unidentifiable, though likely restricted to a mound surface - Similar artifacts to Trench 6 and O Khlong - Pinkware
7	Tuol Khtum	0.28	<ul style="list-style-type: none"> - Same condition as Tuol Neakta, though the area appears to be very small - Pinkware
8	O Chrang Kraham	1.2	<ul style="list-style-type: none"> - No looting was reported here, hence, no mentioned of gold - Currently used as a dry rice garden where a lot of ceramics appeared on the surface - Similar type of potteries with Trench 8 and O Trel - No Pinkware
9	Tuol Meas	0.4	<ul style="list-style-type: none"> - Looting activities during the 1980s - Gold and beads were reported in small quantities - Destroyed by recent laterite quarry - A few pieces of undiagnostic earthenware
10	Tuol Ansang	0.5	<ul style="list-style-type: none"> - Looting activities during the 1980s - Gold and beads were reported in small quantities - Sandstone tool, “sword”, similar to those at O Trel
11	Phnom “O Trel”	0.3	<ul style="list-style-type: none"> - Looting activities during the 2000s - Gold and beads were reported at small quantities - Sandstone tool, “sword”, appeared at O Trel - Destroyed by recent laterite quarry

12	Sambor	0.02	<ul style="list-style-type: none"> - No looting was reported - The only site in Sambor bearing similar type of potteries as Trench 8 and O Trel - Pinkware
----	--------	------	---

Table V-2. Early Historic Sites identified within the study area; 60% of these sites contain Pinkware

Most settlements comprise burials, which attracted the chronic looting since the 1980s, located inland (across the swamp from the levee) on the laterite mounds not suitable for cultivation (Figure V-9). No Early Historic ceramics were found on the levees near these settlements; either because of low surface visibility or because there was no ceramic there. Villagers interviewed did not find any ceramics in their properties. O Trel and O Khlong, however, are located directly on the levees. Other settlements such as Ba Chong and Ba Doem also contain the Early Historic ceramics and are located on the levee. However, whether they were burials or habitations with similar ceramics is unclear since there is no evidence or reports of human bones. Two possibilities explaining this pattern: 1) people were living on the levees and buried their dead further inland, and, 2) burials were placed within the habitation areas, i.e., residential burial (Higham 2015; White and Eyre 2011; Zeitoun et al. 2012, 535–36). Higham (2015) argues that residential burials appeared during the Early Historic period and associated with ancestral worship. The current data from Stung Treng are not suitable to test either hypothesis.

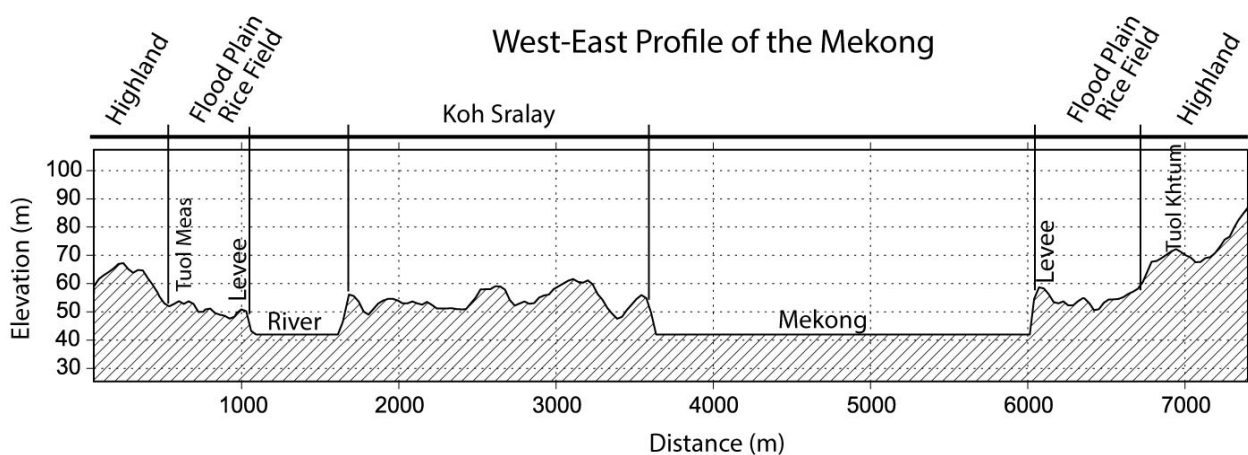


Figure V-9. West-East topographic profile of the Mekong from the Early Historic site of Tuol Meas to Tuol Khtum (elevation based on the SRTM-1arc second data)

V.3 Early Historic Economy: Production, Consumption, and Interaction

No archaeological evidence of agriculture, craft production, animal or fish bones was uncovered from the excavation. Carbonized nodules were observed within the pot contents of Trench 8; however, whether they were rice is subject to further botanical studies (Dr. Cristina Castillo had wet-screened the sample that is currently under study). Yet, proxies for rice agriculture include chaff temper added to the Reduced ware and Pinkware. The location of the Early Historic settlements also provides another indication of their livelihood. All identified Early Historic sites are located along the major rivers or at the confluence of tributaries, a productive area for rice agriculture as well as aquaculture (See Figure V-7 and Chapter VII.).

V.3.1 Ceramics and Neutron Activation Analysis

Ceramic Morphology

Earthenwares observed in this study were hand-formed using a paddle and anvil technique; however, no anvils were uncovered throughout the research area. Anvils, which are proxies for ceramic production, are often found in many sites in Cambodia such as Angkor Borei, Phnom Borei, Prohear, and Phum Snay. Morphological observation suggests that the Stung Treng's ceramics share similar characteristics with other sites in Cambodia and northeast Thailand. For example, the Reduced Ware horizon was shared among the Thala Borivat and other Early Historic sites (see Fehrenbach 2009; Fehrenbach and Glascock 2011). Pedestaled wares, bowls, and cord-marked carinated ware are generally quite common during the Early Historic period Cambodia and northeast Thailand. Yet, varying shapes and designs may indicate regional variations and local productions. Fine Orange Ware and cord-marked carinated ware are common in Angkor Borei ceramic traditions.

These ceramic characteristics suggest that there were interactions between the early communities in Stung Treng and other regions beginning during the Early Historic period. The shared ceramic traditions including carinated ware, bowls, and Pinkware in sites located along the major river systems in Stung Treng and 50km downstream in Sambor suggests a regional system of which the Mekong was the main communication route. By 500 CE, the ceramics assemblage continued to be dominated by sand-tempered and Buffware ceramics, some of which were red-painted (see next Chapter VI).

INAA Results

KPX funded an INAA analysis of thirty earthenware sherds (280g) from the excavated contexts were selected (Appendix H). These samples were selected to meet criteria comparable with Shawn Fehrenbach’s research on the pre-Angkorian ceramics (Fehrenbach 2009; Fehrenbach and Glascock 2011) and to address questions summarized in the Table V-3 below:

Category	Question	Sample	KPX#
Flared-rim vessel	Does this ware group form a separate cluster? Or, Is it a variation of other Early Historic wares like the Thala Borivat carinated ware and pedestalled ware?	1. T7.8:1.8eb #1 body 2. T7.6:1.bfb #1 body	1. 1315 2. 1314
Reduced ware	Do they form a separate cluster from other ceramic groups? Or, were they imported?	1. T6.7:2.10 #1 body 2. T7.3:3.10 #1 body	1. 1305 2. 1312
Fine Orangeware	Was it an import from Angkor Borei?	1. T7.3:3.11 #1 body	1. 1313
Buffware	Do they form a different distribution patterns compared to Fehrenbach’s data?	1. T1.12:1.12 body 2. T2.10:1.12 body 3. T6.8:1.12 body 4. T9.7.12 body 5. T10.2.12 body 6. Col. 042 O Khlong body	1. 1301 2. 1303 3. 1307 4. 1327 5. 1329 6. 1300
Carinated ware	Is this ware group similar to Fehrenbach’s outlier Class X from Angkor Borei?	1. T6.9:4.8g rim 2. T6.9:4.8da shoulder–de 3. T8 pot #1 body 4. T8 pot #3 body 5. T9.4.8db rim 6. T9.5.98 shoulder	1. 1309 2. 1310 3. 1317 4. 1320 5. 1325 6. 1326
Bowl	Do they have similar signature to other categories?	1. T6.7:2.8db rim 2. T8 pot #2 body 3. T8 pot #3 body	1. 1306 2. 1318 3. 1321

		4. T9.4.8eb body	4. 1324
Pinkware	Do they have similar signature to other categories?	1. T6.8:2.8b rim 2. T7.8:1.8b rim 3. T9.5.8b rim	1. 1308 2. 1315 3. 1323
Sand-tempered ware (Kendi)	Is there a compositional difference between Buffware and sand-tempered through time?	1. T1.13:1.8d body 2. T6.9:4.8e spout 3. T10.1.8eb spout	1. 1302 2. 1311 3. 1328
Pedestaled ware	Do they have similar geochemical signature to other categories?	1. T6.5:1.8da join 2. T8 pot#2 body 3. T9.3.8eb join	1. 1304 2. 1319 3. 1322

Table V-3. Thala Borivat earthenware INAA samples and their questions

Contrasted with the ceramic morphological characteristics, the INAA results from this small sample size suggest that the Thala Borivat samples are compositionally diverse compared to data from Angkor Borei, Cheung Ek, Phum Snay, Prohear, and Village 10.8 (Table V-4). The Angkor Borei samples (n:95) cluster around two compositional groups (1 and 4). The Cheung Ek samples (n:67) bunch into two separate groups (2 and 5); and the Phum Snay samples (16) are clustered within Group 3 (Figure V-10).

Most Thala Borivat ceramics subjected to this analysis belong to TB Phase 1 and TB Phase 2; the results are summarized in the Table V-5 below. Two-third of the Thala Borivat samples are compositionally related to the Angkor Borei and Cheung Ek samples (Figure V-11). Despite the variations, three patterns emerged:

Site	N	1 (red circles)	2 (Crosses)	3 (Blue diamonds)	4 (Brown crosses)	5 (Triangles)
Angkor Borei	95	56	2	1	36	0
Cheung Ek	67	5	22	0	0	40
Phum Snay	16	2	1	10	1	2
Prohear	7	3	0	4	0	0
Thala	21	5	6	1	2	7
Village 10.8	7	4	0	0	1	2
	Σ 213	75	31	16	40	51

Table V-4. Major INAA compositional groups of the pre-Angkorian earthenware from Angkor Borei, Prohear, Cheung Ek, Village 10.8, Phum Snay, and Thala Borivat (excluding outliers)

1) The pedestaled ware and bowl of TB Phase 1 (BCE 200-CE300) and TB Phase 2 (300-500 CE) are clustered within Cheung Ek group 5. Both ware groups occurred together with Cord-marked carinated ware. The latter, however, is compositionally more diverse. Since none of these ware types have been found from Cheung Ek, their association remains ambiguous.

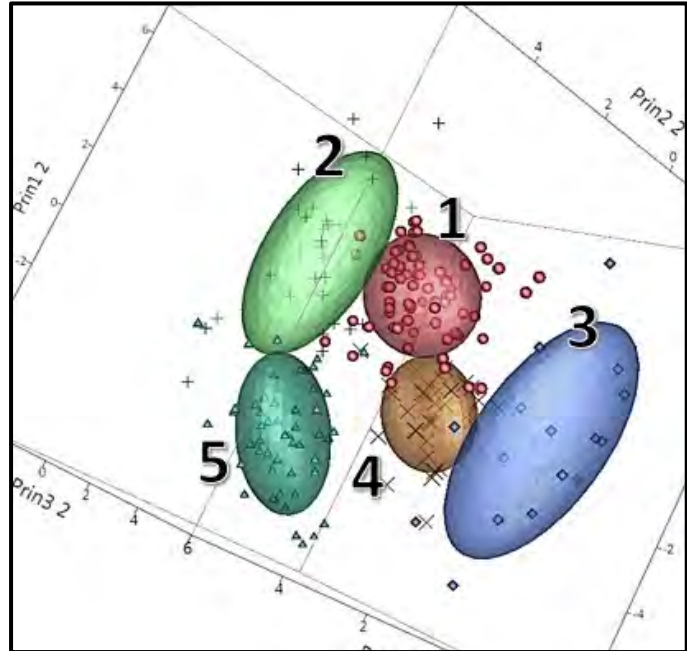


Figure V-10. INAA compositional groups of the pre-Angkorian earthenware from Angkor Borei, Prohear, Cheung Ek, Village 10.8, Phum Snay, and Thala Borivat (n=213; excluding outliers)

2) The Fine Orangeware compositional data fit with the Angkor Borei samples (4), which implies that it was imported from the delta. This ceramic has an associated date of 160±85 CE at Phum Snay and occurred in the large Early Historic site at O Trel.

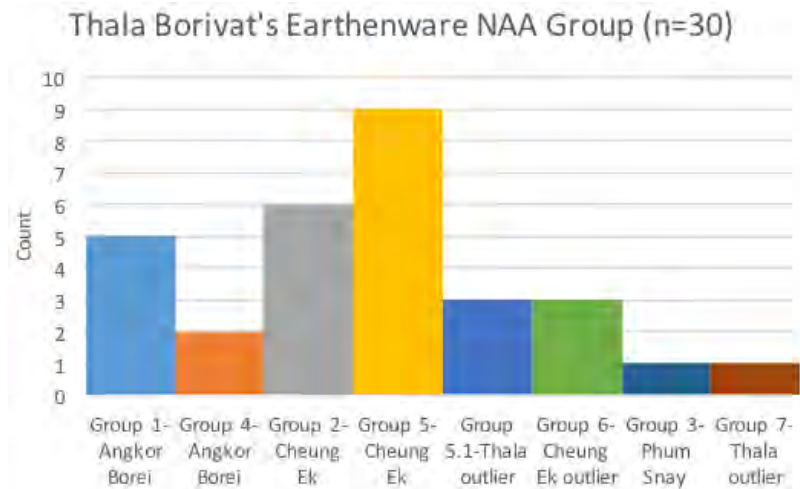


Figure V-11. INAA compositional groups of the Thala Borivat earthenware (n=30) by regions

Ware Type	Sample	KPX#	Compositional Group
Flat-based ware	1. T7.8:1.8eb #1 body	1315	2
	2. T7.6:1.bfb #1 body	1314	7 (outlier)
Reduced ware	1. T6.7:2.10 #1 body	1305	4
	2. T7.3:3.10 #1 body	1312	3
Pedestaled ware	1. T6.5:1.8da join	1304	5

	2. T8 pot#2 body	1319	5
	3. T9.3.8eb join	1322	5
Bowl	1. T6.7:2.8db rim	1306	5
	2. T8 pot #2 body	1318	5
	3. T8 pot #3 body	1321	5
	4. T9.4.8eb body	1324	5
Cord-marked carinated ware	1. T6.9:4.8g rim	1309	5
	2. T6.9:4.8da shoulder	1310	5.1 (outlier)
	3. T8 pot #1 body	1317	2
	4. T8 pot #3 body	1320	6 (outlier)
	5. T9.4.8db rim	1325	2
	6. T9.5.98 shoulder	1326	5.1 (outlier)
Fine Orangeware	1. T7.3:3.11 #1 body	1313	4
Industrial Ware/Pinkware	1. T6.8:2.8b rim	1308	1
	2. T7.8:1.8b rim	1315	2
	3. T9.5.8b rim	1323	2
Buffware	1. T1.12:1.12 body	1301	2
	2. T2.10:1.12 body	1303	2
	3. T6.8:1.12 body	1307	1
	4. T9.7.12 body	1327	1
	5. T10.2.12 body	1329	1
	6. Col. 042 O Khlong body	1300	1
Sand-tempered Kendi	1. T1.13:1.8d body	1302	6 (outlier)
	2. T6.9:4.8e spout	1311	6 (outlier)
	3. T10.1.8eb spout	1328	5

Table V-5. NAA compositional groups for each Thala Borivat's ceramic type

3) Buffwares from TB Phase 2 (c. 500 CE) are compositionally related to Angkor Borei and Cheung Ek. If this pattern represents imports from the Delta, it would represent continuing interactions between Stung Treng and the Delta toward the formation of the pre-Angkorian polity (500-800 CE). The distribution of Buffware is quite common across Southeast Asian early polities between 300-600 CE. This pattern of ceramic distributions suggests that Cambodia's upper Mekong was incorporated into the regional system by at least 500 CE.

4) Sand-tempered kendis of TB Phase 3 (600-800 CE) group together as outliers. These sand-tempered samples were selected from Trench 1 dated between 355 to 538 CE and Trench

10 dated between 652 to 769 CE. This ware type was compositionally an outlier through the period of 200 years.

V.3.2 Beads: IA-CP-MS Analysis

Evidence of the Early Historic interactions can be inferred from beads. A total of 57 beads (complete and fragments) was retrieved from both surface collections (13 beads) and two excavation trenches 6 and 8 (44 beads). Many others were from recorded looters in O Trel. The most prominent colors range from dark blue, to light blue-turquoise, green, red, yellow, and white (Figure V-12). Fourteen beads from excavated contexts and nine from surface collection were selected for the IA-CP-MS analysis by Dr. Alison Carter (see appendix I).

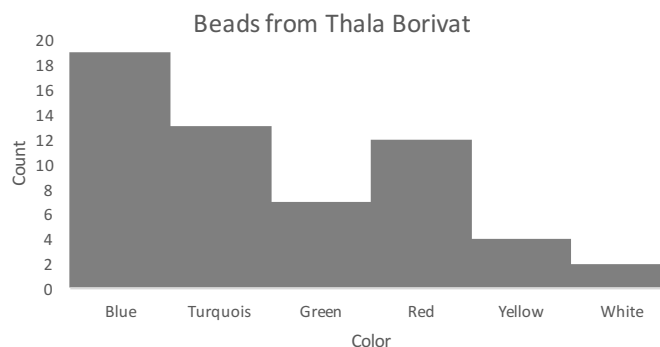


Figure V-12. Thala Borivat beads of different colors

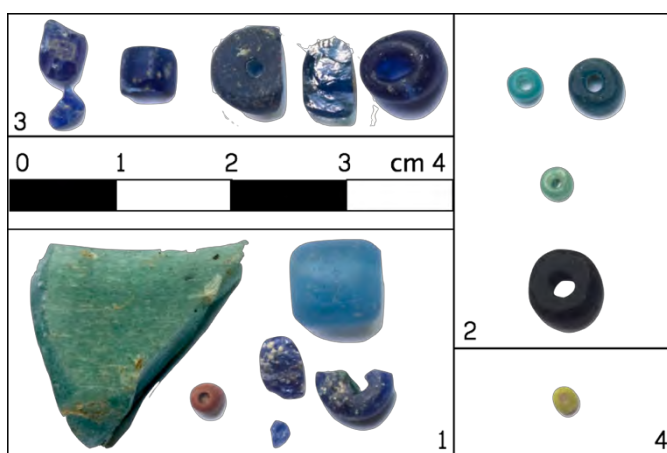


Figure V-13. Compositional groups of the Thala Borivat beads

Beads appeared in the period between 200 BCE and 500 CE due to connection with maritime trade networks (e.g., Bellina 2016; Bellina and Glover 2004, 2009; Carter 2010, 2015; Higham 2002). The IA-CP-MS analysis of these beads suggests that they belong to four compositional groups, i.e., Potash glass (m-K-Ca-Al), High-alumina mineral soda glass (m-Na-Al), Mineral soda glass (m-Na-Ca-Al), and Lead glass (Carter 2010, 2013, 2015) (Figure V-13). Each group belongs to two known trade networks, i.e., South Asia and South China Sea. The results are summarized in Table V-6 (see the original report in Appendix I).

G**	Date	Origins	T*	E*	Provenience	Related sites	Network
1	5 th -1 st BCE & 2 nd -4 th CE	South China-North Vietnam	4	4	O Trel (Trench 6 & 7), Kang Memay	Angkor Borei, Phnom Borei, Prohear, Bit	South China Sea

					(Trench 8), Sambor	Meas, Village 10.8, and Phum Snay	
2	4 th BCE – 10 th CE	South Asia	4	20	O Trel (Trench 6)	Phum Snay, Phum Sophy, Phum Lovea, Prei Khmeng, Phnom Borei, Angkor Borei	Indian Ocean
3	3 rd /2 nd BCE – 4 th CE	Arikamedu	4	4	O Trel (Trench 6)	Angkor Borei, Prohear	Indian Ocean
4		China or other regions	1	1		Angkor Borei, Ban Non Wat	Unknown
5	4 th BCE – 10 th CE	South Asia/China		10			Indian ocean and South China Sea
<p>*#T: number of tested beads, #E: number of estimated beads</p> <p>**Group 1: Potash glass (m-K-Ca-Al) and subtype m-Ka-Al; 2: High-alumina mineral soda glass (m-Na-Al); 3: Mineral soda glass (m-Na-Ca-Al); 4: Lead glass; 5: Red opaque beads (could be m-Na-Al Type 1 or potash)</p>							

Table V-6. IACPMS results of beads from Thala Borivat

The IA-CP-MS analysis on the chronometrically-anchored beads from the excavated contexts dated between 79 to 538 CE suggests that the Cambodia’s upper Mekong became part of the regional trade networks of both the South China Sea and the Indian Ocean.

V.3.3 Craft Production and Consumption

Evidence relating to metallurgies in the Early Historic period Thala Borivat is limited. Nonetheless, two small pieces of thin bronze artifacts, possibly ornaments, were uncovered from Trench 6/Layer 3 with mixed debris of burials and brick fragments dated between 355 and 538 CE. A small bronze bell was uncovered from O Khlong with a burial context (Figure V-14). The bell has groove patterns similar to those found at Phum Snay (Yasuda 2013, 100 Figure 4.7).

Looters reported finding bronze artifacts fashioned into buffalo horn, which were also found in Phum Snay and Prohear. The appearance of Buffware and Pinkware represents the terminal occupation sequence at O Khlong, which places it in TB Phase II. No well-preserved metal object was found other than these bronze objects.

Some excavated units contain slags, small brick rubbles with grooves, and Pinkware, which may associate with metal craft activities. Slags appeared to be primarily iron; however, some bear bluish-green oxidized copper on the surface (Figure V-15).

Unconfirmed copper ingots were reported by looters at Phum O Trel. In Trench 1, slags appeared from Layer 4 dated between 419 and 560 CE and Layer 1 (6th-17th centuries CE). While in Trench 6,

they appear mostly in Layer 3 and 4 dated between 355 and 538 CE together with Pinkware and brick rubble, which may have been parts of crucibles, molds, or furnace structures. Many of these rubble in Trench 6 and Trench 7 bear straight grooves, which were hay or plant impressions added for strength (Figure V-16).



Figure V-14. 1) Bronze artifact from O Trel Trench 6/Layer 3, 2) Bronze bell from O Khlong, 3) Bronze Bell from Phum Snay



Figure V-15. Slags from Trench 6 were found with Pinkware sherds (Note: pink burned clay on these slags suggest that they were molten and poured on a clay or soil surface)

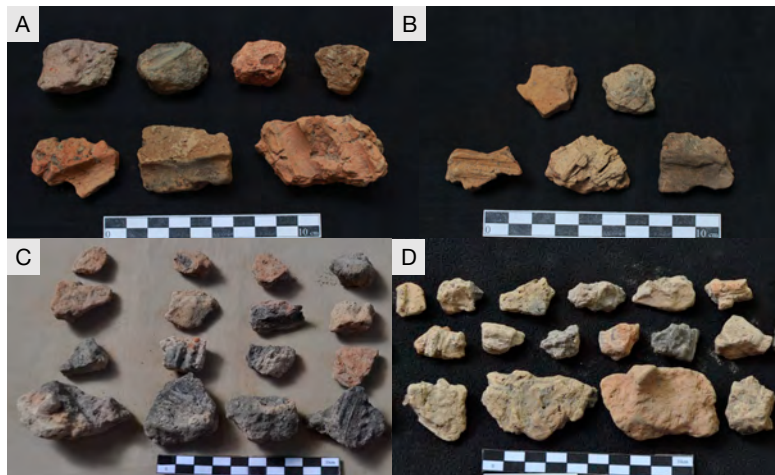


Figure V-16. Brick rubble: A&B) Trench 7 Layer 1; C&D) Trench 6 Layer 3b

The artifacts from the disturbed Layer 1 and 2 of Trench 7 from O Trel suggest a close relationship between the amount of brick rubble and slag (Figure V-17). This area was heavily looted, and the landowner recently leveled the surface by bulldozer, burying looted pits and presumably spreading the looted debris across the property. The artifacts from Layer 1 and 2 then represent a subset of the artifacts within the looted area. This association, however, is not clear for the artifacts of Trench 6 (Figure V-18). What can be inferred from this trench is that Trench 6's Layer 3a and 3b represent the peak of intense activities where artifacts from every category, including slags, brick rubbles, and Pinkware outnumber other layers (Table V-7).

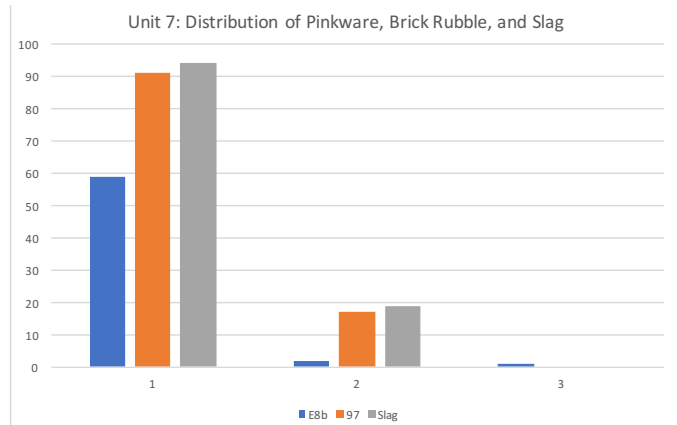


Figure V-17. Distribution of Pinkware, Brick rubble, and Slag in Trench 7

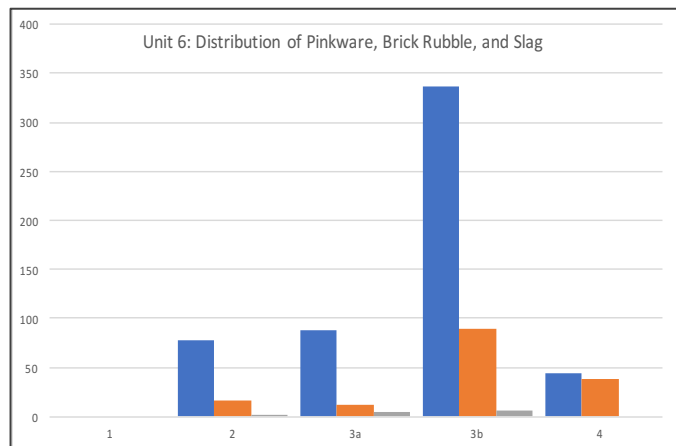


Figure V-18. Artifact distribution in Trench 6

The Industrial ware/Pinkware only occurred mostly in layer 3-4 and appeared as small rubble in layer 2. Slag also occurred in Layer 2 and 3 of Trench 7 dated between 171 BCE and 46 CE together with Pinkware. The slag association with the AMS date of Trench 7 is uncertain because of the mixed soil matrix between an Early Historic burial and the later phase. Pinkwares from Trench 9 have an associated date of between 251 and 398CE; while in Trench 6 they occurred in a context dated between 138 and 380 CE and between 355 and 538 CE. Coincidentally, Pinkware sherds from Sambor Collection 14 were also found with a piece of slag, a blue potash glass bead (dated between the 2nd and 4th centuries CE), and Buffware ceramic (c. 500 CE).

By 500 CE, Pinkware and grooved-brick rubble were not found in Trench 1; in fact, no Pinkware was found east of O Trel. But slag bearing ‘fluid’ patterns commonly associated with primary production involving smelting continued to be present in the upper strata of the Angkor period (Layer 2 to 4) [Figure V-19]. Unit1/Layer 4 yields 70g of slag dated between 419 and 560 CE. Small iron pieces were found with 904g of slag, KBG, KGG, and Chinese tradewares in Layer 2 dated between the 12th-14th centuries CE.

Due to the small sample size, the current evidence is insufficient to infer the type of metal production in Thala Borivat. Nevertheless, the amount of the three artifacts, slag, grooved brick fragments, and Pinkware, reported above suggest that they are unlikely to occur by chance. Rather their morphology and limit concentration are proxies to metal crafting activities possibly related to a secondary production process (forging and smithing) during the Early Historic period (Mitch Hendrickson, Martin Polkinghorne, and Stéphanie Leroy pers.comm. 2017). Slags associated with the primary production process (smelting), which may or may not have been in situ, occurred during the Angkorian and post-Angkorian periods. These activities were at peak between 300 and 500 CE, well within the transitional period TB Phase II and coincided with other evidence of regional interactions discussed in the previous sections.

Type	L1	L2	L3a	L3b	L4	Total	%
E8a	0	0	0	17	0	17	1
E8b	0	78	88	337	45	548	30
E8c	0	0	0	5	0	5	0
E8sand	1	116	141	708	130	1096	60
E8g	0	14	7	35	33	89	5
E8h	0	1	0	2	2	5	0
E9	0	0	0	10	0	10	1
E10	0	0	0	2	0	2	0
E11	0	0	0	0	0	0	0
E12	0	0	2	45	0	47	3
E13	0	0	0	7	0	7	0
Un-ID	0	0	0	0	0	0	0
Modern	1	0	0	0	0	1	0
Total	2	209	238	1168	210	1827	100

Table V-7. Distribution of Pinkware relative to other earthenware in Trench 6 per layer.

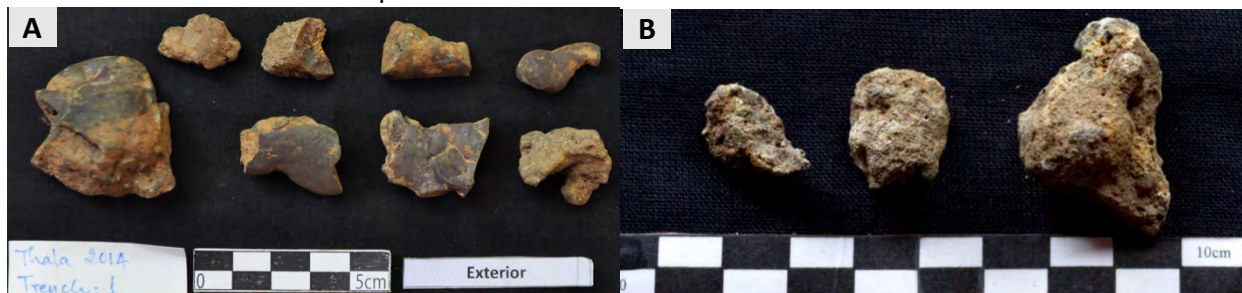


Figure V-19. A) ‘Fluid’ slags from Trench 1/Layer 2 mixed with KGG, KBG, and tradewares from Yuan-Song and a Vietnamese ‘Chocolate Base-ware’ dated between the 12th and 15th centuries CE; B) Slags from Trench 1/Layer 4C with an AMS date of 419 to 560 CE

Most slags came from the excavated trenches of O Trel (4341g from Trench 6 and 7 compared to 981.1g from Trench 1), which suggest its limited distribution to the largest site. However, inference to a hierarchical differentiation based on craft production between the early communities of Stung Treng is insufficient based on the current dataset.

V.4 Emergence of Sociopolitical Complexity

The data on the Early Historic period Stung Treng is sparse. However, the spatial distribution of the Early Historic burials, their grave goods (e.g., different types of ceramics and beads), and the different looting intensities between sites share common characteristics with other Early Historic burials in the northwest, east, and southern Cambodia. A series of observations and implications in the following paragraphs is made based on these shared characteristics.

Only four excavation trenches in Stung Treng offer direct evidence of the Early Historic period. Other data came from surface collection, which resulted from lootings, road constructions, and farming. The pedestrian survey employed by this project did not homogeneously cover the whole region due to greater distance between sites as well as low surface visibilities. Yet, the looting for gold and other burial goods, during the 1980s and into 2014, provide an extra factor strengthening the observation of site distribution. Given a three-decade period of searching and looting, the possibility that other Early Historic sites are yet to be discovered and looted is very low.

The extent of looting, road construction, and surface collection within the Early Historic sites provide a rough estimate of site size ranging from 0.1 ha to 4 ha. The most heavily looted sites are the largest (O Trel: c. 4 ha, O Khlong: c. 1-2 ha) and were reported to contain more gold and bronze artefacts and beads than the smaller sites, hence attracted more looters. The artifact density from both surface collection and excavation support this claim: **1)** The number of earthenware sherds from the surface collection units located in O Khlong and O Trel are higher than other areas (Figure V-21: A); **2)** The number of Pinkware sherds from these surface collections is also higher than other areas (Figure V-21: B); **3)** The number of both earthenware and Pinkware sherds excavated from Trench 6 and Trench 7 located in O Trel outnumbers those from other units with the Early Historic components (Figure V-21: C-D); **4)** More beads were

found in Trench 6 and Collection 47 located in O Trel followed by Collection 41 located in O Khlong and Trench 8 of Tuol Neakta Kang Memay (Figure V-21: E).

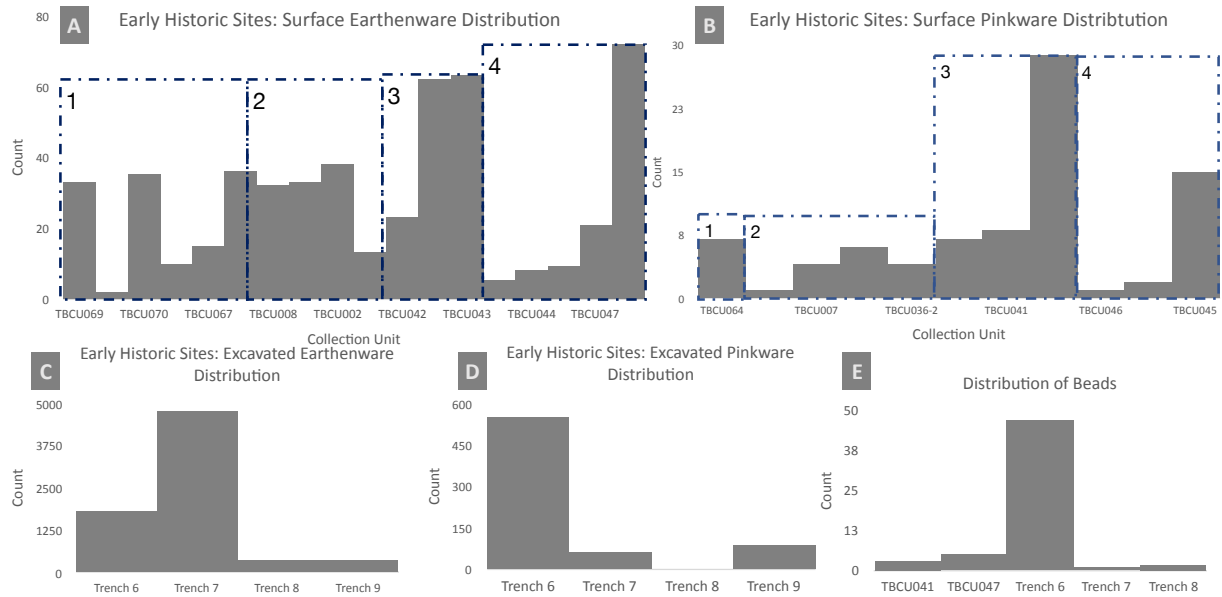


Figure V-21. Surface earthenware distribution among the Early Historic sites. 1) Sites located south of Thala Borivat; 2) Sites located around Ba Doem; 3) O Khlong; 4) O Trel

Other artifact variabilities were observed between these settlements, these include: **1)** A type of polished sandstone tools, referred to as a “sword” by looters because of their double edges, were only found at O Trel and Tuol Ansang, and reported at another destroyed mound near O Trel (Figure V-20). They were found in broken pieces and reported to be associated with burials. Smaller pieces appeared in the burial context of Trench 6’s Layer 3 and 4 dated between 138 and 538 CE. **2)** Agate and carnelian beads—which appear in the Early Historic contexts (e.g., Carter 2015; Ian Glover and Bellina 2003)—were looted from O Trel (Figure IV-12) and also reported from O Khlong (unconfirmed).



Figure V-20. Sandstone object, "sword", from O Trel reportedly found with burials.

O Trel possesses all the major characteristics that set it apart from other Early Historic settlements. These include: all ware types plus the flat-based ceramics, diverse types of beads, stone “swords”, slags (126 pieces, 4.34kg), Fine Orangeware (from the Delta), burials, the

largest settlement, and reports of large quantities of gold. It also comprises the most diverse types of beads as evident by the excavation and villager's collections. These characteristics suggest an unequal distribution of wealth among these Early Historic communities. O Trel represented the first-tier, multicomponent, and multifunctional settlement and is the best candidate for a central place. O Khlong shares many of these characteristics; however, its smaller size suggests that it was a secondary center.

Pinkware only appeared at 60% of the Early Historic settlements and most abundant in large settlements of O Trel and O Khlong, both of which are located at the major confluences (Figure V-7). This factor suggests that the settlement nucleation occurred between 300 and 500 CE when O Trel and O Khlong became the largest settlements, possibly, at the expense of other communities where Pinkware and Buffware were absent. Smaller settlements were likely incorporated into these two larger settlements. The settlement nucleation and expansion of this period coincided with the large number of beads found and reported in both O Trel and O Khlong. The IA-CP-MS results imply increased involvements with the South China Sea and Indian Ocean trade networks. The INAA results, although inconclusive, suggest diverse ceramic production centers, which imply the possibilities of inter- and intra-community interactions occurring since 300 CE.

The current dataset cannot reconstruct hierarchical differentiation at the individual level. However, parallel trends was observed at other Southeast Asian Early Historic sites, where increased access to trade goods resulted in an unequal access to wealth (e.g., Higham 2002, 222–27, 2007, 606–8). Wealthy and powerful individuals expressed their status through rich burials goods such as beads, fine and/or imported ceramics, bronze, and gold jewelries. During the Early Historic period, wealth, status, and power were vested in the individuals.

V.5 Summary

An area where the Early Historic surface artifacts were found represents an Early Historic community in Stung Treng. These surface artifact areas comprise of 7.6 ha area or 11.9% of the total occupied area (see discussion in Chapter VI.3.1). The excavation Trenches 6, 7, 8, and 9 provide time depth and possible functions for these early communities. The results can be summarized below:

Communities: Settlement Patterns

The first clear evidence of the Early Historic communities in Stung Treng appeared during TB1 (200 BCE-300 CE) and TB2 (300-500 CE). These communities were located along the Mekong and Sesan and shared the same ceramic traditions. The ceramic technologies were diverse and composed mainly of sand-tempered ceramics as well as some Reduced ware ceramics and a few sherds of the Fine Orangeware vessel. The common ceramic forms comprise bowls, pedestalled-ware, cordmarked carinated ware, and the Industrial/Pinkware. The latter appeared during c. 300 CE and in sites clustering near the major confluences of the Mekong-Sekong and Sekong-Sesan. Its appearance in Sambor represents the earliest evidence of interactions between the Early Historic communities of Thala Borivat and Sambor, likely through the Mekong.

Buffware appeared later in this region c. 500 CE and marked the terminal phase of many Early Historic settlements. Its appearance coincided with the introduction of religious brick architecture, which first appeared in the largest settlement of O Trel and smaller settlements of Ba Doem and Ba Chong where brick structures sit atop the Pinkware strata. Absence of Buffware, kendi, and brick temples in some Early Historic settlements suggests that by 500 CE, c. 50% of these communities were abandoned. Yet, the majority of settlements where Pinkware was found continued to be occupied during the later period (discussed in Chapter VI.3.1).

Early Historic Economy

The locations of these Early Historic communities along the major rivers suggest that they were dependence on river resources such as the fertile flood plains and fisheries. Rice chaff temper included in some ceramic provides clue to rice agriculture. Slags occurred during TB Phase 2 (300-500 CE) and were found with Pinkware. This context suggests that the Stung Treng Early Historic communities were involved with a secondary metallurgy production such as forging or smithing. Looters reported copper ingots and gold associated with the burial contexts. These mineral resources are currently being exploited within 100 km radius from Thala Borivat (see Chapter VII.2.3).

The INAA analysis of 30 earthenware ceramics from this period suggest that there were multiple production centers and two-third of them share a similar geochemical signature to

ceramics from Cheung Ek. The results are inconclusive due to a small sample size and/or the sample selection criteria. Nonetheless, the INAA analysis of sherd, morphologically belonging to the Fine Orangeware or Vat Kumnou tradition found in the looted burial context at O Trel, indicates that it shares a chemical fingerprint with the Angkor Borei compositional group 4. Fine Orangeware represents the earliest ceramics imported from the Mekong Delta.

Various types of beads associated with two known maritime trade networks, the Indian Ocean and South China Sea, and other unknown networks were found in most Early Historic burials. The IACPMS analysis of 15 beads indicates that they share geochemical compositions with other settlements including those located in the Delta (Angkor Borei, Phnom Borei, and Bit Meas), eastern Cambodia's Terre Rouge (Village 10.8); northwestern Cambodia's settlements (Prei Khmeng, Phum Lovea, Phum Snay, and Phum Sophy), and northeast Thailand (Ban Non Wat). Agate and carnelian beads often associated with Southeast Asian Early Historic settlements were found in the looted contexts at O Trel.

This evidence suggests that the Early Historic communities in Stung Treng participated in a regional trade network that moved beads and ceramics. The spread of Pinkware 50km downstream to Sambor was possibly the result of this network.

Organizational Change: Social Stratification

The Early Historic communities were located along the major river system in Stung Treng. The settlement patterns data suggest that during TB Phase 2 (300-500 CE), the communities having Pinkware was found nucleated around two major settlements of O Trel and O Khlong. The appearance of Pinkware 50km downstream at Sambor suggests long-distant interactions or a regional system shared by these communities. This settlement nucleation suggests an organizational change corresponding possibly to economic and demographic centralization propelled by an intensification of the Early Historic regional trade network.

The current data do not allow analysis at an individual level where social stratification can be inferred. However, at a community level, the data suggest that around c. 300 CE, there was differential access to prestige goods associated with burials including gold and other metals, and trade items such as beads and imported ceramics from the Delta. The objects reported by looters concentrate in larger settlements such as O Trel (c. 4ha) and O Khlong (c. 2

ha), both of which are located on the levees. The excavated units (6 and 7) at O Trel, Trench 8 at Tuol Neakta Kang Memay, and Trench 9 at Ba Doem confirmed these reports. The large size and rich diversity of artifacts (e.g., different types of fine ceramics and beads) uncovered from O Trel suggests that it was the likely contender for a central place among the Early Historic communities.

The elites of these communities were benefiting from the regional trade network, which intensified during TB Phase 2. A parallel trajectory has been recorded within the Early Historic communities in the Delta, northwest Cambodia, and northeast Thailand. Excavations at these settlements, particularly burial sites, indicated that sociopolitical complexity emerged during BCE 300- CE 400. This pattern suggests that status and wealth was vested in individuals and their families. Whether these characteristics correspond to an early emergence of state in Stung Treng is unclear. The contemporaneous period of Angkor Borei Phase II (200 BCE-300 CE) saw the Mekong Delta hosts a regional system that linked settlements from Angkor Borei to Oc-Eo, which is associated with the Funan polity of the Chinese records.

The next Chapter VI synthesizes both excavation and survey data to study change and continuity from the Early Historic to pre-Angkorian communities.

Chapter VI. Interpretation: Pre-Angkorian Communities c. 500-800 CE

This chapter reconstructs the pre-Angkorian communities of Stung Treng and Kracheh based on settlement patterns, dated artifacts, and temples. A general perspective on the pre-Angkorian economy of this region is extrapolated from a combination of datasets, including settlement patterns, ceramics, architectural styles, inscriptions, and other artifacts uncovered from both excavation and surface collection.

TB Phase 3 (500-800 CE) corresponds to Angkor Borei Phase 4 and the historical pre-Angkorian period c. 600-800 CE when accounts of early kings appeared in the local inscriptions. In Stung Treng and Sambor, this period is characterized by a rapid settlement expansion within the 6th century CE. In Stung Treng, this settlement growth coincided with discontinuity in some Early Historic settlements where 70% contain no evidence of either a brick structure or the ceramics of the pre-Angkorian period. The pre-Angkorian settlements expanded mostly into the previous unoccupied areas rather than spatially fusing multiple Early Historic communities due to their distance. Local inscriptions, both Khmer and Sanskrit, became more common throughout the seventh century. The earliest inscriptions of this region belong to Bhavavarman I's families dated between c. 550-600 CE.

The following sections begin with the reconstruction of pre-Angkorian communities in Stung Treng based on multiple datasets including mapping, surface collection, and excavation. The settlement template is then compared to data from Sambor and Sambok, which were based primarily on surface collection.

VI.1 Data Sources and Interpretation

Contrary to the Early Historic period where items such as beads, fine ceramics, and metal objects yield insights into the socioeconomic patterns at both individual and community levels, the pre-Angkorian period lacks such data sources due to lack of coverage. Evidence of this period is associated with corporate religious activities. Data acquired through this research suggest that both temples and habitations shared the same ceramic types including Buffware, kendi, and sand-tempered wares. Furthermore, the settlement configuration comprises both civic and ceremonial features (i.e., mound, temple, and trapeang), which also blurs the distinction between ceremonial and residential areas. The epigraphic data available after 550

CE are used to provide insights into both the sociopolitical and economic settings of the study area.

Spatial distribution of temple, surface collection, and trapeang recorded during the 3-phase fieldwork serves as the basis of community reconstruction. The data recovery method has potential effects on the results of sites being located and several caveats should be made. Due to low surface visibility, the pedestrian surveys were not homogenous across this region (see Chapter III.3.3). However, other factors strengthen the observation of the pre-Angkorian site distribution. These include: 1) Trapeang, particularly those with embankments, are the main characteristic of the pre-Angkorian and Angkorian settlements (See Chapter II.4.1). High resolution SNES satellite images provided by Google Earth (and cross-checked through different recorded dates) indicate that the trapeang are predominantly located near sites identified by these projects. 2) The local brick recycling habits were reported since the end of the 19th century. Bricks were dismantled from temples in Thala Borivat and Ba Doem for new domestic or public constructions (e.g., house platform, well, toilet, pagoda). Prasat O Pongro located 3km inland from Ba Doem was also targeted. 3) People in this region also farm dry rice and carry out logging deep inland. Villagers from Thala Borivat, Kamphon (along the Sesan), and Siem Pang (Sekong) reported of their fields located near small tributaries between 3 and 10 km inland, which can be confirmed through satellite images. During the dry season, draft animals are allowed to roam freely in the highlands and recaptured before the start of the rainy season. This roaming behavior suggest that the visibilities of brick features located in the highland reported by the locals are quite accurate. The chance that a temple located further inland has not being reported is extremely low. 4) Road construction involving the excavation of soil trenches and ditches occurred independently of the research design. Yet, these construction projects took place mainly within the areas covered by the three previous factors. It thus strengthens the data recovery procedure.

Small settlements could exist in the highland without either a trapeang or brick structure (for examples, those recorded in K.1257 from Ba Doem). However, these settlements would only constitute a very small proportion of sites identified within the lowland and would minimally affect the results of this interpretation, particularly on site hierarchy.

VI.2 Chronological Indices

The pre-Angkorian contexts are characterized by surface ceramics, brick features, and trapeang, some of which are chronometrically dated (Figure VI-1). Other relative dates are obtained from ceramic chronology (particularly through comparison with that of Angkor Borei), artistic styles, and inscriptions.

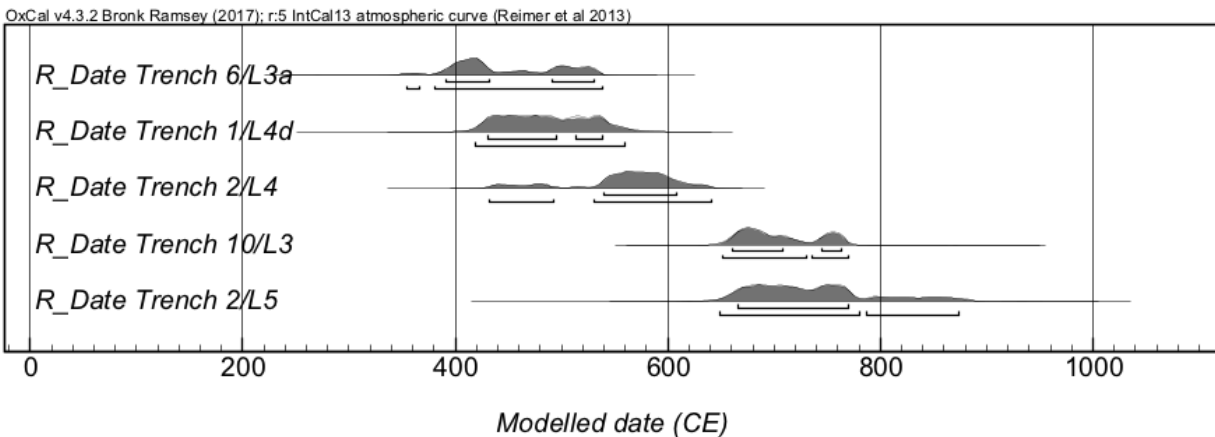


Figure VI-1. AMS dates associate with the pre-Angkorian period

VI.2.1 Ceramics

Stung Treng Ceramics

By c. 500 CE, the ceramic assemblage in Stung Treng is dominated by various types of sand-tempered ware, Buffware, and Red-painted ware (Figure VI-2). Bowl, pedestalled ware, flared-rim vessel, flat-based vessels, and

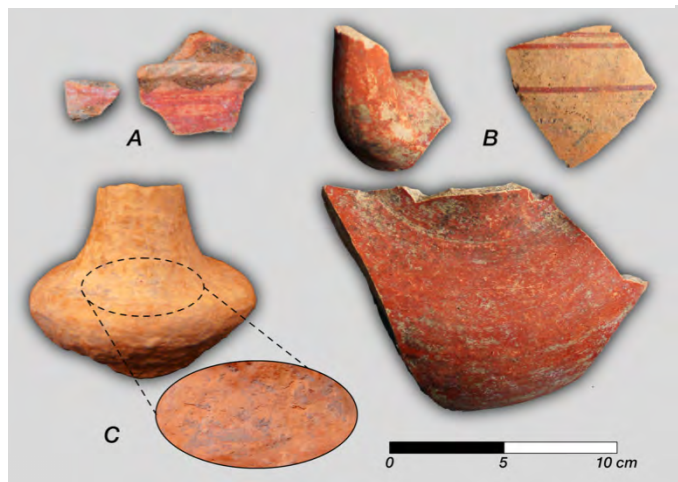


Figure VI-2. Pre-Angkorian Red-painted ware: A) Trench 3; B) Sambor Prei Kuk (B.P. Groslier collection, NMC); C) Hang Savat Collection 032-Buffware with red paint remains on the surface.

cordmarked carinated ware of the Early Historic period disappeared (Figure IV-26). The ceramic morphology became

less diverse and the best diagnostic ceramics are the numerous types earthenware kendi (See Chapter IV.3: ceramic assemblage of Trench 1, Trench 2, and Trench 10). The second diagnostic ceramics, although are not well-understood, are the Red-painted ware including kendi, found

within the pre-Angkorian contexts such as Angkor Borei, Sambor Prei Kuk, and Prei Khmeng (e.g., Fehrenbach 2009; Guérine 2002; Pottier et al. 2006; Stark 2000, 2003b).

The spatial distribution of the pre-Angkorian ceramics covers a much larger area than the previous period covering c. 82% of the dated area (Figure VI-13 and Chapter VI.3.1 below). The artifacts appear to be homogenous across the region and only differ in quantity rather than quality. Only three collection units provide evidence of continuity from the Early Historic to pre-Angkorian periods, i.e., O Trel, Ba Chong, and Ba Doem, all of which contain pre-Angkorian brick temples.

Sambor-Sambok Ceramics

Evidence of the Early Historic settlements in Sambor is limited. Most sites and surface collections within the controlled area contain mostly pre-Angkorian and Angkorian brick temples, and ceramics such as kendi spout, Buffware, various types of sand-tempered earthenware, stonewares, and tradewares (Figure VI-3). Collection 14 from Anlong Prang is the only site with clear Early Historic components including Pinkware sherds and a blue glass bead. No red-painted ware was found, possibly, due to poor preservation. Other ceramics belong to the Angkorian period such as the KGG and KBG as well as the 12th-13th century CE Chinese tradeware.

There is no evidence of the Early Historic component at Sambok. Most surface ceramics are sand-tempered earthenware, which belong to the pre-Angkorian period (500-800 CE). They concentrate around Phnom Sambok, which also comprises the Angkorian stonewares including roof tiles and a KGG sherd.

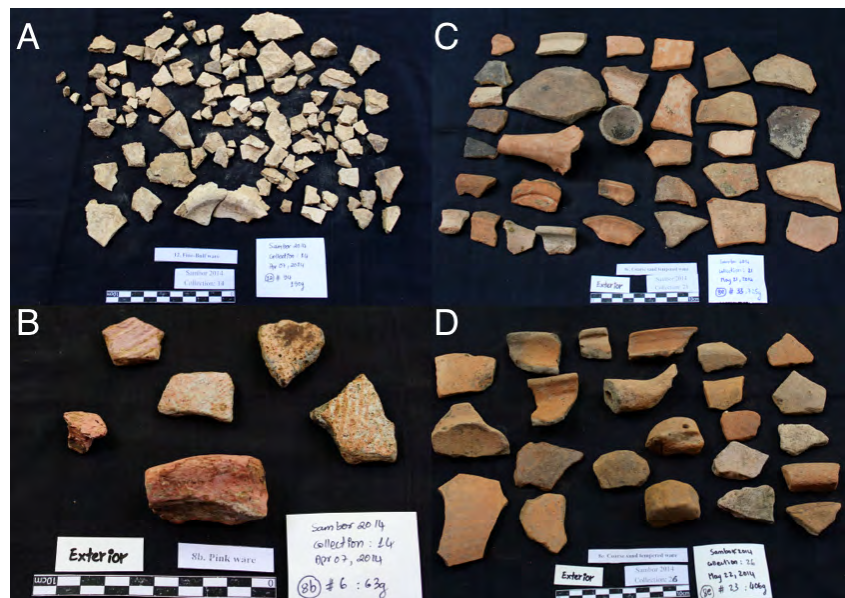


Figure VI-3. Surface ceramics from Sambor and Sambok. A) Buffware kendi of Collection 14; B) Pinkware of Collection 14; C) Earthenware of Collection 21; D) Earthenware of Collection 26 from Sambok

VI.2.2 Brick Monument

The emergence of brick monuments associated with the Hindu/Buddhist religions in Southeast Asia coincided with the historical records of early polities. In Angkor Borei, brick religious monuments occurred after c. 5th-6th centuries CE (Table VI-1) (Stark, Sanderson, and Bingham 2007). The second date range overlaps with that of the Thala Borivat temples (See: Parmentier 1927a, 1927b, 1935; Bénisti 1968). Most brick features uncovered throughout the fieldwork contain elements such as sandstone pedestals, drainages, lintels, inscriptions, or brick decorative elements, all of which belong to religious temples (see Chapter IV.).

Architectural Type	Date	Site	Characteristics
Civic	170±150 BCE to 420±120 CE	Angkor Borei	Wall construction
Ceremonial	300-700 CE	Angkor Borei, Thala Borivat, Sambor Prei Kuk, Prei Khmeng, Trapeang Phong	Brick shrines or temples

Table VI-1. Type of Brick Architecture and its associated dates and characteristics based on Stark et al (2007)

Stung Treng

Brick fragments and brick structures are the most common features documented across the study area. Evidence of the earliest brick construction in Stung Treng occurred between the 4th and 6th centuries CE (Table VI-2, Figure VI-1). In Trench 9, small brick fragments were observed mixed with a fill matrix of Pinkware and other Early Historic sherds from bowls and cordmarked carinated ware. In Trench 6, they were mixed with the disturbed Early Historic burial context where sherds, tiny bone fragments, and beads were uncovered. In Trench 1 brick fragments were compacted with sherds and clay to make foundation for the upper brick structure.

The chronometric dates of Table VI-2 suggest that the earliest brick monuments in Stung Treng are contemporary with the religious monuments of Angkor Borei and the Mekong Delta. Some of these monuments are located atop the Early Historic remains of O Trel, Ba Chong, Ba Doem, and Anlong Prang/Sambor, which represent the earliest adoption of Indic religion. The Early Historic burial site of O Trel contains one of the earliest dated brick fragments, some of

which may belong to one of three brick structures located nearby. Thus, brick monuments located within this site suggest continuity and transformation of the ancestral worship into the Hindu/Buddhist temple.

Location/Trench	AMS Date	Context
Hang Savat Trench 10	652-769 CE	Brick fragments found with multiple ensembles of complete ceramics, possibly associated with the cremated burials and a brick temple located nearby
Kang Techo Trench 2 (and Trench 3/5)	1) 431-641 CE 2) 649-875 CE	Bricks were found in two phases: 1) Waterlogged strata: associated with the first phase of this temple platform construction and intact brick masonry observed on the surface 2) Additional structure located in the upper layer
Kang Techo Trench 1	419-560 CE	Brick fragments were crushed and mixed with small sherds to serve as a foundation for another brick structure
O Trel Trench 6	355-538 CE	Interface between disturbed Early Historic burials and pre-Angkorian temples
Ba Doem Trench 9	251-398 CE	Interface between disturbed Early Historic layer and pre-Angkorian temples

Table VI-2. The earliest evidence of brick use in Thala Borivat

No evidence of the Early Historic settlement existed east of O Trel (i.e., within the Thala Borivat proper). The earliest brick structures appeared in Trench 1 located at c. 2km east of O Trel by 419 to 560 CE. Sometimes between 431 and 641 CE, the trapeang of Tuol Trapeang Khnar was excavated and brick monuments were erected. These structures indicate that the pre-Angkorian settlement expansion in Thala Borivat occurred during the 5th and 7th centuries CE.

Most brick temples in Thala Borivat were built and modified between 400 and 800 CE and have the TB tradition lintels. Additional structures were added to major platforms including Trapeang Khnar sometimes between 652 and 769 CE. Different lintel traditions such as SPK style (c. 600-650 CE), Prei Khmeng (c. 636-700 CE), and Bayon (c. 12th-13th century) were found at Sala Prambuon Lveng (Figure VI-4). Surface ceramics collected from this temple include

Angkorian stoneware and Chinese tradeware such as Song Dynasty white porcelain and Yuan Dynasty celadon. All evidence provides a date range of 9th-14th century, which suggests that this temple continued to be an important center at least until the 13th century. It is possible that Sala



Sala Prambuon Lveng (Bénisti [1968] misplaced it at Prasat Khtop)



Sambor Prei Kuk Style Lintel from Trapeang Khnar(?) (currently at Phnom Theat)



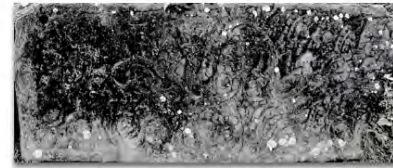
Prei Khmeng (?) Style Lintel at Prasat Ba Chong



Prei Khmeng Style Lintel at Sala Prambuon Lveng courtesy of Isao Takahashi 1991.



Kampong Preah (?) Style Lintel at Prasat Ba Doem



Bayon Style Lintel from Sala Prambuon Lveng (currently at Phnom Theat)

Figure VI-4. Different Lintel Traditions from Stung Treng c. 600-1200 CE

Prambuon Lveng housed the principal god of *Nāgasthānapura* recorded in the Angkorian inscriptions K. 436 and K. 293C.

Similar occupational sequence occurred at Ba Doem within or after the c. 251 to 398 CE matrix of brick fragments and other Early Historic ceramics. Contrary to the large spatial expansion of Thala Borivat, the Ba Doem temples concentrated mainly within the 2 ha-Ba Doem precinct itself (Figure VI-5). The habitations expanded westward along narrow banks on both sides of the Sesan. This event occurred between the 7th and 8th centuries CE as implied by K.360 and an AMS date from Trench 10. However, no Angkorian ceramics were found within the Ba Doem precinct itself. Rather they occurred further west in Phum Samkhuoy, which may contain another brick temple at Tuol Dei lth. Between c. 600-700 CE, Stung Treng brick temple distribution was at its peak stretching from the

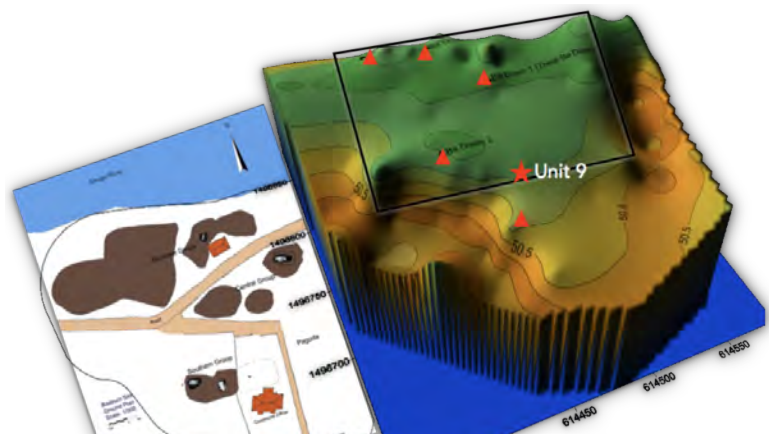


Figure VI-5. The Ba Doem Complex: A survey map conducted by Phon Kaseka and Oum Boramey in 2007 (left) and a topographic map of the terrace in 2014.

large center in Thala Borivat at the Mekong confluence to the minor center of Ba Doem of the Sesan-Sekong confluence and other smaller settlements.

Temple and Temple

Cluster

Based on features

visible on the surface, brick features in Thala Borivat can be grouped into three categories: 1) Single tower; 2) Cluster of towers with or without particular

arrangements; 3) Large platform with single or multiple towers. Horizontal excavation is needed to verify this observation because these features have been largely altered by brick looting, which has occurred since Lajonquière’s (1907, 57–64) report. The temple platforms are concentrated mainly around Trapeang Khnar-Sala Prambuon Lveng, which is practically located at the center of this large settlement (Figure VI-6).

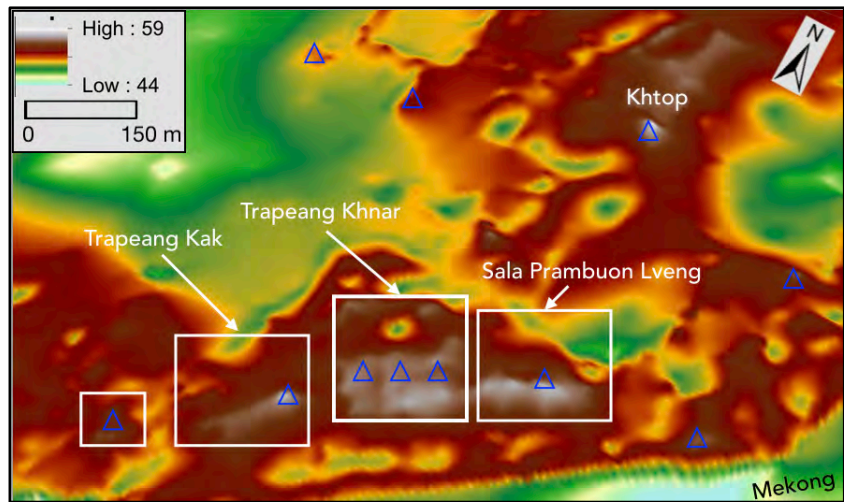


Figure VI-6. Concentration of large temple platforms around Sala Prambuon Lveng

Lintel

Twenty-eight TB tradition lintels (including its floral variants with two arches and one medallion) have been recorded across the pre-Angkorian region (Figure VI-7). Fifteen of these lintels were found at Thala Borivat, four at Sambor, three at Wat Phu, three at Phaniet/Chanthaburi (Thailand), and the rests were isolated lintels found across Cambodia (Figure VII-7). This pattern supports Parmentier’s (1927a, 1:214) claim that Thala Borivat was an ‘autonomous pre-Angkorian art center’. It is not clear whether this artistic tradition pre-dates or was contemporaneous with SPK style (Bénisti 1968). The relative dating, based on the chronometric dates acquired from the excavation located near the temples bearing the TB tradition, provides a date ranges from 400-650 CE. Nevertheless, Thala Borivat was certainly an important art center with an impressive number of temples compared to other centers in this region.

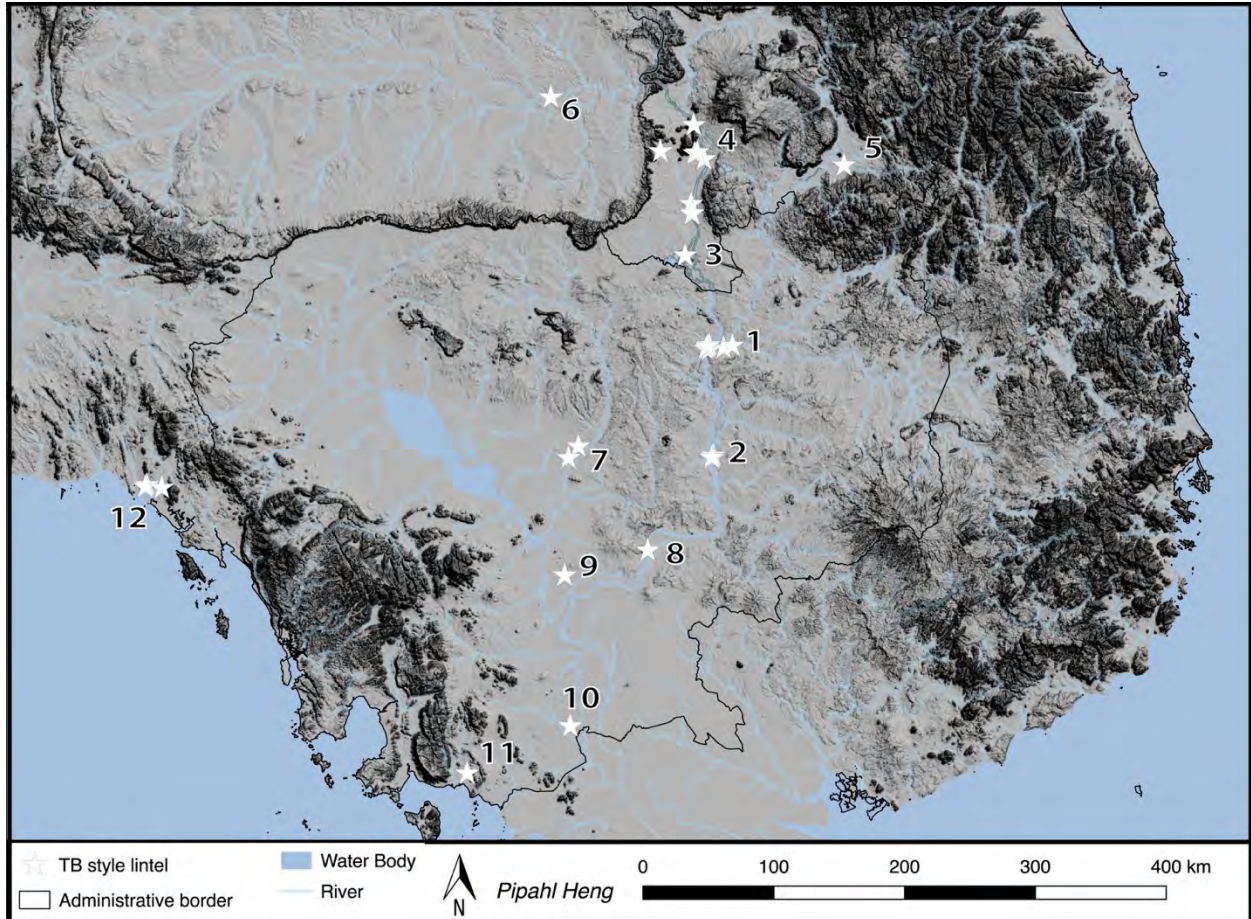


Figure VI-7. Distribution of the Thala Borivat lintel tradition with one medallion and two arches: 1) Thala Borivat, 2) Sambor, 3) Khong, 4) Wat Phu, 5) Attapeu, 6) Wat Supat, 7) Sambor Prei Kuk, 8) Han Chey, 9) Wat Batheay, 10) Asram Maha Reusseï (Angkor Borei), 11) Phnom Chngok, 12) Phaniet/Chanthaburi

Statuary

Based on the inscriptions, most brick temples in Stung Treng were dedicated to Śiva (Chapter IV.4.1). K.359, dated between 550-600 CE, indicates that *Hiraṇyavarman* installed both Śiva and the Sun god, and donated a complete set of *Rāmāyaṇa*, *Purāṇa*, and *Bhārata* texts, all of which relate to *Viṣṇu*. *Liṅga* and *Nandin* were often reported from here, particularly a large *Nandin* at Prasat Preah Ko and a smaller one at Ba Doem [Parmentier (1927,215) also reported another *Nandin* from Sala Prambuon Lveng].

Other statues from Kampong Cham Kau, located upstream on the Sesan, include a Śiva and a *Viṣṇu*, currently housed in the National Museum. A lower portion of a small sandstone statue recently found at Ba Doem likely belongs to Surya, the sun god, known for wearing a tunic and boots (Figure VI-8). Most Surya statues have been found in the Mekong Delta where

Louis Malleret associated them with Funan (Malleret 1966; Woodward 2011). A female statue torso was also found at Ba Doem (Figure VI-9). The style of her Sampot is consistent with other known pre-Angkorian goddesses, commonly associate with a consort of Śiva, two of which came from Koh Krieng located near Sambor.



Figure VI-8. Surya(?) from Ba Doem

Figure VI-9. Torso of a Devi from Ba Doem

Sambor

Unlike Thala Borivat, there is no example of standing brick monuments in Sambor besides their inscriptions (Table IV-8). However, four variations of the TB tradition lintels were found at Sambor⁷ (one is *in situ*, one is in the National Museum, and two others are in the Kracheh Museum). Thus, the monumental tradition of Sambor also flourished after CE 500, contemporary with Thala Borivat. The Pinkware site of Anlong Prang has three brick towers aligning north-south. A *somasūtra* found from this site suggests that one of the towers possibly belonged to the Thala Borivat doubled-chambered tradition, and likely had a TB tradition lintel (Figure VI-10). A new Citrasena inscription (pre-600 CE), Ka.173, was found at Koh Damlong in the Mekong across from Wat Sasor Maroy (Vong Sotheara: pers.comm. 2016).



Figure VI-10. *Somasūtra* from Anlong Prang: the 90-degree extension of the drainage suggests that it was off-center and relates to a double-chambered configuration

⁷ Unfortunately, most of them were removed without proper report of provenience to the National Museum and Kracheh provincial museum. One of them possibly came from Kamnap (a.k.a. Kamnap Ta Kin) where K.125/1001CE recorded the name *Śambhupura* (Lajonquière 1902,187; Leclère 1904,739-740).

Similar to Thala Borivat, the settlement expansion in Sambor occurred quickly with brick monuments following the initial Pinkware phase.

Sambok

No standing example of brick temples and the Thala Borivat tradition lintel have been found in Sambok. Despite the pre-600 CE Citrasena inscription, the other inscriptions and the architectural elements (SPK style lintel, colonettes, and other decorative elements) from Sambok dated to the 7th century CE (Figure VI-12 and Figure VI-11). Similar to Stung Treng and Sambor, the temples in Sambok were dedicated mainly to *Śiva* or *Harihara*, a combination of *Śiva* and *Viṣṇu*.

VI.2.3 Trapeang/Pond

Although trapeangs were found in proximity to some of the Early Historic sites (e.g., Tuol Neakta, Tuol Khtum, and O Trel), their relationship is speculative. A well-dated Trapeang came from Trench 2 at Trapeang Khnar where the organic debris of the pond's bottom produces an AMS dates of 431 to 641 CE. Another relative date came from Trench 1 dated between 419 and 560 CE associated with a brick structure, which has a trapeang located to the east. These are the earliest dates for the Prasat-Trapeang configuration beside the moat of Bakong in Angkor, which dates between 682 and 782 CE (Penny et al. 2006).

Trapeangs located close to brick structures are likely contemporaneous, i.e., 500 to 800 CE. The spatial association between trapeang and temples such as Preah Ko and Khtop in Thala Borivat implies that the Prasat-Trapeang template appeared in this region very early. Other trapeangs without brick features association are located inland and are considered to be within the Thala Borivat residential district.

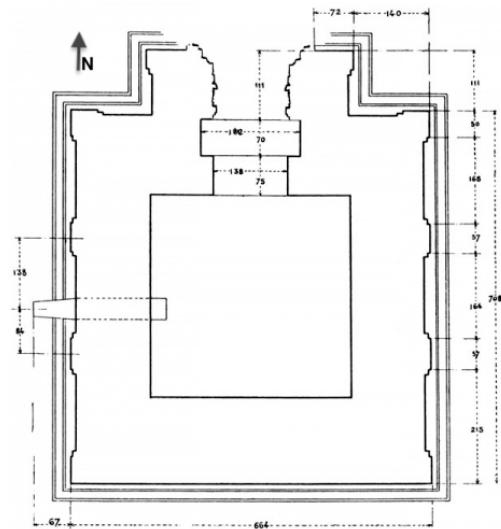


Figure VI-12. Ground plan of a brick structure on Phnom Sambok (Source: Parmentier 1927: PLXCVII; CISARK)



Figure VI-11. SPK style lintel, possibly came from Prasat Thma Kre, housed in Wat Thma Kre

VI.3 Pre-Angkorian Communities of Stung Treng and Kracheh (c. 500-800 CE)

VI.3.1 Stung Treng Settlement

Contrary to the linear distribution and greater distance between the Early Historic period settlements, the pre-Angkorian settlements are clustered around both confluences of the Mekong, Sekong, and Sesan (Figure VI-13). The spatial distribution of ceramics, brick features, and trapeang clusters characterize the pre-Angkorian settlements of Thala Borivat. It was perhaps the intensive interactions of the Early Historic period described in Chapter V.3 that introduced brick monuments to this region sometimes during the 5th-6th centuries CE. By 400-500 CE, the Early Historic communities of O Trel expanded northeast into what is now Thala Borivat where Pinkware or other Early Historic artifacts were absent. This expansion coincided

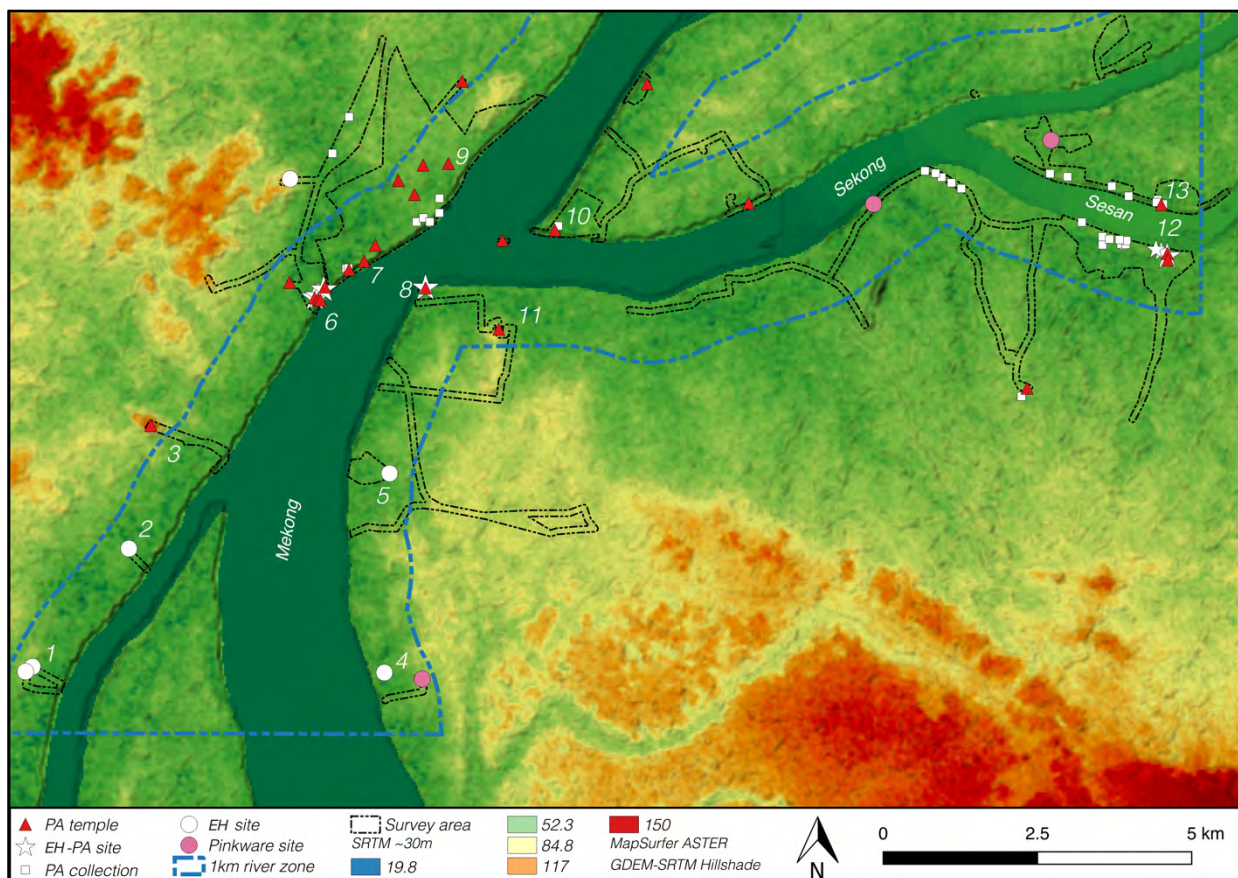


Figure VI-13. Early Historic (EH) and pre-Angkorian (PA) site distributions (surface collections and temples). 1) Tuol Meas, 2) Tuol Ansang, 3) Phnom Prasat, 4) Tuol Khtum Kang Dei Sa, 5) Tuol Neakta Kang Memay, 6) O Trel, 7) Sala Prambuon Lveng & Trapeang Khnar, 8) Ba Chong, 9) Preah Ko, 10) Kantuy Ko 11) Phnom Theat, 12) Ba Doem, 13) Hang Savat. No evidence of continuity for those Early Historic sites in white circle.

with the appearance of brick structures as evident in Trench 6 in O Trel, Trench 1 and 2 in Thala Borivat.

This second settlement nucleation and expansion came at the expense of other Early Historic settlements where no evidence of brick structure or the pre-Angkorian ceramics was found (Table VI-3 and Figure VI-13). Around Thala Borivat, only O Trel and Ba Chong provide evidence of continuity. Further east, brick structures and other pre-Angkorian remains were found atop the Early Historic remains at Ba Doem. However, the Early Historic settlements of O Khlong and Hang Savat both have no evidence of continuity. This pattern implies that by c. 500 CE, most Early Historic settlements were abandoned and consolidated into two large communities of Thala Borivat and Ba Doem, which became prominent centers throughout the pre-Angkorian period.

Settlement	ha	Date	Early Historic context	Pre-Angkorian Context	Continuity?
O Trel	4	200 BCE-800 CE	<ul style="list-style-type: none"> - Burials heavily looted during the 1980s and recently in the 2000s due to “large quantities” of gold - Stone beads, glass beads - Pinkware - Cord-marked carinated ware and pedestalled ware 	<ul style="list-style-type: none"> - Burial with context disturbed during the pre-Angkorian period - Four brick temples were built within the burial zone. Two of them bear TB lintels 	Yes
Phnom ‘O Trel’	0.33	300-500 CE	<ul style="list-style-type: none"> - Unconfirmed report of beads and artifacts similar to O Trel (completely demolished) 	<ul style="list-style-type: none"> - No evidence of brick feature - Hilltop would have been a great potential for temple construction but none was reported here 	No
Tuol Khtum	0.28	300-500 CE	<ul style="list-style-type: none"> - Burials looted during the 1980s with reports of small 	<ul style="list-style-type: none"> - No kendi - No brick 	No

			quantities of beads and gold - Pinkware		
Ba Chong	0.45	300-800 CE	- Pinkware - Cord-marked carinated ware	- Brick temple - Various pre-Angkorian and Angkorian ceramics - Inscription	Yes
Ba Doem	2	300-800 CE	- Pinkware - Cord-marked carinated ware and pedestalled ware	- Various pre-Angkorian debris - Brick temple - Inscription	Yes
O Khlong	2	300-500 CE	Burials heavily looted during the 1980s and recently in the 2000s due to "large quantities" of gold - Stone beads, glass beads - Pinkware - cord-marked carinated ware and pedestalled ware	- No brick feature or pre-Angkorian ceramics - Nucleated with Ba Doem?	No
Hang Savat	0.11	300-500 CE	- Pinkware	Likely abandoned as settlements became more prominent on the Sesan bank where brick temples, various types of pre-Angkorian ceramics, and cremated burial are located	No
Anlong Prang (Sambor)	0.02	300-800 CE	- Pinkware - 1 blue bead	Pre-Angkorian Prasat Anlong Prang	Yes

Table VI-3. Early Historic settlements and evidence of continuity to the pre-Angkorian period

It is not clear whether the settlement expansion slightly preceded or expanded as a settlement package with the temple, that is, whether the new settlements were the temple communities. However, the data suggest that the pre-Angkorian settlement expansion of c. 500-800 CE coincided with the presence of temples in a new area. By around 600 CE, O Trel became less important as the temples and ponds are mainly concentrated in Thala Borivat.

The ceremonial district of Thala Borivat is defined by temples clustered along the river stretching from O Trel to Phnom Thala Borivat. The concentration of large temple platforms around Sala Prambuon Lveng to Prasat Preah Ko implies that this area was the main ceremonial center. The longevity of Sala Prambuon Lveng and its location within the large platform

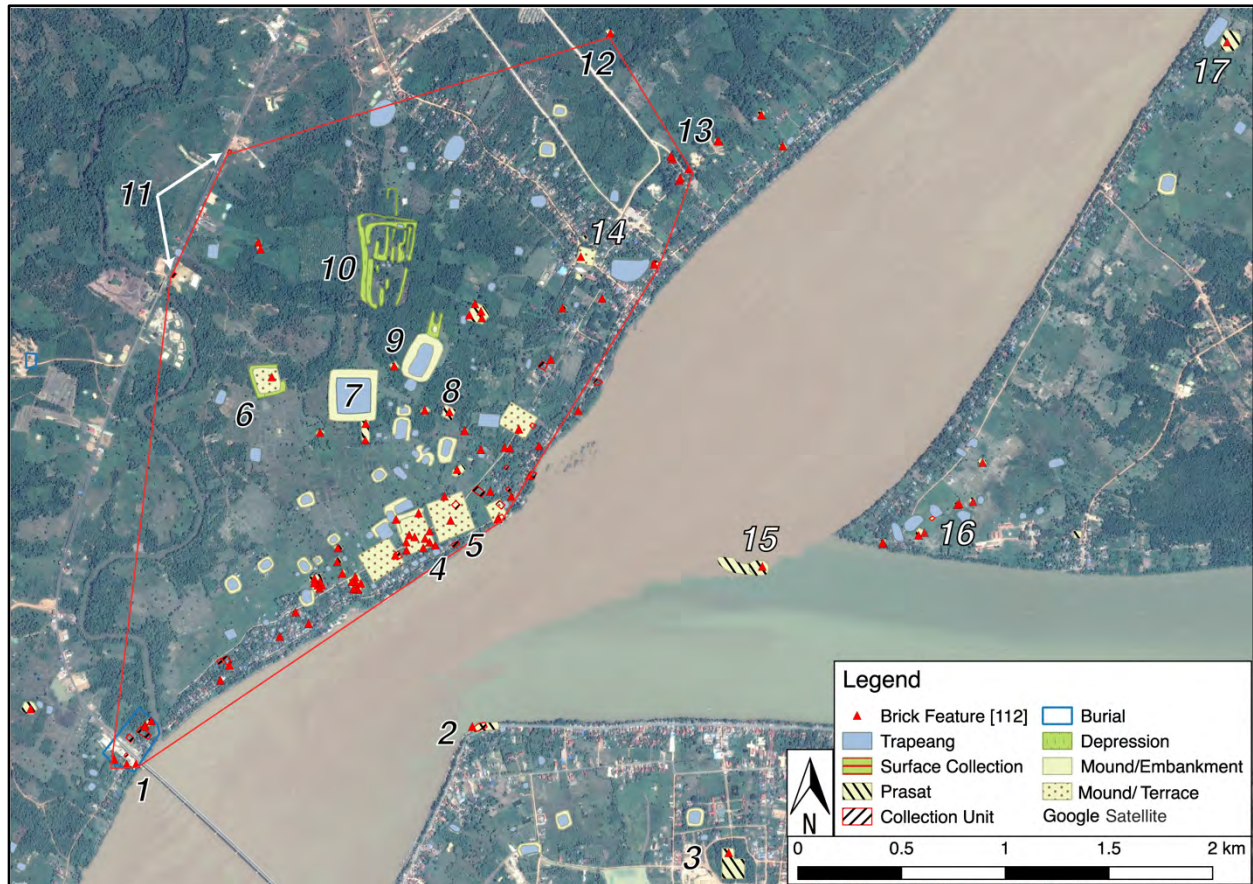


Figure VI-14. Cluster of brick features in Thala Borivat. 1) O Trel, 2) Ba Chong, 3) Phnom Theat, 4) Trapeang Khnar, 5) Sala Prambuon/bei Lveng, 6) Phnom Prahong, 7) Trapeang Techo, 8) Prasat Khtop/Pros, 9) Prasat Charoek, 10) Veal Ro-il foot print, 11) two collection units with kendi spouts, 12) Brick structure, possibly, corresponds to Parmentier's report of a temple with TB style lintel; 13) Brick structures of Phnom Thala/Banan; 14) Preah Ko/Boran; 15) Koh Bay Samnom; 16) Kantuy Ko; 17) Upmong. A red polygon links dated pre-Angkorian sites located at the border of the Thala Borivat group.

concentration implies that this area was the center of Thala Borivat at its peak. The residential district enclosed the ceremonial district to the west and was composed of mainly trapeangs and randomly-spaced temples (Figure VI-14). Despite being c.100 ha larger than Sambor, the Thala Borivat settlements only comprises c. 100 trapeangs.

Physical Setting

The settlements continued to be located on levees and concentrated around two nuclear settlements of Thala Borivat and Ba Doem. The data indicate that the pre-Angkorian communities are predominantly concentrated within the lowland. Of the total area covered by pedestrian survey, 9% contains evidence of occupations—from the Early Historic to Angkorian periods—based on datable features (e.g., temples, surface ceramics, and trapeang) (Table VI-4). Only 49% of this occupied area (5% of the area covered) can be dated based on ceramics and architectural elements. The majority of this dated area, 84% belong to the pre-Angkorian periods c. 500-800 CE.

	Area Categories	Ha	%	Comments
Total Area Surveyed	Area Covered	1408	100%	Thala Borivat, Ba Doem, and road cuts
	Occupied	133	49%	Including mounds and some trapeangs
	Datable	64	5%	Surface collections and brick temples
Datable Area	Early Historic	8	12%	Surface ceramics
	pre-Angkorian	54	84%	3 ha or 4% continue from the Early Historic period
	Angkorian	27	42%	21 ha or 33% continue from the previous periods
	Post-Angkorian	3	4%	Based solely on tradeware; 4% overlaps with the previous period

Table VI-4. Stung Treng region: Settlement sizes in each occupational sequence

As reported in Chapter IV. , the majority of sites in Stung Treng are located within a 1km zone from the river. A cross-tabulation analysis between a soil productivity data⁸ (3: High, 2: Medium, 1: Low) and 1km zone along the rivers (0,1) –rasterized into 100-square-meter pixels– suggests a strong correlation between the 1km zone and the high to medium soil productivity located within the research area (Table VI-5). Another cross-tabulation analysis between site areas (with rasterized value of 0 for no site, and 1 for site area) and elevation (derived from SRTM 1 arc-second reclassified into 3 categories, 3: 40-60m, 2: 60-80m, and 1: \geq 80m) indicates that 75% of sites are located within the elevation of 40-60m, which are located along the rivers (Table VI-6).

Based on these results, a maximum area where sites are located can be created by combining soil productivity, elevation, and a 1km zone along the river. The combined results suggest that 86% of sites are located within medium to high productivity soil of the lowland and only 14% are located on the highland (Table VI-7 and Figure VI-15). In fact, most sites of the highland categories are located in the northern section of Thala Borivat including Phnom Prahaong and a large footprint (Figure VI-15: 11). The only ‘true’ highland site is Prasat O Pongro (Figure VI-15: 12).

Category		Soil Productivity			
		1	2	3	Total
River Zone	0	7938	1125	4384	13447
	1	2227	3031	4095	9353
	Total	10165	4156	8479	22800

Table VI-5. Cross-tabulation between soil productivity and a 1 km zone along the rivers (shaded row). (0 represents no overlapping areas)

Category		Elevation			
		1	2	3	Total
Site	0	4305	7651	10748	22704
	1	0	23	73	96
	%	0	24	76	100

Table VI-6. Cross-tabulation between site area and elevation within the main research area (shaded row). (0 represents none overlapping pixels)

Category		Suitable Area			
		1	2	3	Total
Site	0	13434	335	8935	22704
	1	13	12	71	96
	%	13.5	12.5	74	100

Table VI-7. Pixel cross-tabulation of suitable area and site area (shaded row). (0 represents none overlapping pixels)

⁸ Soil productivity data was produced by Save Cambodia’s Wildlife (2014, 138) and the ESRI Shapefile format was acquired from Open Development Cambodia on January 21, 2014.

In Thala Borivat, despite the smaller surface collection areas, settlement expansion of this period can be inferred from the distribution of trapeang and brick features. Sites located along the boundary of this concentration provide a datable boundary for the pre-Angkorian period. These include four temples in O Trel, kendi spouts from a road cut near O Trel from the NW corner, Prasat Chareuk with TB tradition lintel and pre-Angkorian inscription is the northern edge, another brick feature likely the same one reported by Henri Parmentier (1937, 630) to have a TB tradition lintel, and Phnom Thala Borivat with a pre-Angkorian pedestal (Figure VI-14). The total area covered by these structures is c. 600ha (not include 250ha of Kantuy Ko and Ba Chung-Phnom Theat area) or c. 150 times greater than the largest Early Historic site of O Trel. In Ba Doem, the pre-Angkorian settlements extended from the Ba Doem complex to cover an area of 45ha over a 1-km stretch of the levee. Across the Sesan, in Hang Savat peninsular, the Pinkware settlement located near the Sekong was discontinued. The pre-Angkorian period

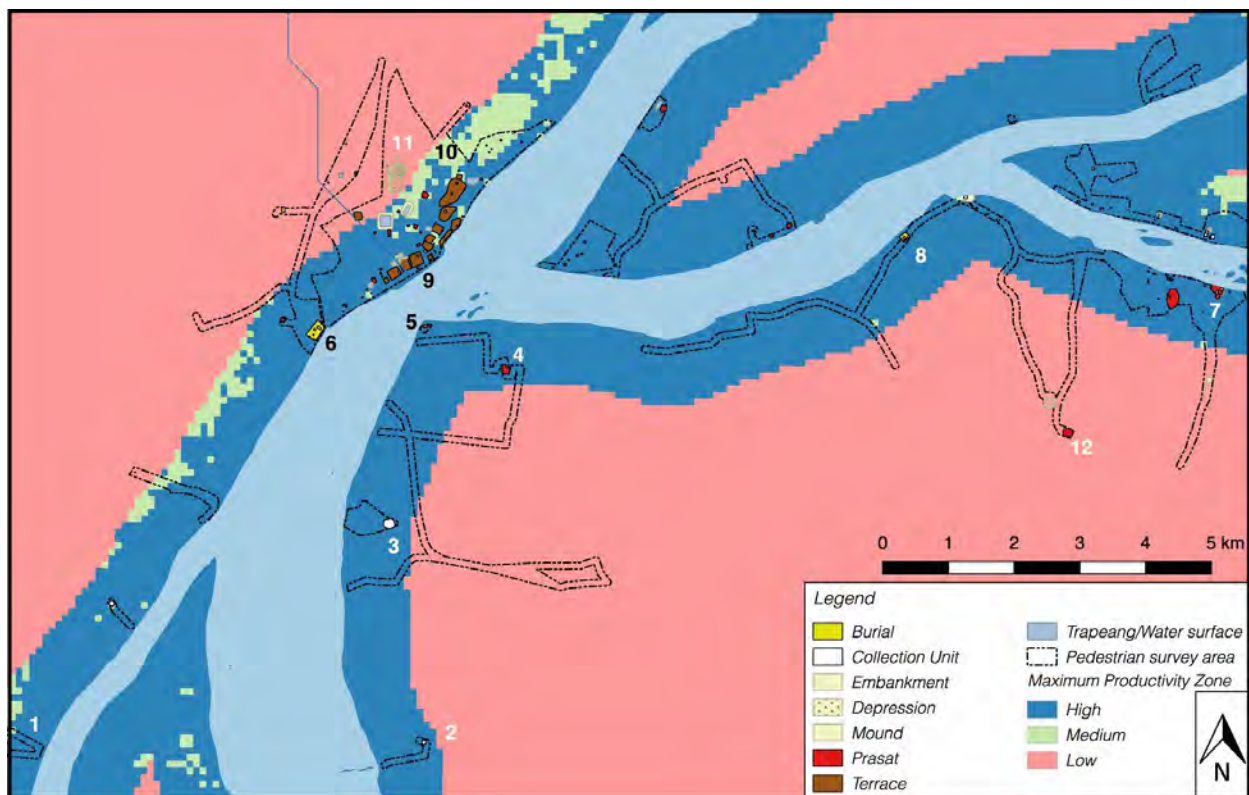


Figure VI-15. Settlement distribution within the suitable area of high soil productivity, lower elevation, and near the rivers. 1) Tuol Meas, 2) Tuol Khtum, 3) Tuol Neakta Kang Memay, 4) Phnom Theat, 5) Ba Chong, 6) O Trel, 7) Ba Doem r, 8) Ba Chong, 9) Sala Prambuon Lveng & Trapeang Khna, 10) Preah Ko 11) Phnom Prahaong and a footprint, 12) Prasat O Pongro.

brick features, trapeangs, and ceramics concentrated along a c. 39ha area of the Sesan levee. The undated inscription K.360 claims this levee as property of the Ba Doem god.

The extent of the pre-Angkorian settlements of Thala Borivat is comparable to the modern Stung Treng town of which the 1998 and 2008 censuses recorded the population between 3500 and 3700⁹ (Appendix B: Note 7). Similarly, the extent of settlements in Ba Doem, Hang Savat, and Kantuy Ko is also comparable to the modern villages of which the censuses respectively documented between 900-1100, 500-700, and 800-1300 people. A 1916 census provided a figure of 2119 for Khum Stung Treng (possibly included Hang Khou Suon/Kantuy Ko and other villages) and 871 for Khum Hang Savat (likely include Ba Doem and Sam Khuoy) (Henri 1916 Table 5, Population Statistic). These figures suggest that size and population of the primary center of Thala Borivat is at least twice as large as the secondary center of Ba Doem.

VI.3.2 Sambor Pre-Angkorian Communities (c. 500-800 CE)

Similar to Thala Borivat, the Sambor settlements concentrate within the lowland (between the elevation of 29-36 masl) close to the Mekong, the area currently dominated by rice fields. The settlement configuration consists of brick temples, trapeangs, and large mounds. However, no large platform like Sala Prambuon Lveng was identified. Despite having more pre-Angkorian and Angkorian inscriptions, it is difficult to date the temples and trapeangs because those inscriptions are reportedly confined to a handful of sites. The earliest occupation phase of in Sambor corresponds with TB II (300-500 CE) when Pinkware appeared at Anlong Prang within a 0.2ha collection unit (Figure VI-16:9). Toward the end of this period, a new *Citrasena* inscription was found on an island of Koh Damlong located across from Wat Tasor Maroy (Vong Sotheara, pers.comm.). Some of the brick temples in this region have TB tradition lintels, which suggest that both centers are contemporary.

By the pre-Angkorian period (500-800 CE), the total surface collection area is 0.58ha. The 450ha area located between these dated sites comprises large mounds and ponds, many of

⁹ There were no high-rise apartments in Stung Treng as of 2014. Most houses were evenly spaced and occupied by single and extended family members. In a way, Stung Treng town was a larger and dense version of a typical Cambodian village.

which were possibly contemporary. By 800 CE, the settlements in Sambor spread to 500 ha within the survey area. The size would be triple, if it included settlements on other islands and area outside of the survey area, where pre-Angkorian temples were documented.

The presence of many KBG (with designs associated with Cheung Ek) and the fine quality KGG (associated with the early phase of Kulenware) likely suggests a date range of c. 800-900 CE, which corresponds to the last queen of Sambor (c. 803 CE) and *Jayavarman II* whose families were mentioned K.125. Thus, by the time of the three queens (c. 700-800 CE), Sambor became the largest settlement along the Mekong outcompeting other centers like Thala Borivat (Figure VI-16, and Table VI-8).

In Sambor, the residential and ceremonial districts are less-defined compared to Thala Borivat because there are fewer temples. Yet, similar to Thala Borivat, most temples are located close to the river and surrounded by over 150 trapeangs.

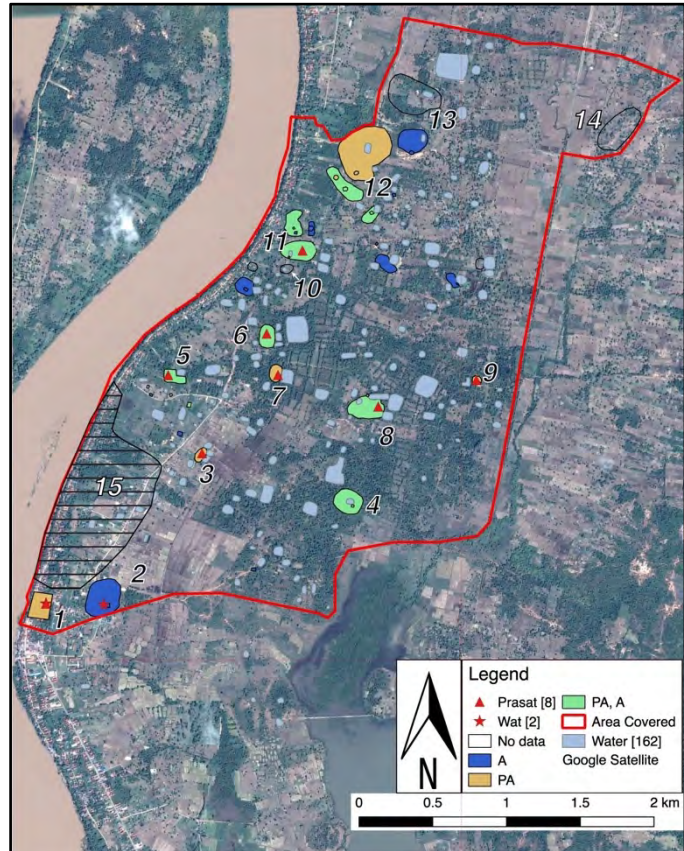


Figure VI-16. The *Sambhupura* Settlements (A: Angkor, PA: Pre-Angkor): 1) Wat Tasor Maroy, 2) Vihear Kok, 3) Kamnap Trapeang Thma, 4) Tuol Trapeang Thma, 5) Kamnap Don Meas, 6) Kamnap Trapeang Prei, 7) Kamnap Trapeang Sinoa, 8) Kamnap Ta Ouk, 9) Kamnap Anlong Prang, 10) Tuol It, 11) Group of Kamnap Ta King, 12) Group of Tuol Trapeang Khnar and Trapeang Prom, 13) Tuol Trapeang Anchanh, 14) Tuol Kruos, 15) No data (modern village)

Area	Mound (ha)	Collection (ha)	Total (ha)	Comment
Sambor PA	29	0.6	30	More mounds with pre-Angkorian temple association than the collection area
Sambor A	26	1	27	

Sambok PA	24	0.5	25	The size of Phnom Sambok (23ha) makes the occupation here appear larger than Sambor
Sambok A	23	2.5	26	Large size caused by a collection unit at a 2.3ha Boeng Sambok

Table VI-8. Sambor settlement size (roundup) [A: Angkor, PA: Pre-Angkor]

VI.3.3 Sambok Pre-Angkorian Communities (c. 500-800 CE)

The settlements of Sambok is the most obscure since most artifacts are likely buried under the modern settlements on the levee. Based on the current data, by the pre-Angkorian period Sambok settlements reached 70-87 ha concentrated mostly along the narrow levee located between two temples, Phnom Sambok and Thma Kre (Figure VI-17). The characteristic of these settlements, however, is different from Thala Borivat and Sambor in that there is no trapeang cluster located near the temples. This is likely the result of an easy water access to a large natural lake/swamp of Boeng Sambok (a.k.a Boeng Khla). The Sambok communities were located within the lowlands possibly exploiting the area surrounding the swamp. Vickery (1998: 103-105) argues that the relationship between Sambok and Sambor can be established through: 1) the name ending with *-kirti* of K.926/624 CE and K.127/683CE; and 2) that the

Suvarṇalinga of K.127 (Sambor) was that of K.926 of which the donation was to be joint with *Amareśvara* of K.127.

VI.4 Pre-Angkorian

Economy

The lack of archaeological coverage makes the reconstruction of pre-Angkorian economies difficult.



Figure VI-17. pre-Angkorian and Angkorian Communities in Sambok. 1) K.122 of Citrasena, 2) Wat Thma Kre, 3) Prasat Thma Kre, 4) New brick features, 5) Phnom Sambok, 6) Boeng Sambok (outlier)

Nevertheless, evidence of continuity from the Early Historic to the pre-Angkorian period at least implies that certain aspects of their societies and economies were similar. Additionally, inscriptions appearing throughout the study area after 550 CE are used to support the discussions below. These inscriptions recorded populations from different sociopolitical and economic classes and their economies (Chapter II.2; Table VI-9). The pre-Angkorian temples and the elites possessed similar economic means with emphases on agriculture (e.g., rice agriculture, plantation, and draft animals).

Type	Term	Context	Translation	Inscription
Rice Agriculture	<i>Sru/Srū</i>		Unhusked-rice	K.1287:1; K.124:12, 21
	<i>Raṅko</i>		Husked-rice	K.1287:3; K.127:12; new Sambok inscription 2:2, 3; K.127:10
		<i>Raṅko so</i>	White husked-rice	K.127:10
	<i>Sre</i>		Rice field	K.133:7; K.926:10; K.927:4; K.1287:5, 19; K.1287:6, K.129:21, 22; K.927:2; K.1257:3; new Sambok inscription 1:9; new Sambok inscription 2:2
		<i>Sre ai caṃkā</i>	Rice field located at a garden/plantation (swidden field)	K.1287:5, 19
		<i>Sre vraī</i>	Wild rice field (swidden field)	K.1257:3
		<i>Sre ai kaṃdot</i>	Rice field located at <i>kaṃdot</i> (myrobalan, <i>Phyllanthus emblica</i> L.)	K.1287:6
		<i>Sre ai taṅkut</i>	Rice field located at Taṅkut (stump of trees) [swidden field?]	K.129:21
		<i>Sre karoma candrā taṃmrah</i>	Rice field located below or of the lowland at <i>candrā taṃmrah</i>	new Sambok inscription 2:2
		<i>Sre ai cok 'aṃvil</i>	[a] rice field located at Cok Amvil (tamarind wood)	K.129:21

	<i>Sre ai cdiñ ramañ</i>	Rice field located at Cdiñ Ramañ (deer river)	K.129:21-22
	<i>Sre ta tel ti kurāk śūragrāma tve ai cdiñ vrī dāñ</i>	Rice field that lord <i>śūragrāma</i> cultivated at the river Cdiñ Vrī Dāñ	K.927:2
	<i>Sre chdiñ jrau</i>	Rice field located at Cdiñ Jrau (deep river)	New Sambok inscription 1:9
	<i>Sanre</i>	Rice field measurement	K.430:4
	<i>Ka-ol</i>	Granary	K.926:11
Economic Trees	<i>Slā teṃ</i>	Areca plant	K.1287:6, 20; K.1257:29
	<i>Slā</i>	Areca (plant or nut)	K.124:20
	<i>Slā 'āy vraī raṃteñ</i>	Areca [plants] at the Galangal Forest	K.430:4
	<i>Daṃrñ teṃ slā</i>	Areca Plantation	K.926:10
	<i>Toñ</i>	Coconut	K.1287:20
	<i>Krapās</i>	Cotton	K.124:10, 16, 19
	<i>Lño</i>	Sesame	K.124:11, 20
	<i>Tvau</i>	Millet	K.124:11, 20
	<i>Śunthī</i>	Ginger	K.124:12, 15, 19
	<i>Ñrañor</i>	Palm syrup (from sugar palm)	K.124:18-19
Other products	<i>Gmuṃ</i>	Honey	K.124:11, 17, 18
	<i>Kalmon</i>	Beeswax	K.124:12, 20
	<i>Pareñ</i>	Oil	K.124:18, 19
	<i>Canlek</i>	Cloth	K.124:10, 13, 18
	<i>Carū</i>	Sanskrit: Oblation of rice, barley and pulse boiled with butter and milk	K.124:13, 17, 20, 21
	<i>Tmir sñak</i>	Leave weaver: leaves could come from sugar palm, coconut, or from the forest	K.129:4

Draft animals	<i>Tmur</i>		Cattle	K.1287:6, 19; K.1257:28; K.127:9; K.129: 22; K.926:10
	<i>Tmur</i>		Male Cattle (bull)	K.127:19
	<i>jmol</i>			
	<i>Canmat</i>		Uncastrated bull	K.127:19
	<i>Krabi</i>		Water buffalo	K.1257:28-29; K.129:22
	<i>Ksor</i>		Sanskrit: Water buffalo	K.127:19

Table VI-9. pre-Angkorian economies based on inscriptions from Stung Treng and Kracheh within the research areas

Since the pre-Angkorian inscriptions suggest that their temples practiced temple economies, evidence of a brick temple is also evidence of a temple economy and the surrounding communities as a whole. The economies of these brick temples and the local elites are implied to include at least donations, rice agriculture, gardening, temple laborers, draft animals, and economic trees. The following discussions combine the limited archaeological evidence with the epigraphic data to reconstruct the pre-Angkorian economy.

VI.4.1 Agriculture

No direct evidence of rice agriculture was uncovered by this project. Though some earthenware sherds uncovered from both Stung Treng and Sambor in the pre-Angkorian context include rice chaff temper (Figure VI-18). Nonetheless, the epigraphic evidence from this region from the 7th and 8th centuries CE suggests reliance on two types of rice agriculture (wet and dry rice). K.1257, K.1287, and K.1288 from Stung Treng describe the donations to gods, which includes means of subsistence such as rice and husked rice from various fields (including *sre ai camkā* and *sre vraï* [dry or swidden rice field]), laborers, areca trees, coconuts, cows, and buffalos. The Sanskrit K.360 from Ba Doem claims that the temple domain extends on both sides of the



Figure VI-18. An example of rice-chaff tempered earthenware from Trench 1/layer 4b and charred rice from Tuol Angka Khmao

‘fortunate river banks’ (Sesan), referring to the fertile area of Hang Savat where three brick features and their extended settlements were located.

During the 11th century CE, a new inscription from Kantuy Ko describes a court proceeding of a disputed tax-exempted rice field. The passage reads: *[v]āp puvva[m] āca ti āyatv ta vriha viṣaya ta khlo[ñ]*: *Vāp Puv is not to come under the authority of the provincial rice tax collector*¹⁰. An unpublished AMS analysis by a Japanese team on charred rice remains collected from Tuol Angka Khmau¹¹ (Thala Borivat) was reportedly dated to the 13th century CE (Heng Sophady: pers.comm.) (Figure IV-8:7).

Other economic trees including betel nuts and coconuts were common donated items to the temples. Flora remains from a waterlogged context of Trench 2 dated between 431 and 641 CE comprise well-preserved coconut husks, gourd shell, and bamboos. This evidence implies the presence of these plants within the temple precincts (all of which are still grown on this platform). Others remains include pieces of construction wood, small branches with cut-marks and burn-marks, likely associated with cooking or water boiling¹² or other temple activities (Figure VI-19).

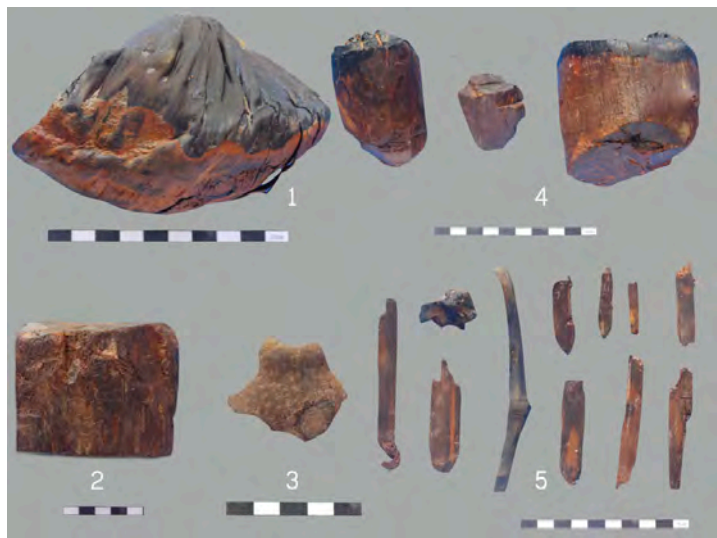


Figure VI-19. Floral remains from Trench 2/431-641 CE. 1) Coconut husk, 2) Piece of construction wood, 3) Gourd shell (possibly, bottle gourd), 4) firewood, 5) Bamboos

The pre-Angkorian and

Angkorian epigraphic evidence as well as the Angkorian charred rice remains from Thala Borivat

¹⁰ An almost exact same sentence is used on K232/1006CE in Sakeo/Thailand, which is common throughout *Suryavarman I* (1003-1050 CE).

¹¹ The site is heavily disturbed. First, by new burials during 1960s-1970s and, recently, by locals looking for charred rice believed to have medicinal properties.

¹² A group of temple laborers was *amuḥ dik sroñ* or water heater; another K.155 lists a group of laborers called *mahānasa* or kitchener (cook)

suggest a degree of dependence on rice agriculture. As discussed in the previous section, the pre-Angkorian settlements are predominantly located within the lowlands. This location implies dependence on agriculture where high-yield wet rice, economic trees, and other aquatic resources can be exploited. Settlement expansion into the highland, represented by the 'anchored temples' implies an integration between wet rice of the lowland and dry rice of the hinterlands. A site location model relative to the fertile area along the rivers will be explored in the next Chapter VII.

VI.4.2 Craft Production and Consumption

Research focusing on the metal craft production in the pre-Angkorian and Angkorian period is in its infancy. The pre-Angkorian example of craft production came from unpublished research by B.P. Groslier in SPK where crucibles (some with Buffware paste, other mixed with coarse sand temper) and lumps of lead were excavated (currently stored at the NMC) within the ceremonial complex. Archaeological evidence for the pre-Angkorian crafts in Thala Borivat is limited. Nonetheless, as discussed in Chapter V.3.3, evidence of slags and brick rubbles of Trench 1 and 6 suggests that craft activities continued from the Early Historic to Angkorian periods.

Inscriptions of this period do not mention any ceramic or metal production; however, they described donations of copper utilitarian ware, gold, and silver objects to gods. In Thala Borivat K.1287, *P-añ Rāṃ* donates metal ware such as a silver box (or covered box), 1 crown, a three-footed copper ware(?), a gold band (wearing across the shoulder), a copper umbrella, 2 embossed copper wares, a copper incense burner, an embossed copper drum, a tray, an embossed object (*srageḥ*), and a bronze ware. Similarly, K.124/804 CE mentions a donation of a copper footed tray, a copper pot, and a copper ladle by the queen of Sambor.

The epigraphic evidence suggests that the pre-Angkorian elites and temples were consumers of metal crafts. However, many questions remain as to whether craft production was private or corporate; or, whether it was internal to this region where raw materials including iron, copper and gold occurred naturally; or, whether crafts were imported. A location model of the pre-Angkorian sites and mineral resources will be explored in the next Chapter VII.

VI.4.3 Interactions

As reported in Chapter V.3.1, the INAA results for the Thala Borivat ceramics, which could serve as evidence of interactions, are inconclusive due to small sample size (n:30). Other evidence of interactions came from the distribution of Citrasena-Mahendravarman's inscriptions along the Mekong and the Mun rivers (see discussion in Chapter VII.4) as well as the locations of the TB tradition lintels discussed in the previous section.

Nonetheless, the pre-Angkorian settlements of northeast Thailand, southern Laos, Cambodia, and southern Vietnam shared many similarities such as Buffware, red-painted ware, artistic styles (lintels and other decorative elements), inscriptions (languages, style, and content), temple economies, and the settlement configuration of mound, temple, and trapeang. These shared traits suggest that greater social, political, or economic integrations occurred throughout the pre-Angkorian world. The intense interactions during the Early Historic period that moved beads and other goods across these regions were likely responsible for such integrations to occur during the later period.

VI.5 Pre-Angkorian Period Centralization

Evidence of centralization during the pre-Angkorian period can be drawn from both settlement patterns and economies discussed in the above sections. The spatial distribution of temples, trapeangs, and surface artifacts suggests that settlement expansion and nucleation occurred in both Thala Borivat and Sambor during 500 and 600 CE. While O Trel, Ba Chong, Ba Doem, and Anlong Prang continued to be used and transformed into the pre-Angkorian temples, other Early Historic settlements were abandoned. This factor suggests major organizational changes where populations of these abandoned settlements may have been incorporated into the new expanded settlements of Thala Borivat and Ba Doem during c. 500 CE. The current data cannot pinpoint the exact causes of this phenomenon nor the individuals associated with it. Nonetheless, settlement nucleation occurring in these large and small centers suggests some sorts of hierarchical differences between the primary and secondary centers or centralization appearing toward the end of the Early Historic period. The settlement hierarchy can also be inferred from the temple economy recorded in the inscriptions.

VI.5.1 Settlement Hierarchy

The pre-Angkorian settlements of Thala Borivat and Ba Doem correspond to the primary or first-tier and secondary or second-tier settlements respectively. One of the purposes of this research was to identify whether there was a distinction in artifact types between these centers and whether there were clear indicators of an 'urban center'. However, artifacts from surface collection and excavation suggest that both centers consumed the same types of ceramics such as Buffware and Sand-tempered ware. The distinction between these centers is only visible in terms of size of the settlement unit consisting of temples and trapeangs. The large center of Thala Borivat contains c. 56 temples (including those located in Kantuy Ko and Stung Treng town), while the smaller center of Ba Doem only comprises five temples (though, Ba Doem itself is a platform containing at least seven separate temples). This distinction is comparable to the many temples (over 130 brick temples) located in the capital city of *Īśānapura* compared to a lesser number of temples found within other known pre-Angkorian centers.

The number and size of these monuments correspond to the number of laborers and the quantity of resources required to build them, i.e., large centers require more resources than smaller centers. The Stung Treng settlement patterns suggest a three-tiered settlement system corresponding to Thala Borivat, Ba Doem, and smaller temples located further away. Similar patterns can be discerned from Sambor-Sambok and their surrounding settlements as well as Wat Phu and its neighboring settlements. This pattern suggests differences in economic and political hierarchy between these centers and corresponds to the relationship between urban center and its hinterlands. This hierarchical regression repeats with distance from the centers.

VI.5.2 Temple Economy and Hierarchy

A parallel inference to the hierarchical regression from the primary to secondary center based on settlement size and distance can be drawn from the epigraphic data. Some pre-Angkorian inscriptions contain an aspect of joint gods, in which subsistence, revenues, or means of productions from one temple were shared with a hierarchically superior temple (See Vickery 1998: Chapter 5). Two inscriptions from Stung Treng suggest interactions and hierarchy between the primary center and the secondary center. K.1287 from Thala Borivat describes the donations by *P-añ Rāṃ* to the gods *Suvarṇṇaliṅga* and *Caṇḍīśvara*. This inscription ends with

phrase: “*gi neḥ ti roḥ tel prativaddha ai ta vraḥ kamratān añ diṅgeśvara.*” Vong (2011) translates *prativaddha* as “these listed items are even concerned as donated objects for My Lord *Diṅgeçvara*.” Philip Jenner¹³, agrees with Pou (2004: 325), translates the sentence as “*It is this, the aforesaid, that [he] has conveyed to My Holy High Lord Śrī [L]iṅgeśvara (Sic! for *Diṅgeśvara*).*”

Since *Diṅgeśvara* is only mentioned once and the donations described before this sentence only attributed to gods *Suvarṇaliṅga* and *Caṅḍīśvara*, *prativaddha* is likely another version of the pre-Angkorian *psaṃ* or joint gods, which in this case, joint the means of production and subsistence. The passage, thus, reads: “*It is this, the aforesaid [donations to gods *Caṅḍīśvara* and *Suvarṇaliṅga*], that [shall] join with god *Diṅgeśvara*.*” K.360 from Ba Doem mentions the construction of a brick chamber and a wall for god *Caṅḍeśvara*. If this god were the same *Caṅḍīśvara* as that of K.1287 (See: Goodall 2009, 407–9; Sanderson 2003, 437), then the means of subsistence donated to Ba D

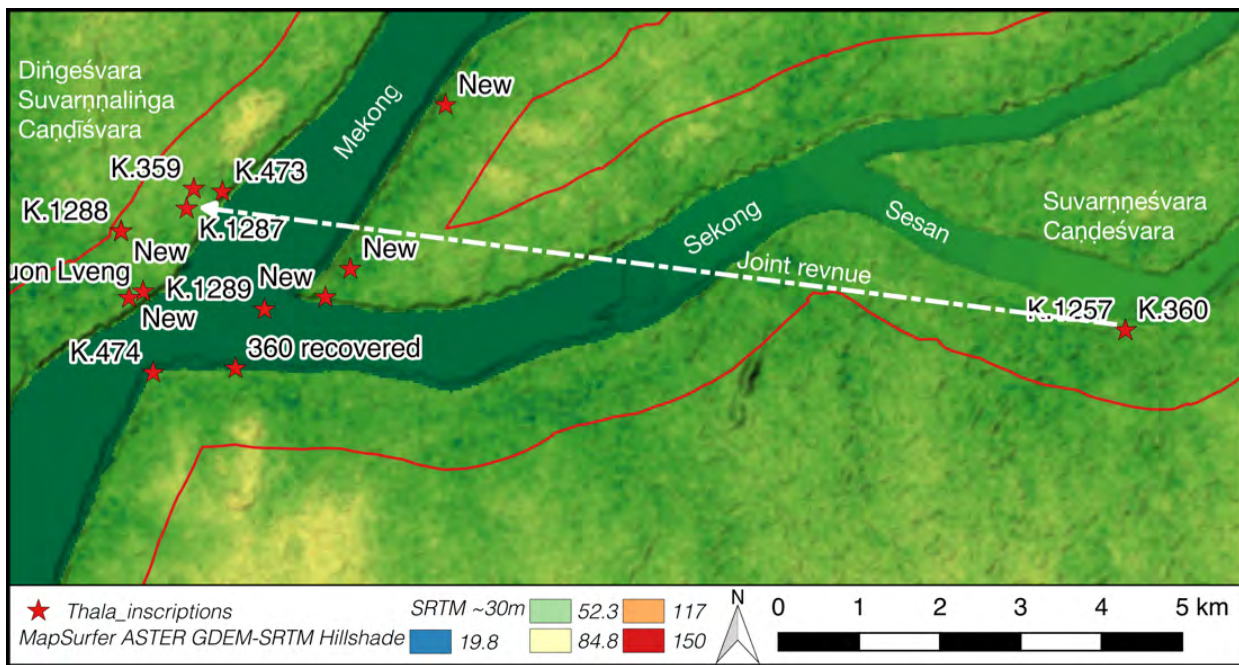


Figure VI-20. Joint-god inferred by K.1287 from Thala Borivat and K.360 from Ba Doem if *Caṅḍeśvara* and *Caṅḍīśvara* were the same god

¹³ <http://sealang.net/ok/corpus.htm>: Ka. TP/I

oem were joint with Thala Borivat (Figure VI-20).

In Kracheh, K.926/664 CE from Sambok, Poñ *Prajñākīriti* joined the donation made to a god *Survarṇaliṅga* with god *Śaṅkarnārāyaṇa*. In K.127/683CE from Sambor, the donation to god with the same name, *Survarṇaliṅga*, was joined with god *Amareśvara* by a Mratāñ *Íśvaravindu*. If both *Survarṇaliṅga* refer to the same god in Sambok [as Vickery (1998: 103) suggested], then the hierarchical regression can be traced from *Amareśvara* of the primary center in Sambor to *Survarṇaliṅga* of the secondary center in Sambok.

VI.5.3 Social Stratification and Centralization

Analysis at an individual level is not possible based on the archaeological data acquired by this project. The different distribution of wealth among the Early Historic settlements during TB Phase II suggests a stratified society. The evidence of continuity between the Early Historic and pre-Angkorian primary center of O Trel, thus, suggests its socioeconomic continuity. Additionally, the princely inscriptions of *Hiraṇyavarman* and *Citrasena* with their *Brahmanical* gods occurred sometimes between 550 and 600 CE followed by records of other elite titles including the Poñ and Mratāñ between 600 and 800 CE. This evidence of continuity suggests that the pre-Angkorian elites could descend from those of the previous period.

Between 550 and 800 CE, the local epigraphic records indicate that, similar to inscriptions from the Mekong delta, the pre-Angkorian populations of the study areas were socially, economically, and politically stratified (Table VI-10).

Type	Term	Context	Translation	Inscription (#line)
Elite	<i>Vraḥ Kamrateñ añ</i>		King	K.124:5-6
	<i>Kanheñ Kamrateñ añ</i>		Queen	K.124:4-6
	<i>Paṃnos/Paṃnvos</i>		Cleric	K.124:14; K.127:10, 13; K.129:4
	<i>Poñ</i>		Matrilineal local chiefs; sometimes hold high positions	K.129:1; K.926:4; K.927:4, 5
	<i>P-añ</i>		Possibly, relates to the title Poñ (see Table IV-7)	K.1287:7

	<i>Mratāñ</i>		Relate to Poñ, but were commonly state officials	K.127: 5; K.133(II):1; K.926:5; K.927:3
	<i>Kuruñ</i>		Governor	K.124:7
	<i>Kurāk</i>		Governor	K.927:2
	<i>Kurek</i>		Governor	K.124:7-8
	<i>Kloñ</i>		Leader	K.927:4; K.926:5; 124:8, 14
	<i>Mahānauvāhakara</i>		Sanskrit: master of a sea-going vessel	K.133(I):1
Workforce	<i>Vā/va</i>		Mr.	In most inscriptions
	<i>Ku</i>		Ms.	In most inscriptions
	Minorities?	<i>Vā atā vrai</i>	Savage grandfather	K.1257:11
		<i>Ku ame vrai</i>	Savage mother	K.1257:13
<i>Ku vrai</i>		Savage woman	K.1257:13; K.133:7, 8	

Table VI-10. pre-Angkorian stratified populations based on inscriptions from Stung Treng and Kracheh within the research areas dated between 550-804 CE

These inscriptions record the pre-Angkorian elite's endowment of agricultural products, animals, and workforces to the temples. Thus, evidence of a temple is also evidence of the pre-Angkorian communities, economies, and social stratifications. The workforces and products assigned to the temples by these elites represent both demographic and economic centralization. A few instances of the recorded workforces with names such as "savage grandfather," "savage mother," and "savage woman" suggest that the population centralization may include the ethnic minorities of the highlands.

This 200-year gap between the Early Historic burials and the later elites renders the attribution of settlement expansion and nucleation to the political centralization superficial. Nevertheless, the current data suggest that centralization or at least some forms of organizational change did occur and that it was associated with the demographic, economic, and ideological centralizations.

VI.6 Summary

Chapter VI. reconstructs the pre-Angkorian communities and economies of the study area based on a combination of settlement patterns, surface and excavated data, and the epigraphic data. The data acquired within the research area suggest there were regional scale organizational changes during c. 500 and 800 CE, associated with settlement expansion and nucleation, the introduction of new religious ideologies as evident by the temples and their inscriptions, and regional integration implied by shared artifact traditions and settlement configuration. The results can be summarized below:

Communities: Settlement Patterns

The pre-Angkorian settlement template of Thala Borivat and Sambor comprises mound, temple, and trapeang. The Thala Borivat settlements expanded at an unprecedented scale c. 150 times the largest Early Historic settlement at O Trel. In Stung Treng, these new settlements clustered into the primary and secondary center of Thala Borivat and Ba Doem. This expansion and nucleation coincided with the expansion of temples.

Between 400 and 500 CE, brick structures appeared in Stung Treng, some of which were built atop the Early Historic settlements, particularly those with Pinkware including as O Trel, Ba Chong, and Ba Doem. Brick fragments associated with temple construction lay in disturbed deposits atop the Trench 6 burial feature at O Trel with an associated date of 355 to 538 CE. Three pre-Angkorian brick structures, two of which had Thala Borivat tradition lintels, are located within this 4-ha area. Other Early Historic settlements provide no evidence of continuity into TB Phase 3 (500-800 CE). The earliest evidence of brick structures located outside O Trel, within an area where no Early Historic ceramics were found, appeared at the same time or slightly after the brick temples first appeared at O Trel. These brick structures are clustered around two major centers of Thala Borivat, occupying the Mekong-Sekong confluence, and Ba Doem near the Sekong-Sesan confluence. By 700 CE, most brick structures occupied the largest settlement extent in Stung Treng.

In Sambor, at Anlong Prang where Pinkware and a blue glass bead were found, a double-chambered brick structure (which is a Thala Borivat temple tradition), was built. Other temples, particularly Kamnap Ta Kin where a variant of the TB lintel tradition was found, were

built soon after Anlong Prang. The spatial distributions of the pre-Angkorian temples and surface ceramics in Sambor represent settlement expansion and nucleation from a smaller Early Historic settlement similar to the phenomenon that occurred in Thala Borivat.

That some of these brick temples were built atop the Early Historic burials suggests continuity in local populations and a transformation from ancestor worship into the later Indic-related religious institutions. The Early Historic burial practice was likely changed from inhumation to cremation or mixed practices as reported in the Chinese accounts. A series of ceramic clusters mixed with ashes and tiny bone fragments, found in Hang Savat's soil trenches, is the earliest evidence of a pre-Angkorian cremated burials with an associate date of 652-769 CE.

Jean Delvert described the 1960s Cambodian settlements where the center was marked by rich and large pagodas and houses built in close proximity to one another; while poor houses with large space between them were located toward the outskirts. This is precisely the pattern observed in Thala Borivat and Sambor where the ceremonial district or the center is defined by clusters of temples and trapeangs; while the randomly spaced temples and trapeangs define the residential district or the edge. These characteristics suggest that both Thala Borivat and Sambor were contenders for central place at a regional scale.

Economies

The research areas lack direct evidence of the pre-Angkorian economies. Yet, some economic activities such as rice agriculture and gardening can be inferred from settlement patterns and inscriptions, which appeared in this region during the 6th to 8th centuries CE. Similar to the Early Historic settlements, the pre-Angkorian settlements were predominantly located within the lowland environment along the rivers. This location provides these communities with access to myriad resources such as fertile land and water for agriculture, particularly wet rice, aquatic resources, as well as communication routes. The epigraphic data from this region lists items such as rice, coconut, areca nut, cotton, and animals were donated by the pre-Angkorian elites to the temples. Most of these items are historically planted and raised in the lowland. The organic materials uncovered from a waterlogged context of Trench 2

and dated between 431 and 641 CE include coconut husk and gourd shell, which suggest the availabilities of these products within the lowlands.

The highland setting, which begins at c. 1km from the river, is characterized by strata filled with bedrock and pebbles and inadequate water sources; all of which is unfavorable for rice agriculture. Nonetheless, some 'anchored temples' and trapeangs are located in the highland near seasonal streams. These temples represent the pre-Angkorian settlement expansion into the highlands. The inscriptions from Thala Borivat and Ba Doem described donations of rice from the dry rice fields and forest rice fields, both of which refer to swidden fields of the highland. Both settlement patterns and the inscriptions suggest that there was an economic integration between the lowland and highland by at least the 7th century CE.

The pre-Angkorian period also lacks evidence of trade and interactions provided by imported beads and ceramics of the Early Historic period. Nonetheless, the shared traditions of ceramics (Buffware, red-painted ware, and kendi), artistic styles (lintel and statuary), inscriptions in both Khmer and Sanskrit, social stratification (elite titles), and settlement configuration (mound, trapeang, temple) suggest that the pre-Angkorian communities of this region and other regions of the Mekong delta and the Mun valley were socially integrated. Only one example relates to traveling the Mekong: K.133 at Sambor, which refers to a donation by the master of sea-going vessel (*mahānavahkara*). Yet, the distribution of *Citrasena-Mahendravarman* inscriptions along the Mekong and the Mun of northeast Thailand imply the use of the river systems and interactions between communities of these regions.

Centralization

The pre-Angkorian period settlement expansions in Thala Borivat and Sambor suggest a general increase in population. The coincidence of this phenomenon with the temple implies its relationship with religious-ideological change, particularly with the introduction of Indic religions and their temples. Settlement expansion into the highland combined with the economic data offered by limited archaeological data and the epigraphic records, dated between 550 and 800 CE, suggest an agricultural integration of the lowland wet-rice and highland dry-rice. Instances of laborers bearing names associated with 'forest' or 'savage' suggest that the population centralization may include ethnic minorities of the highland. The

distribution of the princely families of *Citrasena* and *Hiraṇyavarman's* inscriptions along the Mekong from Kracheh to Stung Treng also suggests that a political integration within this stretch of the Mekong occurred by c. 600 CE.

Based on these data, centralization during the pre-Angkorian period could refer to any or a combination of demographic, economic, religious, and/or political centralizations. The pre-Angkorian period settlement nucleation in Thala Borivat and Sambor fit the settlement hierarchy model where centralizations (be it economic, politic, demographic, and/or religious) occurred at a primary center. The primary center is quantitatively larger and comprised of more temples, trapeang, and, by extension, population than the secondary or third tier centers. The epigraphic data also imply hierarchical relationships between the temples of the primary and secondary center. Donations to the secondary center's temples were sometimes specified to be shared or joint with the primary center's temples.

As discussed in Chapter VI.4, the reconstruction the pre-Angkorian economies of the research areas is insufficient due to lack of direct evidence. A settlement modeling based on correlations between site locations with soil productivity data, modern economic data, and navigation data is required to provide a general perspective on the economy of this region. Chapter VII explores this settlement model.

Chapter VII. Modeling the Communities and Economies of the Pre-Angkorian Mekong-3S Region

This chapter reconstructs the spatial distribution of the pre-Angkorian communities through a combination of the survey data, inscriptions and site locations reported in Chapter VI, as well as sites documented by CISARK and other scholars. Its scope encompasses regional economies and interactions within the Mekong-3S Region, which conveniently fits the Mekong 4th Reach located between Pakse (Laos) and Kracheh where the main hydrological contribution come from the 3S basins (Sekong, Sesan, and Sre Pok) (Constable 2015; MRC 2003, 2005, 9). To what extent do the pre-Angkorian settlement and population distribution within the Mekong-3S region correspond to the physical environments such as agricultural productivity, mineral resource, river rapids, and communication route?

In contrast to the Early Historic period, evidence for trade interaction during the pre-Angkorian period is unclear. Trade items such as beads of the previous period do not appear in the archaeological records within the study area. This pattern is quite common across the pre-Angkorian world and is associated with the shift from maritime trade to inland agriculture during the 7th century CE. Nonetheless, the spatial distribution of the pre-Angkorian settlements along the major rivers, the inscriptions in both Khmer and Sanskrit, and artistic traditions (lintel and statuary) suggest that the Mekong-3S region was connected to other pre-Angkorian centers. The settlement locations correspond well to an economic model and a Mekong navigation model reconstructed based on traveler accounts and colonial censuses dated between the 17th and 20th centuries CE.

A regional pre-Angkorian political economy model suggests that settlements were placed along strategic locations where the river traffic is difficult due to the rapids. These locations offered travelers food, accommodations, places of worship, skilled navigators, boats, as well as access to trade goods of the hinterland. The communities of this region were resilient to crop failure by relying on a combination of wet rice and dry rice agricultures, fishery and forestry resources, and, possibly mineral resources. The spatial distribution of these resources corresponds to the ecological potentials of the lowland and highland.

VII.1 Defining the Pre-Angkorian Mekong-3S Region

As illustrated in Chapter VI. , the pre-Angkorian sites located in the study areas are predominantly concentrated near the river systems. This Chapter VII. studies the pre-Angkorian economic activities of the Mekong-3S Region, a 39,564 sq. km region defined by evidence of the pre-Angkorian sites (e.g., temples, arts, and inscriptions). One hundred sixty-four dated sites based on data from this dissertation fieldwork and on descriptions and photos available on CISARK and other publications were plotted on Google Earth's satellite images (Lorrillard 2014; Souksavatdi 1998; Santoni and Hawixbrock 1998, 1999; Santoni and Souksavatdi 1996). The northwest and southwest boundaries are marked by Phu Malong in Laos (Thala Borivat tradition lintels) and Phnom Sopoar Kalei (south of Kracheh, K.166 of Citrasena). The northeast and east boundaries are based on the pre-Angkorian sites in Attapeu (Laos) and Kampong Cham Kau in Rattanakiri.

This large Mekong-3S region provides a general perspective on the ecological settings favored by the pre-Angkorian communities. An ecological template explored in Chapter VI.3, is applied to the whole region to study settlement history and economic activities. The following sections begin by situating the pre-Angkorian settlements within the ecological highland-lowland settings, which correspond to different economic resources. Then, a navigation model of the Mekong-3S Region is proposed based on examination of the modern river morphological aspects, traveler accounts of the 17th to 20th centuries, and locations of the pre-Angkorian sites. An economic model of a combined agrarian wet rice-dry rice and trade system is proposed for the pre-Angkorian communities of the Mekong-3S Region.

VII.2 An Ecological Model

The survey results suggest that the contrasted highland-lowland landforms described in Chapter III played a crucial role in settlement configurations. Most settlements, both the Early Historic burials and pre-Angkorian temples, documented during this research project are predominantly located within the lowland, which is circumscribed within a 1-km zone along the rivers. Some brick structures are also located further inland. This general pattern can still be observed on modern habitations of this region. This contrasting natural setting provides a rich ecotone for the population of this region.

The following sections explore the relationship between the pre-Angkorian settlement patterns and the surrounding ecological settings at a regional scale.

VII.2.1 Lowland: Agriculture and Fisheries

The lowland or wetland, which includes large and small fertile islands and peninsular, is located along the major river systems. This is the most productive area of medium to high fertility soil, which is suitable for rice agriculture, vegetable and fruit gardens, and aquaculture¹⁴ (Figure VII-1). Flood regime annually replenishes the lowland with fertile alluvial soil. Economic plants such as coconuts, cottons, betel nuts and leaves, sugar palms, sugarcanes, and peppers were reportedly grown along the river in the early 20th century (Anonym 1913b, 13). Animal husbandry, particularly of cows, buffalos, and pigs, was practiced in the lowland.

An early 20th century census reports that Koh Sralay and the peninsular of Hang Savat and Kantuy Ko (Hang Khou Suon) had larger populations than the commercial and

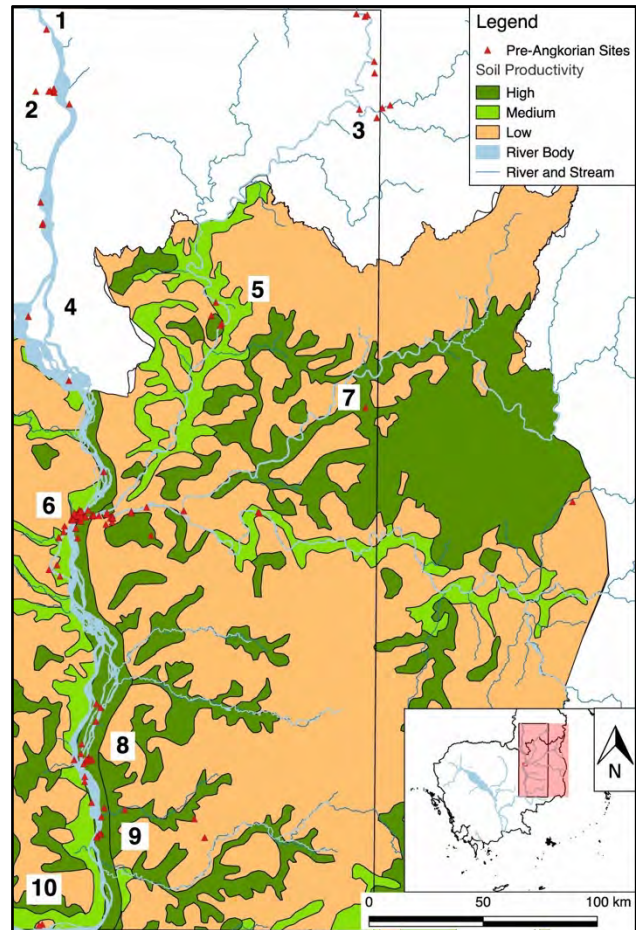


Figure VII-1. Pre-Angkorian sites located within the medium to high soil productivity zones in Cambodia. No data available for Laos but it likely possesses a medium productivity because of the well-irrigated Gleyic Acrisols soil located along the rivers. 1) Phu Malong, 2) Wat Phu, 3) Attapeu, 4) Khon, 5) Siem Pang, 6) Thala Borivat, 7) Kampong Cham Kau, 8) Sambor, 9) Sambok, and 10) Phnom Sopoar Kalei.

¹⁴ Soil productivity data are not available for Laos; however, a 2007 FAO's dominant soil type map places Attapeu and Wat Phu as having Gleyic Acrisols. This soil type is common to SEA and suitable for wet rice in a well-irrigated area along the river but prone to crop failure due to poor rainfall (FAO-UNESCO 1979, 55–56; International Rice Research Institute, New York State College of Agriculture and Life Sciences, and University Consortium on Soils for the Tropics 1980, 96).

administrative center in Stung Treng town (Anonym 1913b; Henri 1916). Current censuses indicate that people living along these river systems are heavily fish-dependent, particularly on migratory fish of the Sesan and Srepok rivers¹⁵ (Constable 2015; Save Cambodia’s Wildlife 2014, 90–91). Rice output in the early 20th century is reported to average between 2.6-3.1 tons/ha, comparable to the fertile areas of the Tonle Sap and the Delta (Guérin 2001: 38). Interviews conducted with farmers during Phase II (2012-2013) indicate that the current rice output within the lowlands of Thala Borivat and Ba Doem, with traditional methods (rain-fed, animal driven, and no chemical fertilizer), is between 3-5 tons/ha.

Lowland Settlements

Eighty-five percent of the verified Early Historic and pre-Angkorian sites of the Mekong-3S Region are located within a 1-km zone along the river systems (Table VII-1 and Figure VII-2). They are considered as lowland communities dependent on wet rice agriculture. Inscriptions from this region—particularly from Sambor and Sambok—refer predominantly to rice fields of the lowland located near various rivers (Table VI-9). K.134/781 CE from Lboek Srot located to the east of Sambor includes *damriñ...pdai karom* (garden in the lowland), *pdai karom* (lowland). These inscriptions also account for donations of draft animals including cows and buffalos, which are currently raised in the lowland and used for plowing. K.360 lists melted butter (ghee) as a gift to a god. Other donations of coconut, betel nut, cotton, palm syrup, sugar, millet, sesame and ginger, were likely products of the lowlands. Most of these crops were cultivated on the levees during the colonial period. Furthermore, coconuts and gourd shell were found in the waterlogged context of Trench 2 with an AMS date of 431 to 641 CE located within a temple precinct of Trapeang Khnar.

Productivity	Sites	%
High	56	40
Medium	60	43
Low	24	17

Table VII-1. Proportion of the Mekong-3S Region pre-Angkorian sites to Soil Productivity in Cambodia

¹⁵ This dependency is being threaten by multiple hydroelectric dams currently proposed and built in Laos, Vietnam, and Cambodia.

VII.2.2 Highland: Swidden Agriculture, Fisheries, and Forestry Resources

In contrast, the highland is currently dominated by forest and populated by various ethnic groups practicing swidden agriculture, exploiting fisheries and forestry resources such as hunting, deer hide, ivory, elephant capture, peacock feather, boat, oar, cardamom, gamboge, honey, bee wax, etc. (Baird 1995, 2000; Garnier 1885; Guérin 2001, 2008; HOR et al. 2014; Kersten 2003; Ruohomäki 2004; Van Wuysthoff and Garnier 1871; You, Kleinpeter, and Diepart 2015). Fisheries play an important role for the highland communities located upstream from Stung Treng (e.g., Baird 1995; Baird and Mean 2005; Baran et al. 2014). Ramie (*Boehmeria nivea*) was cultivated to

make fishing nets; while rattans were exploited to make ropes for various purposes including navigation. Colonial censuses from 1905 indicates that the ethnic minorities accounted for two

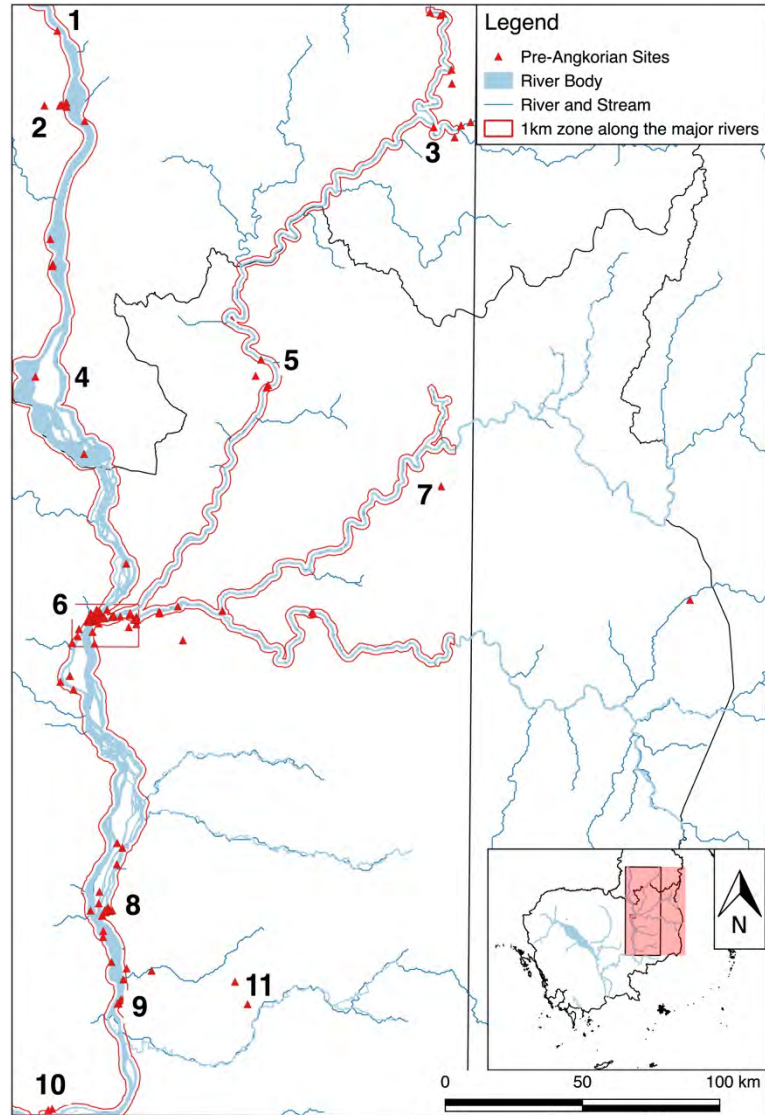


Figure VII-2. 85% of pre-Angkorian sites identified in this region are located within 1km of the rivers and on islands of the Mekong. 1) Phu Malong, 2) Wat Phu, 3) Attapeu, 4) Khon, 5) Siem Pang, 6) Thala Borivat, 7) Kampong Cham Kau, 8) Sambor, 9) Sambok, 10) Phnom Sopoar Kalei, 11) Lboek Srut and Preah Theat Khvan Pir.

thirds of the population in this region¹⁶ (Guérin 2001, 37). Around Stung Treng, the highland starts at c. 1km from the river and is characterized by shallow pebble and rock strata, which render cultivation difficult. Various tributary streams and ravines traversing the highlands to the major rivers create a series of flat narrow valleys¹⁷, which allow the expansion of dry rice fields upland. In 1905, the yield of dry rice around Siem Pang was between 2.3-2.4 tons/ha, which is relatively productive compared to wet rice (Guérin 2001, 40). Until recently, villagers in Stung Treng preferred dry rice agriculture of which the fields spread c. 7 km to 20 km inland and reported an estimated yield between 2-3 tons/ha. Nowadays, they are encouraged by the government and NGOs to focus on wet rice agriculture with new types of crops.

Recent colonial records portray this area as economically vibrant and marked by complex multi-ethnic exchanges, warfare, and slave raiding during the 17th and 19th centuries CE (e.g., Aymonier 1895; Baird 2010a, 2010b; Garnier 1885; Guérin 2001, 2008; Van Wuysthoff and Garnier 1871).

Hinterland Settlements

It is within this highland setting that some brick structures, the ‘anchored temples’, were reported. Only 25% of sites reported in the Mekong-3S region, from Kracheh to Wat Phu, Attapeu, and Veun Sai, are located in this setting. These temples are relatively dated by four known temples in Kracheh, Stung Treng, and Attapeu, e.g., Preah Theat Khvan Pir, Lboek Srot, Prasat Ku, and Kampong Cham Kau, and Upmong Sesu (e.g., Bruguier and Lacroix 2017; Lorrillard 2014). They belong to the pre-Angkorian period based on inscriptions, architectural elements, and statuary. Preah Theat Khvan Pir (K.121/717 CE) and Lboek Srot (K.134/781 CE Jayavarman II) are located 35 km east of Sambor-Sambok, within the area historically inhabited by the ethnic *Phnong*. K.1257/700-800 CE from Ba Doem possibly referred to the ethnic minorities of this region as it listed laborers from different communities or groups providing

¹⁶ During this period, Stung Treng covered a large portion of Preah Vihear province as well as Rattanakiri province.

¹⁷ Modern swidden fields in Ratanakiri, further to the east, are commonly located along the streams (See: You, Kleinpeter, and Diepart 2015)

services to Ba Doem, called '*hajai*¹⁸,' a Cham¹⁹ word for "a shelter or lodge for gardeners or field keeper or domain, property" (Pou 2004, 545). One of these was *Hajai ai Jam-er* where three persons likely belonged to an ethnic family. These include *vā atā vrai* (Mr. elderly wild/forest/savage man), *ku ame vrai* (Ms. mother wild/forest/savage women), and *ku vrai* (Ms. wild/forest/savage woman).

Another inscription, K.124/803 CE of the three queens from Sambor lists a group of workforces called *Tmon*, which is translated as either "debt slave," "small [minor?] laborers," or a group of minorities of the same name living in this region (Aymonier 1900, 305; Jenner 2009; Pou 2004, 227). These inscriptions also imply products of the highlands. Another community of K.1257, *hajai ai sre vrai* or property of 'forest rice field', conceivably refers to swidden fields. K.1287 from Thala Borivat also lists a donation of rice from a *sre ai camkā*, dry or swidden rice field, possibly, located further inland from Thala Borivat. Beeswax and honey mentioned in K.124/803 CE were likely highland products.

Since brick temples and their inscriptions are generally linked to the pre-Angkorian and Angkorian Khmer and their spatial distribution is restricted to along the rivers, the anchored-temple likely represent a Khmer settlement expansion into the highland. The spatial distribution of these anchored-temples resembles two functions of the later settlements recorded between the 17th to 20th centuries, 1) Hinterland, and 2) Trading Post.

The first function is associated with the exploitation of dry or swidden fields as reported by inscriptions mentioned earlier as well as the modern practice of this region described by Mathieu Guérin (2001). The second function fits Van Wuysthoff's (Van Wuysthoff and Garnier 1871; Kersten 2003), also Garnier (1885), description of Sambok that it was the "corridor to the

¹⁸ This term is perhaps an equivalent to '*vnok*' or group used in K.904/713 CE, K.134/781 CE, and K.124/803CE. Vickery (1998: 296-297) argues that toward the end of the pre-Angkor period (the 8th century CE), the inscriptions refer to laborers of the temple without mentioning their patrons, the Poñ and Mratāñ, which was common during the 7th century.

¹⁹ It is uncertain whether this term was introduced by the Jarai, other Chamic speakers living along the Sesan further to the east (For locations of these communities, see Guérin and Padwe 2011). This term was used in two other instances in K.324/893 CE from Lolei/Angkor and K.119/1014 CE from O Smach located further away from known Chamic speaking groups.

Phnong Country” inland where forestry products were traded. Additionally, the charter of Wat Sambok indicates that it was found in 1601 CE by king *Soriyopoar* and designated as the ‘gate of the country’ to conduct foreign affairs with Laos and the Jarai. The latter was a tribal federation of the Jarai of central Vietnam and Phnong of eastern Cambodia ruled by the Jarai’s shamans known as the “King of Water” and “King of Fire,” who maintained a ritual alliance with Cambodia until the end of the 19th century (Piobb 1895; Leclère 1903; Meyer 1965). Van Wuysthoff added that the Priest-Governor of Sambor conducted king’s minor duties on his behalf because Sambor was located at the frontier between Cambodia and Laos (Kersten 2003, 20–21; Van Wuysthoff and Garnier 1871, 255).

VII.2.3 Mineral Resources Exploitation

Evidence of metallurgical activities in Stung Treng and Sambor is limited. Yet as explored in the previous section VI.4.2, metal was likely exploited for craft production by the Early Historic and pre-Angkorian communities of the Mekong-3S region. Due to limited data, it is not possible to identify the type of the exploited metal, e.g., copper, iron, etc. The Industry of Angkor Project (INDAP) reports iron smelting activities (primary production) around Preah Khan Kampong Svay (120km west of Thala Borivat), which began as early the 8th century CE (T. Hall et al. 2016; Pryce et al. 2014). Other iron smelting sites were also reported in Mlu Prei located at 80km northwest of Thala Borivat, by Thuy Chanthourn and his team (Thuy 2010). These sites likely exploited the known iron deposit at Phnom Dek located 60 km southwest of Mlu Prei and near Thala Borivat (Figure VII-3). Francis Garnier (1885, 83) reported that iron bar from Tonle Ropou (the area between Mlu Prei and the Laos border) was used as money in this region during the 19th century (also reported by Anonym 1913a). Copper, tin, lead, zinc, and gold deposits have been found concentrating around the pre-Angkorian settlements of Wat Phu and Attapeu in Laos (Marutani 2006, 11–18).

Gold looting within sites located in Stung Treng and Sambor was reported in Chapter III and IV. The so-called ‘fish-egg gold’ was, possibly, naturally formed alluvial gold similar to that reported from Prohear and other Southeast Asian sites {Citation}. Contemporary gold mines are located at O Tron, 30 km east of Sambor (Sieng 2004; Spiegel 2014), Bo Kham/Andong Meas of

the upstream Sesan reported in 1894 (Anonym 1913b, 20), as well as the upstream Sekong in Siem Pang and Attapeu (Aymonier 1895; Garnier 1885, 82; Van Wuysthoff and Garnier 1871).

During the 1590s CE, a Cambodian king, probably, *Preah Satha* [date based on Mak Phoeun (2002)], led a naval expedition up the Sekong river to Attapeu to seek control over gold quarries located in the Sekong tributaries (Van Wuysthoff and Garnier 1871, 256). Recent official and unofficial iron, gold, and other metal mining licenses were granted around the study area. Pre-Angkorian and Angkorian sites are located near these resources, yet their exploitation in antiquity remains unknown (Figure VII-3).

VII.3 Modeling the Mekong

Navigation

The pre-Angkorian corpus does not mention trade activities or river traffic of this region. Although the community roads likely existed, as the term ‘road’ was mentioned by the inscriptions from Sambok and Sambor, no trace of land routes linking multiple settlements along these river systems has been identified. Given the terrain conditions of this region (e.g., multiple deep streams and ravines), durable roads like the Angkorian highway would be costly

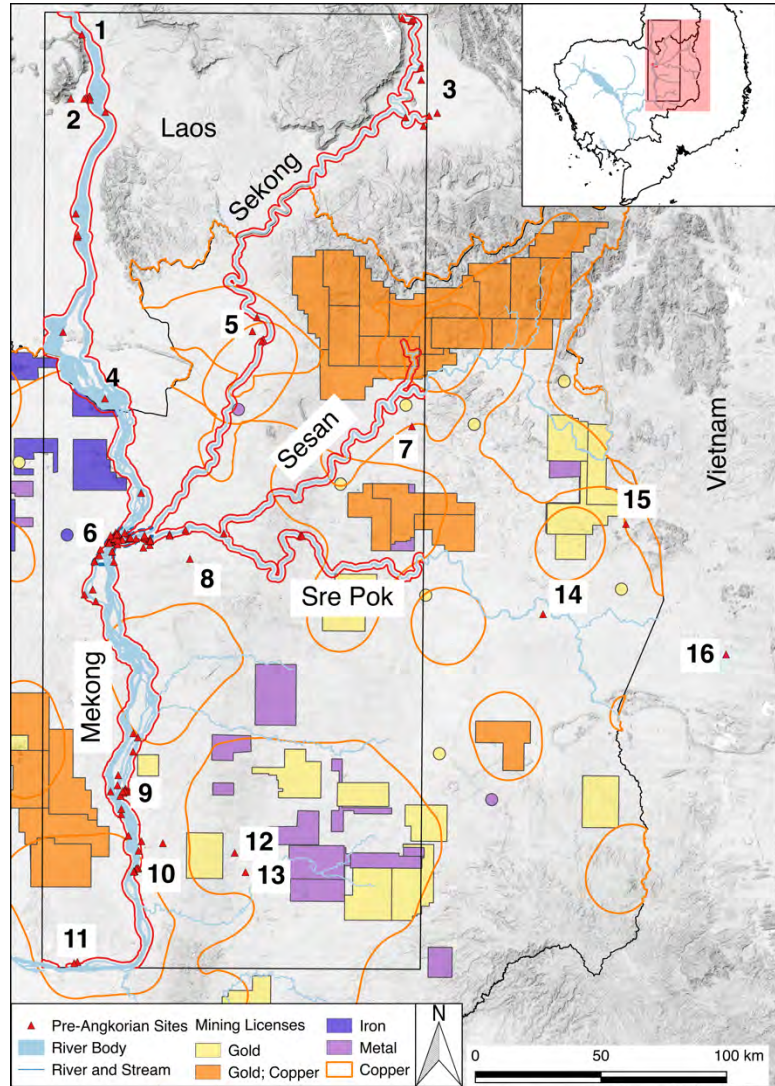


Figure VII-3. Map of government licensed mining areas in northeast Cambodia from 1995 to 2014 compiled by Open Development Cambodia. 1) Phu Malong, 2) Wat Phu, 3) Attapeu, 4) Khon, 5) Siem Pang, 6) Thala Borivat, 7) Kampong Cham Kau, 8) Phnom It, 9) Sambor, 10) Sambok, 11) Phnom Sopoar Kalei, 12) Lboek Srut, 13) Preah Theat Khvan Pir, 14) Angkorian inscription of Koh Mayol, 15) Tak Nang, 16) Yang Prong. (15 and 16 are Cham temples c. 9th-14th centuries CE)

as it requires yearly maintenance and multiple bridge constructions. Furthermore, even with all the troubles encountered during Van Wuystof's river trip to Laos during the 17th century, the Dutch concluded that the Mekong was the best commercial route to Laos compared to great efforts and expense of the land routes using carts (Kersten 2003).

River traffics can be inferred from several lines of evidence including settlement locations, traveler accounts, and river morphology. The following sections combine the modern river morphological studies and recent traveler accounts to construct a navigation model of the Mekong-3S region. Archaeological evidence such as locations of temples and inscriptions will be plotted against the navigation model to infer that the pre-Angkorian settlements of the were actively engaged in river traffics.

VII.3.1 Implication of the Mekong Navigation

The rise of early civilizations, including the pre-Angkorian centers of the Mekong, are commonly associated with favorable aspects of the rivers such as that they provide water, enrich the surrounding soil through annual flood, and most importantly, are communication routes. The same ideas drove the French colonial ambition to turn the Mekong into a major trade route into southern China, which started the Mekong Exploration between 1866 and 1868 (Garnier 1885; Keay 2005; Osborne 1999, 2000). Communication routes and techniques influence the type of services and control provided by communities located along the river. For instances, the common riverine or maritime centers are 'entrepôt' where goods were traded, and services provided. Obstacles such as piracy and distance also encourage different types of service and travel, and have been applied to the peninsular Thailand where ocean traders from the Indian Ocean may traverse a short-distance inland route and continue their voyage through the Gulf of Thailand and the South China Sea (e.g., Allen 1977, 1997; Bronson 1977; Christie 1990, 1995; Ian Glover 1990; Manguin 2002, 2004; Wolters 1967).

River networks are often discussed based on favorable traits (e.g., at the intersections of rivers or mouths of the river); for example, Vickery (1998: 379), Bénisti (1968) and Lévy (1970) all suggest that control over the river traffics contributed to the development of the pre-Angkorian regional centers located along the Mekong. However, most known pre-Angkorian and Angkorian sites are located far from the Mekong River. These sites are gradually located

closer to the main river near Kampong Cham where the wetland becomes circumscribed to along the river (Cisark 2018; Stark 2006c). Traveler accounts and recent navigation surveys of the Mekong offer yet another characteristic of the riverine network, particularly the rapids forming traffic obstacles and bottlenecks. The following sections explore traffic patterns across these rapids and correlate them with the pre-Angkorian sites locations.

VII.3.2 The Mekong River System and their Rapids

The recent navigation assessment produced by the Mekong River Commission (herein MRC) provides the most possible details for the study area (MRC 2012, 205–368). Though data are available for the entire Mekong basin, this section will briefly cover the navigational aspects of the Mekong from Pakse (Laos, Wat Phu) to Kracheh to construct a navigation model. Then, the model is used to correlate the known archaeological sites within the study area.

Kracheh forms a transitional boundary of the Mekong hydrology and hydrodynamics corresponding to the navigational aspect of the river (Figure VII-4). Upstream from Kracheh, the Mekong flows within a well-defined and geologically stable channel marked by braided channels, islands, bedrocks, shoals, deep pools, and rapids; while downstream from Kracheh, the river flows within a large alluvial channel and overflows into the surrounding floodplains during the flood season (MRC 2005, 49). The stretch of the Mekong from Chiang Saen to the

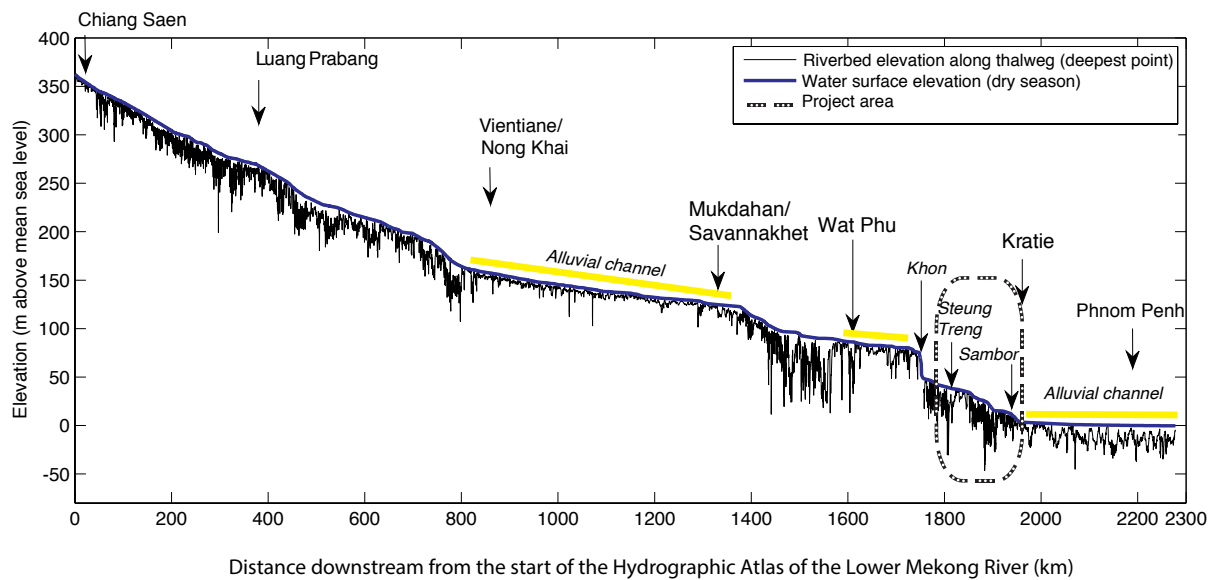


Figure VII-4. Riverbed elevation of the Mekong from Chiang Saen to Phnom Penh, adapted from (Halls et al. 2013:46)

South China Sea is subdivided into multiple sections corresponding to different characteristics, e.g., port locations and river morphologies. The project area (Stung Treng and Kracheh) is located within the most difficult sections of the Mekong, which has attracted multiple reconnaissance surveys since the colonial period (Figure VII-5).

The most recent survey was conducted by the Mekong River Commission focusing on the distribution of deep pools, which are major habitats for aquatic life, as well as a feasibility study for the transportation of dangerous goods (MRC 2012; Halls et al. 2013). The description of each section from Pakse to the South China Sea, which supports different ship carrying capacity (Deadweight Tonnage or DWT based on 100m vessel size) according to the river morphology, is summarized in Table VII-2 and Table VII-3 below (e.g., Hun, Wens, and Geerinck 2016; MRC 2012, 2015; Sar 2010). According to this DWT table, the carrying capacity of the Mekong 4th reach is fairly similar to that of the Bassac and Tonle Sap. However, the reduced load of the last two rivers is associated with the shallow channels, and not the exposed-bedrocks and rapids of the Mekong. Boat travel in the Mekong tributaries have to take into consideration the impact of slope, e.g., the average slope of the Sekong is 2.03%; for the Sesan and Srepok it averages at 0.94% and 0.99% respectively (Meynell 2014, 11).

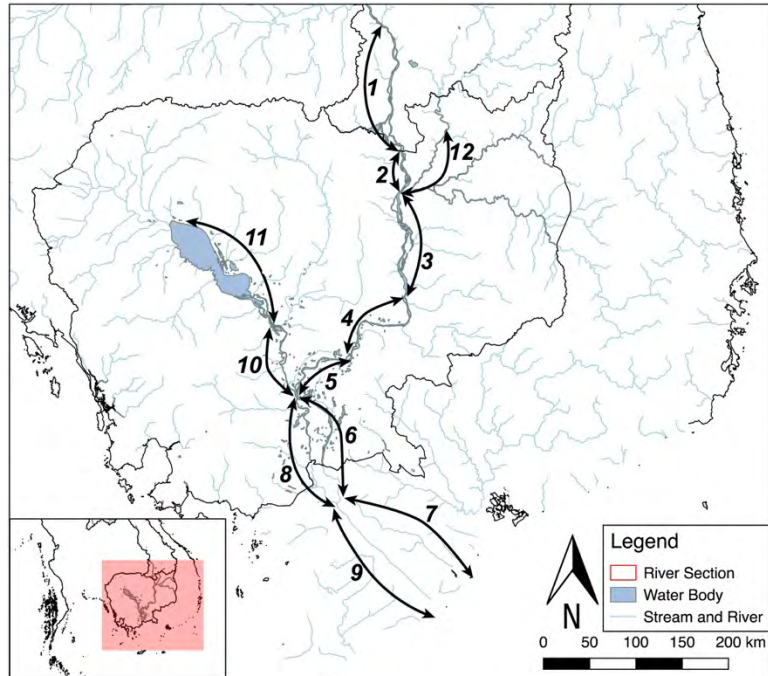


Figure VII-5. Sections of river traffic. 1) Pakse-Khon, 2) Khon-Stung Treng, 3) Stung Treng-Kracheh, 4) Kracheh-Kampong Cham, 5) Kampong Cham-Phnom Penh, 6) Phnom Penh-Vamnau (Mekong), 7) Vamnau-South China Sea (Mekong), 8) Phnom Penh-Vamnau (Bassak), 9) Vamnau-South China Sea (Bassak), 10) Phnom Penh-Kampong Chhnang, 11) Kampong Chhnang-Siem Reap, 12) Stung Treng-Siem Pang.

Section	Km	Characteristics	Navigability
Pakse-Khon	148	Labyrinth of canals, waterways, islands, sand banks and rock outcrops, hidden or not	Tricky, suitable for small vessels, impossible at Khon
Khon-Stung Treng	37	The river is tricky and marked by rocky outcrops and shallow, narrow, sharp bends; shallow waters and numerous slow-flowing branches in the low-water season and turbulent currents during the high-water season.	Dangerous, difficult, suitable for small vessels
Stung Treng-Kracheh	123	<p>The section is complex and scattered with hundreds of islands, rocky outcrops, and shoals creating two major rapids, Sambok and Preah Patang, and many smaller ones. Most of the islands and rock outcrops are flooded during the rainy season and become wetlands during the dry season with dense vegetation obstructing the view of the channel. These characteristics produce strong currents and heavy turbulence within the rapids.</p> <p>The channels are characterized by small bends (some of which are S-shape) and strong side currents. These features are dangerous for navigation because vessels must make two 180-degree U-turns to avoid rocky outcrops and islands. During the dry season, only skilled pilot can navigate through these obstacles.</p>	Navigation is very difficult and requires skilled pilots to navigate the narrow and sharp bended channels
Kracheh-Kampong Cham	113	Large and deep channels with shoals and unstable sand banks.	Some problems during the dry season, skilled pilot is required

Kampong Cham-South China Sea	454	This section has large and deep channels suitable for seagoing vessels. In April and May 2015, two seagoing vessels with the capacity of 3075DWT and 4600 DWT respectively sailed to Tonle Bet (Kampong Cham) and carried 1594-2000 metric tons of Cassava (MRC 2015, 35).	Favorable condition year-round for navigation
------------------------------	-----	--	---

Table VII-2. Navigational conditions along sections of the Mekong (Meshkova and Carling 2012; MRC 2012, 2015)

River	Section	Length	Low water (DWT)	High water (DWT)
Mekong	Pakse-Khon	148	20	50
	Khon-Stung Treng	37	15	50
	Stung Treng-Kracheh	128	20	50
	Kracheh-Kampong Cham	121	80	400
	Kampong Cham-Phnom Penh	106	2000	5000
	Phnom Penh-Vam Nao	154	3000-4000	5000
	Vam Nao-South China Sea	194	3000-4000	3000-4000
Bassac	Phnom Penh-Vam Nao	97	20	50
	Vam Nao-South China Sea	188	5000	5000-6000
Tonle Sap	Phnom Penh-Kampong Chhnang	94	1000	2000
	Kampong Chhnang- Siem Reap	155	20	150

Table VII-3. Maximum Navigable Vessel Size (DWT, based on 100m-vessel), in the Mekong Basin (Adapted from: Sar 2010; See also: Hun et al. 2016; MRC 2012, 2015). The project locations are shaded.

VII.3.3 Traveler Accounts

The accounts reported here came from four main sources. The earliest known account comes from a Dutch trader, Gerrit van Wuysthoff, who set out to explore the Mekong as a commercial route from Cambodia to Vientiane (Laos) in 1641-1642 (Van Wuysthoff and Garnier 1871; Kersten 2003). He traveled through the Mekong from Phnom Penh to Vientiane in 1641 CE using twelve Cambodian boats from Oudong-Phnom Penh. Another account comes from the French scientific exploration of the Mekong led by Doudard de Lagré and Francis Garnier conducted in 1866 CE. The trip started with a steam boat until Kracheh and switched to eight



Figure VII-6. Boats with bamboo platform, staffed by 6 to 10 persons, designed to go through rapids with the help of oars, gaffe with iron hook, and ropes. The scene here possibly depicted the Preah Patang rapids north of Sambor (Garnier 1885:73)

wooden boats, 15-25 meters long, modified to cross the rapids (Garnier 1885, 68–69) (Figure VII-6). These boats were canoes, made out of a single tree trunk, fitted with a surrounding bamboo platform, which allowed the pilots to walk around and stir the boat against strong currents. Bamboo poles attached with an iron fang on one side and an iron fork on the other end allowed pilots to pull or push against the bank, rocks, or tree branches. The canoe itself was covered by a thatched roof for lodging and storage. These boats, depending on the size, carried between six to ten pilots or stingers (Garnier and Delaporte 1996, 53–55).

The other detailed account was compiled by Aymonier and his Cambodian assistants who travelled the Mekong and Sekong to Laos and northeast Thailand in 1885 (Aymonier 1895; Guérin and Chhom 2014). Like his predecessors, Aymonier and his crew started with a steam boat from Phnom Penh to Kracheh, then switched to local boats, similar to those used by Garnier's team, arranged by the Sambor/Sambok governor. Additional information regarding the river systems (Mekong, Sekong, Sesan, and Srepok) was obtained from colonial reports of

Stung Treng in the early 1900s as well as a series of short boat trips and interviews conducted by this research project (Anonym 1913b; Henri 1916; Wéber 1895).

These accounts are summarized in the Table VII-4 below according to each river section provided in the previous Table VII-3, which also overlap major stops used by different teams.

Section/Rapids	Date-Duration	Mean	Comment	Team*
Phnom Penh-Kracheh	July 29- August 01, 1641	Local boats	Thirteen local boats carrying more than 30 people from Oudong, no account of obstacles. It took four days to reach Chhlong (Return: Sambok-Han Chey April 3-7, 1642; 8-11 April: Phnom Penh)	1
	July 7-9, 1866 2 days	Steam boat	No major description	2
	October 1883	Steam boat	No major description	3
Kracheh-Sambor: Sambor/Sambok Rapids	August 2-5, 1641	Same boats	Land route was used to bypass the dangerous water of Sambok rapids. Sambok was a major trade center between Attapeu and the minorities, “Phnong”, inland. He paid tribute to the priest-governor of Sambor, who oversaw the King’s affairs for the border region.	1
	13-14 July 1866	Switched to local boats with special design	Eight boats (15-25m, maned by 6-10 persons, total 50 crew members) provided by the governor of Sambor-Sambok. It took 10 hours to cross the rapids and reach Sambor.	2
	September 28- October 1, 1883	Local boat with special design	Procurement of local boats at Kracheh by the local officials. Stopped at Thma Kre and Sambok.	3

			Ropes were used with oars and gaffes to propel through the rapids of Prek Kampir (Sambok).	
Sambor-Stung Treng: The Preah Patang rapids	August 5-17, 1641	Local boats	10-11 days of no major description	1
	July 15-21, 1866	Same boats	It took 3 days to cross the rapids, while the water kept rising rapidly. Garnier surveyed the dangerous part of the rapids with two skilled pilots. It took only 1 day to return to Sambor.	2
	October 03-07, 1883	Local boats	Encountered Laos merchants in Sambor, learnt about the river conditions from Sambor to Stung Treng. He concluded that with good pilot, large boats can navigate through the Preah Patang rapids during high water. The major issue for trade here were the pirate-infest areas near rapids.	3
Stung Treng-Preah Angkeal/Khon: Series of rapids and the Khon Fall	August 19-25, 1641	Local boats	It took 6-7 days to reach Khon after passing a series of small rapids and mangrove forests. (the return trip only took 2 days)	1
	August 1866 10-11 days (unclear, Garnier passed out for 10 days)	Switch to Laotian boats with similar design	Switch boats in Stung Treng (for political reason? Cambodian boatmen had to return home to help with transplanting rice). It took 4 days to reach Khon. Describe the importance of Khon and Khong islands for commercial purpose.	2

			The return trip downstream only took one day.	
	October 14-17 1883	Local boats	The navigation was described as more annoying than between Sambor and Stung Treng because of traveling through the flooded forests and rapids where branches and tree trunks blocked the routes. Before reaching Khon on the 18 th , rattan ropes and oars were employed to go through the rapids.	3
Khon-Bassac (5 km north of Wat Phu, 30km south of Pakse)	5-18 September, 1641	Local boats	Slow hunting trips (food stocks) on two islands, possibly include Don Daeng in front of Wat Phu.	1
	6-11 September 1866	Local boats	Five days from Khong to Bassac due to favorable river condition	2
	October 25-29 1883	Local boats	Took a series of stops from Khon to Don Sai where the river is larger all the way to Bassac.	3
Stung Treng-Attapeu: series of rapids	5 August 1866	Local boats	De Lagré went to Siem Pang. No description was provided but he recommended that it was “navigable with some work”.	2
	October 1883	Local boats	The Cambodian assistants, Khim and Nou, traveled from Stung Treng to Siem Pang (6 days) and Siem Pang to Attapeu (7 days). This trip involved frequent boat changes at Siem Pang and other minority villages, a service provided by the king of Bassac.	3

	1900-1910?	Small boats	Provide no specific description beyond that boat traffic was possible year-round to Attapeu. The report claims that steam boat can reach Siem Pang.	4
Stung Treng-Sesan-Sre Pok confluence: Series of Rapids	1900-1910?	Local boats	Small boats were possible from Stung Treng to Veun Sai (6 days) and Bohkam (Andong Meas) through the Sesan and Stung Treng-Lumphat through the Srepok.	4
	June 2011, March-May 2014	Local fishing boat with engine	Around Ba Doem, parts of the Sesan are dominated by bedrocks and strong currents. At Chuor Neakta, the rapids create a dangerous turbulence that skilled pilot was required.	5
*Survey Team: 1) Van Wuysthof 1641; 2) Francis Garnier-Louis Delaporte 1866 and 1996; 3) Étienne Aymonier 1883; 4) Colonial reports (Anonym 1913b, 8; Henri 1916, 57–58; Wéber 1895); 5) Thala Borivat Archaeological Project 2011-2014				

Table VII-4. Traveler accounts of the Middle Mekong Navigation from the 17th to 20th centuries

VII.3.4A Navigation Model for the Middle Mekong

The Mekong section from Stung Treng to Kracheh is considered laterally stable due to its narrow corridor, and that only one paleochannel was observed in Sambor (Meshkova and Carling 2012, 12). The pre-Angkorian channel could be relatively similar to the modern one. A navigation model reconstructed based on historical observations is thus applicable to the pre-Angkorian period. Four characteristics associated with the rapids and settlements along the rivers are extrapolated from the physical characteristics and traveler accounts summarized in Table VII-4.

Food and Services

Major rapids like Sambor/Sambok, Preah Patang, and Khon were described as having violent turbulence, exposed bedrocks, and fast-moving floating trees all of which were dangerous to boat travel. Past travelers seek local boats designed to traverse the rapids and experienced guides or pilots and manpower to navigate these dangerous sections. The communities located upstream or downstream the rapids such as Sambok, Sambor, and Stung Treng were the sources for such services, which were provided by the governors.

Aymonier (1895: 23) wrote that, on top of free meals, the boat patrons had to pay a set price for boatmen who participated in the return trip to Sambor, Sambok, and Phnom Penh. Khim and Nou, Aymonier's assistants who traveled the Sekong, remarked that a Laotian village located north of Siam Pang called Ban Keng Phao were obligated to replace a passing traveler's boat (Aymonier 1895, 1:124). This replacement was possibly crucial for travelers to pass the next series of rapids upstream before reaching Attapeu. Garnier in 1866, Aymonier in 1883, and Wéber in 1895 all had their boats and crews arranged or rented by the governors of Sambor and Sambok. Van Wuysthoff, in 1641, was the only one to use the Cambodian merchant boats from Oudong all the way up to Laos, likely through an arrangement with the court at Oudong. Nevertheless, he noted the prominence of the priest-governor of Sambor, who was both the religious leader and the administrative governor, in facilitating travelers. From Khon northward, the pilots from Cambodia insisted to the Dutch that Lao pilots and guides were needed to move forward due to unfamiliar river conditions and being in a different country.

Trade and Interaction

Another characteristic is that some of these centers were historically connected to the hinterlands, particularly to the area dominated by various minorities. Traveler accounts from the 17th to 19th centuries described Sambok as a major intersection between inland routes to Attapeu and the 'Phnong' region, a minority name that the Khmer used to refer to all upland minorities. These centers were vibrant markets where Khmer, Laos, Chinese, and other ethnic groups traded their products, and for restocking supplies. These characteristics resemble the characterization of early Southeast Asian coastal centers functioning as entrepôts and markets.

Traffic Control

Rapids create bottleneck along the communication routes, which facilitate traffic controls such as tax and duties imposed upon travelers by the state, rebels, and pirates alike. Aymonier describes the dangers of the route from Sambor to Khon that caused Laotian merchants to seek his protection. One such danger was the installation of a custom post on an island near the Preah Patang rapids by the insurgents led by the rebel prince Sivatha in 1882 CE. These characteristics enable the centers like Sambor, Sambok, Stung Treng, and Wat Phu to effectively control the river traffic, primarily for tax purpose as well as conducting foreign affairs with Lao and other minorities. Van Wuysthof reported that traders had to report their trade items and made gifts/tax to the priest-governor of Sambor in 1646 CE. The foundation charter of Wat Sambok dated to 1601 CE specified the tax duties of boat merchants to both the Wat and the Sambok governor.

Powerful Spirits

Major rapids like Sambor/Sambok, Preah Patang, Juor Neakta (Sesan) are believed to house powerful Neakta where boat travelers stop and make offerings to ensure their safe trips. Van Wuysthof reported that his boatmen prayed whenever they traversed the rapids and that they made an offering at Ba Chong upon their safe return from Laos. Aymonier and his Khmer assistants provided a vivid aspect of rituals associated with the Neakta and boat travels along the river systems, e.g., drums and gongs were used to scare the evil spirits of the rapids at Khon (Aymonier 1895). During our boat trip to Juor Neakta in May 2014, the pilot offered incenses and cigarettes invoking the Neakta for a safe trip²⁰.

The next section applies this navigation model to analyze archaeological data, primarily, site location.

²⁰ Our crewmember, Chrai Chantha, who served in the provincial police Serious Crime Unit, recalled a boat mission here in the 1990s to retrieve the bodies of drowned cow-buffalo merchants. These merchants traveled upstream to different villages along the San river to buy cows and buffalos and brought them back into town. The accident was said to cause by a disrespect to the Neakta because one of the merchants had urinated near the hut and angered the Neakta. Both Chrai Chantha and Som Thon reported that boat travelers must make offerings of incense, chicken, bananas, and other foodstuff to the Neakta at different rapids to ensure their safety.

VII.4 Pre-Angkorian Mekong Navigation

The only inscription of the Mekong-3S region that mentions boat is K.133 from Sambor. It lists a donation by a *mahānavāhakara*, which Coedès translated as a '*chief of pilot*' (Coedès 1953, 5:81); Jenner translated as a '*master of a sea-going vessel*'; while Vickery (1998: 379) preferred the '*great shipper*'. A similar Sanskrit form was used as *mahānāvika Buddhagupta* on a 6th century CE Bujang valley of Kedah inscription (Guy 2014, 74). Guy translates the title as a '*ship captain*' on page 10 and the '*great sea captain*' on page 74. The following sections use the archaeological artifacts and temple locations to argue that the Mekong was a major traffic route of the Mekong-3S region.

VII.4.1 Archaeological Sites

As described in Chapter IV and V, multiple evidence such as beads, Fineorange ware, and Buffware all suggest that Thala Borivat became integrated in a regional trade network as early as 300 CE. CISARK site database and surveys conducted by Michel Lorrillard in Laos, although incomplete, suggest that most temples of the Mekong-3S region are located along the rivers. Similar patterns were observed on the pre-Angkorian sites in the Mun valley of northeast Thailand (C. Evans, Chang, and Shimizu 2016; Welch 1998).

Most of the 164 sites located along this stretch of the Mekong are reported by CISARK and most of them have clear associations (e.g., inscriptions, lintels, and pedestals) with the pre-Angkorian period. These temples represent a series of pre-Angkorian settlements, some of which were expanded from the centers (Sambor and Thala Borivat) to occupy fertile islands and levees as well as to participate in or taking advantage of the river traffics. Those located further inland represent the expansion into the hinterland exploiting swidden agriculture, forestry resources, as well as trading with other ethnic groups and, possibly, mineral extraction.

The distribution of the Thala Borivat tradition lintels along the rivers and the coast suggest that these communities were brought into interactions by these regional networks²¹ during the 6th century CE (triangles in Figure VII-7). Another contemporaneous network at a larger scale is the distribution of early statuary style of the Buddha and Mitre-Viṣṇu shared across many of the early Southeast Asian polities (Brown 1992, 2011; Dalsheimer and Manguin 1998; Lavy 2014).

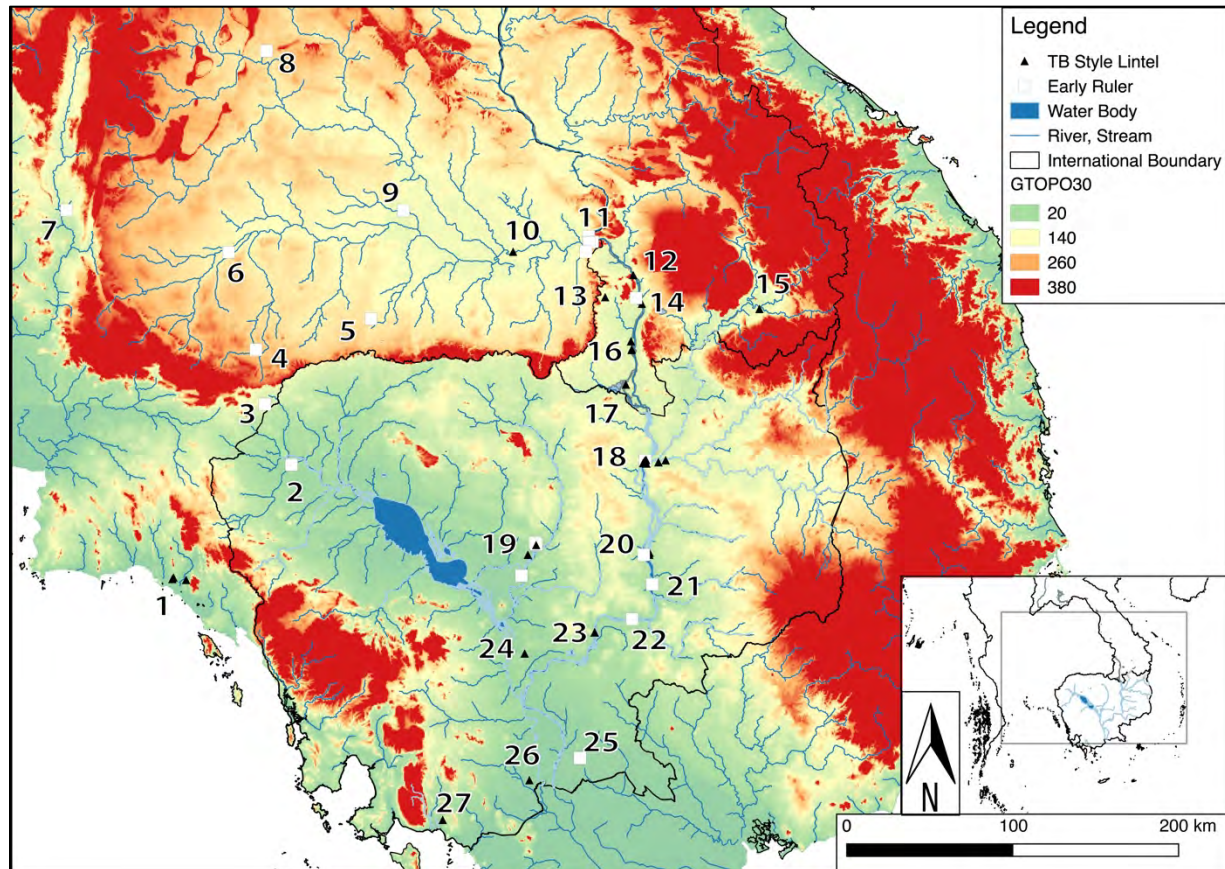


Figure VII-7. Locations of the Thala Borivat Style lintels with one medallion and two arches (triangle) and the inscriptions of Bhavavarman I and Citrasena-Mahendravarman (square). 1) Phaniet, 2) Banteay Mean Chey, 3) Ta Phraya, 4) Khao Rang, 5) Chong Sra Cheng, 6) Phimai, 7) Si Thep, 8) Khon Kaen, 9) Roi Et, 10) Wat Supat (Ubon), 11) Khan Tewda, Tham Prasat, Pak Don, and Phu Lakhon, 12) Phu Malong, 13) Ban Heui Na, 14) Wat Phu, 15) Attapeu, 16) Nong Sombat, 17) Khong, 18) Thala Borivat, 19) Sambor Prei Kuk, 20) Sambor, 21) Sambok, 22) Phnom Sopoar Kalei, 23) Han Chey, 24) Ba Theay, 25) Ādhyapura/Prei Veng, 26) Angkor Borei (Asram Maha Reussei), 27) Phnom Chngok

²¹ Location of the inscriptions and lintels was crosschecked between CISARK, Lorrillard (2014), Inscription Database of Thailand, Mollerup (2012), and identifiable features on Google Earth.

VII.4.2 Epigraphy

A series of Bhavavarman I's family inscriptions, a series of partially duplicated Sanskrit verses, were found along the Mekong. These include 1) One inscription belong to *Hiraṇyavarman*, son of *Bhavavarman I*'s sister, at Thala Borivat and 2) six other inscriptions belong to *Citrasena-Mahendravarman*. Regardless of the intention of these inscriptions, their locations offer one of the earliest evidence of the Mekong and the Mun traffics in the region. The locations of some of these inscriptions overlap with the TB tradition lintels along the Mekong-3S region (squares in Figure VII-7).

K.436 from Sambor Prei Kuk records a military expedition to Champa by *Vikramasiṃha*, a general of *Rajendravarman* (944-968 CE). Upon his return, he made several stops and found various *āśrama*, at *Liṅgapura* (Wat Phu), *Nāgasthānapura*, *Śambhupura* (Sambor), and finally, at *Īśānapura* (Sambor Prei Kuk). This inscription suggests that *Vikramasiṃha* traveled part of the Mekong along the major pre-Angkorian and Angkorian centers. A 13th century Bayon inscription, K.293 (line C7), groups gods *Kamrateñ Jagat Nāgasthān[apura]*, *Kamrateñ Jagat Śambhupura* (Sambor), and *Kamrateñ Jagat Saralāyattana Cuñ* (Sambor) together, which suggests their proximity (Coedès 1928, 105). *Nāgasthānapura*, the *abode city of nāga*, was likely the Angkorian and pre-Angkorian name of Thala Borivat.

These stops partly overlap with the locations of some of the early inscription of Bhavavarman I's family members. By the 17th century, several stops and places mentioned by Van Wuysthof above Kampong Cham correspond well to these early inscriptions (Table VII-5). These stops overlap those used by de Lagré-Garnier and Aymonier during the 19th century (see Table VII-4).

Locations	Modern Name	Site/Inscription
Schanton	described as a mountain, which corresponds with Phnom Han Chey	Site with two TB tradition lintels, K.81's attribution to Bhavavarman I or II is debatable
Pha Changy	On August 2 nd or 3 rd he passed another mountain, which	Citrasena's K.116

	corresponds with Phnom Supoar Kalei	
Sombock	Sambok-Thma Kre	Citrasena's K.122
Sambaboer	Sambor	Citrasena's Ka.173 of Koh Damlong
Boetzoneg	Ba Chong, Stung Treng	Hiranyavarman's K.359 of Thala Borivat on the opposite bank
Saxenham	Khon-Khong	A pre-Angkorian inscription K.1041 (Khon) and TB lintel (Khong)
Khon to Bassac	Don Sai, Wat Luang Kau/Wat Phu, Huei Thamo, Phu Malong	Mahendravarman K.1173, K.1174 and TB tradition lintels (Lorrillard 2014)
Pakmoun	The confluence of the Mekong and the Mun	Mahendravarman K.363 of Phu Lakkhon, K.496 and K.497 of Khan Tewda/Thailand are located at the confluence of the Mekong and the Mun

Table VII-5. Van Wuysthof's stops along the Mekong and Citrasena-Mahendravarman's Inscriptions

These coincidences suggest that the locations are strategic and correspond to the navigational aspects of the Mekong rivers. These sites are located within a distance a boat could travel per day (depending on the direction, upstream or downstream, as well as seasonal water level and current) and close to the rapids (e.g., on the Mekong: Sambok, small islands located within the rapids between Sambor and Stung Treng, Khon-Khong; the Sesan: Ba Doem and Prasat Ku). Major centers like Wat Phu, Thala Borivat, and Sambor are located above and below the major rapids (both upstream or downstream). These locations are ideal for providing services such as accommodations, food, boats, guides, trade goods, as well as places for worship. The communities and elites of these centers would have profited greatly from such services.

These sections of the Mekong, Sekong, Sesan, and the Mun have been in use at least since 300-500 CE. The circulations of beads from both the Indian Ocean and South China Sea, Pinkware in Stung Treng and Sambor, Fine Orangeware from the Mekong Delta, Buffware from other pre-Angkorian centers suggest that the Mekong-3S region settlements were interacting

with other centers via the river systems. The locations of Citrasena-Mahendravarman inscriptions from Phnom Supoar Kalei up to the Mun confluence likely follow this communication route. Some Early Historic sites in northeast Thailand within the Mun and the Chi river systems are located near the Citrasena-Mahendravarman inscriptions and TB lintels (O'Reilly and Scott 2015). By 500-700 CE, the distributions of the TB tradition lintels also overlap with these inscriptions, which imply the use of the river systems and the coast. K.1 from Angkor Borei mentions a litigation involving both rulers of *Bhavapura* (Angkor Borei) and *Jeṣṭhapura* (Ta Phraya/Thailand), which suggests the uses of coastal route (Vickery 1998, 285–88, 338–39).

The post-Angkorian chronicles remains silent about Thala Borivat even though some recorded that *Preah Satha* fled to Laos, via Stung Treng, and died there after the sack of Lovek in 1594 CE (Cabaton 1908). Wuysthof reported that the last presence of the Cambodian ruler in Ba Chung (Boetzong) was c. 1620s. The foundation charter of Wat Sambok offers a date of 1601/1602 CE and is attributed to Soriyopor (1602-1619 CE) of Lovek (Leclère 1903). The charter described tax duties of passing boats to the Wat and placed the head monk as the priest-governor of the border gate. His duties also included foreign affairs with the Lao and Jarai. The last relationship between the Cambodian king and the Jarai ended at the end of the 19th century (Meyer 1965; Piobb 1895).

All evidence described in this section suggests that the Mekong was a major communication route linking various pre-Angkorian communities from the Mekong-3S region to northeast Thailand, the eastern highlands, the Delta, and the coasts. This interaction system possibly started as early as TB Phase 1 (200 BCE-300 CE) and became intensified during TB Phase 2 (300-500 CE), which eventually led to the pre-Angkorian networks of inscriptions and temples during TB Phase 3 (500-800 CE).

VII.5 A Pre-Angkorian Economic Model

VII.5.1A Risk Reduction Model

The rise of pre-Angkorian centers examined in this research corresponds with the natural characteristics (such as fertile land, dangerous rapids) of the Mekong-3S region. The diverse environmental settings and their associated resources make this region a good example of ecotone exploitations. Mathieu Guérin (2001, 44) reconstructed an early 20th century model of

which both types of agrarian ecosystems, wet rice and swidden rice, gave rise to trade. During this period, people of the lowlands, i.e., Laos and Khmer, greatly benefited from this system since they controlled the market. This integrated system functioned as a risk reduction strategy for inhabitants of both ecosystems. This is because wet rice and dry rice have different planting-harvesting cycles, which differ by one or two months, responding to different type of risks. Wet rice is prone to too much rain and flood; while, dry rice risks animal disturbance, drought, and delayed rainy season. When one of the systems was affected, food supplies could be secured through trade from the other system. However, when both systems were affected by prolonged drought, rice were imported from other regions (e.g., Khon and Attapeu in Laos) through the rivers. Based on the colonial reports, the most sought after highland items were elephants, boats and oars, cardamom, rattans, ramies, and ivories, all of which were traded for cotton cloth, glass beads, salt, ceramics, gongs, copper, and iron from the lowland (Anonym 1913b, 21–29; Guérin 2001).

Mathieu Guérin (2001, 51) cautions the application of this system to antiquity because the interaction systems between different ethnic groups in this region, he argues, originated as recently as the 18th century and only became integrated under the colonial rule. However, as demonstrated throughout this Chapter VII, brick structures and their dated materials documented along the river systems (Mekong, Sekong, Sesan, and Sekong) predominantly belong to the pre-Angkorian period. For example, along the Sekong, a brick structure with a statue's ablution basin²² found in Siem Pang dates to the pre-Angkorian or Angkorian period. Upstream around Attapeu, all ten features identified were pre-Angkorian (Lorrillard 2014, 191–93). Along the Sesan, the temples of Ba Doem, Prasat Ku, and statues from Kampong Cham Kau belong to the pre-Angkorian art c. 6th -7th centuries CE.

Along the Sekong, the inscription K.998/818 *Śaka* or 996±1 CE found at Ko Mayol (Mondolkiri) dates to the Angkorian period. Both Kampong Cham Kau and Koh Mayol are located at c. 70 km and 40 km respectively from a recently found brick temple, Tak Nang,

²² *snānadroṇī*, commonly called a *yonī*

located in Mondulkiri province. This temple shares many characteristics with the 9th century Hoa Lai-style of the Cham and is located within the Jarai region between the Sesan, Srepok, and the Dalak plateau of central Vietnam. Approximately 50 km on the other side of the border, another Cham brick temple, Yang Prong, dated to the 13th-14th centuries CE is also located within the Jarai region (Tran et al. 2014) (See Figure VII-3). In 1641 CE, Van Wuysthof (1871, 254) reported on trade with inland minorities in Sambok where salt, ceramics, and iron were exchanged for gold, rhinoceros horn, elephant's teeth, gamboge, deer hides, and slaves. Moreover, the charter of Sambok describes ritual relationship with the Jarai which restarted in 1601 CE. This evidence suggests that interactions across this highland region could trace back to the pre-Angkorian and Angkorian periods. Guérin's integrated lowland-highland agrarian model is, therefore, relevant for the Mekong-3S pre-Angkorian and Angkorian settlements.

VII.5.2 An Integrated Economic System

As demonstrated in the previous sections, the archaeological evidence suggests that the Early Historic and pre-Angkorian settlements are predominantly located within the lowland. Settlement expansion, marked by brick temples and trapeang, occurred after 500 CE within Thala Borivat and Sambor and likely reduced the size of the productive land within these centers. Small number of brick features and trapeangs located within the peninsular and islands would compensate for the limited farmland within the centers. Trapeangs were also parts of the economic means for water management and fish capture. Around 60% of the trapeangs recorded in the pre-Angkorian corpus were associated with the elites of various titles including the Poñ and Mratāñ (Vickery 1998:306). The settlement expansion into the highland, associated with the 'anchored-temples,' were possibly driven by swidden fields and other forest resources that possibly brought the pre-Angkorian Khmer in direct contacts with minorities of the highland.

Similarly, the epigraphic data suggest exploitation of both ecosystems of the lowland and highland. K.1287 from Thala Borivat records that a local elite, *P-añ Rām*, donated rice from a dry rice field and another unspecified rice field (possibly, wet rice), metal objects, draft animals, coconuts, and betel nuts to gods. K.360 from Ba Doem claims the fertile lowland on both sides of the Sesan as property of the gods. K.1257 (c. 700-800 CE) also from Ba Doem

accounts for laborers living in the hinterlands with swidden fields, draft animals, betel nut trees, and possibly, minorities laborers. An AMS date associated with Ba Doem of the Sesan left bank is between 251 and 398 CE; on the right bank where a brick feature and large trapeang are located, the associate AMS date is between 652 and 769 CE. Since no TB phase II (300-500 CE) materials were found on the right levee, the settlement expansion of Ba Doem took place sometimes between 500 and 700 CE. In Kracheh, besides those inscriptions mentioning rice fields of the lowlands, K.134/781 CE of Lbok Srot located further inland lists a group of laborers from *Jvor*, which likely refers to the Sambor/Sambok rapids, 35km away. K.124/803 CE from Sambor lists the items to be traded— for example, cloth for palm syrup; cotton for pickled ginger, sesame, and betel nut; and honey for oil—most of which are lowland products. Some of these were the same trade items between lowland-upland communities of this region during the 17th and early 20th centuries.

The earliest brick structures of Ba Doem, Thala Borivat, Sambor, and Sambok appeared around c. 500-600 CE, then within 200 years the temple properties had expanded to both sides of the Mekong and the Sesan as well as deep into the hinterlands. The above evidence suggests the integration of the upland and lowland ecosystems occurred at least by c. 600-700 CE. The expansion of temple properties across both ecosystems resembles the risk reduction strategies reported in the early 20th century example described by Mathieu Guérin. This strategy would allow the Mekong-3S region temples and their communities to be resilient to crop failure caused by floods or delayed rainy seasons.

Moreover, the communication networks along the river systems, explored in the previous section, helped these communities to be resilient against risks as food could be brought in from other communities located upstream or downstream. Along the Mekong, pre-Angkorian communities were located in Khon and Wat Phu upstream and Sambor downstream from Stung Treng. Along the Sekong, the pre-Angkorian communities were located in Attapeu and Siem Pang. Along the Sesan, the communities were located in Ba Doem, Prasat Ku, and Kampong Cham Kau. These pre-Angkorian intracommunity networks likely centered in Thala Borivat where most brick structures were recorded with the most TB tradition lintels. It was one

of the largest settlements of the Mekong-3S region owing largely to the advantage of the interconnected river networks.

VII.6 Summary

Chapter VII. extrapolates the settlement configuration and characteristics examined in Chapter VI and applies it to the pre-Angkorian communities and economies at a regional scale. Three models (ecological, navigation, and integrated agrarian models) are proposed and evaluated using the spatial and chronological data from this research as well as those provided by other researchers. The results can be summarized as follow:

The Pre-Angkorian Settlements: An Ecological Model

The Thala Borivat settlement patterns indicate that the Early Historic and pre-Angkorian period communities were predominantly located in the lowland suitable for rice agriculture, economic trees and gardening, as well as access to the rivers. Between 500 and 600 CE, the pre-Angkorian communities expanded from the Early Historic settlements including O Trel and Ba Doem into the previously unoccupied fertile farmlands. This factor may have pushed the settlements to expand into the islands and further into the highlands where the supply of water is inadequate for wet rice agriculture between 600 and 800 CE. The inscriptions of this period suggest that the pre-Angkorian communities had access to both wet rice and dry rice (presumably from the hinterland settlements). Similarly, in Sambor and Sambok, the pre-Angkorian communities were mainly concentrated along the Mekong and on the islands.

At a regional scale, from Pakse (Laos) to Kracheh similar patterns occurred where 85% of the pre-Angkorian communities are concentrated within a 1km zone along the rivers. Another 25% of the sites in this region are located in the highlands. The 8th century inscriptions from Lbok Srot and Preah Theat Khvan Pir, both pre-Angkorian temples located 20km inland from Sambor, suggest an integration of wet rice and dry rice agriculture. The settlement patterns of this region imply preference for the lowland where fertile land and water resources support wet rice agriculture, economic plants such as coconut, betel nuts, cottons, and animals including cattle and buffalos. The highland settlements relied mainly on dry rice agriculture and forestry products (e.g., hides, beeswax, ivories, ramies, etc.). Instances of minorities being listed

as the temple's workforces suggest that the settlement expansion brought the pre-Angkorian communities closer to the highland minorities.

The highland areas of this region contain rich mineral resources such as iron, copper, and gold. Iron production centers from the pre-Angkorian to post-Angkorian periods have been found to the west of the Mekong. Slags found from the Thala Borivat excavations suggest that the pre-Angkorian communities were involved with metallurgy, possibly with secondary production such as forging and smithing. This region, particularly Attapeu (Laos), where most brick temples belong to the pre-Angkorian period, is historically known for its alluvial gold. There is no evidence of gold smithing or mining from the archaeological records of this region; however, sites in Stung Treng and Sambor have been subjected to gold lootings since the 1980s. Additionally, inscriptions in Thala Borivat and Sambor list donations of copper ware to the temples.

The data suggest that the pre-Angkorian period c. 500-800 CE saw the largest region-wide settlement expansions, possibly from pockets of the pre-existing Early Historic communities to occupy most of the lowlands located within a 1km zone along the rivers as well as expanding into the highlands. The overall trend corresponds to increase population and integration of the wet and dry rice agriculture provided by the contrasted highland-lowland ecological resources.

A Pre-Angkorian Navigation

The research areas are located in a transitional zone where the Mekong flows from a well-confined channel marked with islands, rapids, and braided channels of the upper Lower Mekong Basin to the Cambodian plains (beginning from Kracheh) and the Mekong Delta. The river hydrological and morphological studies conducted by the Mekong River Commission correspond directly to the navigability of the Mekong in this region. Traveler accounts made by Dutch traders and French colonial explorers from the 17th and 19th centuries provide insights into the navigational aspects of the Mekong. These data suggest that the river rapids play an important role in structuring the navigation and settlement patterns along the Mekong.

The communities of this region not only provided travelers with food and accommodations but also services such as boats, navigational equipment, and pilots to traverse

the dangerous rapids. These communities also provided link to the hinterlands, where trade of forest products was conducted with different minorities inhabiting this region. The positions of the large communities in Sambok, Sambor, Stung Treng, Khong (Laos), and Pakse (Laos) above and below the major rapids allowed these communities to control the flow of river traffics and levied taxes on passing boats. Additionally, these centers also provide places of worship for travelers before and after crossing the rapids, which are believed to house powerful spirits that can cause dangers to travelers.

The characteristics described above fit the locations of the pre-Angkorian temples and inscriptions, particularly of Citrasena-Mahendrarvarman and Hiraṇyavarman located along this section of the Mekong. Pre-Angkorian centers of Sambok, Sambor, Thala Borivat, and Wat Phu were positioned to take advantage of the Mekong navigation, which begin since at least 300 CE when glass beads were brought into Thala Borivat and Sambor. The distribution of the Thala Borivat tradition lintels along the Mekong, the Mun, and the coast also suggest a pre-Angkorian emphasis on navigation.

A Pre-Angkorian Integrated Economies

Evidence of the pre-Angkorian settlement expansion (within the lowland and into the highland), the river navigation, as well as the wet and dry rice agriculture of this region suggest that the communities of this region were socially and economically integrated. The pre-Angkorian economic patterns resemble an integrated agrarian model proposed by historian, Mathieu Guérin, for this region during the early 20th century. According to this model, the wet and dry rice cultivation allowed the communities of this region to be resistant to risks posed by droughts, floods, or delayed rainfall. Because the one-to-two-month off-set of the planting-harvesting cycles between these two systems responded differently to risks, if one system were impacted, rice could be traded from another system.

This integrated economic system forged interdependencies between the lowland-highland communities through trading of resources from both ecosystems. The available accounts of such trade only came from the 17th century CE. Yet, the distributions of the known pre-Angkorian temples along the rivers and inland suggest that a similar integrated system began much earlier.

Chapter VIII synthesizes and extrapolates the data and interpretation acquired from the Mekong-3S region to generalize the pre-Angkorian state formation process by emphasizing the role of the communities and temples in the regional pre-Angkorian economies.

Chapter VIII. Synthesis, Discussion, and Conclusions

The previous chapters reconstructed a skeletal aspect of the Mekong-3S region's pre-Angkorian communities and their economic systems. The following sections synthesize the archaeological data with the historical accounts to reconstruct the nature of pre-Angkorian communities, economy, and their relationship with the temple institution. This chapter discusses settlement expansion as proxy to organizational changes by answering the guided questions outlined in Chapter I. It begins with a summary of data associated with settlement (re)configurations in Stung Treng and Sambor. The settlement nucleation corresponds to two organizational changes occurred during TB II c. 300-500 CE and TB III c. 500-800 CE. The next section attributes such changes to ideological, demographic, socioeconomic, and political centralizations with emphasis on the role of communities and temples in the pre-Angkorian state formation process.

The following sections extrapolate data from the Mekong-3S region to infer the political economy of the pre-Angkorian state, particularly on agriculture, trade, and interactions. Then, it discusses the relationship between the capital and the regional centers, emphasizing the role of the temple economy, trade, and ideology as means of the state appropriation of local resources.

VIII.1 Settlement (Re)Configuration and Organizational Changes

The previous chapter V, VI, and VII outline the evolution of the Early Historic and the pre-Angkorian period communities in Thala Borivat, Sambor, and the Mekong-3S basin. The settlement patterns of this region are summarized in Table VIII-1 below:

Phase	Date	Settlement Patterns	Characteristics	Interpretation
TB Phase I	200 BCE- 300 CE	- Small communities sparsely located along the river systems in Stung Treng	- Each community shared similar ceramics (bowls, cordmarked carinated ware, and pedestaled ware) - No evidence of similar ceramics in Sambor	- Simple agricultural societies

TB Phase II	300-500 CE	<ul style="list-style-type: none"> - Settlement nucleation associated with the distribution of Pinkware sites near the river confluences in Stung Treng - Settlement nucleated into two large sites: O Trel and O Khlong 	<ul style="list-style-type: none"> - Pinkware occurred only near the river confluences - Pinkware spread downstream to Sambor - Large sites of O Trel and O Khlong contained the most Pinkware - O Trel was the center of these communities and hosted diverse artifacts including varieties of ceramic types and glass beads, Fineorange ware imported from the Mekong Delta - Buffware represents the terminal phase of these sites 	<ul style="list-style-type: none"> - Evidence of sociopolitical complexities associated with organizational changes - These changes were demographic (higher populations in large sites) and economics (river routes moving trade goods) - A regional system where Sambor now has Pinkware and connected to a regional trade network
TB Phase III	500-800 CE	<ul style="list-style-type: none"> - The settlements expanded from many of the previous Pinkware sites - In Stung Treng, O Trel expand 150 times northeastward into a previously uninhabited area of Thala Borivat and continued to be the primary center - O Khlong was abandoned; but the Pinkware site of Ba Doem expanded to become a secondary center - Sambor settlements also expanded into areas where no Pinkware was found - Smaller settlement expanded into the highlands 	<ul style="list-style-type: none"> - Buffware, kendi, and red-painted ware - Absence of trade items - Emergence of brick temple - Temples clustered within the large centers of Thala Borivat and O Trel - Princely inscriptions appeared between 550-600 CE - Elite inscriptions appeared after 600 CE - Shared settlement configuration (mound, temple, and trapeang) and artistic style (lintel) with other pre-Angkorian centers 	<ul style="list-style-type: none"> - Evidence of a major organizational shift associated with increased population and economic integration - A clear regional system associated with the distribution of the TB tradition lintel and its variants within the Mekong-3S region. Thala Borivat was a major center of this lintel tradition. - This region became integrated into the historical pre-Angkorian state by 600-615 CE when Citrasena-Mahendrarman inscriptions appeared

Table VIII-1. Settlement Patterns and Organizational Changes within the Mekong-3S region

Settlement size, by extension population size, artifact distributions, temples, brick features, and ponds are used to infer hierarchy between these settlements, a similar approach used elsewhere including the Valley of Oaxaca (Drennan, Berrey, and Peterson 2015; Kowalewski et al. 1989b). The pattern summarized in Table VIII-1 suggests that the settlement expansion and nucleation occurred twice: 1) TB II c.300-500 CE; and 2) TB III c. 500-800 CE. Archaeologists use changes in settlement configuration at a regional scale to infer organizational change, particularly associating it with different types of centralization including political, economic and demographic (Drennan and Peterson 2008; Kowalewski et al. 1989a; Wilson 1988).

Based on the data acquired from the Mekong-3S region, in what ways is the process of organizational change from the Early Historic to pre-Angkorian period materialized in the archaeological record?

VIII.1.1 Early Historic Centralization (TB II c. 300-500 CE)

Settlement Patterns

The Early Historic settlements are defined solely on the distribution of surface ceramics. The extent of looting activities, cultivations, road constructions combined with the surface collection areas, and excavations allowed size estimations for these sites. For instance, the surface collection size at O Trel (Collection 45-48 & 74) combined is 0.3 ha; however, the area reported to have artifacts by looters and area located under the modern bridge combined is c. 4ha. Likewise, the total surface collection area of O Khlong (Collections 41-43) is 0.3 ha but the reported looted area exceeds 2ha²³ (Table VIII-2 and Figure VIII-1).

Eleven early historic settlements identified in the research area can be subjectively grouped based on geographic proximity. In Figure VIII-2, O Trel is the largest settlement located at the west bank of the Mekong-Sesan confluence. Ba Chong, Tuol Neakta (Kang Memay), and Tuol Khtum are located to the east of the confluence, where Tuol Neakta is the largest

²³ In fact, it was reported that similar artifacts also occurred 500m further inland.

settlement at 2ha. Along the Mekong river further south of Thala Borivat the known Early Historic settlements are smaller and located far from one another until O Chrang Kraham, which is c. 1 ha. Further east, at the confluence of the Sesan-Sekong, O Khlong is the largest settlements compared to Hang Savat and Ba Doem (Figure VIII-2 and Figure VIII-3).



Figure VIII-1. O Trel and O Khlong: Collection size and estimated settlement size

#	Settlement	Est. (ha)	Collection size (ha)
1	O Trel	4	0.3
2	Ba Chong	0.2	0.2
3	Tuol Neakta	2	0.1
4	Tuol Khtum	0.3	0.3
5	O Khlong	2	0.3
6	Hang Savat	0.1	0.1
7	Ba Doem	0.2	0.2
8	Tuol Ansang	0.5	0.5
9	Tuol Meas	0.4	0.4
10	O Chrang Kraham	1	1
11	Sambor	0.02	0.02

Table VIII-2. Estimated Early Historic settlements size

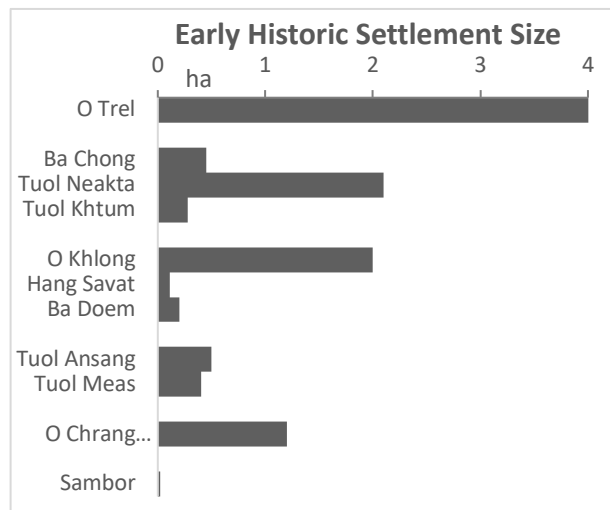


Figure VIII-2. Early Historic settlement size

The Early Historic settlement sizes and locations (TB Phase I and Phase II c. 200 BCE-500 CE) suggest that there were three contenders for a central place, O Trel, Tuol Neakta, and O Khlong. However, a different configuration emerges for TB phase II c. 300-500 CE where the Pinkware settlements only form two large clusters dominated by two contenders for a central place, O Trel and O Khlong (Figure VIII-4 and Figure VIII-5). One cluster is located at the

Mekong-Sesan confluence and the other is located on the Sesan-Sekong confluence. Pinkware is the only diagnostic Early Historic artifact identified in Sambor. Settlement size and specialization (rich ceramic types, Pinkware, and glass beads discussed in Chapter V.) suggest a three-tiered settlement

hierarchy in Stung Treng, which is geographically corresponding to O Trel, O Khlong, and other smaller settlements.

This evidence implies that the first organizational change corresponds to the nucleation or centralization of the Early Historic communities around large settlements or ‘centers’ located at the river confluences and the extended interaction beyond Stung Treng to include Sambor. This phenomenon coincided with increase interaction with the maritime trade network linking the South China Sea to Indian Ocean.

Artifacts and Economy

The most common diagnostic ceramics found in Early Historic settlements comprise bowls, pedestalled-ware, and cordmarked carinated ware. The excavation of Trench 8 suggests

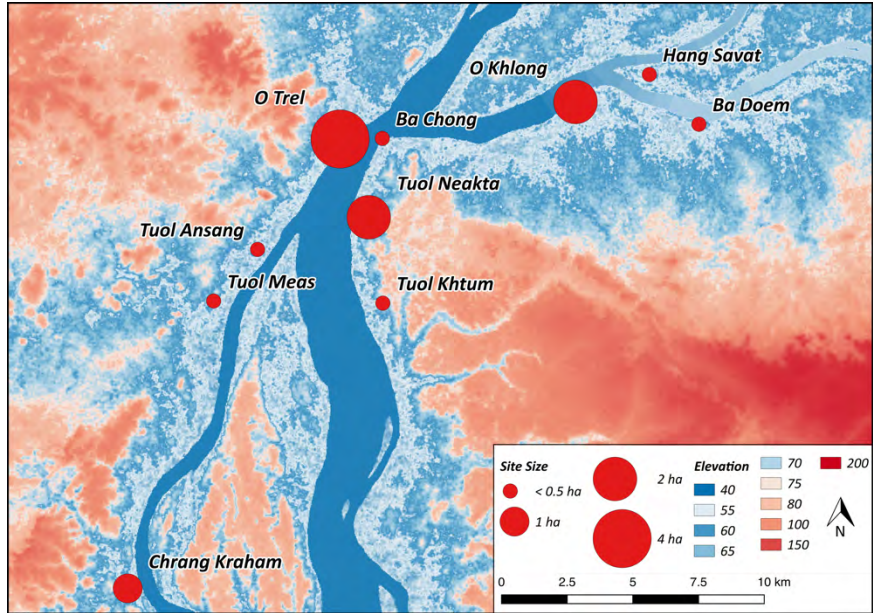


Figure VIII-3. Early Historic settlement size in Stung Treng c. 200 BCE-500 CE

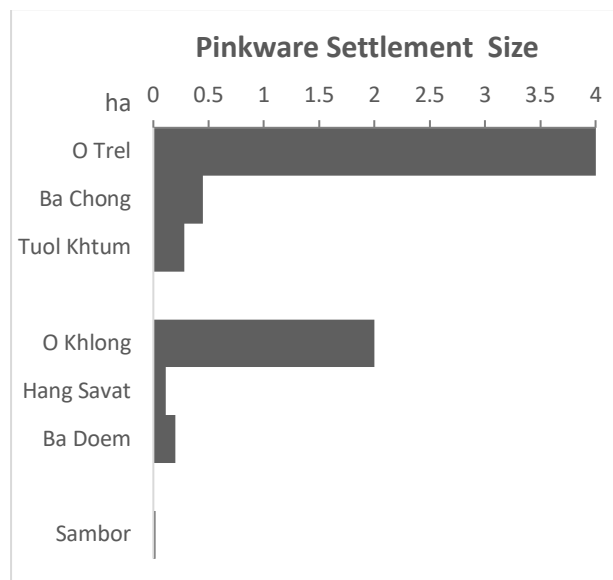


Figure VIII-4. Pinkware settlement size c. 300-500 CE

that these ceramics were used as burial goods, one of which stored two glass beads; while small carbonized materials found within these pots imply that they may have stored organic materials.

Pinkware appeared in the contexts post-dated 300 CE and at settlements located near the river confluences,

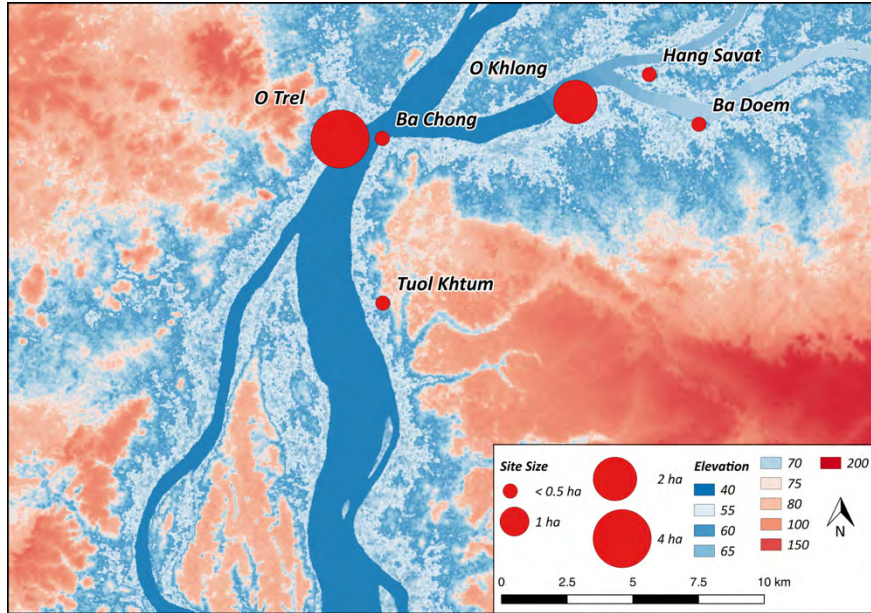


Figure VIII-5. Pinkware settlement size located on the confluences

particularly at O Trel and O Khlong. Other artifacts such as varieties of glass beads, flat-based ceramics, flared-rim ceramics, sandstone “swords,” slags, appeared predominantly at O Trel. Fine Orangeware sherds of the Mekong Delta and imported glass beads indicated that the Early Historic communities of Stung Treng were incorporated into the international maritime networks linking the South China Sea to Indian Ocean.

Evidence of agriculture is limited only to rice-chaff earthenware pastes, most of which relate to Pinkware. Yet, the Early Historic settlements in Stung Treng are located along the rivers near the seasonally flooded area suitable for rice agriculture. Contemporary settlements in Cambodia such as Phum Snay (Domett and O’Reilly 2009; O’Reilly et al 2006), Prei Khmeng (O’Reilly and Shewan 2016:445), Koh Ta Meas (Frelat and Souday 2015), and at Angkor Borei (Pietruszewski and Ikehara 2006) suggest that by this period wet rice agriculture became prevalent in most Early Historic communities. Wet rice was important to the Iron Age communities prior to the introduction of temples. In northeast Thailand, agricultural intensification and participation with regional trade networks during this period have been linked to the emergence of sociopolitical complexities. Settlements sizes and locations as well as different access to trade materials as evident by beads (from both excavated and looted contexts) and reports of different quantities of gold artifacts looted from the Early Historic

settlements in Stung Treng suggest that these communities experienced similar organizational changes recorded in the northeast Thailand Early Historic mortuary contexts (Higham 2002, 224–27, 2016, 433–34). Increased trade and interactions may have caused the agricultural communities of the TB I c. 200 BCE-300 CE to nucleate around two large settlements of O Trel and O Khlong during TB II c. 300-500 CE.

VIII.1.2 Pre-Angkorian Centralization (TB III c. 500-800 CE)

Settlement Patterns

Unlike the Early Historic settlements, the pre-Angkorian settlements are a series of sites or clusters of continuous features including mound, temple, trapeang, and surface artifact. Similar to the previous period, however, the pre-Angkorian settlements also have undefined boundary. The uneven surface artifact distribution, unclear relationships between each feature, and the lack of precise chronology render the settlement size estimation challenging. Furthermore, the location of habitations relative to these features is also unknown. For instance, the Chinese accounts of the 6th centuries informed that tenths of families shared a trapeang; but did not provide details as to where these families were located relative to their shared trapeang.

Nonetheless, remote sensing, ground survey, and surface collection data suggest that features such as mounds, temples, ponds, and surface collections do occur in proximity to one another and form a continuous surface that can be associated broadly with a local community or clusters of communities. Since most dated materials (ceramics, architectural elements, and inscriptions) predominantly belong to the pre-Angkorian period, and many are found at the edge of the settlement clusters, the settlement size is defined as an area located within a line connecting features (mounds, temples, trapeangs, and surface collections) along the edge of a cluster (Figure VIII-6). Isolated trapeangs and those forming a linear pattern are excluded since they are most likely recent (see discussion in Chapter IV.1.1). In Stung Treng, the results produce two main clusters of Thala Borivat and Ba Doem, each of which comprises satellite settlements located across the confluences. The O Pongro cluster of temples and trapeang is the only local community located at a distance greater than 1km from the river.

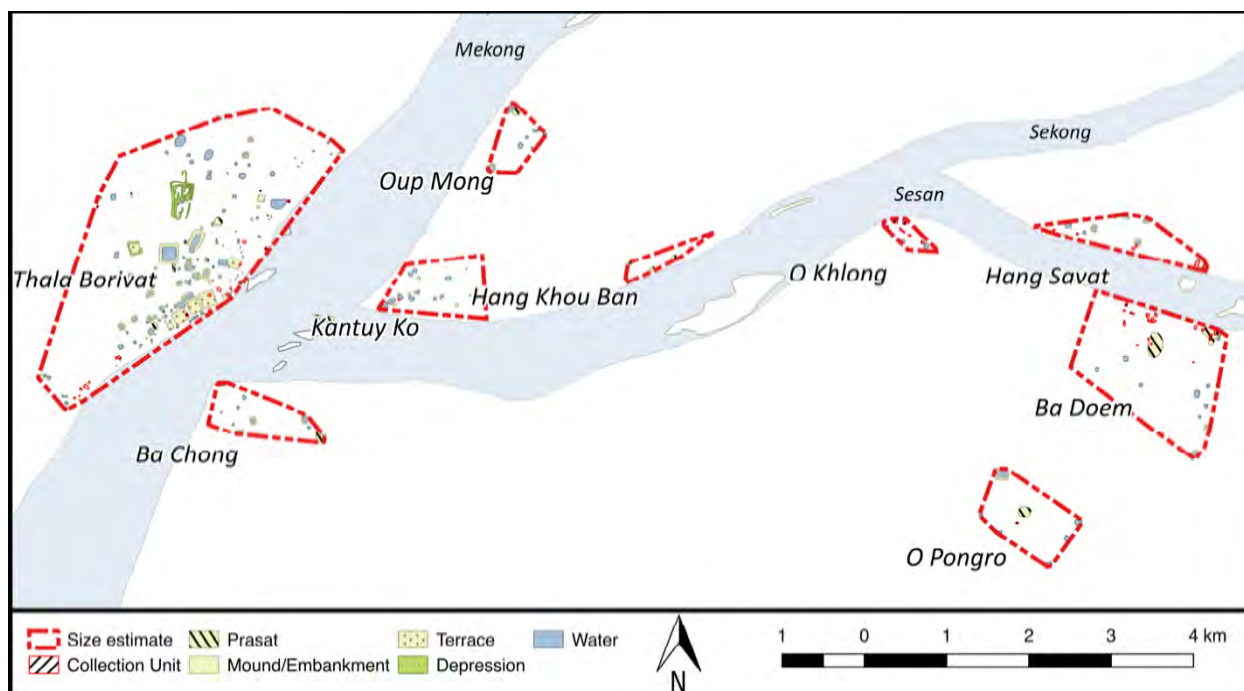


Figure VIII-6. Stung Treng pre-Angkorian settlements

Group	Settlement	Temple	Trapeang	Area covered	Temple/km	Trapeang/km
Thala Borivat	Thala Borivat	46*	108	666	0.7	2
	Ba Chong	2	10	60	0.3	2
	Oup Mong	1	10	34	0.3	3
	Kantuy Ko	5	15	76	0.7	2
Ba Doem	Hang Kho Ban	3	1	17	2**	1
	O Khlong (E)	0	3	13	0	2
	Hang Savat	3	8	62	0.5	2
	Ba Doem	6	6	228	0.3	0
	O Pongro	1	7	79	0.1	1
Sambor	Sambor	8	157	645***	0.1	3
	Sambok	3	1	102	0.3	0

Table VIII-3. Pre-Angkorian settlement size. *A complex consists of multiple towers is counted as 1; ** the status of temple in Hang Khou Ban is reserved; *** Sites located outside the targeted area are not included.

The Thala Borivat settlement covers c. 666 ha followed by the Ba Doem settlement of 227 ha (Table VIII-3 and Figure VIII-7). The gaps in features (temple, trapeang, and surface

collection) between the large and small clusters suggest that there were multiple local communities nucleating around the larger ones. The largest center of Thala Borivat also has a high concentration of temples with 0.7 temple per square km (not counting separate towers within a complex) (Figure VIII-8: left graph). This settlement comprises large temple platforms (2ha to 3ha) concentrating at the center around Sala Prambuon Lveng. This pattern suggests that by TB III c. 500-800 CE, Thala Borivat and its surrounding settlements became the central place in Stung Treng where most activities are represented by the sheer number of temples and trapeangs.

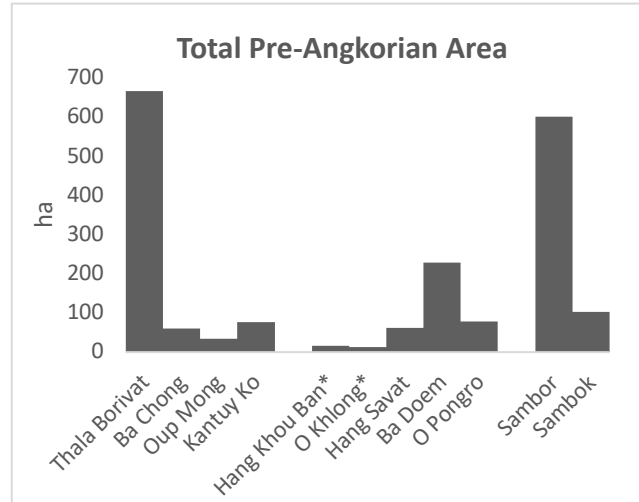


Figure VIII-7. Site size grouped into three large clusters. * Possibly, form a separate cluster.

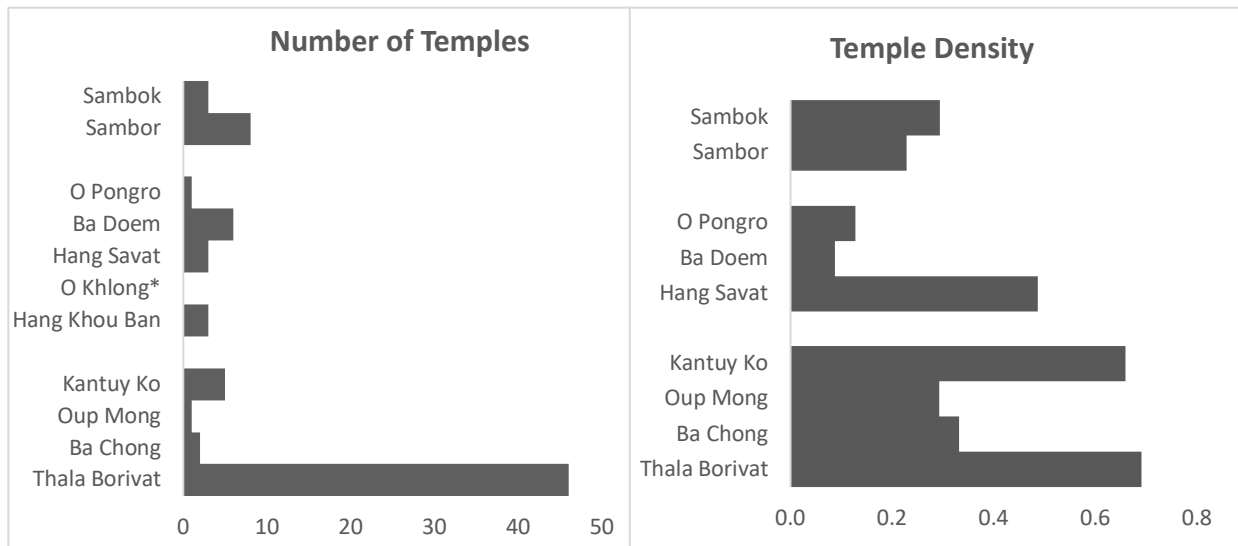


Figure VIII-8. Left: number of temples within a settlement cluster; Right: temple density per square km

A similar pattern occurred at Sambor where the settlement size is comparable with Thala Borivat at c. 645 ha (Figure VIII-8: right graph). The differences, however, are the amounts of trapeang and temple. While Thala Borivat hosts an impressive 46 temples, Sambor comprises the most trapeang, c. 157 or 3 trapeang/square km, and only 8 temples or 0.1/ square km (Figure VIII-9). These differences may result from multiple factors including:

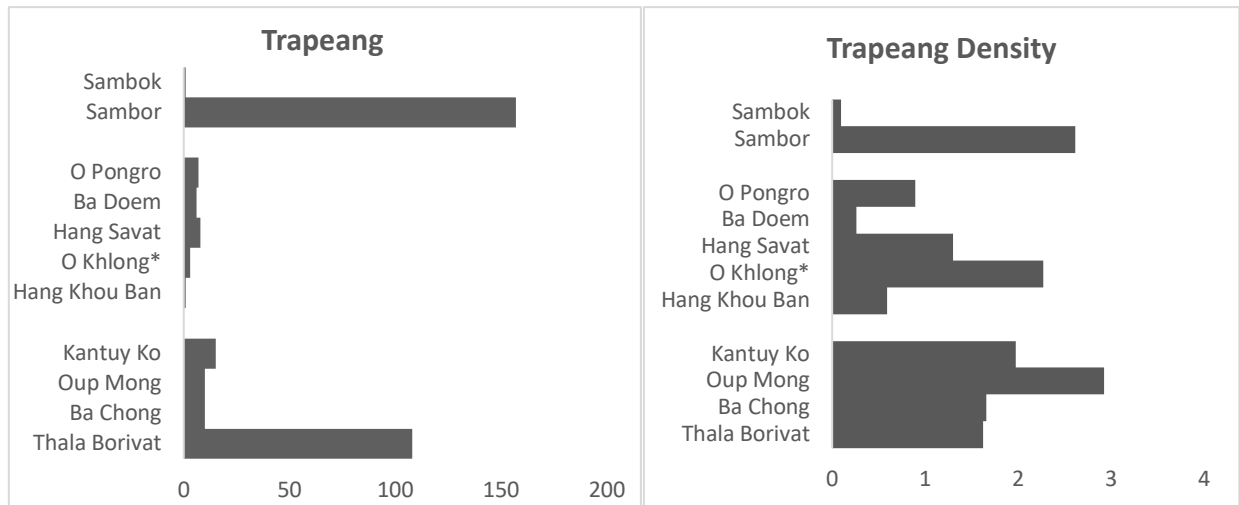


Figure VIII-9. Left: number of trapeang within a settlement cluster; Right: trapeang density per square km (*a separate settlement located east of the Early Historic site of O Khlong)

1. The long occupational sequence at Sambor c. 600-1300 CE, which was one of the important Angkorian centers, may have continued to accumulate more trapeang. Although the Thala Borivat sequence is comparable, the distribution of the Angkorian materials is limited to within the center near Sala Prambuon Lveng, which suggests a decreased settlement size.
2. Different function: Thala Borivat was a large ritual center where most temples were built, which explain the high concentration of the TB tradition lintels. Whereas, Sambor was an economic center hosting a larger population. Similar patterns can be observed within Stung Treng where the peninsula settlements of Kantuy Ko and Hang Savat have a higher density of trapeang than their larger centers of Thala Borivat and Ba Doem. Both areas are historically known for fertile agricultural lands, which attract more people.

A comparable pattern was observed in the Mekong delta around Angkor Borei as well as the Angkorian period temples where larger settlements contain more temples or multiple small settlement units (D. Evans 2002; D. Evans et al. 2007; Stark 2006c; Stark et al. 2015). This aspect implies that the temple and civic communities are deeply intertwined.

A Pre-Angkorian Integrated Economic System

The limited archaeological data agree with the epigraphic data that the pre-Angkorian temples were centers of an agrarian economy (see Chapter VI and Chapter VII). The prominent locations of these temples and their inscriptions within both the wetland and upland ecological settings suggest that they were integrating the economic resources of both areas, particularly wet and dry rice agriculture. The pre-Angkorian corpus indicates that temples were consumers of crafts (e.g., metal utensils and jewelry) and employed artists for temple construction and statuary. Temples also provide places of worship (pilgrimage sites), accommodations, food, and services, all of which make them an ideal place for community interactions.

Chapter VII models a correlation between the pre-Angkorian settlements and the river rapids located in the Mekong-3S region. Places visited and reported by the 17th and 19th century CE traveler accounts along this section of the Mekong overlap with the locations of the pre-Angkorian temples as well as the *Citrasena-Mahendravarman* and *Hiranyavarman* inscriptions between 550 and 615 CE. The combination of these factors and the shared art tradition (e.g., lintels and statuary) suggests that there were intense interactions among the pre-Angkorian settlements of the Mekon-3S region and other pre-Angkorian centers via the rivers. This interaction network continued directly from the Early Historic period when glass beads and Fine Orangeware were imported to Stung Treng.

Additionally, the early 20th century documents suggest that settlements within this narrow strip of the Mekong were prone to flood and drought (Guérin 2001). Such risks for large settlements like Thala Borivat and *Śambhupura* can be minimized by importing food from the upland or other regions via the rivers. These characteristics allowed the communities like Ba Doem, which was located at the confluence of the Sesan and Sekong, to benefit from traffic from the Sekong (Attapeu and Siem Pang) as well as the Sesan and Srepok where the other communities (pre-Angkorian and ethnic minorities) were located. Ultimately, the 3S river traffics merge with those of the Mekong (Wat Phu and *Śambhupura*), which allowed Thala Borivat to capitalize on this traffic convergence.

Despite the differences, the regional patterns suggest that by TB III c. 500-800 CE there were at least two competing central places or supra-community along this stretch of the

Mekong, Thala Borivat and Sambor. Further north, a contemporary and equally large center of Wat Phu (c. 450 ha) was another contender for central place. Large settlements with cluster of temples like Thala Borivat, Sambor, and Wat Phu correspond well to the territorial unit of 'Pura' mentioned in the inscriptions, i.e., *Nāgasthānapura*, *Śambhupura*, and *Liṅgapura*, respectively.

VIII.2 Discussion: Centralization and State Formation

The previous section links settlement reconfiguration to two phases of organizational changes. The last phase occurred during TB II c. 500-800 CE and coincided with the introduction of brick temples. What were the driving forces behind this organizational change?

VIII.2.1 From Burial to Temple

The current dataset from Stung Treng suggests that there were continuities between the Early Historic communities and rituals into the pre-Angkorian period. Both excavated and surface collection data indicate that some temples were built atop the Early Historic burials. The Early Historic burials are considered residential burials where burials were placed within the settlements (Higham 2015; White and Eyre 2011; Zeitoun et al. 2012, 535–36). In this regards, the pre-Angkorian temples were also 'residential temples' surrounded by the settlements.

The best evidence of this continuity come from O Trel and Ba Doem where temples were built within the pre-existing settlement sometimes during c. 500-600 CE then spread into the previously uninhabited areas. Similar patterns have been observed from various settlements such as Angkor Borei, Go Thap, Angkor region, and Phimai (see: P. Heng 2016). In the Early Historic settlement of Phum Snay (northwest Cambodia), there is no clear evidence of continuity after CE 400. However, the presence of a mound bordered by stone wall without any pre-Angkorian temple attributes (e.g., brick structure, pedestal, and ablution drainage), possibly represents some sorts of religious structure prior to the introduction of the Hindu-Buddhist tradition (Yasuda 2013; Yasuda and Chuch 2008). The Early Historic burial tradition of inhumation became rare in the pre-Angkorian archaeological records. The disturbed context found at Hang Savat where complete pots, including kendis, were interred in a series of small pits mixed with brick fragments, ashes, and tiny bone fragments likely represents the shift into cremation practice. The excavate context of Trench 10 dates between 652 and 769 CE. Whether

the pre-Angkorian funeral became associated with the temple is unknown. Nonetheless, during TB Phase III (500-800 CE), most activities became concentrated around the temples, possibly, continuing the role played by the Early Historic burials.

Based on the current evidence, it is not clear whether temples were the cause or the results of settlement expansion; that is, whether there were small communities slightly preceded the temple construction; or, whether the communities were temple communities set out to expand into the new land. Nevertheless, throughout the survey area, pre-Angkorian ceramics were found clustering in areas near the temples. This pattern suggests that the pre-Angkorian communities and temples were indistinguishable units of the settlements. Even if there were settlements preceding the temple, the temple construction succeeded very quickly after the initial habitations. This rapid settlement expansion between 500-700 CE explains the pattern observed in the inscriptions that there were well-established societies in the areas where the inscriptions were erected (Vickery 1998, 276).

VIII.2.2 Socioeconomic Centralization

The difficulty in studying the organizational change and the pre-Angkorian state development is the obscure relationships between the Early Historic and the pre-Angkorian period. This because the Angkorian period research has dominated the field since the last century and most Early Historic archaeological research concentrated mainly on mortuary context in northeast Thailand outside the pre-Angkorian centers. Hypotheses pertaining to continuity from the Early Historic to pre-Angkorian societies have been based on the extrapolation backward from the historical accounts or forward from the archaeological data. This because of the gap of data in the period between 400 and 600 CE.

Recent research in Angkor Borei, Prei Khmeng, and now, Thala Borivat, helps narrow this gap by showing continuity from the Early Historic burials to the later temples in major pre-Angkorian centers from the Mekong Delta to Angkor and the Mekong-3S region. This research suggests that evidence of a brick temple is also evidence of a temple economy and the community's economy, particularly of those elites, Poñ and Mratāñ, who made endowments to the temples. These elites possessed similar economic package, e.g., dry and wet rice, economic trees, draft animals, workforces, and metal ware etc., to those recorded in the Mekong Delta

most of which relate to agrarian economy. Even the elite title *P-añ* of K.1287 from Thala Borivat, which is rare in the pre-Angkorian corpus, occurs in K.28 near Angkor Borei and K.79/644CE from Ta Keo. Research in northeast Thailand suggests that this socioeconomic package continued directly from the Early Historic economy (Higham 2016).

During the Early Historic period, one of the elite's conspicuous displays of wealth was through burial practice associated with ancestral worship where the rich and, presumably, powerful individuals and families offered trade goods, fine ceramics, and metal artifacts to their deceased members (see recent summary in O'Reilly and Shewan 2015b). The data from Thala Borivat provide a similar pattern where large settlements like O Trel and O Khlong were the most populated and had access to trade goods, particularly glass beads. Smaller settlements like Tuol Neakta had less wealth and were presumably hierarchically inferior. The elites of the large communities possibly acquired wealth through control of agricultural productions and trade flows, owing to the prime locations near the river confluences. Reports of large quantities of gold looted in large settlements compared to small settlements suggest that gold provides another dimension of wealth differentiation among these Early Historic communities who directly or indirectly exploited the alluvial gold deposits, currently and historically mined along the Sekong and Sesan tributaries (Chapter VII.2.3). The distribution of Pinkware from Stung Treng to Sambor implies an emergence of a regional system centered on the river confluences in Stung Treng.

By the pre-Angkorian period, the elites displayed their status and wealth through largesse to the Hindu/Buddhist temples in the form of endowments. Some of these temples were built atop the Early Historic burials. The sociopolitical arena shifted from the individual burials to temples and their Indic gods. Some of these elites belonged to the royal families of *Bhavavarman I* who ruled in *Īśānapura* (Sambor Prei Kuk) and left their inscriptions with the Mekong-3S region temples c. 550-600 CE. Similar to the Early Historic period where large settlements comprised the most specializations, the pre-Angkorian period large settlements comprised more temples and trapeang, which suggest large concentration of wealth and populations of various ranks.

The combinations of the epigraphic and settlement data suggest that the pre-Angkorian settlement unit (mound, temple, and trapeang) should not be considered simply as a temple community nor as a civic community. The epigraphic records of economic transactions between elites via the temples is best interpreted as indicating that temple institutions were the centers of community interactions and that the temples validated and legitimized such transactions (i.e., sealed the deal through gods). This pattern was common in both Angkorian and post-Angkorian inscriptions where land transactions, donations, or freeing “slaves” required a collective witness (e.g., K.154/734CE; for the post-Angkorian examples, see: Khin 1980; Lewitz 1972, 1973b, 1973a). Similar aspects occurred in Bali where temples function as mediation centers among agricultural communities (e.g., Hauser-Schäublin 2011; J. Stephen Lansing and de Vet 2012) or the *Sātavāhana* monasteries and the *Gupta* temples where the royalties and peoples of other strata came to term with sustaining the religious institutions (e.g., Ray 1986; Willis 2009).

VIII.2.3 Political Centralization in the Mekong-3S Region

The emergence of sociopolitical and economic complexities during TB Phase III (500-800 CE) postdate similar phenomenon recorded in the Mekong Delta (AB Phase II: 200 BCE–300 CE) but it coincided with the flourished Funan polity of the Chinese records. Although both regions were interacting, or at least participating in the same trade network, the rare occurrence of Fine Orangeware in the Mekong-3S region suggests that the influence of Funan was limited mainly to the delta. Shortly after the temple was introduced into the Early Historic communities, the inscriptions associated with the pre-Angkorian ruler, *Bhavavarman I*, families emerged within Thala Borivat and along the Mekong from Phnom Supoar Kalei to Wat Phu c. 550-600 CE. This factor suggests that the pre-Angkorian political centralization followed the settlement nucleation during TB Phase II (300-500 CE) and coincided with settlement expansion of TB Phase III (500-800 CE).

Historians have identified the center of Chenla with Wat Phu due to K.365 of *Devanika* and the mountain of Wat Phu; yet, to date only a limited number of pre-Angkorian temples have been reported from here (Lorrillard 2014; Santoni 1990; Souksavatdi 1998; Santoni and Hawixbrock 1998, 1999; Santoni and Souksavatdi 1996). Since the brick temples and the

associated Thala Borivat Tradition lintels are concentrated mainly in Stung Treng, Thala Borivat was at least the most important ritual center of the Mekong-3S region.

The distribution of *Bhavavarman I's* family inscriptions, especially, those of *Citrasena-Mahendravarman* provides another interesting pattern (see Chapter VII.). These inscriptions can be divided into two groups: 1) pre-coronation *Citrasena* (pre-600 CE), and 2) post-coronation *Mahendravarman* (600-615 CE). The distribution patterns of the name *Citrasena* is noteworthy: three of them come from Kracheh and only one from Buriram/Thailand. These include K.116/Supor Kalei, K.122/Sambok, Ka.137/Sambor, and an incomplete K.513/Tham Phet Thong-Buriram. These inscriptions mention the installation of *Liṅga* by *Citrasena* with permission from his parents. The post-coronation inscriptions using *Mahendravarman* were found along the Mekong from Wat Phu into the Mun river system of northeast Thailand (Lorrillard 2014, 197–98). Of these, K.1173 and K.1174 record *Mahendravarman's* tribute to his father and uncle at Wat Luang Kau/Wat Phu (Lorrillard 2014, 206). Since the inscriptions from *Citrasena* and *Hiraṇyavarman* and *Citrasena's* parents are clustered between Kracheh and Wat Phu, their distribution implies that their family originates in this region. If the matrilineal system were applied, *Hiraṇyavarman's* father (a Brahman) would have married into the family located within the Mekong-3S region, mostly likely at Thala Borivat²⁴.

The evidence present above suggests that the settlement nucleation of TB III (500-800 CE) was associated with or followed by the pre-Angkorian political centralization within the Mekong-3S region—which was possibly the core area of Chenla in the Chinese accounts— and was likely associated with *Bhavavarman I's* families. Yet, as illustrated in the previous section VIII.1.2, the patterns of size and functions of these contemporary centers (Wat Phu, Thala

²⁴ Compare the similar case of a Cham king *Prakaśdharma* of C.96/658 CE who claimed that his father went to Bhavapura and married his mother, a daughter of *Īśānavarman*. Also, K.438 from SPK records a *mratāñ Durgasvāmi* who married a daughter of *Īśānavarman*. Sahai (2008, 64) notes that the inheritance of *Hiraṇyavarman's* princely title whose father was a Brahman was not practiced in India. *Hiraṇyavarman* traced his lineage through his mother, a sister of *Bhavavarman I*, which was a common inheritance practice among the matrilineal *Poñ*.

Borivat, and Sambor) and their early inscriptions, suggest that they were competing centers or central places, ruled by members of the same family, prior to *Īśānavarman*.

VIII.2.4 The Pre-Angkorian State Formation and the Roles of Temple

The previous sections suggest that economic, demographic, ideological, and political centralizations during TB Phase 3 (500-800 CE) were associated with the formation of the northern pre-Angkorian polity/polities outside the Mekong Delta. This phenomenon can be attributed to the formation of Chela in the Chinese records, particularly the History of the Sui (589-618 CE), which specified the role of *Citrasena* in unifying the pre-Angkorian state (Pelliot 1903: 272). Based on this timeline, the state formation process succeeded the appearance of temples and the settlement expansion rather quickly, in only c. 100 years. What was the role of temple and its temple economy in this organizational shift? This section discusses the relationship between settlement patterns, community, temple economy, and other social factors such as lineage and social stratification to explore the factors driving settlement expansion during TB Phase 3 (500-800 CE). Was the settlement expansion the result of an elite's initiative? Or, was it a community-based decision?

Temples and temple communities were extensions of the pre-Angkorian communities. The pre-Angkorian corpus indicates that temples were religious corporations possessing labors of various divisions as well as varying means of production including lands, economic trees, draft animals, boats, etc. The question arises as to whether this temple economic apparatus was intended to achieve sustainability or to generate surplus for the communities. Examples from the South Asian temple economy, particularly under the Gupta, suggest that these economic means were primarily intended to sustain ritual activities as well as those who conducted these rituals, the brahmans and their attendants (e.g., Ray 2008; Shaw 2011; Willis 2009).

Since the pre-Angkorian corpus extensively features endowment as a major component of the temple economy, the temple's surplus production status suggested by historians (e.g., Vickery 1998: 309) remains ambiguous. An undated and fragmented pre-Angkorian inscription K.108 from Kampong Cham reads "*durbhikṣa sru*" or "rice shortage" (IC 6: 38). This inscription suggests that even equipped with such means of production, some temples were prone to risks

of crop failure. In South Asia, the enshrined gods were seen as the enduring living entities, providing their followers with blessing and guaranteeing their well-being in the afterlife to allow the Gupta temples to accumulate wealth and became stable institutions (Willis 2009:127, 150). It is perhaps for these reasons that the pre-Angkorian temples continued to receive donations long after they were built. Some gods were possibly “Indianized” Early Historic deities that continued to be worshipped. Endowments provided the donors with prestige, merits, or heavenly afterlife as specified in the imprecation section of the pre-Angkorian corpus. Nevertheless, the fact that some temples’ means of production and subsistence were joint with other temples suggest their production beyond a self-sustaining corporation or at least that some were subjected to taxation²⁵ (See Vickery 1998:155-171).

Who owns the temple? Was temple an elite corporation? Or, was it a communal corporation? Michael Vickery (1998) and Sachchidanand Sahai (2012) agree that pre-Angkorian temples were centers of community production; however, they diverge in describing the nature of this system. Vickery (1998:276-278) argues that the pre-Angkorian communities were simply the Early Historic communities converted to Hindu-Buddhist and that the incentive to restructure the economy through the temples was the communities themselves represented by their lineage heads, the Poñ and Mratāñ. Sahai (2012) contends that temples were “Indianized” elite apparatus for land reclamation project. In other words, the community expansion was an elite initiative. Sahai’s argument was based on K.5 and the Angkorian inscription corpus, which commonly portrayed the Angkorian communities as the elite’s establishments in the new lands (See also: K. R. Hall 2011; Ricklefs 1967; Sedov 1978).

The data from Stung Treng suggest that settlement expansion and temple construction were concurrent; however, whether it was the results of temple communities’ expansion through the elite’s or communal initiative, is not yet testable. The settlement expansion did

²⁵ Historian Michael Vickery (1998) is not convinced that the temples were taxed, because there is hardly any mention of terms translated as “tax”. Since, however, there is only one exception of K.426 where “*ckop*” cannot be reconstructed as to ‘levy duties’ as Vickery points out, other instances are very convincing and commonly used with “*ge ta dap*”, ‘those who blocked access’ (Table VIII-4).

occur rapidly after the temples were introduced to the Early Historic communities c. 500 CE²⁶. Though there were few accounts related to the temple construction itself²⁷, the pre-Angkorian corpus records broadly three types of temple patrons: 1) Elites and free people (Poñ, Mratāñ and others), 2) High-ranking officials (ruler's vassals and governors), 3) Ruler (kings and queens). These categories allow us to compare and contrast the epigraphic data with archaeological data.

Communal Temple

The pre-Angkorian societies were thought to be lineage-based communities where land ownership was communal and assigned to be used by lineage heads including the Poñ and Mratāñ (Vickery 1998:299-310). Were the pre-Angkorian temples communal?

The archaeological data suggest that there was an obvious contrast in the concentration of wealth from the Early Historic period where wealth was concentrated on the individual burials and the pre-Angkorian period when wealth was concentrated on the temple. If the Poñ and Mratāñ were rooted in the Early Historic elites, their rich burial goods, laborers, land, and other resources were already private property rather than communal property at least by TB Phase 2 (300-500 CE). Absence of individual wealth during the pre-Angkorian period can be simply the results of change in burial practice, e.g., from inhumation to cremation; or it can be explained by the fact that individual wealth was donated to the temples. Large settlements with temples of various sizes and shapes like Thala Borivat are often described as “central places” or “urban centers,” which characterize large-scale societies beyond those based on lineages and associate with complex chiefdoms or states (e.g., Drennan and Peterson 2006; Drennan, Quattrin, and Peterson 2006; Isendahl and Smith 2013; Peterson and Drennan 2005; M. L. Smith 2006).

²⁶ Jean Delvert (1961:219) wrote that it was the community that preceded the Buddhist Wat. In modern Cambodia, it is common that a new Wat was built soon (10-20 years) after a community was settled into a new area. For instance, Wat Tram Neak in Apsara's Hotel Zone only became established after sizeable communities of returning refugees were relocated there in the early 1990s.

²⁷ e.g., K.939 from Angkor Borei refers to the construction of four brick towers in *Bhavapura*; K.341/674 CE from Neak Buos with a royal edict orders a construction of brick temple imitating the temple of *Liñgapura* (Wat Phu).

As noted in Chapter IV.1, the spaces between platform temples in Thala Borivat contain no ceramics or evidence associated with habitation refuses. This absence implies a strong property ownership among these temples. Strict boundary markers recorded in the inscriptions can thus be inferred from the survey data within Thala Borivat. Furthermore, since most laborers, rice fields, trapeangs, and roads are commonly associated with the Poñ and Mratāñ, they were likely elite projects or private properties for common use or a ‘fief’, for which the transfer through temples provided legal-ritual justification. In fact, there are a few instances where rice field and trapeang are associated with the title *Va* (Mr.) and *Ku* (Ms.), commonly used by laborers²⁸. The pre-Angkorian inscriptions of the Mekong-3S region do not feature the collective donation commonly recorded in the Delta. This factor suggests that either a few elites had monopolized all the resources; or, that the settlements were less extensive compare to those of the Delta; or, that collective donation was not practiced in this region.

Cross-cultural comparisons of landownership, particularly of the Incan *Ayllu* kin group and the royal *Panaca* as well as the Aztec *Calpolli*, suggest that the communal landownership was not transferrable as it was the “inalienable possession” of a lineage or endogamous community (M. E. Smith 2006; Trigger 2003, 320). The kin-based *Ayllu* organization is very close to Michael Vickery’s model of the pre-Angkorian kin-based landownership, yet no comparable unit was recorded in the Khmer inscriptions (e.g., Farrington 1992; Sherbondy 1994; Stanish 1994; Trawick 2001). The *Calpolli*, which commonly comprised a temple, was not communal but rather owned by the nobilities who leased out the lands to peasants in return for goods or labors, of which a portion was absorbed by the Aztec state (M. E. Smith 2014, 20). Increase land sale, similar to those recorded in the pre-Angkorian inscriptions, suggests instead a decline in communal ownership, which corresponds well with the archaeological records of the shift from individual burial to temple wealth or a transfer of rights to an established institution (Trigger 2003, 315–37).

²⁸ People with commoner’s titles of *Va* (Mr) and *Ku* (Ms) also appear to associate with rice fields and Trapeang. K.1 *travañ va tvellan*; K.22 *Va Nāgavindu* sold rice field to god; K.561/681CE *travañ ku kañcann*. (See also: Jacob 1993a, 300–301)

The lineage and communal ownership model is not convincingly supported by the archaeological and settlement data from Thala Borivat and Sambor. Yet, the fact remains that temple institutions were the locus of inter and intra community's activities, a similar observation made by Jean Delvert about modern Cambodian Buddhist Wat.

Elite Temple

Were the pre-Angkorian temples elite projects? Some early inscriptions were commissioned by rulers titled kings or princes. These include *Guṇavarman* of K.5 who claims that he was placed, by his father *Jayavarman* of Funan (c.470–514 CE), to be in charge of a 'religious domain' reclaimed from the mud (Coedès 1931, 7). K.365 from Wat Luang Kau (Wat Phu) records the construction of a *Mahātirtha*, a large pilgrimage tank having a width of ½ *yojna* (Coedès 1956). By c.550–600 CE, a series of inscriptions left by *Bhavavarman I* (c.550–600 CE) and *Citrasena-Mahendravarman* (c.600–616 CE) record the erections of liṅgas, *nandin*, and sacred reservoir to commemorate their victories. Some of them (e.g., K.1173-K.1174 from Wat Phu, K.1280 from Don Khum Ngoen) have associated brick structures. K.356 (c. 550-600 CE) written by *Hiraṇyavarman*, a nephew of *Bhavavarman I*, was found at one of the brick temples with a TB lintel tradition.

Another set of inscriptions recorded the elite foundations after 600 CE without the collective donations. These inscriptions recorded their patrons as governors or vassals of the ruling kings (See Vickery 1998: 321-416). For instance, the *Āḍhyapura* (Prei Veng) family of K.53, K.54, and K.55 fall into this category. These inscriptions suggest an intimate link between the temple and the city of *Āḍhyapura* and the governor's families. Other inscriptions such as K.151 of *Indrapura* governor (Kampong Cham), K.21 of *Dhanvipura* governor (Ta Keo), K.81 of *Ugrapura* governor (Han Chey), Ka.108 of *Bhīmapura* governor (Battambang), and K.109 of *Vyādhapura* governor (Kampong Cham-Prei Veng), etc., also belong to the same category (See Vickery 1998: Chapter 7 and 8).

These foundational inscriptions post-date the complex sociopolitical systems of Funan in the Chinese and archaeological records. Stark et al (2007) argue that the canal systems, as well as the walls and their brick structures pre-dated brick religious monuments by at least a century. In Stung Treng and Kracheh, these inscriptions represent continuity from the Early

Historic to the pre-Angkorian and Angkorian periods. Since the 5th-6th century CE inscriptions are associated mainly with rulers and their establishments, it is tempting to propose that temples were the elite or state apparatus. However, in most cases, kings were absent from the inscriptions since the focus of these inscriptions were local communities. This factor implies that most temples and their political economic affairs rest in the local communities and the local elites rather than the state elites. Instances of the elite temples and the state elite involvements with the local temples suggest that the pre-Angkorian temples functioned as a mutual interaction grounds between the community, the local elite, and the state elite.

The above discussion suggest that some temples were placeholders or “offices” for regional centers as well as for the ruling elite families and their legitimization. This functional aspect is supported by instances of litigations and court proceedings involving local communities and their elites as well as the state represented by its rulers and/or officials. The pre-Angkorian settlements were multifunctional, some were multicomponent, centers encompassing both civic (elite and commoners) and religious communities where temples were the focus of communal activities. Each of these communities, i.e., civic or religious, can function as the driving force of settlement expansion forming new settlement units.

VIII.3 Pre-Angkorian State and Economy Viewed from the Mekong-3S Region

The sections above explore the relationships between the pre-Angkorian communities, temples, and elites. Temples played multiple roles during the pre-Angkorian period beyond providing places of worship. They were centers of community interactions; they were arenas for the elite’s conspicuous display of wealth through generous endowment; in some cases, they were “state office” legitimizing both local and state rulership. Economically, they were center of agrarian production; they validated the investment, exchange, and transfer of properties among the local elites. Temple economy and a settlement’s economy were inseparable and mirrored one another, at least based on our current data. What were the economic systems based on the pre-Angkorian Mekong centers?

VIII.3.1 Agriculture

Chapter VI and VII demonstrate a close relationship between the pre-Angkorian settlements and the fertile lowlands located with a 1-km zone along the river. This factor

suggests some degree of dependence on wet rice agriculture and fishery resources. Some settlements are located in the highland environment, which is suitable for dry rice or swidden agriculture. The pre-Angkorian inscriptions as well as the recent historical accounts from the Mekong-3S region also support exploitations of both ecological zones.

The pre-Angkorian corpus in general suggests that the temples, local elites, and the communities were predominantly agrarian. They had rice fields, gardens, economic trees, as well as labor forces. However, it is unclear whether the local elites also possessed a corporate aspect of production units like some of the temples such as the corps of weavers, herders, scribes, farmers, cooks, etc. , commonly recorded after 700 CE. These production units, particularly weavers, may belong to different household units that form a civic community since there is no instance of elite association with craft production as there is with the rice fields and trapeang. Examples from the 8th century feature laborers, rice farmers and herders, from several communities (*vnok, hajai*), were donated to the temples by the elites. These include K.38/*Jayavarman I* from Bati, K.904/713 CE from the West Baray, K.1029/744 CE from Wat Prei Veng, and K.134/781 CE from Lboek Srot.

VIII.3.2 Interactions and Exchanges

Interactions: Navigation and Pilgrimage

The pre-Angkorian communities explored in Chapter VII are mainly located along the river course where traffic is possible. The ethnohistorical accounts suggest that travelling this part of the Mekong was very dangerous due to the rapids. The main pre-Angkorian centers of Wat Phu, Thala Borivat, and Sambor are positioned within the gap of these rapids where travelers can seek shelters, food, pilots and manpower to navigate the rapids located upstream or downstream. These centers also provided places of worship for travelers before or after crossing the rapids, many of which are generally associated with powerful spirits. They also provide windows to the forestry products coming from the hinterlands.

The pre-Angkorian settlements also functioned as pilgrimage centers associated with the Sanskrit term *tīrtha*, commonly located along the river. For instances, in K.733 from Kampong Chhnang, a Brahman said he visited several pilgrimage sites (*tīrthāyatana*); K.940 records a place called *tīrthagrām* (the ford village) located west of Phnom Penh, possibly

associated with Cheung Ek. Similar term occurs in two inscriptions of the Mekong, K.1289 (most likely, dated to the 9th century CE) from a small island located in the confluence of the Mekong and Sekong records a *braḥ tīrtha* (the sacred ford); and K.365 reports the construction of a *Mahātīrtha* from Wat Luang Kau (Wat Phu) (Coedès 1956; Vong 2011). The last inscription provides the width measurement of a $\frac{1}{2}$ *yojana* for the *Mahātīrtha*. If $\frac{1}{2}$ *yojana*²⁹ roughly equal 5km, the measurement fits the length of the visible southwest “moats” of *Liṅgapura*, an enclosure which Coedès (1956: 220) identifies with a place named *Kurukṣetra* recorded in the same inscription.

The pre-Angkorian examples of *tīrtha* suggest that it may refer to both a civic community (ford) as well as to pilgrimage site, which again indicates the inseparable nature between civic and temple communities. Buddhist sites located along trade routes in the Deccan (India) have been suggested to perform a similar role (e.g., Chakrabarti 1995; Ray 1986, 2008).

Exchange

The pre-Angkorian corpus provides little information regarding trade and exchange. Although they record exchange among the elites and the temples, no references to merchants, trade, or markets could be extrapolated from the corpus. The recorded production and exchange were both prestige goods (e.g., cloth, conch, precious stone and metal) and utilitarian goods (e.g., utensils, agricultural produce, and animals) (Vickery 1998:257, 274, 292-3). Since the pre-Angkorian corpus concerns mainly the subsistence and agrarian economy of the temple, trade may not have been a major aspect of the temple economy. K.259, which records an appointment of a guru as *vaṇijām adhipaḥ* “chief of merchants” during the reign of *Jayadevī*, implies that trade was controlled by the state and was not an “independent market variety” (Vickery 1998:313).

Only K.940 from west of Phnom Penh refers specifically to river traffic; it starts with a king’s edict (possibly, *Jayavarman I*), and lists boats belong to five temples (two of which can be

²⁹ Cunningham (1871, 571–73) calculated the Indian *yojana* against the Chinese accounts between the 5th-14th centuries CE and provided a range of 9.5-10.8km.

identified in Ta Keo) authorized to pay salt duties to the fort of *Tirthagrāma*³⁰. This example suggests that salt was a commodity centralized or taxable by the state. The inscription ends with a warning of punishment to those who block their passages or levy other tax on them. Three other inscriptions mention boats— and by extension, river traffic—as temple properties: K.426 from Cheung Ek, K.939 from Angkor Borei, K.44/674 CE Kuhea Luong—all of which are located close to water bodies. Interestingly, the term ‘*ckop*’ to levy duties (see footnote 1 and Table VIII-4) was applied twice to the river traffic. K.133 from *Śambhupura* records a donation by a *mahānauvāhakara*, chief of pilot or master of sea-going vessel. K.725 (*Jayavarman I*) records a *samantanauvāha* ‘chief of rowers’, “he who knows the difference between groups (of rowers)”, likely refers to the title of “chief of navy”³¹ (IC1: 11).

These delta and coastal inscriptions bear some similarities with the Mekong-3S region settlements illustrated in Chapter VII. Examples from the Mekong-3S region, both inscriptions and recent historical accounts, suggest that most trade items were perishable materials such as cottons, ramies, ivories, boat, hides, bee wax, gamboge, metal utensils, and elephants. Salt and cloth were important trade items with the highland communities during the 17th-19th centuries. These trade items are unlikely to survive in the archaeological record, which makes attempts to study pre-Angkorian trade difficult. However, the post-Angkorian example may illuminate the aspect of the relationship between trade, communities, and the state. Historical accounts (chronicles and inscriptions) suggest that the post-Angkorian economy was centered primarily on agriculture even though trade became much important (e.g., Mak 1981; Pou 1989; Vickery 1977, 2004b).

³⁰ The translation of this text differs from Vickery’s (1998, 295) reading of Coedès (IC5:74), which Coedès and later Jenner (Jenner 2017) translate as ‘distribute to’ or ‘deliver to’ *Tirthagrāma*. The location of this fort is not precise since the inscription was reported to be found on a mound near Phnom Penh international airport where no river is located. If salt was imported from the coastal communities in Kampot where the LPA sites have been documented, then the likely route of this trade was Prek Tnot, which links Kampong Speu to the Bassak river by passing near Cheung Ek.

³¹ This title possibly refers to the same person, *Pracaṇḍasimha*, who was later awarded another title of *sahasrādhīpati*, which Coedès translates as “chief of a thousand cohorts” during a war and Vickery (1998:345) chief of a group of 1000 warriors from *Dhanvipura*.”

The rise of *Śambhupura* during the 8th century has been attributed to trade (Vickery 1998:313-316). The Chinese records of the South West Silk Route interactions in southern Laos and northeastern Cambodia from the 7th to 13th centuries provide an extension of this inland trade networks linking the Mekong river systems to southern China (Yang 2004, 292 Map 2). In Yang Bin's map, *Lu Zhenla* (land Chenla) was placed further north in Vientiane; while, *Shui Zhenla* (water Chenla) was placed somewhere in Thailand. Historians placed Land Chenla within the Mekong-3S region, possibly associated with Sambor, which was part of this complex inland network by the 7th and 8th centuries CE. The "Gap Period" (700-800 CE) inscriptions continue to maintain the agrarian economy associated with temples and to ignore the trade networks.

The Khmer portion of K.259 from the Angkor region records that a 'wealthy merchant' gave wealth to *Jayadevī* who in turn donated it to the temple (see Jenner 2017 for the most recent translation). This merchant was likely the same appointed "chief of merchant" of the Sanskrit portion. This example implies again that trade was independent of temple affairs. Chapter V illustrates that trade was an important factor of the first settlement nucleation during TB Phase II (300-500 CE). The Early Historic trade network linked the Mekong-3S region to other regions with access to goods from both the Indian Ocean and South China Sea. It was during this period that scarce epigraphic accounts began to mention rulers and their families such as *Jayavarman* and *Rudravarman* of the Mekong Delta and *Devanika* of Wat Phu and *Bhavavarman I* and his families along the Mekong and Mun.

The European accounts of the post-Angkorian period suggest that trade was tightly controlled by the state or the palace, and that there was no 'free trade' (Kersten 2003, 2006). Traveler accounts indicate that price of trade articles during the 17th-19th centuries was not fixed, as it increased with the distance from the origins. Nor was a monetary system playing an important role in this barter economy. Merchants bartered local products with imported goods (ceramics) and metal. The price of these local goods increased with distance closer to the major markets, especially, in the capital of Oudong. If similar circumstances applied to the pre-Angkorian period [e.g., cloth measurement was not standardized Vickery (1998:281-283)], trade was not the chief concern of the temples and their inscriptions since it was likely controlled by the state. The hypothesis that market price was standardized by the state has

been attributed to Karl Polanyi's misconception that there was no true market in the pre-industrial civilizations (M. E. Smith 2004, 76; Trigger 2003, 60).

Based on the data collected within the Mekong-3S region, the pre-Angkorian communities were primarily agrarian dependent on a combination of wet and dry rice agriculture, fruit and vegetable gardens, animal herds, and fisheries. Another economic dimension, the regional trade and exchange, likely controlled by the state, strengthened the interactions between multiple centers of the Mekong-3S region as well as the Mekong delta.

VIII.3.3 Pre-Angkorian State Finance

The sections above provide a general perspective on the pre-Angkorian economy based on data from the Mekong-3S region. This section explores possible evidence and model of the pre-Angkorian political economy with emphasis on the state appropriation of regional resources. What was the relationship between the pre-Angkorian state and its regional centers?

Southeast Asian early states have been characterized as galactic polities or mandala, which emphasizes the replication of multiple centers bonded by ritual relationship. This ritual relationship legitimizes the 'suzerainty' of the center and the ruler as well as tribute extraction (e.g., Tambiah 1977; Wolters 1999a). These characteristics fit the role of the temple economy examined in the previous sections, where the civic economies operated alongside the temple economy. Examinations of other pre-industrial civilizations, particularly the Mesopotamian and Egyptian civilizations, suggests that the palace economy was a major economic institution for state finance (e.g., M. E. Smith 2004; Trigger 2003). There is no record of such estate for either the pre-Angkorian or Angkorian economies. Data of Cambodia's palace economy only come from the 17th and 19th centuries reported by traders and colonial officials that kings owned prime lands along the rivers, trade goods, trade vessels, mineral extraction, etc. (e.g., Aymonier 1875, 1895; Kersten 2003; Leclère 1894b, 1894a, 1908; Van Wuysthoff and Garnier 1871).

Despite the agrarian characteristics of the Cambodian written records (inscriptions and chronicles), the European and Japanese accounts portrayed the post-Angkorian state, particularly the 17th century, as both a land-based and trade-based state (Kraan 2009; Vickery 2004b). Cornelis van der Lijn, the governor of the VOC, abandoned plans to revenge the

disastrous Dutch military expeditions in Cambodia reasoning that the Cambodian king could reorganize the resistance within the large hinterland even if the capital of Oudong was captured (presumably, compared to the sack of Malacca) (Kraan 2009). Evidence from the later Southeast Asian states indicates that the state or ruler controlled trade, tribute, tax, and corvée labors (e.g., Christie 1990; Reid 1988, 1993, 2000; Vickery 1998, 325). Since the pre-Angkorian and post-Angkorian states share some similarities through control over trade, the post-Angkorian palace economy could provide clues to the pre-Angkorian and Angkorian palace economies.

Cross-cultural analyses suggest that both temple and palace institutions comprised similar organization and means of production (Trigger 2003:327). This aspect is reflected in the post-Angkorian written records that the royalty and the palace were the largest landowners followed by state officials and the Wat. The palace possessed large labor forces including war captives, hereditary slaves from families of convicted rebels, volunteered labors, as well as corvée labors (e.g., Leclère 1890, 1899). All of which was possessed by the Wat through endowments. If these characteristics were to apply to the pre-Angkorian period, the palace would have been a greater version of the temple institution possessing large estates, complex division labors, and craft production in addition to tribute, corvée labors, and trade.

The post-Angkorian temple economy—similar to those practiced in Thailand, Laos and Burma prior to the 20th century CE—still possessed the basic characteristics of those of the pre-Angkorian and Angkorian periods (Aung-Thwin 1985; Leclère 1894b, 1899; Reynolds 1979). The Wat still received donations, owned land, labors, boats, and, in some instances, functioned as regional offices. The main differences between the post-Angkorian Wat and the previous period temples were: 1) the inheritance system, and 2) the Wat received exclusive tax-exempt status (which is not the case for at least the Angkorian temples). The *Theravāda* Buddhist Wats were collectively occupied by celibate monks under a patriarch, who was appointed by the supreme patriarch or kings or elected within the local rank. The 17th century post-Angkorian examples of Wat Tasor Moroy in Sambor and Wat Sambok offer a rare instance of a religious institution tasked to control trade and accommodate foreign affairs. Van Wuysthof reported in 1641 CE that Sambor was governed by a priest-governor (the patriarch of Wat Tasor Moroy)

entitled *Radia Pourson* appointed by the king. This priest-governor was placed in charge of minor affairs at the border between Cambodia and Laos. Passing trade boats must report to the priest-governor of their cargo and passengers as well as present gifts (i.e., tax) to him. The charter of Wat Sambok offers yet a similar narrative. The Wat was reported to have been found by king *Soriyopoar* (*Suryavarman*) in 1601 CE and designated as the ‘gate of the country’ to conduct foreign affairs with Laos and the *Jarai*. The foundation of the Wat includes 40 families of laborers (state “slaves”), lands, lakes, forests, and streams. The Wat was entitled to a portion of the duties imposed on boat carrying betel leaves, wooden pedestalled-wares, wooden wares, trunks, ceramics, and cloth. This foundation charter and Wat Tasor Maroy provide an interesting similarity with the pre-Angkorian K.940 of which *Tirthagrāma* was authorized to collect salt duties from passing boats. Another example from the Sambok charter is the authorization to spend the local resources on foreign affairs, particularly for conducting ceremonies to receive royal letter from Laos as well as the Jarai’s King of Water and King of Fire. These include rice, salt, sugar, betel nuts, betel leaves, lime, tobacco, elephants, cows, buffalos, cloth, mats, ceramics, iron, lead, etc. This characteristic is similar to the ‘territorial states’ category where most tax revenues remained under the provincial jurisdictions (Trigger 2003, 401).

The pre-Angkorian corpus suggests a minimal role played by the pre-Angkorian kings in the temple economy; however, whether the same factor also applies to the civic economy is not clear. Reference to tax collection only appears in the edict inscriptions as a precaution of punishment together with those who block access to the temple premise from the reign of Jayavarman I (Table VIII-4). As suggested in the previous section, trade was likely under state control, which contributed to the state finance. Yet, trade alone does not explain the relationship between the local and regional communities. Temple economic network—of which a portion of revenues, means of production, and subsistence moved up the hierarchy to regional temples and ultimately the state—is suggested to be the economic pillar of the Angkorian period (e.g., K. R. Hall 2011; Sedov 1978). Leonid Sedov (1978) argued that the payment and contribution from smaller temples to the central Angkorian temples were insignificant or “nominal”. While, a recent estimate payment to the joint-gods in five Angkorian

inscriptions account for 0.4-15% of each temple's production, of which only the last number is economically significant (Lustig 2009b, 213).

Inscription	Date	Rulers	<i>ājñā</i>	<i>ckop</i>	<i>dap</i>	Comments
K.502	616-637	<i>Īśānavarman</i>	x			Sanctions an endowment
K.1250	616-637	<i>Īśānavarman</i>	x			Sanctions an endowment
Ka.12	616-680	<i>Bhavavarman II?</i>	x			Land grant
K.49	664	<i>Jayavarman I</i>	x	x	x	Inheritance
K.341S	674	<i>Jayavarman I</i>	x			Establish new foundation
K.44	674	<i>Jayavarman I</i>	x	x	x	Joint gods
K.818	650-803	<i>Jayavarman I</i>	x			
K.38	578-677	<i>Jayavarman I</i>	x		x	Sanctions an endowment
K.1004	691	<i>Jayavarman I</i>	x			Sanctions an endowment
K.137		<i>Jayavarman I</i>	x			Joint gods
K.940	578-677	<i>Jayavarman I?</i>	x	x	x	Salt duties
K.426		<i>Jayavarman I?</i>	x	x		<i>Joint gods; ckop here means "to gather"</i>
K.259S	682-720	<i>Jayadevī</i>	x			Endowment
K.341N	701	<i>Jayadevī?</i>	x			Land grant
K.904	713	?	x		x	Sanctions an endowment
K.154	734	?			x	Precarious
K.1029	744	?	x		x	Sanctions an endowment
Ka.4	776	?	x			Incomplete fragment
K.670	650-803	?	x			Incomplete fragment

Table VIII-4. Inscriptions contain the term "*ājñā vraḥ kamratān añ*" (royal edict), "*ge ta ckop*" those who collect tax, and "*ge ta dap*" those who block access.

The pre-Angkorian joint-gods system has been argued to be politically or economically insignificant (Vickery 1998:156). The inscriptions suggest that, in most cases, it was the donors who dictated their donations to be jointly used by different temples. Whether these donors were state officials and thus the joint donation was a state initiative are a matter of speculation. Nonetheless, two inscriptions dated to the end of the 7th century CE, K.44

proclaimed not to join with *Dhanvipura* (a pre-Angkorian center of K.21 located 41km to the northeast of this inscription) and K.137 asked not to join with an unidentified *Samudrapura*, imply that resources may be joint with a political center. Toward *Jayavarman I's* reign, the edict inscriptions like K.44, K.49, and K.137 validated the role of the temple managers as well as the inheritance of temple properties.

This factor may relate to the formation of a new class of the temple elites who appropriated one or two generations worth of donations, so that the second or third generation of the temple elites became landowners themselves. The accumulation of temple wealth and power from ca. 500 to 650 CE contributed to conflicts among temples of different families as well as with the local authorities over the use of resources. This tension encouraged the temple elites to seek royal interventions, which frequently ruled in their favor and, thus, brought the temple corporation closer to the state authority. This trend helps explain the Angkorian period temple economy, particularly during *Jayavarman II*, when temple corporations run by the elite families were assigned land reclamation projects in the north (K. R. Hall 1985, 2011; Lustig 2009b; Sedov 1978; Vickery 1998).

The patterns examined above suggest that the degree of state centralization correspond to the degree of relationships between the state, the elites, and the temple (Figure VIII-10-A).

For examples, the interference of the temple institution by the palace and elite would be an indicator of state centralization as seen during the reign of *Jayavarman I* because the three largest estates were merged. This is precisely the characteristic of the Angkorian period when most of the temples were associated with state officials who began their career under *Jayavarman II*. In other words, during the Angkorian period, the spheres of

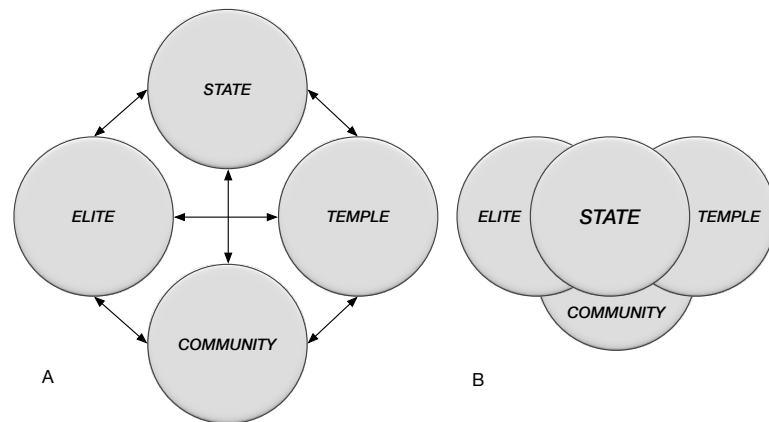


Figure VIII-10. A. Relationship scheme between the community, temple, elite, and the state, B. Centralization occurs when the spheres of these four entities greatly overlapped, i.e., the communities and the elites merged with the temples and the state easily asserts direct power via this new entity

the state, temple, and elite estates greatly overlapped (Figure VIII-10-B). The state interference was to organize lands, resources, labors, and means of production; but there is no evidence of state irrigation initiatives (Bishop, Sanderson, and Stark 2004; Van Liere 1980; Vickery 1998, 311).

VIII.4 Conclusions

The last section concludes the results of this dissertation project by providing a narrative of the pre-Angkorian state formation.

The main purpose of this dissertation research is to understand the pre-Angkorian state development process through organizational changes that occurred during the transitional period between the Early Historic and the pre-Angkorian periods based on data from the pre-Angkorian regional centers located in the Mekong-3S Region. This region is associated with Chenla polity of the 6th century Chinese accounts. Since the emergence of Southeast Asian early polities became associated with the Indic cultural package (including religions, temples, arts, writings, as well as kingship), these polities have been characterized as a secondary state development. Early scholars explained the origins of these polities with “Indianization.” Coedès (1968, xvii) offered a simple analogy that equated the modern tribal societies, which was perceived as stagnating, with the pre-“*Indianized*” Cambodian societies. Vickery (1998) attributes the pre-Angkorian polities to the “*indigenization*” of “*Indianization*” arguing that the Early Historic communities and gods were simply converted to the Hindu-Buddhist tradition.

This dissertation research provides another complementary perspective to the development of sociopolitical complexities within sites of northeast Thailand-northwest Cambodia, and the Mekong Delta during the Iron Age-Early Historic period (500 BCE – 500 CE). Settlements of this period, mounds and circular moated settlements, were more prominently located next to the river and agricultural soils and were participating in the ever-growing maritime trade networks of the Indian Oceans to South China Sea (e.g., S. Heng et al. 2013; S. Heng 2005; Higham 2002; Higham et al. 2014; O’Reilly and Scott 2015; Reinecke, Vin, and Seng 2009; Stark 2006c). By c. 500 BCE, a distinctive black burnished ceramic tradition (including Phimai Black) associated with the Reduced Ceramic Horizon was shared by these communities, including those at Thala Borivat (e.g., Fehrenbach 2009; Fehrenbach and Glascock 2011;

Higham 2002; Higham et al. 2014; Stark 2003b; Welch 1998). Agricultural intensification (e.g., iron plow and buffalo) as well as access to exotic goods transformed the sociopolitical complexities of these Early Historic communities. Expensive construction of moats and mounds as well as the distinction in burial wealth suggest that there was a trend toward private ownership (e.g., Higham 2015, 2016). The settlements of this period, particularly in northeast Thailand-northwest Cambodia were attributed to a series of the Early Historic chiefdoms (Higham 2002, 229; Higham, Kijngam, and Talbot 2007, 2:586). By the c. 600 CE, most Early Historic sites within the Mun system were abandoned.

Between 300 BCE and 300 CE, a ceramic tradition of the Fine Orangeware Horizon emerged within the Mekong Delta (Bong 2003; Fehrenbach 2009; Fehrenbach and Glascock 2011; Stark 2000, 2003b). Its limited spatial distribution within the delta associates this ceramic tradition with the Funan polity of the Chinese accounts. To date, there are only two examples of this ceramic tradition outside of the delta, i.e., Phum Snay and Thala Borivat. Both archaeological and historical accounts indicate that Funan was both a trade-based and land-based expansionist polity (e.g., Briggs 1951; Coedès 1968; J. Fox and Ledgerwood 1999; Stark 2006c; Vickery 1998). Large settlements like Angkor Borei evolved from the preexisting Early Historic communities. Angkor Borei's wall construction and communication canals predate the appearance of Indic cultural affiliation. By the 4th century CE, the Chinese dynastic history of the Chin and the Liang reported on Funan kings' including: *T'ien Chu Chan-t'an* in 357 CE followed by *Chiao Chen-Ju*, who changed the local laws to conform with the Indian system. Coedès (1968:46-47) considered these rulers as foreigners from India; however, this could simply represent the first conversion to the Hindu-Buddhist tradition by the Funan kings. During the early 5th century CE, the first Chinese name that can be rendered as ending with *-varman* appeared in the records (Coedès 1968:56). This period also saw brick construction associated with religious monuments in Angkor Borei and the Mekong delta during the 5th and 6th centuries CE (Stark, Sanderson, and Bingham 2007), which coincides with the local inscriptions depicting *Jayavarman* and *Rudravarman* as kings of Funan.

A parallel trend occurred in Stung Treng where the Early Historic settlement nucleation appeared c. 300 CE and associated with the Pinkware/Industrial ware. This nucleation may

result from the intensification of trade network that moved beads and ceramics from other regions including the Mekong Delta. The looter's reports of rich and poor burials sites, confirmed by the excavation, implies that there was a pattern of social stratification, elite and commoner, among people of these Early Historic communities (TB Phase 3: 300-500 CE). This aspect is comparable to the emergence of chiefdoms in contemporaneous northeast Thailand or the lineage-based chiefdoms.

By c. 500 CE, brick monuments associated with the Indic religious tradition appeared in the largest Early Historic settlement at O Trel and Ba Doem. The settlement expanded and agglomerated into two centers: Thala Borivat and Ba Doem. Smaller Early Historic settlements located farther, c.5 and 7 km, from these centers contained no evidence of continuity and were likely abandoned. The Thala Borivat data produces a model that suggests that smaller Early Historic settlements were absorbed into the larger ones, between 300–500 CE, to become a nexus of the pre-Angkorian centers. Between 550–600 CE, inscriptions with Indic religious attributes, associated with *Bhavavarman I*'s families, appeared within the Mekong-3S region. The Chinese accounts associate these families with the Chenla polity, a vassal of Funan and located to the north. The concentration of the pre-coronation *Citrasena* and *Hiranyavarman* (nephew of *Bhavavarman I*) between Thala Borivat and Kracheh implies that Mekong-3S region was the core of Chenla. The locations of the pre-Angkorian Poñ and Mratāñ and rulers' inscriptions overlap the locations of the Early Historic settlements (P. Heng 2016). Some of *Mahendrarvarman* inscriptions in northeast Thailand are located close to moated settlements of the Iron Age period identified by O'Reilly and Scott (2015). These factors suggest the continuities of the Early Historic communities and their elites into the pre-Angkorian period similar to Angkor Borei.

Temples became proxies to the pre-Angkorian communities where the inscriptions recorded the activities of both the elites and other population divisions. Wealth became associated with the temple institution, which corresponds to the endowments by the elites, Poñ and Mratāñ, to these temples. The expansion of temples into the highlands suggest the exploitation of both wet rice and dry rice agriculture, to produce surplus and minimize risks such as drought and floods, as well as to acquire trade products from other ethnic minorities of

the region. There were continuities between the socioeconomic aspects of the Early Historic elites, agriculture (wet rice, water control), and craft (textile and pottery) and those mentioned in the pre-Angkorian inscriptions (Higham 2014, 832). The pre-Angkorian temple locations and *Citrasena-Mahendravarman* inscriptions overlap with the rapids, pit stops, and landmarks reported in the 17th and 19th centuries traveler accounts, which suggests that the Mekong and its tributaries were the main communication routes. Primary centers—large settlements marked by high temple density such as Sambor, Thala Borivat, and Wat Phu—are strategically located below or above the major rapids and tributaries of the Mekong. These centers were also known historically to have connections with the hinterland communities. These characteristics allowed these centers to benefit from services such as accommodation, food, place of worship, exchange for trade goods, boats, rowers, and guides to traverse the dangerous rapids.

Between 300 and 600 CE, there were considerable interactions across the regions that became associated with the pre-Angkorian state (e.g., Carter 2015; P. Heng 2016; Higham 2014, 2015; Stark 2006c; Stark and Allen 1998). This interactions resulted in a wide distribution of Buffware (e.g., Fehrenbach 2009; Fehrenbach and Glascock 2011), settlements with temples (e.g., C. Evans, Chang, and Shimizu 2016; P. Heng 2016; Stark 2006c; Stark, Sanderson, and Bingham 2007; Stark et al. 2015), shared art style associated with temple and statuary (e.g., Bénisti 1968; Brown 1992; Boisselier 1966; Dalsheimer and Manguin 1998; Dupont 1952; Lavy 2004, 2014), and the distribution of *Bhavavarman I* and *Citrasena-Mahendravarman* and Khmer inscriptions (e.g., P. Heng 2016; Higham 2014; Jacob 1993a; Lorrillard 2014; Vickery 1998). These shared attributes produce a notion of a pre-Angkorian or Khmer civilization shared across the regions of the Mekong Delta, Cambodia, northeast Thailand, and southern Laos. Contrary to the absence of trading activities in the inscriptions, the archaeological evidence suggests that there was considerable use of the rivers. The post-Angkorian period model could be used to elucidate this pattern that trade was controlled by the state, not by the temples, and that they were not based on a standardized monetary system.

“Indianization”

Examples from the Mekong-3S region suggest that the largest settlement expansion, which is proxy to organizational change, occurred together with the adoption of religions that

materialized as a temple institution c. 500 CE. Temples were probably considered as continuity from the ancestral worship associated with burials due to their constructions atop the Early Historic burials. “Indianization” perhaps is best associated with the adoption of temple institution. However, it did not precede the formation of sociopolitical complexities associated with chiefdoms or states, particularly those of the Mekong Delta and northeast Thailand. Rather the Hindu-Buddhist temples may have incorporated into and/or become the material representation of the preexisting ancestral worship and also added another dimension to the preexisting Early Historic sociopolitical complexity.

As very few commoners were recorded, the pre-Angkorian inscriptions are biased toward the elite endowments of the temple. This pattern implies that in contrasted with the Early Historic conspicuous display of wealth and status through individual burials, the pre-Angkorian elites achieved the same goal and legitimization through largesse endowment of temples. Similarly, consumption of goods including crafts (jewelry and utilitarian ware), statuary, temple constructions, and other goods intensified production, interaction, and exchange. Temples were centers of inter and intra community interactions providing places of worship, pilgrimage, and possibly food for travelers. Temples also provided sanction for business transactions and conflict resolutions.

Temples, their religious ideologies, economies, and settlement template were instrumental in constructing the pre-Angkorian or Khmer ‘civilization’ or ‘identity’ by the 6th and 7th century CE. It was perhaps this shared ideology and identity that distinguishes the pre-Angkorian period from the Early Historic period. If the Chinese accounts that Funan conquered different polities of much of the Mainland Southeast Asia were true, Funan was merely imposing its suzerainty over other polities. This was because the Funan settlement systems and artifact distribution were only concentrated in the Mekong Delta. Whereas, those associated with the pre-Angkorian period or Chenla—especially, the settlement template of temple and trapeang, similar to that of Funan—were shared across the regions that became associated with the pre-Angkorian polity.

These characteristics provide additional dimensions to counterbalance aspects of “Indianization,” which often emphasized a top-down role of the state elites in controlling and

manipulating the populations through this new ideology. Nonetheless, “Indianization,” that is the adoption of Indic religions and temple institution, brought pre-Angkorian rulers into the contemporary trans-Asiatic elite world view that saw the spread of Hindu-Buddhist religions and temples across South, Southeast, and East Asia (e.g., Brown 1996, 2004; Lavy 2004; Wolters 1979). This factor allowed the pre-Angkorian rulers to further legitimize their ideological claim as the “universal monarch.”

Similar “Indianization” processes occurred in India at almost the exact same time. Although the earliest process of the institutionalization of religion, particularly Buddhism, has been attributed to the rise of the *Sātavāhana* in the Deccan between the 1st century BCE and 1st century CE (Ray 1986), the comparable process to Southeast Asia only occurred during the 5th century CE under the *Gupta* and *Pallava* (Champakalakshmi 2002, 1987; Chattopadhyaya 2002; Willis 2009, 200). Similarly, Monica Smith (1999) argues that “Indianization” of Southeast Asia can only be attributed to post-4th century CE after the sociopolitical systems such as the political terms and religious motifs was fully mature under the *Gupta* period. During the *Sātavāhana* and the *Gupta*, the epigraphic records suggest that the royal endowments preceded those of the other elites and people of different strata (Ray 1986; Willis 2009). This pattern is inconclusive for the pre-Angkorian period due to few written records; however, the earliest written records on religious establishments were associated with those elites who called themselves kings or princes (e.g., *Jayavarman*, *Rudravarman*, *Devanika*, *Bhavavarman I*, etc.). The success of this process observed in India has been attributed to the implementation of the *varṇa* system (landlords, their specialists, and technologies; traders, guilds, farmers and other occupational groups) as well as private property that allowed the temple institutions and their associated land grants to expand into the hinterlands (Ray 1986: 101-107; Willis 2009: 158-163). However, the *varṇa* system did not appear during the pre-Angkorian period as the priests, Brahman or monks, were local elite families or were married into the elite families bearing the *Poñ* and *Mratāñ* titles.

Furthermore, contrary to the multiple types of land endowments in India, the pre-Angkorian donations can only be classified as '*devadāna*' or *devāgrahāra*, god's holding corresponds to *dravya vraḥ* (god's property) of K.41, rather than *brahmadeya* or *agrahāra*,

Brahman's holding (see Appendix B, Note 6). Similar to the pre-Angkorian temples, the institutional aspects of land grants during the second urbanism period India have been associated with the agricultural expansion into the countryside. Previous scholarship contends that this aspect led to 'feudalization' of medieval India (Sharma 2006) or 'segmentation' (B. Stein 1980); however, recent scholars argue that land grant legitimized the monarchies and allowed for power consolidation and sociopolitical integration (e.g., Champakalakshmi 2002; Chattopadhyaya 2002; M. L. Smith 2006; Willis 2009).

The pre-Angkorian corpus suggests that although some temples could be state apparatus, their affairs rested mainly with the local elites who were incorporated into the state system. The pre-Angkorian, Angkorian, and post-Angkorian inscriptions suggest that the degree of relationship between the state and temple economy is proxy the degree of the state centralization itself.

VIII.5 Future Research and Hypotheses Evaluation

Archaeological literatures on sociopolitical typologies (e.g., Trigger 2003) or the middle range theories and methods associated with region and community construction (e.g., Drennan and Peterson 2006; Peterson and Drennan 2005; Stark 2006a) are most suitable to explain the complexity of the pre-Angkorian state. Scholarship on state finance, which emphasize both internal and external exploitations rather than the embeddedness of the economy within a political system, potentially offers new perspectives on ancient economies. These exploitations include plunder, staple finance, tribute in luxury goods, taxation in goods or money, rental of state lands, commercial investment, and taxation in labor (e.g., Blanton and Fargher 2009; Gary M. Feinman 2017; Gary M. Feinman and Nicholas 2017; M. E. Smith 2004, 87; Trigger 2003).

Throughout this dissertation, the weakness of each hypothesis has been emphasized mainly due to nature of the data. These include primarily low surface visibilities, which caused the surface collection surveys to rely almost entirely on backhoe trenches made during various road constructions and on domestic surface disturbances. These factors limit the dataset to come primarily from the levees where most of these activities occurred. Yet, this research argues that the region located c. 1km away from the riverbanks is considered 'highland' or hinterland due to its inadequate water supplies and rock or pebble sediment all of which render

wet rice agriculture difficult. Furthermore, some of the road constructions cut through this hinterland and there was hardly any evidence of human occupation outside the clusters of ponds and temples already identified by satellite images and ground survey. This region also lacks excavated data. The ten trenches dug by this project are the only systematic excavation to date.

Nonetheless, to reevaluate the hypotheses put forward in this dissertation regarding organization change, data collection from three domains will be needed: a) settlement data, b) economic data, and c) sociopolitical data.

Settlement data. Due to the low surface visibility, a shovel test survey is necessary to cover a large region extending beyond the 1km-zone boundary of this research. This shovel test will follow a series of transects or cartographic grids radiating out of the temple areas. The preferred resolution could be at 100m interval. The next step is to establish a refined chronology of each settlement feature by randomly selecting temples (especially, the TB lintels) and trapeangs within the center and those located in the hinterlands. The chronology will bracket the settlement expansion from the lowland into the hinterland. Next, a rigorous inventory survey will have to be complete in areas between Wat Phu, Thala Borivat, Sambor, and Sambok. The data will provide a complete picture of the pre-Angkorian settlements along the major rivers and, possibly, include other unknown Early Historic settlements. The last step involves application of the same shovel test survey to other centers including Sambor, Sambor Prei Kuk, Wat Phu, and Attapeu.

Economic data. An assumption was made in this research that the Early Historic and pre-Angkorian communities within the Mekong-3S region were primarily agrarian based on their positions near the river and wetlands. No credible archaeological evidence was found from the excavation other than the chaff-tempered ceramics that belong to both periods. Additionally, the pre-Angkorian inscriptions that talk about an agrarian economy are only available after 600 CE, which postdated both organizational shifts occurring 100-300 years earlier.

To verify this agrarian hypothesis, three strategies will be needed: 1) wet-screen for faunal and floral remains (fishbone, mammal bone, rice, etc.); 2) excavate the Early Historic

burials and perform isotope analysis on teeth to identify the ratios of C3 vs. C4 plants diets; wear pattern analysis on these teeth will also imply dietary preference; 3) expand the excavation to both lowland and highland settlements to access similarities and different in artifact consumption patterns and to retrieve pollens and plant samples from both locations.

This research postulates that the Early Historic and pre-Angkorian communities of the Mekong-3S region were involved in metallurgy based on slags from the excavated contexts and reports of gold artifacts and gold specks through looting activities. More excavation within these settlements and isotope analysis on gold and metal artifacts will provide answer on such metallurgical activities (primary or secondary production) as well as sources for mineral extractions.

Sociopolitical data. This research argues that the pre-Angkorian social stratification inherited that of the Early Historic period through comparison with contemporary settlements in northeast Thailand and northwest Cambodia. To verify this, more excavation data from the Early Historic burial sites such as O Trel, O Khlong, Tuol Neakta, and Kamnap Anlong Prang (Sambor) will be needed. The results will allow an archaeological assessment of wealth differentiations among settlements reported by looters. Furthermore, this research also argues that the second organizational change coincided or followed by a political centralization associated with Citrasena/Mahendravarman and his families. To verify this, a more precise chronology of the temple expansion, particularly those with early inscriptions is also required.

Organizational and Ideological Shift

If the hypotheses and arguments put forward in this dissertation are credible, particularly on the relationship between organizational change and the introduction of new religious ideologies, this hypothesis could be tested against the post-Angkorian example. The late Angkorian organizational change associated with the ideological shift to Theravada Buddhism during the 13th-16th century could be investigated. *Theravāda* Buddhist pagodas, many of which incorporated and repurposed the Angkorian temples, emerged as key economic vehicles, producing increasingly intertwined local communities and founded a *saṅgha* institution that ultimately wielded political and social power. Similar patterns with the Mekong-3S region could be expected: 1) If the organizational change occurred rapidly: the community

reconfiguration toward both the re-purposed Angkorian temples and pagodas by the 14th-16th century following the adoption of Theravāda; 2) If change was gradual: the communities remained clustered around the Angkorian temples and only shifted to the modern pagodas after the 16th or 17th century concurrence with the decline of Cambodia.

Appendix A: Variation of Name and Acronym

Variation of Place Names

Attapeu	Attopeu (Laos), known as Namnoi during the 17 th century.
Ba Doem	ប្រាសាទ Ba Deum, Ba Dom, Ba Daeum
Kracheh	Kratie ក្រាត៊ី
Sala Prambei Lveng	was recorded by Etienne Aymonier and Lunet de Lajonquière. However, Henri Parmentier recorded it as Sala Prambuon Lveng, which is also known today.
Prasat Preah Ko	Prasat Boran, Prasat Bohan, Prasat Srei
Prasat Khtop	Prasat Pros
Phnom Preah Theat	Phnom Theat, That Phu That
Kamnab	literally means ‘buried object’ but commonly used to refer to treasure commonly associated with collapse temples. In part of Stung Treng, a Laotian variant ‘Sombat’ was also used.
Sekong	Tonle Kong
Sesan	Tonle San
Stung Treng	Stoeng Treng, Steung Traeng
Trapeang	pond
Wat Kumnou	Vat Kumnou (Angkor Borei)
Wat Phu	Vat Phu, Vat Phou (Laos, Champassak)

Acronym

3S Rivers	Sesan, Sekong, and Sre Pok rivers (http://3sbasin.org)
AB	Angkor Borei
AMP	Asiatic Mode of Production
APSARA	Autorité pour la protection du site et l’aménagement de la région d’Angkor (Authority for the protection of the site and the Management of the Region of Angkor)
ASTER	Advanced Spaceborne Thermal Emission and Reflection Radiometer

CISARK	Cart interactive des sites archéologiques khmers (EFEO-MoCFA)
BEFEO	École française d'extrême-orient
CKS	Center for Khmer Studies
EFEO	École française d'extrême-orient
FOKCI	Friends of Khmer Culture Inc.
GAP	Greater Angkor Project
JICA	Japanese International Cooperation Agency
LOMAP	Lower Mekong Archaeological Project
MoCFA	Ministry of Culture and Fine Arts
MoUP	Ministry of Urban Planning
NMC	National Museum of Cambodia
RAC	Royal Academy of Cambodia
RUFA	Royal University of Fine Arts
SBCU	Sambor Collection Unit
SEA	Southeast Asia
SNES	Centre National d'Études Spatiales
SPK	Sambor Prei Kuk
SPOT	Satellites Pour l'Observation de la Terre
SRTM	Shuttle Radar Topography Mission
SU	Stratigraphic Unit
TB	Thala Borivat
TBCU	Thala Borivat Collection Unit
USGS	United States Geological Services

Appendix B: Supplementary Note

Note 1: The name Thala Borivat

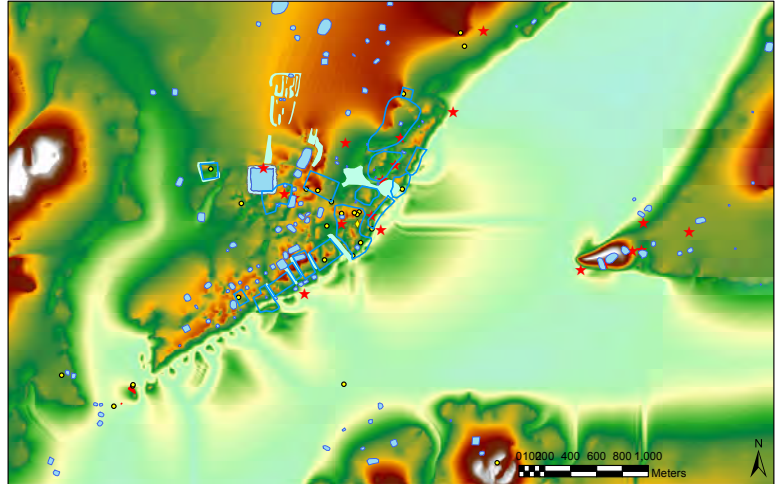
The name Thala Borivat may have derived from the Lao pronunciation of a Pali compound word *dhārāparivata*, meaning swirling water or whirlpool or turbulent (Lajonquière 1907, 56). The term was inspired by the confluence of the Mekong and Kong and probably related to the toponym ‘*veun*’ (a Laos spelling of Khmer term វ័ល *vil* meaning to turn (around), rotate, revolve, spin, whirl) commonly applied to villages along the rivers of this region, e.g., Veun Sai, Veun Kong, Veun Hay, etc. Some Cambodian colleagues (e.g., Long Seam, Oum Boramey) argue that the term possibly derived from a combination of Sanskrit terms *thalā*³², a large mound, and *parvata* or mountain. However, the term Thala Borivat was not known prior to Lajonquière’s inventory. Aymonier and his Khmer assistants reported the area as a poor small village of Veal Kantel (plain of mats) in 1882-1883, a term now narrowly placed near Prasat Preah Ko or Prasat Boran (which is misleading since Aymonier’s description placed it around Sala Pambuon Lveng, within the modern village of Kang Techo). This area was part of the Tonle Ropou province ruled by Champassak Kingdom, which was under Siam suzerainty. The French took over Stung Treng in 1896 and ultimately transferred it to Cambodia in 1904 (see Baird 2010a, 191–92). Thala Borivat then was possibly applied to this area during the Siamese expansion—in response to the French pressure—around 1885 when Champassak was asked to occupy the highlands of Stung Treng and Ratanakiri.

Note 2: Topographic Map

There were several problems encountered during the mapping process. After a dozen of datum points, it was quickly realized that the handheld compass-oriented total station caused orientation errors with increased distance from the main datum. The problem was corrected with additional GPS coordinated-anchored datum points. Another major issue was the total

³² <http://sealang.net/ok/index.htm> : *thalā* /*thɔˈlaː*/[Angkorian *thalā* ~ *dhalā*; local Prākṛta (cf. Pāli *thala* ‘dry or high ground’) corresponding to Sanskrit *sthalā* ‘heap of artificially raised earth, mound’]. **Definitions:**
n. High ground; mound, mount, hillock, knoll.

station's complex set up of back-sighted datum, which caused several errors because wrong datum was selected. This was the first time I used a Total Station to conduct a large-scale topographic mapping in a short time. Poor visibility as well as a large coverage area made the process



Thala Borivat topographic map created using the 2012 total station survey points combined with JICA 2013's 10m-contour intervals (note that most levees here are in the rivers, while the elevation at the tip of Kantuy Ko peninsula is off by 20m)

complicated. This because multiple reference points or datum points were used and multiple pole (stadia rod) heights that needed to be re-adjusted each time (some parts were too high or deep to see using a constant height of 1.5m). The errors were not actually caused by a new datum point but rather by a back-sight ID number. When a new reference point was setup, the total station required a back-sight point which was generally the last station ID that was used to mark the new datum point. Thus, back-sighted to a difference ID resulted in a warp or misplaced instrument location on a new datum.

Additional problem with this topographic map was the elevation value. The official Cambodian topographic map uses the Indian 1960 projection with the Everest datum and Hatien's mean sea level, while the GPS was set to use WGS1984 Zone 48N based on a Geoid elevation. The elevation difference between the two projections is approximately 10m. The freely available Cambodian digital map data produced by JICA only provide a 10m contour interval, which was not helpful for the purpose of this project. Contour-derived elevation values were extracted from the JICA map and combined with the new topographic map. The result was a topographic map of the Thala Borivat region with a strong emphasis on Thala Borivat itself. However, the low resolution JICA map produced a warped map that required further tweaking and additional data.

Note 3: Additional Chronology

To keep the focus of the dissertation on the pre-Angkorian period, the chronological reconstruction of the survey region is presented here in the appendix starting with the deep prehistoric periods (Hoabinhian, Neolithic, and Bronze Age) of which available evidence does not permit the reconstruction of its communities and the Angkorian and post-Angkorian period.

The prehistorical chronology is less defined since research in this period constitutes only a miniscule aspect of the total research, which heavily focuses on the Angkorian temples. The prehistoric period includes a number of 'Paleolithic' or 'Pebble Culture' sites studied by the French geologists and archaeologists in Kracheh and Stung Treng during the 1960s. The Hoabinhian-Neolithic site of Laang Spean, the Neolithic-Bronze Age sites of Samrong Sen, Memot, Mlu Prei, and other cave sites in Kampot were studied mostly during the 1960s (except Samrong Sen in the early 1900s) (e.g., J.-P. Carbonnel and Saurin 1974; Malleret 1959a; Mansuy 1902; Mourer 1988; Lévy 1946; Saurin 1966). Despite the current debate on radiometric date, the Hoabinhian occupations of Laang Spean occurred between 10000-5000 BP and the Neolithic-Bronze Age sites date around 3000 BCE (See: Albrecht et al. 2000; Dega 2001, 152–83; Forestier et al. 2014; Ly 2003, 206–9).

Hoabinhian, Neolithic, and Bronze Age

While the deep prehistory is not part of this study, it is important to note that pebble stone tools collected on the surfaces from Thala Borivat and Sre Reussei (6km northwest of the Thala Borivat temple complex) have been classified as 'Pleistocene Paleolithic' (J. P. Carbonnel 1972; Forestier et al. 2014). Demeter et al (2010) refute this classification and argue that these pebble tools were naturally formed by the fast moving Mekong proto-channels, which extended at c. 10km on each side of the modern channel. Evidence of the Neolithic and Bronze Age of this region is also scarce, possibly due to lack of research. Although the Bronze Age site of Mlu Prei was reported and excavated since the 1940s by Paul Lévy (1946), it is too far (80km northwest of Thala Borivat) to trace any relationship with Thala Borivat.

Shouldered stone axes were reported throughout the Stung Treng region; however, none was reported at Sambor. None of these stone axes was found in the excavated contexts nor within the looted Early Historic burials. They were randomly collected within the rice fields, in the river, vegetable garden, and road fill along the rivers. An absolute date has yet to be associated with shouldered-stone axe tradition in Cambodia. These stone axes have been found at the Neolithic-Bronze Age sites such as

Samrong Sen and Memot with associated date ranges of 3500-1500 BCE (Albrecht et al. 2000; Dega 2001; Ly 2003). Their occurrence within Iron Age context, however, is far from clear as they do appear at the long-term occupation sites at Memot but are generally absent from the Iron

Age context (i.e., post-300 BCE) in northwest Cambodia (S. Heng 2005, 2008; O'Reilly,

Domett, and Pheng 2006; O'Reilly and Shewan 2016; Reinecke, Vin, and Seng 2009; Yasuda 2013; Yasuda and Chuch 2008). Although the Thala Borivat Unit 4's AMS date of 3628 to 3125 BCE perfectly fits the Neolithic-Bronze Age period, the sample is an outlier embedded within the interface of natural and cultural layer. There was no clear evidence of other artifacts beside a few small earthenware pieces likely belong to the pre-Angkorian period.

The reconstruction of early human communities from the deep prehistoric period is not yet possible given the limitation of the current dataset. Nevertheless, a general pattern is that all the stone axes uncovered in Stung Treng came from the river banks close to the later period occupations. After 200 BCE, a better picture of communities located in the study region can be reconstructed until the post-Angkorian period.

Angkorian Period (802-1500 CE)

For the Angkorian period, recent work on stoneware chronology has contributed to provide relative date to Angkorian occupation without datable inscriptions (containing calendrical or paleogeographical date) or architectural elements (stylistic date). Khmer Unglazed and green-glazed stoneware (*a.k.a* Kulenware, hereafter, KGG) were produced between the 9-



Stone Axes 1) Only one from the Ba Doem Region, 2) The rest came from Kang Dei Sa

12th centuries. The production centers of these ceramics are located on Phnom Kulen (Thnal Mrech/Anlong Thom), Sarsei, Bangkok in Angkor region, and Buriram in northeast Thailand. While the Khmer Brown-glazed stoneware (hereafter, KBG) were produced predominantly in Buriram during the 11th to 13th centuries. Other KBG production centers are located at Cheung Ek, which started the production as early as the 9th century till 13th century (Phon Kaseka, pers.comm.), and Toap Chey kiln complex located east of Angkor dated between the 13th-15th centuries CE. The Angkorian curve roof tiles (unglazed, KBG, KGG) appeared with other stoneware during this period. The Angkorian ceramic chronology is summarized below:

Ware Type	800-900	900-1000	1000-1100	1100-1200	1200-1300	1300-1400	1400-1500
Unglazed stoneware							?
KGG/Kulen							
KBG-Buriram (matt brown and black)							
KBG-Toap Chey							?
Lie-de-vin							?
Cheung Ek stoneware						?	

Khmer Stoneware Chronology adapted from Groslier (1981), Cremin (2006), Chhay et al (2012), and Desbat (2011)

This broad stoneware chronology is complemented by tradeware chronology from China, Thailand, and Vietnam. Tradeware is the only index for the post-Angkorian period of which the ceramic and artifact tradition remained unknown. As the precision of stoneware and tradeware chronology is not the focus of this study, they are broadly referred to the dynastic period or a date range between 100-300 years suitable for a broad historical chronology of the Angkorian and post-Angkorian period. (For further details, see: Brown 1988; Roxanna M. Brown 2004; Cremin 2006; Chhay Visoth et al. 2007; Chhay, Tho, and Em 2012; Chhay, Heng, and Chhay 2013; Cheng Pei-Ki et al. 2005; Desbat 2011; Ea 2010; Ea 2015; Groslier 1981; Guy 1986; Miksic 2007; Miksic 2009; Miksic et al. 2009; Rooney 1988; Shimizu 2000; Sjostrand 2002; Wong 2009).

Ware Type	Period	1100-1200	1200-1300	1300-1400	1400-1500	1500-1600	1600-1700	1700-1800	1800-1900
Qingpai, white porcelain, Blue & white	Song Dynasty								
Celadon	Yuan Dynasty								

Blue & white	Ming Dynasty								
Blue & white, celadon, brown glaze	Thai								
Blue & white, Chocolate base	Viet								
Blue & white	Qing Dynasty								

Conventional broadly defined Tradeware Chronology (note that the Song period started since mid-10th century CE, however, most Song ceramics in Angkor fall within the 12th-13th century CE)

Note 4: Sambok

The results of this survey highlight the differences of settlement configurations from Sambor to Thala Borivat. Although known temples are concentrated on levee between Phnom Sambok and Thma Kre, the lack of trapeang—which is the major characteristic of the Khmer settlement patterns—requires explanation. A large body of fresh water, Boeng Sambok, may hinder the need to excavate trapeang. The curiosity derived from K. 927/728-729CE, which mentions a rice field located at a river called *Cdiñ Vrīdāñ* and between two roads of *mratāñ bhā prasanna* and another *mratāñ*. If the river refers to the closest river of Prek Kampi to the north, the extend of this temple and its settlement would have reached 8km. A new inscription refers to a *sre chdiñ jrau* a rice field located at a deep river, which could refer to the same river(?) Or the water body of the marsh land (?).

It is too ambiguous to talk about settlement of Sambok based on a very small survey area. The settlement patterns observed from Thala Borivat, Sambor, and Sambok suggest that they shared common features of mound and trapeang as well as their location on near the levee and in the wetland, likely to accommodate both wet-rice agriculture and trade route. However, despite these similarities, each pre-Angkorian settlements may have distinctive arrangement patterns.

Note 5: Stung Treng 1998 and 2008 Censuses

Census data were available from Open Development Cambodia

(<http://www.opendevelopmentcambodia.net/census/>):

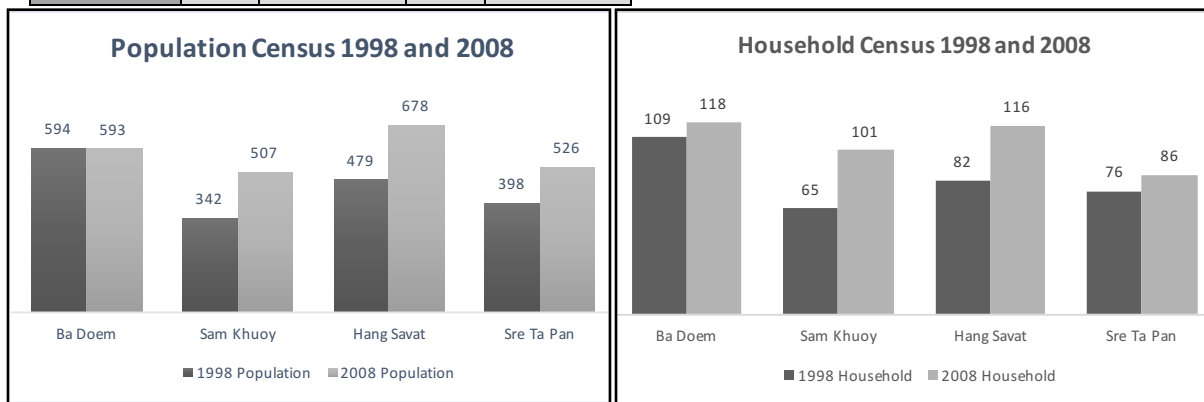
<i>Sruk</i>	<i>Khum</i>	<i>Phum</i>	<i>Pop. 1998</i>	<i>Pop. 2008</i>
<i>Stung Treng</i>	Preah Bat	Ba Chong	1257	1796

<i>Stung Treng</i>	Stung Treng	Multiple Phum	1702	2394
<i>Stung Treng</i>	Sameakki	Hang Khou Suon	1304	802
<i>Sesan</i>	Sam Khuoy	Ba Doem	594	593
<i>Sesan</i>	Sam Khuoy	Sam Khuoy	342	507
<i>Sesan</i>	Sam Khuoy	Hang Savat	479	678

Population Census of Stung Treng town and Khum Samkhuoy

Census	1998		2008	
	Pop.	Household	Pop.	Household
Ba Doem	594	109	593	118
Sam Khuoy	342	65	507	101
Hang Savat	479	82	678	116
Sre Ta Pan	398	76	526	86

Population and household census of the Ba Doem region 1998 and 2008



1998 and 2008 Population and Household Census for Khum Samkhuoy and its potential effect on land use in the survey area

Note 6: Brahmadeya and Devāgraha

In SEA, few inscriptions, paleographically dated to the 5th and 6th centuries CE, record the royal donations (including cattle, lands, sesame seeds, and other goods) to Brahmans (possibly, *brahmadeya*) for their ritual services by *Mūlavarman* of Borneo, *Purṇavarman* of Java, and *Śrīmāra* of Vo-canḥ (Bronkhorst 2011; H. B. Sarkar 1971, 1:6; Vogel 1918). In the Mekong Delta, *Guṇavarman* of K.5 (5th century CE) claims that he was placed by his father *Jayavarman* to be in charge of a “religious domain” of a *Viṣṇu* temple of *Cakratirthasvāmi* reclaimed from the mud (Coedès 1931, 7), which suggests that the practice was devāgraha. In the pre-Angkorian corpus, however, there is no evidence of *brahmadeya* being practiced as the recorded donations were made to the temples/gods, i.e., *devāgraha*.

LOMAP Ceramic Analysis Form

Labelling Example: AB.4.536.211

1. Site (character variable) [SITE]
AB = Angkor Borei
PPK = Prey Phkoam
2. Provenience (numeric variable) [PROV]
00 = Unprovenienced
01- n = Specific Excavation or Surface Collection Unit (often 03 or 04)
3. Level (numeric variable) [LEVEL]
00 = Surface
01 - n = Subsurface level
4. Tag number (numeric variable) [TAG]
AB3 = 001 - 399
1997 collections = 401-499
AB4 = 500 - 750
5. Observation number (numeric variable; 001-n, within each tag) [OBS]
6. Sherd Size (numeric variable) [SIZE]
01 = <5 cm²
02 = 5-16 cm²
03 = 16-49 cm²
04 = 49-100 cm²
05 = >100 cm²
99 = less than 2.5 cm²
7. External Surface Color (numeric variable) [COLOR] (use Munsell terminology)
99 = indeterminate
8. Texture (numeric variable) [TEXTURE]
01 = fine (dense paste with no visible temper and few pores)
02 = medium (semi-dense paste often with pores and voids, temper hardly visible)
03 = coarse (temper visible, often quartz grains, fabric is platy)
99 = indeterminate
9. Vessel Part (numeric variable) [VESPART]
01 = body (can include carination or other shoulder)
02 = rim
03 = neck
04 = spout (restricted with missing rim)
05 = base
06 = lid
07 = rim + neck (must have complete neck profile; FOR RESTRICTED VESSELS ONLY)

- 08 = rim + body (can include shoulder; FOR RESTRICTED VESSELS ONLY)
- 09 = base + body
- 10 = neck + body (FOR RESTRICTED VESSELS ONLY)
- 11 = partial reconstructible vessel (25% or greater present)
- 12 = miscellaneous vessel part (e.g., cylinder fragment, handle, spout, carination)
- 13 = whole vessel
- 14 = other
- 99 = indeterminate vessel part

10. Vessel Shape (numeric variable) [SHAPE]

- 01 = simple restricted
- 02 = composite unrestricted
- 03 = inflected unrestricted
- 04 = complex unrestricted
- 05 = simple restricted
- 06 = composite restricted
- 07 = inflected restricted
- 08 = complex restricted
- 09 = independent composite restricted
- 10 = independent inflected restricted
- 11 = independent complex restricted
- 12 = architectural fragment
- 13 = "lamp"/"lid"
- 99 = indeterminate vessel shape (includes NOT A RIM)

11. Vessel Form (numeric variable) [VESFORM]

- 01 = short flare-rimmed jar
- 02 = tall flare-rimmed jar
- 03 = other flare-rimmed jar
- 04 = other jar
- 05 = cylinder (vertical walls)
- 06 = incurved bowl
- 07 = hemispherical bowl
- 08 = other bowl
- 09 = "lamp"/"lid"
- 10 = architectural fragment
- 11 = miscellaneous appendage (e.g., handle, spout, carinated body sherd, base)
- 12 = flare rimmed bowl

13 = other vessel form

- 99 = indeterminate vessel form

12. Base (numeric variable) [BASE]

- 01 = Pedestaled foot
- 02 = Ring base
- 03 = Knob on/in base
- 04 = absent (includes NOT A BASE)
- 99 = Indeterminate

13. Rim Profile (numeric variable) [RIMPROF] (see Shepard 1971: 246)

- 01 = interior
- 02 = exterior
- 03 = interior and exterior
- 04 = rounded
- 05 = not a rim
- 06 = tapered or direct rim
- 07 = "shelf" rim (rim has horizontal plane)
- 08 = folded rim (must have visible groove)
- 99 = indeterminate

14. Slip Location (numeric variable) [SLIP]

- 00 = absent
- 01 = interior only
- 02 = exterior only
- 03 = interior and exterior
- 99 = indeterminate

15. Paint Location (numeric variable) [PAINT]

- 01 = painted interior and unpainted exterior
- 02 = painted exterior and unpainted interior
- 03 = painted interior and painted exterior
- 04 = unpainted interior and unpainted exterior (i.e., NO PAINT)
- 99 = indeterminate

16. Exterior Surface Treatment (numeric variable) [EXTSURF] (for base sherds, exterior is that which is visible when vessel is standing upright)

- 01 = polished
- 02 = burnished
- 03 = smoothed
- 04 = wiped
- 05 = other
- 06 = not applicable (textured)
- 99 = indeterminate

17. Exterior Surface Decoration (numeric variable) [EXTDEC]

- 01 = impressed (includes comb impressed)
- 02 = cordmarked
- 03 = cordmarked and incised
- 04 = applique
- 05 = no surface decoration
- 06 = other
- 07 = incised
- 99 = indeterminate exterior surface decoration

18. Interior Surface Treatment (numeric variable) [INTSURF] (for base sherds, interior surface consists of the surface that forms the bottom [invisible portion] of the vessel when vessel is standing upright)

- 01 = polished
- 02 = burnished

- 03 = smoothed
- 04 = wiped
- 05 = other
- 06 = not applicable (textured)
- 99 = indeterminate

19. Surface Trace (numeric variable) [TRACE]

- 01 = paint (or organic materials) drip on exterior surface only
- 02 = paint (or organic materials) drip on interior surface only
- 03 = paint (or organic materials) drip on interior and exterior surfaces
- 04 = no paint (or organic materials) drip on either surface
- 99 = indeterminate surface trace

20. Wheel Scars (numeric variable) [STRIA]

- 01 = parallel stria/grooving on interior but not on exterior
- 02 = parallel stria/grooving on exterior but not on interior
- 03 = parallel stria/grooving on interior and exterior
- 04 = no parallel stria/grooving on interior or exterior
- 99 = indeterminate pattern

21. Carbon Core (numeric variable) [CARBON]

- 00 = absent
- 01 = present (includes CME cases in which exterior/interior surfaces are better fired than the core; this is not technically a carbon core UP TO TAG 567 for AB4)
- 02 = differentiation visible but not carbon core (AFTER TAG 567 for AB4)
- 99 = indeterminate

22. Percentage of Rim Present (numeric variable) [RIMLENG]

- 01 = 0-5%
- 02 = 5-10%
- 03 = 10-15%
- 04 = 15-20%
- 05 = 20-25%
- 06 = 25-30%
- 07 = 30-35%
- 08 = 35-40%
- 09 = 40-45%
- 10 = 45-50%
- 11 = greater than 50%
- 12 = complete rim
- 99 = not a rim

23. Orifice Diameter (cm.) (numeric variable) [ORIFDIA] (measured at outside top edge of the rim when leveled [includes out-flared rims]; includes diameter of base or lamp/lid)

- 00 = not applicable
- 99 = indeterminate

24. Aperture Diameter (cm.) (numeric variable) [APETDIA]

00 = not applicable
99 = indeterminate

25. Vessel Wall Thickness (mm.) (numeric variable) [BODTHICK]
99 = indeterminate

26. Temper

01 = fine sand
02 = coarse sand
03 = sand with minerals
04 = sand with chaff
05 = chaff
06 = chaff with minerals

27. Ceramic Group (numeric variable) [GROUP]

01 = Fine Orngeware [FOW]
02 = Cord-marked Earthenware [CME]
03 = Plain Earthenware [PE]
04.1 = Fine Buffware [BFW]
04.2 = Red Painted Buffware [RPB]
04.3 = Incised Oc Eo [IOE]
05 = Coarseware [CW]
06 = Burnished Earthenware [BE]
07 = Whiteware [WW]
08 = Textured Earthenware [TEW]
09 = Coarse Grayware [CGW]
10 = Coarse Orngeware [COW]
11 = Fine Grayware [FGW]
12 = Grayware [GW]
13 = Slipped Wheelmade [SWM]
14 = Red-slipped Earthenware [RSE]
15 = Red-slipped Wheelmade [RSW]
16 = Other [O]
17.1 = Corded Vat Komnou Fineware [VK1]
17.2 = Slipped Vat Komnou Fineware [VK2]
17.3 = "Wheel Made" Vat Komnou Fineware [VK3] (previously SWM)
17.4 = Plain Vat Komnou Fineware [VK4]
18 = Khmer Green Glaze [KGG]
19 = Khmer Brown Glaze [KBG]
20 = Celadon – Chinese or Thai [CEL]
21 = Qingbai [QB]
22 = Blue/White Porcelain – Vietnamese or Chinese [BWP]

28. Numbered non-diagnostic Ceramic Groups (numeric variable) [NNDGRP] (same numbers as ceramic group, but only assigned to non-diagnostic sherds with observation numbers; these records only contain provenience information, observation number, and this group designation)

Thala Borivat Archaeological Project 2014 Ceramic Analysis

Category	Code	Ceramic Group	Description
1	KS	Stoneware or Unglazed stoneware	Khmer stoneware <ul style="list-style-type: none"> ▪ (1a) lie de vin: Bangkong Kiln ▪ (1b) lie de vin: Cheung Ek Kiln
2	KBG	Khmer Brown-Glazed ware	Glazed ware now known to come from Buriram in Northeast Thailand, Cheung Ek, and Toap Chey in Cambodia. <ul style="list-style-type: none"> ▪ (2a) Angkor KBGA ▪ (2b) Buriram KBGB ▪ (2c) Cheung Ek KBGC
3	KGG	Khmer Green-Glazed	Includes, but may not be limited to, Kulenware <ul style="list-style-type: none"> ▪ (3a) Angkor KGGA ▪ (3b) Buriram KGGB
4	TH	Thai ceramics	Thai ceramics dated between 15 th -17 th centuries CE <ul style="list-style-type: none"> ▪ (4a) Nam Noi Brown-Glazed ▪ (4b) Sawankhalok
5	CH	Chinese ceramics	High-fired porcelains (does not include stoneware) <ul style="list-style-type: none"> ▪ 5a Tang Dynasty ▪ 5b Song Dynasty ▪ 5c Yuan Dynasty ▪ 5d Ming Dynasty ▪ 5e Qing Dynasty ▪ 5f Modern
6	VN	Vietnamese ceramics	Vietnamese ceramics that post-date the 15 th century CE
7	KGE	Khmer Glazed Earthenware or Kok Phnov ware (KPNware)	Earthenware or high fired ceramics with transparent or glassy glaze and/or ash-glaze. As of 2014, there are only two known production centers, Kok Phnov and Kok Bei.

8	E	General Undiagnostic Earthenware	Ware fired at low temperature and are commonly utilitarian ware.
8a	8a	Untempered or regular earthenware	This group mainly consists of ceramic with fine clay paste that is generally mixed with little to no temper. Temper can consist of sand (less than 20% of the paste), ground-terracotta (less than 20%), and others. Though, these tempers do not make more than 20% of the paste.
8b	8b	Industrial ware or Pinkware	This type is very common across this area with Iron Age occupations. Though we have found similar ware within the lower layers of Trench 1 and 9. It is very likely that most of the industrial wares are pink exterior and black interior. The paste can consist of moderate to high rice-chaff contents although some occur with very little temper. It bears similar characteristics with the Reduced Ware group. The likely scenario is that the ware was exposed to a very high heat that made the exterior and sometimes the interior exposed to oxygen while the inner paste and the interior face still retains the original reduced ware color.
8c	8c	Rice Chaff-tempered ware	mixed mostly with rice chaff (greater than 20%)
8d	8d	Fine sand-tempered ware	likely resulted from mixing river sand from this area which is fine and rich in feldspar particles. This ware type is generally finished by wiping the exterior to achieve a smoother look. Although, most sherds have their smoothed exterior easily worn off when exposed to water. It seems like the smoothing finish made the exterior of the wall separate from the core-paste. - Smooth on 1 side: 8da

			<ul style="list-style-type: none"> ▪ decorated: 8da-de ▪ non-decorated: 8da-pl (pl for plain) <p>- Smooth on both sides: 8db</p> <ul style="list-style-type: none"> ▪ decorated: 8db-de ▪ non-decorated: 8db-pl
8e	8e	Coarse sand-tempered ware	<ul style="list-style-type: none"> ▪ 8ea. smooth on 1 side ▪ 8eb. smooth on 2 sides
8f	8f	Sand with minerals	generally, the paste appears to mix with white minerals (feldspar and other types of stones). Sherds fall within this category when the minerals represent more than 30% of the surface or paste.
8g	8g	Ground-terracotta (grog) tempered ware	Unless the ground-terracotta represent more than 30% of the paste. Sometimes sand is also added to the texture.
8h	8h	Mineral without sand	generally, the paste contains white minerals (feldspar and other types of stones). Sherds fall within this category when the minerals represent more than 50% of the surface or paste.
9	HiFi	High fired ware	<p>Ware possessing earthenware's paste, forms, and color but were fired at a higher temperature; sometimes called "biscuit ware" (e.g., Darith 2010).</p> <p>This category should be avoided as much as possible. It is recommended that ceramics that fall into this group be re-assigned to either stoneware or earthenware based on form and paste, i.e., although, KPN ware or KGE was fired at a really high temperature, its paste and form does not imitate Angkorian stoneware that we know. Rather they retain forms, which are generally associated with cooking pots or other kitchenware likes</p>

			water-fetching vessel (Ka-am). As for the paste, it contains more pores and more sand or other tempers.
10	RW	Reduced Ware	Iron-Age/ Protohistory burnished black ware
11	FOW	Fine-Orange Ware	Wheel-thrown very fineware common to the delta. Surprisingly, we have pieces of this ware from Trench 7 in the looted context (50cm)
12	FBW	Fine- Buff ware	This ware appears commonly as Kendi, although other kendis have fine to coarse sand temper like other ware.
13	Tlaw	Thala Ware	This ware group consists of mostly sand-tempered and cord-marked pots of which the paste consists of small particles of quartz and feldspars in the sand and Pyrite occurs commonly on the surface. The ware group especially entails a series of carinated and everted rim pots (cooking pots?) found mostly in Thala Borivat and Ba Doem but also occurs in a few burials from Angkor Borei.
97	B	Brick or fired clay	Associated with baked clay materials with or without shape, e.g., brick, kiln's wall, or kiln supports.
98		Sherds smaller than 2 cm ²	Generally, sherds of this size are undiagnostic; unless, they are tradeware or glazed stoneware
99	UnId	Unidentifiable ceramics	Pending further investigation

Appendix D: Site Survey

Thala Borivat Road Cuts

During Phase II field work, multiple sections of ditches were excavated as part Road 2 construction projection in Thala Borivat. A 350m ditch, section 1, was excavated across the rice fields located along the edge of the Phum O Trel Leu levee. Section 2 was a 50m ditch (1m depth) excavated within a depression between a smaller platform (Ban Soñ Señ à la Parmentier) and Tuol Trapeang Kak. Section 3 was a pair of 23m ditches located on both side of the road in a depression between Tuol Trapeang Kak and Tuol Trapeang Khnar. Section 4 was a pair of 350m trenches (0.5-1m depth) extended from Tuol Trapeang Khnar, across Sala Prambuon Lveng to another depression located at its northern edge.

Sambok: Site Description

Phnom Sambok/Wat Chambak Meas

The modern structures on both peaks³³ of Phnom Sambok were built atop pre-Angkorian structures where brick rubble, sandstone slabs, ablution drainage, and pedestals were still visible around these new structures. A Sanskrit inscription K.429 on a *somāsutra* was found on the east peak (Sambok 1) (Finot 1912, 183) and K.430 from the west peak (Sambok 2)(Coedès 1954, 6:44). Both inscriptions were paleographically dated to the pre-Angkorian period. The architectural elements of a collapsed brick structure of Sambok 1, prior to being demolished and covered by a concrete structure in the 1960s, were described by Parmentier (1927:212) to resemble those at Sambor Prei Kuk.

In 2005, a new pond was excavated on the levee next to the entrance to Wat Sambok where intact brick masonry (Sambok 3) was exposed. In 2014, a statue pedestal (*snānadroni*) and sandstone slabs were recorded. At 130m east of this structure, located a group of modern Sino-Khmer burials where many brick fragments were seen on the burial backfill. It was quite likely that the burials were located atop an ancient brick structure (Sambok 4).

³³ The west peak is lower and called Phnom Pros, while the east is called Phnom Srei. The name is commonly applied to mountains or temples in Cambodia referring to a legend that women built taller mound than men.

Wat Thma Kre

A fragment of SPK style lintel was found in Wat Thma Kre; however, there was no visible brick feature observed in this compound. Several sandstone architectural elements such as fragments of round colonnettes were stored in a Neakta's hut in front of the Wat. There is a sandstone formation protruding from the Wat into the river. K.124 was written on a boulder of this formation. Two pre-Angkorian inscriptions, K.926/624CE and K.927/710-729CE were reported from Thma Kre in Phum Chambak Meas (old village name) in 1944 by staff of the Buddhist Institute (Coedès 1953, 5:20–22).

Our survey in 2014 had uncovered a large temple mound in Phum Thma Kre Leu, which was bulldozed in the early 2000s to build houses. This 0.5ha mound, Prasat Thma Kre, was located at 230m northeast of Wat Thma Kre. Locals reported that there was a brick structure with stone slabs, stairways, and two inscriptions. A fragment of pre-Angkorian inscription (piedroit) was uncovered in situ, while another stela was reported to be stolen by a villager who sold it in Siem Reap months earlier. Fragments of bricks, door jams, and a moon stone scattered across different properties atop this mound.

Another fragment of a stela was found in a property located on the other side east of the marsh to the southeast of Prasat Thma Kre. The paleography is pre-Angkorian while the language structure had shifted to Angkorian style employed by K.124/803CE. This stela was reported to be used as an old gravestone located in this property. Upon inspection, no bricks or sandstone debris were seen around this property. Our survey along the new road linking Phum Thma Kre, across this property, to Phnom Sambok did not find any evidence of settlement on this side of the marsh.

Since no evidence of any brick features located between Sambok 4 and Tuol Thma Kre, it is very likely that the stela and the two inscriptions reported in Coedès (1953:20) came from the same place, Prasat Thma Kre. Since no brick feature was reported in Wat Thma Kre, the Sambor Prei Kuk style lintel and two fragments of pre-Angkorian colonnettes in the Neakta's hut may belong to Prasat Thma Kre as well.

Summary Description New Sites Located South of Thala Borivat

Tuol Ansang: a mound (of *Varanus salvator*) located at 4.5km from Phum O Trel and 500m from the river. It was being use as Sala Khum O Rei. Like other burial sites, this mound was looted in the 1980s for gold and beads. There were several pits around the new building that allowed crew members to assess the subsurface artifacts. The stratigraphy was almost entirely small water-worn gravels, similar to Phnom Theat. A few small earthenware sherds bore the characteristics of the O Trel burials. A fragment of a long polished stone tool (locals called it a sword) also shared similarities with O Trel.

Tuol Meas: was a natural hill located at 7km south of Phum O Trel, 600m from the river. Villagers reported that they used to loot gold jewelry and beads (both gold and stone beads) during the 1980s. The mound was currently used as a soil quarry for road constructions. No significant feature was found, although the crew conducted two surface collections of a few scattered earthenware.

Chrang Kraham: was a mound located at 18km downstream from Phum O Trel, 500m from the river. The mound was used for swidden farming and reported to have ceramics. No archaeological feature was found beside scattered sherds on the surface, of which a collection was made. The ceramics share strong similarities with O Trel and Kang Memay burials; though, no industrial ware was found. The location on a mound and away from the river seem to be consistent with other sites such as Kang Memay and Tuol Khtum to be potential Early Historic burials. However, no skeletal remains were seen on the surface nor were their reports of gold looting in this location.

Koh Sralay: Lajonquière (1907) reported of a brick structure (Laotian: Thāt) located at the northern tip of Koh Sralay, which CISARK found evidence of brick remains and a sandstone doorframe. A few trapeang located in the northern part can be identified from remote sensing Google satellite images. A villager in Phum Kang Cham had found a Khmer Brown-Glazed base from the southern portion of this island.

Kang Kngaok/Hup: 15km downstream from O Trel. Som Thon reported that there was a brick structure in this village, which he had seen while working with a clean water NGO during the 1990s.

Phum Kang Dei Sa: A collection of four stone axes belong to Mr. Ket Tharoeun, a relative of Som Thon whose father also collected another stone ax from this area. These stone axes were collected from the rice fields at c. 100m to the east. Besides these stone tools, no archaeological features and artifacts were reported from this area.

Trimble GPS Field Form (Data Dictionary) 2011-2014

Thala_2011_Fieldform
 Reproduced from LCMAP 2009

Thala_site_point	Point Feature, Label 1 = Khum, Label 2 = Srok
Srok	Menu, Normal, Normal
Kratie	
Sambor	
Khum	Text, Maximum Length = 30 Normal, Normal
Phum	Text, Maximum Length = 30 Normal, Normal
Site_Field_Number	Text, Maximum Length = 30 Normal, Normal
Site_Name	Text, Maximum Length = 30 Normal, Normal
Owner	Text, Maximum Length = 30 Normal, Normal
Date Visited	Date, Auto generate Create, Day-Month-Year Format Normal, Normal
Crew_Members	Text, Maximum Length = 30 Normal, Normal
Condition	Text, Maximum Length = 30 Normal, Normal
inhabited	Menu, Normal, Normal
yes	
no	
Desc_of_habitation	Text, Maximum Length = 30 Normal, Normal
Condition	Text, Maximum Length = 100 Normal, Normal
Long_Axis (m)	Text, Maximum Length = 30 Normal, Normal
Short_Axis (m)	Text, Maximum Length = 30 Normal, Normal
General_Site_Desc	Text, Maximum Length = 100 Normal, Normal
Mapping_Method	Text, Maximum Length = 30 Normal, Normal
Surface_Artifact	Menu, Normal, Normal
Yes	
No	
Surface_Visibility	Menu, Normal, Normal
High	
Medium	
Low	
Collection_Method	Menu, Normal, Normal
General	
Systematic_3.6mD	
Surface_coll_Tag_No	Text, Maximum Length = 30 Normal, Normal
Feature_Association	Text, Maximum Length = 30 Normal, Normal
Photo_number	Text, Maximum Length = 30 Normal, Normal
Ceramics	Menu, Normal, Normal
yes	
no	
Ceramic_ID	Text, Maximum Length = 30 Normal, Normal
Comment	Text, Maximum Length = 100 Normal, Normal
Thala_site_line	Line Feature, Label 1 = Comment
District	Text, Maximum Length = 30 Normal, Normal
Khum	Text, Maximum Length = 30 Normal, Normal
Phum	Text, Maximum Length = 30 Normal, Normal
Site_Field_Number	Text, Maximum Length = 30 Normal, Normal
Site_Name	Text, Maximum Length = 30 Normal, Normal
Topo_Quad	Text, Maximum Length = 30 Normal, Normal
Owner	Text, Maximum Length = 30

Date Visited	Normal, Normal Date, Auto generate Create, Day-Month-Year Format Normal, Normal
Crew_Members	Text, Maximum Length = 30 Normal, Normal
Condition	Text, Maximum Length = 30 Normal, Normal
inhabited	Menu, Normal, Normal
yes	
no	
Desc_of_habitation	Text, Maximum Length = 30 Normal, Normal
Condition	Text, Maximum Length = 100 Normal, Normal
Surface_Artifacts	Text, Maximum Length = 30 Normal, Normal
Long_Axis (m)	Text, Maximum Length = 30 Normal, Normal
Short_Axis (m)	Text, Maximum Length = 30 Normal, Normal
General_Site_Desc	Text, Maximum Length = 100 Normal, Normal
Mapping_Method	Text, Maximum Length = 30 Normal, Normal
Type_of_Surf_Coll	Text, Maximum Length = 30 Normal, Normal
Photo_number	Text, Maximum Length = 30 Normal, Normal
Surface_coll_Tag_No	Text, Maximum Length = 30 Normal, Normal
Digital_File_Name_No	Text, Maximum Length = 30 Normal, Normal
No_of_Profiles	Text, Maximum Length = 30 Normal, Normal
No_of_Planviews	Text, Maximum Length = 30 Normal, Normal
Ceramics	Menu, Normal, Normal
yes	
no	
Ceramic_ID	Text, Maximum Length = 30 Normal, Normal
Comment	Text, Maximum Length = 30 Normal, Normal
Thala_site_area	Area Feature, Label 1 = Surface_Visibility, Label 2 = Collection_Method
Srok	Text, Maximum Length = 30 Normal, Normal
Khum	Text, Maximum Length = 30 Normal, Normal
Phum	Text, Maximum Length = 30 Normal, Normal
Site_Field_Number	Text, Maximum Length = 30 Normal, Normal
Site_Name	Text, Maximum Length = 30 Normal, Normal
Topo_Quad	Text, Maximum Length = 30 Normal, Normal
Owner	Text, Maximum Length = 30 Normal, Normal
Date Visited	Date, Auto generate Create, Day-Month-Year Format Normal, Normal
Crew_Members	Text, Maximum Length = 30 Normal, Normal
Condition	Text, Maximum Length = 30 Normal, Normal
inhabited	Menu, Normal, Normal
yes	
no	
Desc_of_habitation	Text, Maximum Length = 30 Normal, Normal
Condition	Text, Maximum Length = 100 Normal, Normal
Long_Axis (m)	Text, Maximum Length = 30 Normal, Normal
Short_Axis (m)	Text, Maximum Length = 30 Normal, Normal

General_Site_Desc	Text, Maximum Length = 100 Normal, Normal
Mapping_Method	Text, Maximum Length = 30 Normal, Normal
Surface_Artifacts	Text, Maximum Length = 30 Normal, Normal
Surface_Visibility	Menu, Normal, Normal High Medium Low
Collection_Method	Menu, Normal, Normal General Systematic_(3.6m_d)
Photo_number	Text, Maximum Length = 30 Normal, Normal
Surface_coll_Tag_No	Text, Maximum Length = 30 Normal, Normal
Digital_File_Name_No	Text, Maximum Length = 30 Normal, Normal
No_of_Profiles	Text, Maximum Length = 30 Normal, Normal
No_of_Planviews	Text, Maximum Length = 30 Normal, Normal
Ceramics	Menu, Normal, Normal yes no
Ceramic_ID	Text, Maximum Length = 30 Normal, Normal
Comment	Text, Maximum Length = 30 Normal, Normal
Point_generic	Point Feature, Label 1 = Comment
Comment	Text, Maximum Length = 32 Normal, Normal
Line_generic	Line Feature, Label 1 = Comment
Comment	Text, Maximum Length = 32 Normal, Normal
Area_generic	Area Feature, Label 1 = Comment
Comment	Text, Maximum Length = 32 Normal, Normal

Site Form 2011-2013

Thala Borivat Archaeological Project

Site Number: _____ UTM Easting: _____
Site Name(s): _____ UTM Northing: _____
Topo quad: _____ Phum/Srok: _____
Previous Citations: _____
Owner (full name in English & Khmer): _____
Date visited: _____ Crew members: _____

Site Characteristics

Condition (circle): vegetated unvegetated inhabited (describe) _____
Features present (circle): artifact scatter collapsed brick architecture other: _____
Surface artifacts (circle): visible & dense visible & light not visible
Long axis N-S (m): _____ Long axis E-W (m): _____

General Site Description:

Documentation

Mapping Method (circle): mountain transit/survey compass GPS Other: _____

Surface collection (circle): 5 m diameter opportunistic other: _____

Camera: _____ Date: _____ Exposure: _____

Camera: _____ Date: _____ Exposure: _____
Surface collection units (and tag numbers): _____

Digital map file names and CD numbers: _____

Surface Collection Form


Thala Borivat Archaeological Project 2011-2013

Photo Number: _____	Team: _____	Collection Number: _____
Date: Yr M D	Surface Visibility: High <input type="checkbox"/>	Medium <input type="checkbox"/> Low <input type="checkbox"/>
Collection Method: General <input type="checkbox"/>	Systematic <input type="checkbox"/>	(No of 3.6 m diameter circles)
No. of Bags: _____	Ceramics ___	Other _____
Feature Associations: _____		

Survey Form 2014 (Desktop Version)

Phala Borivat Archaeological Project
 Department of Anthropology
 University of Hawaii at Manoa, USA
 Piphala Heng

Desktop
iPad
iPhone
Project



Site ID 55

K. N°

IK N°

Site Class Prasat

Period Pre-angkor

Prasat Ku 2

ឧប្បត្តិ

3/5/2014

HABITATION

Permanent Field Hut Spirit

Thatched Religious Other...

OWNER Public

CREW MEMBERS HP, JC, LOEK SAROEU

SITE CONDITION Destroyed By Khmer Rouge And

CENTURIES

LINTEL STYLE

GENERAL DESCRIPTION

This site is located on the river bank on the one end of a trail to Prasat Ku. We have not heard about this particular temple until today (March 5, 2014) on the way back from Koh Sñh when we stopped at a local house asking whether they have known anymore temple around here. They pointed us to an old man that claims to be the guard of Prasat Ku (although Pu Roeung who was in charge of this particular section had no information about him). Though he was quite distrustful to us in fear that we came and loot the temple, he mentioned about a tall tower, which he called a brick kiln used to build Prasat Ku. He said that prior to the Khmer Rouge, the tower was standing tall with intact roof structure until a Khmer Rouge unit dismantle it for its bricks at around the same time with Preah Ko. The foundation itself remained until the new road was built in the early 2012

ARTIFACT LOG#

Surface Visibility

Collection Type

Collection N°

Artifacts Class

Ceramic Fauna Iron Charcoal 1 Stoneware 7 KGE Burnished ware

Brick Flora Bronze Tool 2 KBG 8 Earthenware Fine Orange ware

Fired Clay Organic Gold Other... 3 KGG 9 Hi-Fired Roof tile

Bead Slag Mammal 4 Thai 10 Brick Other...

Metal Archi. Element Aquatic 5 China 12 Un-ID

Stone Statue Jewelry 6 Viet Buffware

Ceramic Class

GPS Northing

Easting

Height

GPS Data

Khet Stoeng Treng

Sruk Se San

Khum Kamphun

Phum

Long Axis

Mapping Method Gps

Mobile Lat 13.557010

Long 106.116955

Accuracy 5

Short Axis

Show on Map

©Heng Piphala 2014

293

Survey Form 2014 (iPhone Version)

Desktop iPad	Desktop iPad	Desktop iPad
SITE ID 55 K. N° IK N° SITE CLASS Prasat PERIOD Pre-Angkor SITE NAME Prasat Ku 2 SITE NAME_KH វត្តគគីរ OWNER Public CREW MEMBER HP, JC, Loek Saroeun DATE VISITED 3/5/2014	SITE CONDITION destroyed by Khmer Rouge and Road Construction CENTURIES HABITATION <input type="checkbox"/> Permanent <input type="checkbox"/> Religious <input type="checkbox"/> Thatched <input type="checkbox"/> Spirit <input type="checkbox"/> Field Hut KHET STQENG TRENG SRUK Se.San KHUM Kacrophu PHUM MAPPING METHOD GPS	GPS Northing Easting Height Long Axis/Short Axis Mobile Lat/Long/Accuracy 13.557010 106.116955 5 Location
Last Next	Prev Next	Prev Next

Desktop iPad	Desktop iPad	Desktop iPad
Surface Visibility Collection Type Collection Number Artifacts Class <input type="checkbox"/> Ceramic <input type="checkbox"/> Statue <input checked="" type="checkbox"/> Brick <input type="checkbox"/> Iron <input type="checkbox"/> Fired Clay <input type="checkbox"/> Bronze <input type="checkbox"/> Bead <input type="checkbox"/> Gold <input type="checkbox"/> Metal <input type="checkbox"/> Mammal <input type="checkbox"/> Stone <input type="checkbox"/> Aquatic <input type="checkbox"/> Fauna <input type="checkbox"/> Jewelry <input type="checkbox"/> Flora <input type="checkbox"/> Charcoal <input type="checkbox"/> Organic <input type="checkbox"/> Tool <input type="checkbox"/> Slag <input type="checkbox"/> Other... <input type="checkbox"/> Archi. Element	Ceramic Class <input type="checkbox"/> 1 Stoneware <input type="checkbox"/> 9 Hi-Fired <input type="checkbox"/> 2 KBG <input type="checkbox"/> 10 Brick <input type="checkbox"/> 3 KGG <input type="checkbox"/> 12 Un-ID <input type="checkbox"/> 4 Thai <input type="checkbox"/> Buffware <input type="checkbox"/> 5 China <input type="checkbox"/> Burnished ware <input type="checkbox"/> 6 Viet <input type="checkbox"/> Fine Orange ware <input type="checkbox"/> 7 KGE <input type="checkbox"/> Roof tile <input type="checkbox"/> 8 Earthenware <input type="checkbox"/> Other... Artifact Log#	Photo Log# General Description This site is located on the river bank on the one end of a trail to Prasat Ku. We have not heard about this particular temple until today (March 5, 2014) on the way back from Koh Shên when we stopped at a local house asking whether they have known anymore temple around here. They pointed us to an old man that claims to be the guard of Prasat Ku (although Pu Roeung who was in charge of this particular section had no information about him). Though he was quite distrustful to us in fear that we came and looted the temple, he mentioned about a tall tower, which he called a brick kiln used to build Prasat Ku. He said that prior to the Khmer Rouge, the tower was standing tall with intact roof structure until a Khmer Rouge unit dismantle it for its bricks at around the same time with Preah Ko. The foundation itself remained until the new road was built in the early 2012 when they bulldozed the rest of it. Now there are small
Prev Next	Prev Next	Prev Begin

Sites Accessed in Each Phase

#	Site Name	Site Class	Phase	Khet	Sruk	Khum	Phum	Collection
1	Brick Feature	Brick Feature	I	Stung Treng	Se San	Sam Khuoy	Sam Khuoy	
2	Brick Feature	Brick Feature	I	Stung Treng	Se San	Sam Khuoy	Sam Khuoy	
3	Brick Feature	Brick Feature	I	Stung Treng	Thala Borivat	Thala Borivat	Kang Techo	
4	Brick Feature	Brick Feature	I	Stung Treng	Thala Borivat	Thala Borivat	Kang Techo	
5	Brick Feature	Brick Feature	I	Stung Treng	Thala Borivat	Thala Borivat	Kang Techo	
6	Prasat Ktop C	Brick Feature	I	Stung Treng	Thala Borivat	Thala Borivat	Kang Techo	
7	Prasat Kang Techo 14	Brick Feature	I	Stung Treng	Thala Borivat	Thala Borivat	Kang Techo	
8	Road cut with brick fragments	Brick Feature	I	Stung Treng	Se San	Sam Khuoy	Ba Doem	
9	tuol norng sim	Brick Feature	I	Stung Treng	Se San	Sam Khuoy	Ba Doem	
10	Tuol Ith	Collection Unit	I	Stung Treng	Se San	Sam Khuoy	Sam Khuoy	TBCU001
11	TBCU002	Collection Unit	I	Stung Treng	Se San	Sam Khuoy	Ba Doem	TBCU002
12	C003	Collection Unit	I	Stung Treng	Se San	Sam Khuoy	Sam Khuoy	TBCU003
13	C004	Collection Unit	I	Stung Treng	Se San	Sam Khuoy	Sam Khuoy	TBCU004
14	Line 007	Collection Unit	I	Stung Treng	Se San	Sam Khuoy	Sam Khuoy	TBCU005
15	TBCU006	Collection Unit	I	Stung Treng	Se San	Sam Khuoy	Sam Khuoy	TBCU006
16	TBCU007	Collection Unit	I	Stung Treng	Se San	Sam Khuoy	Ba Doem	TBCU007
17	TBCU008	Collection Unit	I	Stung Treng	Se San	Sam Khuoy	Ba Doem	TBCU008
18	Tuol Trapeang Pir	Collection Unit	I	Stung Treng	Se San	Sam Khuoy	Sam Khuoy	TBCU009
19	TBCU010	Collection Unit	I	Stung Treng	Se San	Sam Khuoy	Sam Khuoy	TBCU010
20	TBCU011	Collection Unit	I	Stung Treng	Se San	Sam Khuoy	Sam Khuoy	TBCU011
21	TBCU012	Collection Unit	I	Stung Treng	Se San	Sam Khuoy	Sam Khuoy	TBCU012
22	TBCU013	Collection Unit	I	Stung Treng	Se San	Sam Khuoy	Sam Khuoy	TBCU013
23	TBCU014	Collection Unit	I	Stung Treng	Se San	Sam Khuoy	Sam Khuoy	TBCU014
24	TBCU015	Collection Unit	I	Stung Treng	Se San	Sam Khuoy	Sam Khuoy	TBCU015

25	TBCU016	Collection Unit	I	Stung Treng	Se San	Sam Khuoy	Sam Khuoy	TBCU016
26	TBCU017	Collection Unit	I	Stung Treng	Se San	Sam Khuoy	Sam Khuoy	TBCU017
27	TBCU018	Collection Unit	I	Stung Treng	Se San	Sam Khuoy	Sam Khuoy	TBCU018
28	TBCU019	Collection Unit	I	Stung Treng	Se San	Sam Khuoy	Sam Khuoy	TBCU019
29	TBCU020	Collection Unit	I	Stung Treng	Se San	Sam Khuoy	Hang Savat	TBCU020
30	TBCU021	Collection Unit	I	Stung Treng	Se San	Sam Khuoy	Hang Savat	TBCU021
31	TBCU022	Collection Unit	I	Stung Treng	Se San	Sam Khuoy	Hang Savat	TBCU022
32	TBCU023	Collection Unit	I	Stung Treng	Se San	Sam Khuoy	Hang Savat	TBCU023
33	Tuol Lokta	Collection Unit	I	Stung Treng	Se San	Sam Khuoy	Sam Khuoy	TBCU024
34	TBCU025	Collection Unit	I	Stung Treng	Se San	Sam Khuoy	Sam Khuoy	TBCU025
35	TBCU026	Collection Unit	I	Stung Treng	Se San	Sam Khuoy	Sam Khuoy	TBCU026
36	TBCU027	Collection Unit	I	Stung Treng	Se San	Sam Khuoy	Sam Khuoy	TBCU027
37	TBCU028	Collection Unit	I	Stung Treng	Se San	Sam Khuoy	Sam Khuoy	TBCU028
38	TBCU029	Collection Unit	I	Stung Treng	Se San	Sam Khuoy	Sam Khuoy	TBCU029
39	TBCU030	Collection Unit	I	Stung Treng	Se San	Sam Khuoy	Sam Khuoy	TBCU030
40	TBCU032	Collection Unit	I	Stung Treng	Se San	Sam Khuoy	Hang Savat	TBCU032
41	TBCU033	Collection Unit	I	Stung Treng	Se San	Sam Khuoy	Hang Savat	TBCU033
42	TBCU034	Collection Unit	I	Stung Treng	Se San	Sam Khuoy	Hang Savat	TBCU034
43	Kampong Wat Hang Savat	Collection Unit	I	Stung Treng	Se San	Sam Khuoy	Hang Savat	TBCU035
44	Tuol Prateal Ploeng Pun van fai	Collection Unit	I	Stung Treng	Se San	Sam Khuoy	Hang Savat	TBCU036
45	TBCU037	Collection Unit	I	Stung Treng	Se San	Sam Khuoy	Sam Khuoy	TBCU037
46	TBCU038	Collection Unit	I	Stung Treng	Se San	Sam Khuoy	Sam Khuoy	TBCU038
47	TBCU039	Collection Unit	I	Stung Treng	Se San	Sam Khuoy	Sam Khuoy	TBCU039
48	TBCU040	Collection Unit	I	Stung Treng	Stung Treng	Srah Roessey	Dong Ta Dam	TBCU040
49	TBCU041	Collection Unit	I	Stung Treng	Stung Treng	Srah Roessey	Dong Ta Dam	TBCU041

50	TBCU042	Collection Unit		Stung Treng	Stung Treng	Srah Roessey	Dong Ta Dam	TBCU042
51	TBCU043	Collection Unit		Stung Treng	Stung Treng	Srah Roessey	Dong Ta Dam	TBCU043
52	TBCU044	Collection Unit		Stung Treng	Thala Borivat	Thala Borivat	O Trel	TBCU044
53	TBCU045	Collection Unit		Stung Treng	Thala Borivat	Thala Borivat	O Trel	TBCU045
54	O Trel	Collection Unit		Stung Treng	Thala Borivat	Thala Borivat	O Trel	TBCU047
55	TBCU049	Collection Unit		Stung Treng	Stung Treng	srah roessey	Dong Ta Dam	TBCU049
56	Rice field 1	Collection Unit		Stung Treng	Se San	Sam Khuoy	Sam Khuoy	
57	Surface ceramics	Collection Unit		Stung Treng	Se San	Sam Khuoy	Ba Doem	
58	Tuol Sre tapai	Collection Unit		Stung Treng	Se San	Sam Khuoy	Ba Doem	
59	Stone axes	Collection Unit		Stung Treng	Se San	Sam Khuoy	Sre Ta Pan Krom	
60	Phut Hikham	Mound		Stung Treng	Se San	Sam Khuoy	Hang Savat	
61	Sala Sruk	Other		Stung Treng	Thala Borivat	Thala Borivat	Kang Techo	
62	Wat Chas	Other		Stung Treng	Se San	Sam Khuoy	Hang Savat	
63	Prasat Hang Savat 2	Prasat		Stung Treng	Se San	Sam Khuoy	hang savat	TBCU031
64	Prasat O Trel 2	Prasat		Stung Treng	Thala Borivat	Thala Borivat	O Trel	TBCU046
65	Prasat O Trel 4C	Prasat		Stung Treng	Thala Borivat	Thala Borivat	O Trel	TBCU048
66	Ba Chong	Prasat		Stung Treng	Stung Treng	Preah Bat	Prek	TBCU063
67	Ba Doem 2	Prasat		Stung Treng	Se San	Sam Khuoy	Ba Doem	
68	Ba Doem 4	Prasat		Stung Treng	Se San	Sam Khuoy	Ba Doem	
69	Prasat Hang Savat 1	Prasat		Stung Treng	Se San	Sam Khuoy	Hang Savat	
70	Phnom Prasat	Prasat		Stung Treng	Thala Borivat	O Rei	Anlong Svay	
71	Phnom Theat	Prasat		Stung Treng	Stung Treng	Stung Treng	Prek	
72	Ba Doem 3	Prasat		Stung Treng	Se San	Sam Khuoy	Ba Doem	
73	Prasat Kang Techo 4	Prasat		Stung Treng	Thala Borivat	Thala Borivat	Kang Techo	
74	Prasat Hang Savat 3	Prasat		Stung Treng	Se San	Sam Khuoy	hansavat	

75	Prasat O Pongro	Prasat	I	Stung Treng	Se San	Sam Khuoy	Sam Khuoy	
76	Prasat O Trel 1	Prasat	I	Stung Treng	Thala Borivat	Thala Borivat	O Trel	
77	Prasat O Trel 3	Prasat	I	Stung Treng	Thala Borivat	Thala Borivat	O Trel	
78	Prasat O Trel 4A	Prasat	I	Stung Treng	Thala Borivat	Thala Borivat	O Trel	
79	Prasat O Trel 4B	Prasat	I	Stung Treng	Thala Borivat	Thala Borivat	O Trel	
80	Thala Borivat 2A	Prasat	I	Stung Treng	Thala Borivat	Thala Borivat	Thala Borivat	
81	Ba Doem 1 (Theat Ba Doem)	Prasat	I	Stung Treng	Se San	Sam Khuoy	Ba Doem	
82	Preah Ko	Prasat	I	Stung Treng	Thala Borivat	Thala Borivat	Thala Borivat	
83	Prasat Kang Techo 6B	Prasat	I	Stung Treng	Thala Borivat	Thala Borivat	Kang Techo	
84	Neakta Chramoh Thom A	Prasat	I	Stung Treng	Thala Borivat	Thala Borivat	Kang Techo	
85	Prasat Ktop A	Prasat	I	Stung Treng	Thala Borivat	Thala Borivat	Kang Techo	
86	Prasat Ktop B	Prasat	I	Stung Treng	Thala Borivat	Thala Borivat	Kang Techo	
87	Prasat Phnom Prahong	Prasat	I	Stung Treng	Thala Borivat	Thala Borivat	Kang Techo	
88	Prasat O Trel 6G	Prasat	I	Stung Treng	Thala Borivat	Thala Borivat	O Trel	
89	Sala Prambuon Lveng	Prasat	I	Stung Treng	Thala Borivat	Thala Borivat	Kang Techo	
90	Prasat Kang Techo 7	Prasat	I	Stung Treng	Thala Borivat	Thala Borivat	Kang Techo	
91	Prasat Kang Techo 15	Prasat	I	Stung Treng	Thala Borivat	Thala Borivat	Kang Techo	
92	Prasat Kamnap	Prasat	I	Stung Treng	Thala Borivat	Thala Borivat	Thala Borivat	
93	Stupa (thad)	Stupa	I	Stung Treng	Se San	Sam Khuoy	Sre Ta Pan Leu	
94	trapeang	Trapeang	I	Stung Treng	Thala Borivat	O Rei	Anlong Svay	
95	Thala Borivat 6	Brick Feature	II	Stung Treng	Thala Borivat	Thala Borivat	Thala Borivat	
96	Thala Borivat 8	Brick Feature	II	Stung Treng	Thala Borivat	Thala Borivat	Thala Borivat	
97	Prasat O Trel 7A	Brick Feature	II	Stung Treng	Thala Borivat	Thala Borivat	O Trel	
98	Prasat O Trel 7B	Brick Feature	II	Stung Treng	Thala Borivat	Thala Borivat	O Trel	
99	Prasat O Trel 7C	Brick Feature	II	Stung Treng	Thala Borivat	Thala Borivat	O Trel	

100	Prasat O Trel 7D	Brick Feature	II	Stung Treng	Thala Borivat	Thala Borivat	O Trel	
101	Prasat O Trel 7E	Brick Feature	II	Stung Treng	Thala Borivat	Thala Borivat	O Trel	
102	Prasat O Trel 7F	Brick Feature	II	Stung Treng	Thala Borivat	Thala Borivat	O Trel	
103	Prasat O Trel 10	Brick Feature	II	Stung Treng	Thala Borivat	Thala Borivat	O Trel	
104	Prasat Trapeang Khnar C	Brick Feature	II	Stung Treng	Thala Borivat	Thala Borivat	O Trel	
105	Prasat Trapeang Khnar D	Brick Feature	II	Stung Treng	Thala Borivat	Thala Borivat	O Trel	
106	Prasat Trapeang Khnar E	Brick Feature	II	Stung Treng	Thala Borivat	Thala Borivat	O Trel	
107	Prasat Trapeang Khnar F	Brick Feature	II	Stung Treng	Thala Borivat	Thala Borivat	O Trel	
108	Prasat Trapeang Khnar G	Brick Feature	II	Stung Treng	Thala Borivat	Thala Borivat	Kang Techo	
109	Prasat Trapeang Khnar H	Brick Feature	II	Stung Treng	Thala Borivat	Thala Borivat	Kang Techo	
110	Prasat Trapeang Khnar I	Brick Feature	II	Stung Treng	Thala Borivat	Thala Borivat	Kang Techo	
111	Prasat Trapeang Khnar J	Brick Feature	II	Stung Treng	Thala Borivat	Thala Borivat	Kang Techo	
112	Prasat Trapeang Khnar K	Brick Feature	II	Stung Treng	Thala Borivat	Thala Borivat	Kang Techo	
113	Sala Prambuon Lveng B	Brick Feature	II	Stung Treng	Thala Borivat	Thala Borivat	Kang Techo	
114	Prasat O Trel 12	Brick Feature	II	Stung Treng	Thala Borivat	Thala Borivat	O Trel	
115	Thala Borivat	Collection Unit	II	Stung Treng	Thala Borivat	Thala Borivat	O Trel	TBCU050
116	Thala Borivat	Collection Unit	II	Stung Treng	Thala Borivat	Thala Borivat	Thala Borivat	TBCU051
117	Sala Prambuon Lveng	Collection Unit	II	Stung Treng	Thala Borivat	Thala Borivat	Kang Techo	TBCU053
118	Thala Borivat	Collection Unit	II	Stung Treng	Thala Borivat	Thala Borivat	Kang Techo	TBCU054
119	Sala Prambuon Lveng	Collection Unit	II	Stung Treng	Thala Borivat	Thala Borivat	Kang Techo	TBCU055
120	Kang Techo	Collection Unit	II	Stung Treng	Thala Borivat	Thala Borivat	Kang Techo	TBCU056
121	O Trel	Collection Unit	II	Stung Treng	Thala Borivat	Thala Borivat	O Trel	TBCU057
122	Kang Techo	Collection Unit	II	Stung Treng	Thala Borivat	Thala Borivat	Kang Techo	TBCU059
123	Kang Techo	Collection Unit	II	Stung Treng	Thala Borivat	Thala Borivat	Kang Techo	TBCU060
124	Kang Techo	Collection Unit	II	Stung Treng	Thala Borivat	Thala Borivat	Kang Techo	TBCU061

125	Kang Techo	Collection Unit	II	Stung Treng	Thala Borivat	Thala Borivat	Kang Techo	TBCU062
126	Tuol Angka Khmao	Mound	II	Stung Treng	Thala Borivat	Thala Borivat	Kang Techo	
127	Brick feature (Retired 2014)	Other	II	Stung Treng	Thala Borivat	Thala Borivat	O Trel	
128	Wat Thme Kre	Other	II	Kracheh	Kracheh	Kracheh	Thma Kre	
129	Thma Kre Inscription	Other	II	Kracheh	Kracheh	Kracheh	Thma Kre	
130	Trapeang Kak	Prasat	II	Stung Treng	Thala Borivat	Thala Borivat	O Trel	TBCU052
131	Prasat Kang Techo 6A	Prasat	II	Stung Treng	Thala Borivat	Thala Borivat	Kang Techo	TBCU058
132	Prasat Kang Techo 5	Prasat	II	Stung Treng	Thala Borivat	Thala Borivat	Kang Techo	
133	Prasat Kou	Prasat	II	Stung Treng	Se San	Kamphun	Kamphun	
134	Thala Borivat Junior High school	Prasat	II	Stung Treng	Thala Borivat	Thala Borivat	Thala Borivat	
135	Thala Borivat 7	Prasat	II	Stung Treng	Thala Borivat	Thala Borivat	Thala Borivat	
136	Neakta Chramoh Thom B	Prasat	II	Stung Treng	Thala Borivat	Thala Borivat	Kang Techo	
137	Prasat Kang Techo 12	Prasat	II	Stung Treng	Thala Borivat	Thala Borivat	Kang Techo	
138	Prasat Kang Techo 13	Prasat	II	Stung Treng	Thala Borivat	Thala Borivat	Kang Techo	
139	Prasat Charoek	Prasat	II	Stung Treng	Thala Borivat	Thala Borivat	Kang Techo	
140	Prasat O Trel 6A	Prasat	II	Stung Treng	Thala Borivat	Thala Borivat	O Trel	
141	Prasat O Trel 6B	Prasat	II	Stung Treng	Thala Borivat	Thala Borivat	O Trel	
142	Prasat O Trel 6C	Prasat	II	Stung Treng	Thala Borivat	Thala Borivat	O Trel	
143	Prasat O Trel 6D	Prasat	II	Stung Treng	Thala Borivat	Thala Borivat	O Trel	
144	Prasat O Trel 6E	Prasat	II	Stung Treng	Thala Borivat	Thala Borivat	O Trel	
145	Prasat O Trel 6F	Prasat	II	Stung Treng	Thala Borivat	Thala Borivat	O Trel	
146	Prasat O Trel 8	Prasat	II	Stung Treng	Thala Borivat	Thala Borivat	O Trel	
147	Prasat O Trel 9	Prasat	II	Stung Treng	Thala Borivat	Thala Borivat	O Trel	
148	Prasat O Trel 7G	Prasat	II	Stung Treng	Thala Borivat	Thala Borivat	O Trel	
149	Prasat Trapeang Khnar B	Prasat	II	Stung Treng	Thala Borivat	Thala Borivat	Kang Techo	

150	Prasat Trapeang Khnar A	Prasat	II	Stung Treng	Thala Borivat	Thala Borivat	Kang Techo	
151	Prasat Kang Techo 10	Prasat	II	Stung Treng	Thala Borivat	Thala Borivat	Kang Techo	
152	Prasat O Trel 8	Prasat	II	Stung Treng	Thala Borivat	Thala Borivat	O Trel	
153	Prasat O Trel 9	Prasat	II	Stung Treng	Thala Borivat	Thala Borivat	O Trel	
154	Prasat O Trel 10	Prasat	II	Stung Treng	Thala Borivat	Thala Borivat	O Trel	
155	Prasat O Trel 11	Prasat	II	Stung Treng	Thala Borivat	Thala Borivat	O Trel	
156	Voeng Kong	Prasat	II	Stung Treng	Thala Borivat	Thala Borivat	Kang Techo	
157	Prasat Kang Techo 8	Prasat	II	Stung Treng	Thala Borivat	Thala Borivat	Kang Techo	
158	Thala Borivat 10A	Prasat	II	Stung Treng	Thala Borivat	Thala Borivat	Thala Borivat	
159	Thala Borivat 10B	Prasat	II	Stung Treng	Stung Treng	Stung Treng	Thala Borivat	
160	Koh Bay Samnom	Prasat	II	Stung Treng	Thala Borivat	Thala Borivat	Thala Borivat	
161	Prasat O Trel 5	Prasat	II	Stung Treng	Thala Borivat	Thala Borivat	O Trel	
162	Kantuy Ko 4	Brick Feature	III	Stung Treng	Thala Borivat	Samakki	Hang Khou Suon	TBCU068
163	Brick feature	Brick Feature	III	Kracheh	Sambor	Sambor	Don Meas	
164	Sambok 3	Brick Feature	III	Kracheh	Citr Borei	Thma Kre	Thma Kre Leu	
165	Kantuy Ko 2.1	Brick Feature	III	Stung Treng	Stung Treng	Samakki	Hang Khou Suon	
166	Pha Bang	Brick Feature	III	Stung Treng	Siem Pang	Thma Keo	Pa Bang	
167	Hang Khou Ban 1	Brick Feature	III	Stung Treng	Stung Treng	Samakki	Hang Khou Ban	
168	Hang Khou Ban 2	Brick Feature	III	Stung Treng	Stung Treng	Samakki	Hang Khou Ban	
169	Wat Hang Khou Ban	Brick Feature	III	Stung Treng	Stung Treng	Samakki	Hang Khou Ban	
170	Koh Snheng	Brick Feature	III	Stung Treng	Se San	Phluk	Phluk	
171	Ba Doem 6	Brick Feature	III	Stung Treng	Sesan	Sam Khuoy	Ba Doem	
172	Prasat Kang Techo 11	Brick Feature	III	Stung Treng	Thala Borivat	Thala Borivat	Kang Techo	
173	Kantuy Ko 5	Brick Feature	III	Stung Treng	Thala Borivat	Samakki	Hang Khou Suon	
174	Kantuy Ko 6	Brick Feature	III	Stung Treng	Thala Borivat	Samakki	Hang Khou Suon	

175	Koh Snaeng	Brick Feature	III	Stung Treng	Thala Borivat	Thala Borivat	Koh Snaeng	
176	Kang Kngaok	Brick Feature	III	Stung Treng	Thala Borivat	Thala Borivat	Kang Kngaok	
177	Siem Pang 3	Brick Feature	III	Stung Treng	Siem Pang	Thma Keo	Pa Bang	
178	Siem Pang 4	Brick Feature	III	Stung Treng	Siem Pang	Thma Keo	Pa Bang	
179	Tuol Khtum	Burial	III	Stung Treng	Stung Treng	Preah Bat	Kang Dei Sa	TBCU064
180	Kang Memay	Burial	III	Stung Treng	Stung Treng	Preah Bat	Kang Memay	TBCU065
181	Kang Memay Burial 2 & 3	Burial	III	Stung Treng	Stung Treng	Preah Bat	Kang Memay	TBCU067
182	Chrang Kraham	Burial	III	Stung Treng	Thala Borivat	Kang Cham	Kampong Pang	TBCU069
183	Tuol Meas	Burial	III	Stung Treng	Thala Borivat	O Rei	Pong Teuk	TBCU070
184	Tuol Meas	Burial	III	Stung Treng	Thala Barivat	O Rei	Pong Teuk	TBCU070
185	Tuol Ansang/Tuol Meas	Burial	III	Stung Treng	Thala Borivat	O Rei	Phum O Rei	TBCU071
186	SBCU013	Collection Unit	III	Kracheh	Sambor	Koh knher	Bay Samnom	SBCU013
187	Kamnab (Anlong Prang)	Collection Unit	III	Kracheh	Sambor	Sambor	Don Meas	SBCU014
188	Tuol Phum Ta Ouk	Collection Unit	III	Kracheh	Sambor	Sambor	Don Meas	SBCU015
189	Tuol Trapeang Thma	Collection Unit	III	Kracheh	Sambor	Sambor	Don Meas	SBCU016
190	Vihear Kok	Collection Unit	III	Kracheh	Sambor	Sambor	Sambor	SBCU018
191	Veal Vong	Collection Unit	III	Kracheh	Sambor	Sambor	Sambor	SBCU019
192	Tuol Don Meas	Collection Unit	III	Kracheh	Sambor	Sambor	Don Meas	SBCU020
193	Tuol Don Meas	Collection Unit	III	Kracheh	Sambor	Sambor	Don Meas	SBCU021
194	Tuol Don Meas	Collection Unit	III	Kracheh	Sambor	Sambor	Don Meas	SBCU022
195	Tuol Don Meas	Collection Unit	III	Kracheh	Sambor	Sambor	Don Meas	SBCU023
196	Trapeang	Collection Unit	III	Kracheh	Citr Borei	Thma Kre	Thma Kre Leu	SBCU024
197	Phnom Sambok	Collection Unit	III	Kracheh	Citr Borei	Thma Kre	Thma Kre Leu	SBCU025
198	Phnom Sambok	Collection Unit	III	Kracheh	Citr Borei	Thma Kre	Thma Kre Leu	SBCU026
199	Boeng Sambok	Collection Unit	III	Kracheh	Citr Borei	Thma Kre	Thma Kre Leu	SBCU028

200	Chuor Neakta	Collection Unit	III	Stung Treng	Se San	Sre ko	Sre ko	TBCU072
201	Sala Sruk CU	Collection Unit	III	Stung Treng	Thala Borivat	Thala Borivat	Thala Borivat	TBCU073
202	O Trel	Collection Unit	III	Stung Treng	Thala Borivat	Thala Borivat	O Trel	TBCU074
203	Tuol Trapeang Khna lech							
ខ្មែរ លើស"	Mound	Kracheh	Sambor	Koh knher	Svay Chek	SBCU001		
204	Tuol Trapeang Prum	Mound	III	Kracheh	Sambor	Koh knher	Svay Chek	SBCU002
205	Tuol Trapeang Anhchanh	Mound	III	Kracheh	Sambor	Koh knher	Svay Chek	SBCU004
206	Tuol Ta Neang	Mound	III	Kracheh	Sambor	Koh knher	Bay Samnom	SBCU005
207	Tuol Trapeang Khtum	Mound	III	Kracheh	Sambor	Koh knher	Bay Samnom	SBCU006
208	Tuol Trapeang Kamprak	Mound	III	Kracheh	Sambor	Koh knher	Bay Samnom	SBCU007
209	Tuol Khnar	Mound	III	Kracheh	Sambor	Koh knher	Bay Samnom	SBCU008
210	Tuol Kamnap	Mound	III	Kracheh	Sambor	Koh knher	Bay Samnom	SBCU009
211	Tuol Kamnap	Mound	III	Kracheh	Sambor	Koh knher	Bay Samnom	SBCU010
212	Tuol Kamnap	Mound	III	Kracheh	Sambor	Koh knher	Bay Samnom	SBCU011
213	Tuol Kamnap Ta Kin	Mound	III	Kracheh	Sambor	Koh knher	Bay Samnom	SBCU012
214	Tuol Trapeang Ampil	Mound	III	Kracheh	Sambor	Sambor	Don Meas	SBCU017
215	Tuol Trapeang Anhchanh	Mound	III	Kracheh	Sambor	Koh knher	Svay Chek	
216	Tuol Kruos	Mound	III	Kracheh	Sambor	Koh knher	Svay Chek	
217	Tuol	Mound	III	Kracheh	Sambor	Koh knher	Bay Samnom	
218	Tuol Kamnap	Mound	III	Kracheh	Sambor	Koh knher	Bay Samnom	
219	Tuol Kamnap	Mound	III	Kracheh	Sambor	Koh knher	Bay Samnom	
220	NA	Mound	III	Kracheh	Sambor	Koh knher	Bay Samnom	
221	Tuol	Mound	III	Kracheh	Sambor	Sambor	Don Meas	
222	Tuol Trapeang Thma	Mound	III	Kracheh	Sambor	Sambor	Don Meas	
223	Tuol Trapeang Thma	Mound	III	Kracheh	Sambor	Sambor	Don Meas	
224	Tuol (new inscription)	Other	III	Kracheh	Citr Borei	Thma Kre	Thma Kre Leu	

225	Recovery of K.360	Other	III	Stung Treng	Stung Treng	Preah Bat	Ba Chong	
226	House of Choeng Poon	Other	III	Stung Treng	Stung Treng	Srah Ruessei	Sre Po	
227	4 stone axes collection	Other	III	Stung Treng	Stung Treng	Preah Bat	Kang Dei Sa	
228	Koh Sralay 2	Other	III	Stung Treng	Thala Borivat	Thala Borivat	Kampong Pang	
229	Keng Prasat	Other	III	Kracheh	Sambor	Sambor	Keng Prasat	
230	Phnom Sambok (Srei)	Prasat	III	Kracheh	Citr Borei	Thma Kre	Thma Kre Leu	SBCU027
231	Thala Borivat 1	Prasat	III	Stung Treng	Thala Borivat	Thala Borivat	Thala Borivat	TBCU066
232	Tuol Kamnap Meun Cheum	Prasat	III	Kracheh	Sambor	Koh knher	Bay Samnom	
233	Trapeang Prei	Prasat	III	Kracheh	Sambor	Koh knher	Bay Samnom	
234	Kamnap (Anlong Prang)	Prasat	III	Kracheh	Sambor	Sambor	Don Meas	
235	Tuol Ta Ouk	Prasat	III	Kracheh	Sambor	Sambor	Don Meas	
236	Prasat Kamnap Trapeang Thma	Prasat	III	Kracheh	Sambor	Sambor	Don Meas	
237	Wat Tasar Maroy	Prasat	III	Kracheh	Sambor	Sambor	Sambor	
238	Prasat Don Meas A	Prasat	III	Kracheh	Sambor	Sambor	Don Meas	
239	Prasat Don Meas B	Prasat	III	Kracheh	Sambor	Sambor	Don Meas	
240	Prasat Don Meas C	Prasat	III	Kracheh	Sambor	Sambor	Don Meas	
241	Prasat Don Meas D	Prasat	III	Kracheh	Sambor	Sambor	Don Meas	
242	Tuol Kamnap Trapeang Sinoa	Prasat	III	Kracheh	Sambor	Sambor	Don Meas	
243	Phnom Sambok (Pros)	Prasat	III	Kracheh	Citr Borei	Thma Kre	Thma Kre Leu	
244	Sambok 2	Prasat	III	Kracheh	Citr Borei	Thma Kre	Thma Kre Leu	
245	Kantuy Ko 1	Prasat	III	Stung Treng	Stung Treng	Samakki	Hang Khou Suon	
246	Prasat Thma Kre	Prasat	III	Kracheh	Citr Borei	Thma Kre	Thma Kre Leu	
247	Kantuy Ko 2.2	Prasat	III	Stung Treng	Thala Borivat	Samakki	Hang Khou Suon	
248	Kantuy Ko 2.3	Prasat	III	Stung Treng	Thala Borivat	Samakki	Hang Khou Suon	
249	Tuol Neakta Komlup	Prasat	III	Stung Treng	Siem Pang	Thma Keo	Pa Bang	
250	Kantuy Ko 3	Prasat	III	Stung Treng	Stung Treng	Samakki	Hang Khou Suon	

251	Kantuy Ko 8	Prasat	III	Stung Treng	Stung Treng	Samakki	Kantuy Ko	
252	Hang Khou Ban 3 Primary School	Prasat	III	Stung Treng	Stung Treng	Samakki	Hang Khou Ban	
253	Prasat Kamnab	Prasat	III	Stung Treng	Stung Treng	Thala Borivat	Thala Borivat	
254	Prasat Kamnab	Prasat	III	Stung Treng	Thala Borivat	Thala Borivat	Thala Borivat	
255	Thala Borivat 3	Prasat	III	Stung Treng	Thala Borivat	Thala Borivat	Thala Borivat	
256	Thala Borivat 2B	Prasat	III	Stung Treng	Thala Borivat	Thala Borivat	Thala Borivat	
257	Prasat Kou 2	Prasat	III	Stung Treng	Se San	Kamphun	Phluk	
258	Prasat Kamnab A	Prasat	III	Stung Treng	Thala Borivat	Thala Borivat	Thala Borivat	
259	Prasat Kamnab B	Prasat	III	Stung Treng	Thala Borivat	Thala Borivat	Thala Borivat	
260	Prasat Kamnab C	Prasat	III	Stung Treng	Thala Borivat	Thala Borivat	Thala Borivat	
261	Thala Borivat 4	Prasat	III	Stung Treng	Thala Borivat	Thala Borivat	Thala Borivat	
262	Ba Doem 5	Prasat	III	Stung Treng	Sesan	Sam Khuoy	Ba Doem	
263	Thala Borivat 9B	Prasat	III	Stung Treng	Thala Borivat	Thala Borivat	Thala Borivat	
264	Thala Borivat 9C	Prasat	III	Stung Treng	Thala Borivat	Thala Borivat	Thala Borivat	
265	Thala Borivat 9D	Prasat	III	Stung Treng	Thala Borivat	Thala Borivat	Thala Borivat	
266	Thala Borivat 9E	Prasat	III	Stung Treng	Thala Borivat	Thala Borivat	Thala Borivat	
267	Thala Borivat 9F	Prasat	III	Stung Treng	Thala Borivat	Thala Borivat	Thala Borivat	
268	Thala Borivat 9G	Prasat	III	Stung Treng	Thala Borivat	Thala Borivat	Thala Borivat	
269	Thala Borivat 5	Prasat	III	Stung Treng	Thala Borivat	Thala Borivat	Thala Borivat	
270	Thala Borivat 9H	Prasat	III	Stung Treng	Thala Borivat	Thala Borivat	Thala Borivat	
271	Thala Borivat 9A	Prasat	III	Stung Treng	Thala Borivat	Thala Borivat	Thala Borivat	
272	Kantuy Ko 7 (Upmung)	Prasat	III	Stung Treng	Thala Borivat	Samakki	Hang Khou Suon	
273	Prasat Don Meas E	Prasat	III	Kracheh	Sambor	Sambor	Don Meas	
274	Phnom Ith	Prasat	III	Stung Treng	Se San	Phluk	Phluk	

Appendix E: Surface Collection

Stung Treng Surface Artifacts

Stung Treng Stoneware and Tradeware: Count

Collection#	Phase	Total	KS	KBG	KGG	TH	CH	VN
TBCU001	1	1			1			
TBCU003	1	1					1	
TBCU005	1	1			1			
TBCU006	1	1	1					
TBCU007	1	2		1	1			
TBCU008	1	18	8	1	3		6	
TBCU010	1	1	1					
TBCU013	1	1		1				
TBCU014	1	1			1			
TBCU015	1	2	2					
TBCU018	1	1					1	
TBCU019	1	5	3		1		1	
TBCU024	1	4	1	1	1		1	
TBCU026	1	1					1	
TBCU027	1	5	2				3	
TBCU029	1	15	2	2			11	
TBCU030	1	15		1		1	13	
TBCU031	1	2	2					
TBCU033	1	4		2			2	
TBCU038	1	2	2					
TBCU039	1	6	2				4	
TBCU043	1	1					1	
TBCU048	1	11	11					
TBCU049	1	7		5			2	
TBCU052	2	7	3	3			1	
TBCU053	2	13		2	2		9	
TBCU054	2	2	1	1				
TBCU055	2	40	10	17	8		5	
TBCU056	2	9	2	1	3		3	
TBCU058	2	1		1				
TBCU059	2	29	4	12			12	1
TBCU060	2	16	4	10			2	
TBCU061	2	3		2			1	
TBCU062	2	6	5	1				
TBCU063	2	36	36					
TBCU073	3	6	2	3			1	
	Total	276	104	67	22	1	81	1

Stung Treng Stoneware and Tradeware: Weight

Collection#	Phase	Total	KS	KBG	KGG	TH	CH	VN
TBCU001	1	85			85			
TBCU003	1	3					3	
TBCU005	1	10			10			
TBCU006	1	100	100					
TBCU007	1	50		10	40			
TBCU008	1	192	120	2	20		50	
TBCU010	1		x					
TBCU013	1	11		11				
TBCU014	1	3			3			
TBCU015	1	115	115					
TBCU018	1	4					4	
TBCU019	1	196	166		17		13	
TBCU024	1	33	13	4	13		3	
TBCU026	1	1					1	
TBCU027	1	37	21				16	
TBCU029	1	304	229	45			30	
TBCU030	1	55		4		9	42	
TBCU031	1	182	182					
TBCU033	1	108		105			3	
TBCU038	1	21	21					
TBCU039	1	153	47				106	
TBCU043	1	8					8	
TBCU048	1	1225	1225					
TBCU049	1	271		248			23	
TBCU052	2	851	743	106			2	
TBCU053	2	95		2	25		68	
TBCU054	2	158	138	20				
TBCU055	2	1965	751	814	276		124	
TBCU056	2	58	34	2	11		11	
TBCU058	2	468		468				
TBCU059	2	445	68	302			74	1
TBCU060	2	746	67	677			2	
TBCU061	2	60		48			12	
TBCU062	2	110	93	17				
TBCU063	2	4560	4560					
	Total	12683	8693	2885	500	9	595	1

Stung Treng Earthenware: Count

Collection#	Phase	Total	E8a	E8b	E8c	E8sand	E8g	E8h	E9	E10	E11	E12
TBCU001	1	12				6	5	1				
TBCU002	1	38		6		32						
TBCU003	1	1				1						
TBCU004	1	4				4						
TBCU006	1	1				1						
TBCU007	1	33		4		29						
TBCU008	1	32		1		31						
TBCU009	1	7				7						
TBCU010	1	7				7						
TBCU011	1	18				18						
TBCU012	1	14				14						
TBCU013	1	5				5						
TBCU014	1	3				3						
TBCU015	1	2				2						
TBCU016	1	13				13						
TBCU017	1	7				7						
TBCU018	1	20				20						
TBCU019	1	10				10						
TBCU020	1	170			1	169						
TBCU021	1	123				120						3
TBCU022	1	136				83						53
TBCU023	1	20				20						
TBCU024	1	5				5						
TBCU025	1	1				1						
TBCU026	1	46				46						
TBCU027	1	38				38						
TBCU028	1	12				12						
TBCU029	1	23				23						
TBCU030	1	37				37						
TBCU031	1	4				4						
TBCU032	1	25				24						1
TBCU033	1	8				8						
TBCU034	1	4				4						
TBCU035	1	14			1	13						
TBCU036-1	1	7				7						
TBCU036-2	1	13		4		9						
TBCU037	1	16				16						
TBCU038	1	9				9						
TBCU039	1	22				22						
TBCU040	1	11				11						
TBCU041	1	62		8		43				7		4
TBCU042	1	23		7		14						2
TBCU043	1	63		29		33						1

TBCU044	1	8				8						
TBCU045	1	72		15		55			2			
TBCU046	1	5		1		4						
TBCU047	1	21	1			20						
TBCU049	1	5				5						
TBCU050	2	14				14						
TBCU051	2	2				2						
TBCU052	2	7				7						
TBCU053	2	16				16						
TBCU054	2	5				5						
TBCU055	2	18				18						
TBCU056	2	50				50						
TBCU057	2	2				2						
TBCU058	2	15				15						
TBCU059	2	26				26						
TBCU060	2	10				10						
TBCU061	2	25				25						
TBCU062	2	6				6						
TBCU063	2	23		1		22						
TBCU022.2	3	15	1			2	12					
TBCU022.3	3	29				22	7					
TBCU022.4	3	86				11	75					
TBCU023.2	3	48	1			6	41					
TBCU064	3	10		7		3						
TBCU065	3	36	7			29						
TBCU066	3	6					6					
TBCU067	3	15	7			5	3					
TBCU068	3	3					3					
TBCU069	3	33				31	2					
TBCU070	3	35				35						
TBCU071	3	2	1			1						
TBCU073	3	5				5						
TBCU074	3	9	1	2		5	1					
	Total	1781	19	85	2	1446	155	1		9		64

Stung Treng Earthenware: Weight

Collection#	Phase	Total	E8a	E8b	E8c	E8sand	E8g	E8h	E9	E10	E11	E12
TBCU001	1	40				40						
TBCU002	1	165				165						
TBCU003	1	5				5						
TBCU004	1	85				85						
TBCU006	1	40				40						
TBCU007	1	295		35		260						
TBCU008	1	465		15		450						

TBCU009	1	35			35						
TBCU010	1	50			50						
TBCU011	1	235			235						
TBCU012	1	100			100						
TBCU013	1	70			70						
TBCU014	1	30			30						
TBCU015	1	17			17						
TBCU016	1	66			66						
TBCU017	1	35			35						
TBCU018	1	150			150						
TBCU019	1	67			67						
TBCU020	1	1480		12	1468						
TBCU021	1	1175			1153					22	
TBCU022	1	1370			978					392	
TBCU023	1	203			203						
TBCU024	1	20			20						
TBCU025	1	31			31						
TBCU026	1	285			285						
TBCU027	1	287			287						
TBCU028	1	55			55						
TBCU029	1	298			298						
TBCU030	1	380			380						
TBCU031	1	50			50						
TBCU032	1	668			460					208	
TBCU033	1	50			50						
TBCU034	1	23			23						
TBCU035	1	150		8	142						
TBCU036-1	1	133			133						
TBCU036-2	1	231	83		148						
TBCU037	1	233			233						
TBCU038	1	60			60						
TBCU039	1	253			253						
TBCU040	1	61			61						
TBCU041	1	739	125		376			177		61	
TBCU042	1	201	78		117					6	
TBCU043	1	741.5	395		346					.5	
TBCU044	1	50			50						
TBCU045	1	1945	522		1339			84			
TBCU046	1	102	36		66						
TBCU047	1	543	16		527						
TBCU049	1	60			60						
TBCU050	2	142			142						
TBCU051	2	12			12						
TBCU052	2	423			423						
TBCU053	2	136			136						
TBCU054	2	131			131						

TBCU055	2	384				384						
TBCU056	2	420				420						
TBCU057	2	17				17						
TBCU058	2	512				512						
TBCU059	2	222				222						
TBCU060	2	121				121						
TBCU061	2	370				370						
TBCU062	2	40				40						
TBCU063	2	1185		10		1175						
TBCU022.2	3	914	1			317	596					
TBCU022.3	3	720				665	55					
TBCU022.4	3	949				150	799					
TBCU023.2	3	944	1			141	802					
TBCU064	3	41		7		34						
TBCU065	3	260	7			253						
TBCU066	3	46					46					
TBCU067	3	104	7			64	33					
TBCU068	3	24					24					
TBCU069	3	251				225	26					
TBCU070	3	599				599						
TBCU071	3	7	1			6						
TBCU074	3	548	1	2		500	45					
	Total	23349.5	34	1308	20	18611	2426			261		689.5

Stung Treng: Other terracotta

Collection#	Phase	Count				Weight			
		97	98	99	Modern	97	98	99	Modern
TBCU002	1		12				25		
TBCU003	1		2				5		
TBCU004	1		2				5		
TBCU005	1		1				5		
TBCU006	1								
TBCU007	1		7				20		
TBCU008	1		1				5		
TBCU010	1		2				5		
TBCU011	1		7				15		
TBCU012	1		15				25		
TBCU013	1		4				5		
TBCU014	1		3				5		
TBCU015	1		3				5		
TBCU016	1		9				15		
TBCU017	1		1				5		
TBCU020	1		28				35		
TBCU021	1		17				25		
TBCU022	1		14				15		

TBCU024	1			1				2	
TBCU025	1		1				1		
TBCU027	1		3				5		
TBCU028	1		3				10		
TBCU029	1		2				5		
TBCU030	1		4	1			10		
TBCU032	1		9				10		
TBCU035	1		3				5		
TBCU036-2	1		4				10		
TBCU040	1		5				5		
TBCU042	1		1				4		
TBCU043	1		2				5		
TBCU044	1		4				5		
TBCU045	1		2				5		
TBCU051	2		6				16		
TBCU052	2								
TBCU053	2		3				5		
TBCU054	2								
TBCU055	2		4	1			11	1	
TBCU056	2		8				21		
TBCU057	2		7				14		
TBCU061	2		1				1		
TBCU062	2		3				7		
TBCU022.3	3	3				365			
TBCU022.4	3	4				46	27		
TBCU023.2	3	2				272			
TBCU065	3		39				44		
TBCU066	3						6		
TBCU067	3					12			

Stung Treng Miscellaneous Artifacts: Count

Collection#	Phase	Sandstone Chip	Laterite	Stone tool?	Bead	Slag	Iron	Bronze	Wood	Stone
TBCU003	1									2
TBCU016	1	1								
TBCU022.4	1									1
TBCU041	1				3			1		
TBCU045	1			3						
TBCU047	1			1	5					
TBCU053	2					2				

TBCU059	2	1								
TBCU071	3			5						
TBCU072	3			2						
TBCU074	3			11						

Stung Treng Miscellaneous Artifacts: Weight

Collection#	Phase	Sandstone Chip	Laterite	Stone tool?	Bead	Slag	Iron	Bronze	Wood	Stone
TBCU003	1									10
TBCU016	1	125								
TBCU022.4	1									44
TBCU041	1				x			5		
TBCU045	1			370						
TBCU047	1			35	x					
TBCU053	2					93				
TBCU059	2	34								
TBCU071	3			201						
TBCU072	3			322						
TBCU074	3			2526						

Kracheh Surface Artifacts

Sambor Stoneware and Tradeware: Count

Collection#	Phase	Total	KS	KBG	KGG	TH	CH
SBCU001	3						
SBCU002	3						
SBCU003	3	1	1				
SBCU004	3						
SBCU005	3	3	1		1		1
SBCU006	3	6	6				
SBCU007	3	4	0		4		
SBCU008	3	6	0		6		
SBCU009	3	17	9	2	4		2
SBCU010	3	38	25	4	6		3
SBCU011	3	17	15	2			
SBCU012	3						
SBCU013	3	11	2	6			3
SBCU014	3	8	2	6			
SBCU015	3	23	5		16		2
SBCU016	3	30	9		21		
SBCU017	3	24	10	3	4		7
SBCU018	3						
SBCU019	3	1	1				
SBCU020	3	16	12	1	1		2
SBCU021	3	25	7		17		1
SBCU022	3	2	1		1		
SBCU023	3	3	2		1		
	Total	235	108	24	82		21

Sambor Stoneware and Tradeware: Weight

Collection#	Phase	Total	KS	KBG	KGG	TH	CH
SBCU001	3						
SBCU002	3						
SBCU003	3	32	32				
SBCU004	3						
SBCU005	3	52	44		3		5
SBCU006	3	77	77				
SBCU007	3	23			23		
SBCU008	3	49			49		
SBCU009	3	416	261	36	107		12
SBCU010	3	776	711	46	14		5
SBCU011	3	253	213	40			
SBCU012	3						
SBCU013	3	281	74	194			13

SBCU014	3	268	74	194			
SBCU015	3	110	69		37		4
SBCU016	3	206	132		74		0
SBCU017	3	121	24	21	48		28
SBCU018	3						
SBCU019	3	42	42				
SBCU020	3	278	102	8	3		165
SBCU021	3	365.5	253		112		0.5
SBCU022	3	145	127		18		
SBCU023	3	31	29		2		
	Total	3525.5	2264	539	490		232.5

Sambor Earthenware: Count

Collection#	Phase	Total	E8a	E8b	E8c	E8sand	E8g	E8h	E9	E10	E11	E12
SBCU001	3	113	6		21	58			28			
SBCU002	3	43	2	8		31		2				
SBCU003	3	8				8						
SBCU004	3	62	1		3	58						
SBCU005	3	20				20						
SBCU006	3	56				56						
SBCU007	3	110	1			94	1		13			1
SBCU008	3	132	1		20	108			3			
SBCU009	3	88	8		1	70	9					
SBCU010	3	32				27	5					
SBCU011	3	19	2			17						
SBCU012	3	58	4		4	47	3					
SBCU013	3	21				20	1					
SBCU014	3	121		6		20	1					94
SBCU015	3	29				19			10			
SBCU016	3	128				121	6					1
SBCU017	3	10				10						
SBCU018	3	6				6						
SBCU019	3											
SBCU020	3	33				24	9					
SBCU021	3	112	1		5	106						
SBCU022	3	30				29			1			
SBCU023	3	25	1			22	2					
	Total	1256	27	14	54	971	37	2	55			96

Sambor Earthenware: Weight

Collection#	Phase	Total	E8a	E8b	E8c	E8sand	E8g	E8h	E9	E10	E11	E12
SBCU001	3	1192	129		288	521			254			
SBCU002	3	923	32	66		802		23				

SBCU003	3	182				182						
SBCU004	3	524	4		30	490						
SBCU005	3	270				270						
SBCU006	3	544				544						
SBCU007	3	1042	21			779	17		220			5
SBCU008	3	1442	4		177	1191			70			
SBCU009	3	1075	138		153	686	98					
SBCU010	3	283				204	79					
SBCU011	3	146	9			137						
SBCU012	3	712	27		31	619	35					
SBCU013	3	348				323	25					
SBCU014	3	601		63		323	25					190
SBCU015	3	298				191			107			
SBCU016	3	1458				1364	75					19
SBCU017	3	115				115						
SBCU018	3	123				123						
SBCU019	3											
SBCU020	3	388				249	139					
SBCU021	3	2432	5		99	2328						
SBCU022	3	563				539			24			
SBCU023	3	500	12			444	44					
	Total	15144	381	129	778	12407	537	23	675			214

Sambor: Other terracotta

Collection#	Phase	Count				Weight			
		97	98	99	Modern	97	98	99	Modern
SBCU001	3	1	18			395	62		
SBCU002	3								
SBCU003	3								
SBCU004	3								
SBCU005	3								
SBCU006	3								
SBCU007	3								
SBCU008	3								
SBCU009	3								
SBCU010	3								
SBCU011	3								
SBCU012	3		6				19		
SBCU013	3								
SBCU014	3								
SBCU015	3		5				12		
SBCU016	3			1				10	
SBCU017	3								
SBCU018	3								

SBCU019	3								
SBCU020	3								
SBCU021	3								
SBCU022	3								
SBCU023	3								
	Total	1	29	1		395	93	10	

Sambor: Miscellaneous Artifacts

Collection#	Phase	Count			Weight		
		Stone tool	Bead	Slag	Stone tool	Bead	Slag
SBCU004	3	1			44		
SBCU006	3	1			43		
SBCU007	3	4			1590		
SBCU014	3		1	1		1	0.5

Sambok Surface Artifacts

Sambok Stoneware and Tradeware: Count

Collection#	Phase	Total	KS	KBG	KGG	TH	CH
SBCU024	3						
SBCU025	3	1			1		
SBCU026	3	20	13		7		
SBCU027	3	1	1				
SBCU028	3	2		1			1
	Total	24	14	1	8		1

Sambok Stoneware and Tradeware: Weight

Collection#	Phase	Total	KS	KBG	KGG	TH	CH
SBCU024	3						
SBCU025	3	4			4		
SBCU026	3	516	441		75		
SBCU027	3	64	64				
SBCU028	3	45		44			1
	Total	629	505	44	79		1

Sambok Earthenware: Count

Collection#	Phase	Total	E8a	E8b	E8c	E8sand	E8g	E8h	E9	E10	E11	E12
SBCU024	3	3				3						
SBCU025	3	28	1			27						

SBCU026	3	46	1		4	37	4					
SBCU027	3	26	13			7			6			
SBCU028	3											
	Total	103	15		4	74	4		6			

Sambok Earthenware: Weight

Collection#	Phase	Total	E8a	E8b	E8c	E8sand	E8g	E8h	E9	E10	E11	E12
SBCU024	3	17				17						
SBCU025	3	308	18			290						
SBCU026	3	1062	38		45	840	139					
SBCU027	3	694	411			94			189			
SBCU028	3											
	Total	2081	467		45	1241	139		189			

Appendix F: Excavation Summary

Trench 1

Trench 1 Summary

Archaeological site code: THALA 2014

Trench Number: 1

Excavator(s): Chap Sopheara, Um Vutha, Moul Kumnet, Vitou Akpivath, Hoin Chanara, Muong Raksmeay, Hannah Arnhold

Date Started: Feb-18-2014; Date completed: March-4-2014.

Associated trenches (list and explain relationship): N/A

Type of archaeological feature (mound, depression, linear trace etc.): Unit 1 is located in the NE of a mound around 10m from a village house under a mango tree close to the pond.

Location of Datum: SW corner.

Beginning depth (cmbd): NE: 28 SE: 17 SW: 0 NW: 12.5 Average (MBD): 0

Ending depth (cmbd): NE: 147 SE: 240 SW: 248 NW: 148 Average (MBD): 250

EXCAVATION SUMMARY

Total number of levels (spits) excavated in trench: 25 spits excavated of unit 1.

Total number of cultural layers (list all levels within each layer):

Layer 1a (Spit 1, Spit 2) ,

Layer 1b (Spit 1, Spit 2),

Layer 1c (Spit 2, Spit 3, Spit 4, Spit 5),

Layer 2 (Spit 3, Spit 4, Spit 5, Spit 6, Spit 7, Spit 8, Spit 9, Spit 10),

Layer 3a (Spit 9, Spit 10, Spit 11, Spit 12, Spit 13),

Layer 3b (Spit 10, Spit 11, Spit 12),

Layer 4a (Spit 13, Spit 14, Spit 15, Spit 16),

Layer 4b (Spit 13, Spit 14, Spit 15, Spit 16, Spit 17, Spit 18),

Layer 4c.1 (Spit 19, Spit 20),

Layer 4d (Spit 21, Spit 22),

Layer 4c.2 (Spit 22, Spit 23, Spit 24, Spit 25),

Layer 5 (Spit 25)

TRENCH RECORDS INVENTORY

Sections drawn (list): Section of North, East, South and West wall and the ground level.

Photographs taken (list sequentially by photo number): 4724, 4725, 4726, 4727, 4728, 4729, 4731, 4734, 4735, 4736, 4738, 4743, 4744, 4746, 4747, 4748, 4754, 4755, 4756, 4757, 4758, 4759, 4760, 4766, 4767, 4768, 4769, 4780, 4892, 4894, 4895, 4896, 4899, 4900, 4904, 4905, 4909, 4911, 4914, 4915, 4916, 4917, 4918, 4919, 4920, 4921, 4923 (VA camera)

0057, 0058, 0059, 0061, 0062, 0063, 0064, 0065, 0066, 0067, 0072, 0073, 0074, 0075, 0076, 0077, 0104, 0105, 0106, 0107, 0108, 0109, 0113, 0114, 0115, 0116, 0119, 0120, 0121, 0122, 0123, 0124, 0125, 0126, 0127, 0163, 0165, 0166, 0144, 0167, 0171, 0173, 0174, 0182, 0211, 0212, 0215, 0217 (MCR camera)

Artifact bags (list sequentially by bag number): surface (1bag), THALA 1.1, 2.1, 3.1, 4.1, 4.2, 5.1, 5.2, 5.3, 6.1, 6.2, 6.3, 6.4, 6.5, 7.1, 7.2, 8.1, 9.1, 10.1, 11.1, 11.2, 11.3, 11.4, 12.1, 12.2, 12.3, 12.4, 13.1, 13.2, 13.3, 14.1, 14.2, 14.3, 14.4, 15.1, 15.2, 15.3, 16.1, 17.1, 18.1, 19.1, 20.1, 20.2, 20.3, 20.4, 20.5, 21.1, 21.2, 21.3, 21.4, 21.5, 21.6, 21.7, 22.1, 23.1, 24.1, wall cleaning (1bag)

Soil sample bags (list sequentially by bag number): One bag for each layer: Layer 1a, Layer 1b, Layer 1c, Layer 2, Layer 3a, Layer 3b, Layer 4a, Layer 4b, Layer 4c.1, Layer 4c.2, Layer 4d, Layer 5

Name of digital notebook file: Trench Diary Trench 1

EXCAVATION RECORDS SUMMARY

CULTURAL FEATURES PRESENT (*nb*: in notes for postholes, list length/width/diameter and depth; level with which posthole is associated, and shape)

Feature no.	Level (and Cultural Layer)	Type of feature	SU numbers associated with feature	Notes

RADIOCARBON SAMPLE LIST/ASSESSMENT (*nb*: quality of sample refers to the size and integrity of each charcoal piece; in ranking please use 1-n)

C-14 sample SU	Level (cultu-ral layer)	Context (association)	Assessment (quality of sample, association w/particular strat. or artifactual layer, etc.)	Rank within trench
SU 11 (#1)	3a/3b	BSD: 126cm 63cm from north wall, 8cm from east wall	small pieces mixed with soil	
SU 11 (#2)	3a/3b	BSD: 135cm 125cm from north wall, 9cm from west wall	medium sized pieces	
SU 12 (#1)	3a/3b	BSD: 140cm 42cm from north wall, 13cm from west wall	Medium sized piece, good condition, near the bricks	
SU 12 (#2)	3a/3b	BSD: 146cm 18cm from north wall, 39cm from west wall	Small piece, near the bricks	
SU 12 (#3)	3a/3b	BSD: 150cm 54 from south wall, 15 from west wall	Two or three pieces, no bricks around	
SU 13 (#1)	4a/4b	BSD: 150cm 20cm from south wall, 20cm from west wall	Few smaller pieces	
SU 13 (#2)	4a/4b	BSD: 156cm 36cm from south wall, 51cm from west wall	One big piece and some smaller ones	4
SU 14 (#1)	4a/4b	BSD: 162cm 18cm from south wall, 41cm from east wall	Small piece	
SU 15 (#1)	4a/4b	BSD: 168cm 2cm from south wall,	Medium sized piece broken into small parts	

		40cm from west wall		
SU 15 (#2)	4a/4b	BSD: 173cm 45cm from south wall, 50cm from west wall	Medium sized piece	
SU 20 (#1)	4c.1	BSD: 200cm, 53cm from south wall, 14cm from west wall	Medium sized piece in good condition	
SU 20(#2)	4c.1	BSD: 207cm 45cm from south wall, 4cm from west wall	Very small piece	
SU 20 (#3)	4c.1	BSD: 207cm 58cm from south wall, 8cm from west wall	Big piece	3
SU 20 (#4)	4c.1	BSD: 209cm 50cm from south wall, 6cm from west wall	Medium sized piece	
SU 21 (#1)	4d	BSD: 215cm 17cm from south wall, 21cm from west wall	Medium sized piece	
SU 21 (#2)	4d	BSD: 217cm 32cm from south wall, 16cm from west wall	Medium sized piece	
SU 21 (#3)	4d	BSD: 211cm 48cm from south wall, 12cm from west wall	Big piece in a good condition	2
SU 21(#4)	4d	BSD: 215cm 46cm from south wall, 30cm from west wall	Very big piece in a good condition	1

STRATIGRAPHIC LINKAGES WITHIN TRENCH (Use this table to associate each of your spits/features with specific stratigraphic layers).

SU #	Description/Notes	Belongs to Layer
Surface (0)	Topsoil, first spit of excavation. Sandy loam, some pieces of ceramics and bricks, much rubbish like plastic etc.	1a & 1b
1		
2		1c
3	Very similar to the two spits above but many bricks and some pieces of gravel and iron.	1c & 2
4	Some ceramics, bricks and a few pieces of slag.	
5	Many bricks, a few ceramics, slag and gravels. The soil is sandy clay with loam and hard.	
6	Many bricks along the wall from NW to SW. The soil is sticky clay. The artifacts found in the spit above continue in this spit. The number of bricks is increasing.	2

7	The soil consists of less sand and is getting very sticky. Many bricks continue throughout the spit, some ceramics were found.	
8	The soil is similar to the last spits and contains some bricks, gravels, tree roots, ceramics and sandstones.	
9	The clay component is stickier compared to the last spit. There are some bricks, gravels, tree roots, ceramics, some slag and sandstones.	2 & 3a
10	The soil has more sticky clay with less sand and loam. The artifacts continue to be the same.	3a & 3b
11	The soil is stickier than SU 10. Artifacts and inclusions are similar to the last spits but some pieces of charcoal were found.	
12	The soil consists of clay with less sand and seems to be a bit wet and softer compared to the spit before. Some charcoal.	3a
13	Only the southern part of the trench (Grid S) was excavated. The soil is very hard and mixed with more sticky clay. Many pieces of ceramics (mostly earthenware), a few stones and gravels were found. A few bricks appeared along the western part of the trench. Some charcoal.	3a, 4a and 4b
14	The soil is a bit darker than in the last spit and there is more sandy loam. Artifacts and inclusions are similar to the last spit but much more charcoal appeared.	4a & 4b
15		
16	Sticky clay mixed with sand and loam. Still a few tree roots, small gravels and stones and less ceramic sherds.	
17	Sticky clay with some sand and loam with more bricks and brick rubble, less ceramics sherds.	4b
18	Clay with some sand and loam. Almost no ceramics, some brick rubble.	4b & 4c
19	Sticky clay but mixed with more sand and some yellow clay spots. Many pieces of brick rubble. Only small sherds of ceramic were found.	4c
20	Similar to the last spit but the soil colour is a bit darker. Many ceramics and much more charcoal at the bottom. Yellow clay spots and manganese.	
21	Still many ceramics and charcoal, few pieces of iron, some gravels and brick rubble.	4d
22	The soil contains of more sand and is stickier than before especially in the SW corner. Some charcoal, ceramics and brick rubble.	
23	The soil got a bit stickier but is still mixed with much sand. A few pieces of laterite, some gravel, some brick rubble.	4c
24	Sticky clay mixed with sand. Some gravel and less ceramics.	4c & 5
25	No ceramics. Less brick rubble at the top of the spit which continued from the last spit. Many spots of yellow clay and manganese. Natural layer, the excavation was finished.	5

Description of artifact variability (Describe kinds and relative density and distribution of artifacts across unit and between levels if any):

Ceramic sherds and bricks were the main artifacts found in trench 1. Ceramic sherds occurred in different amounts from layer 1 to 4.

Layer 1a, b and c contained some sherds (earthenware and stoneware) and a few bricks.

Layer 2 had a high density of brick rubble. Ceramic sherds were common (mostly earthenware, less stoneware) and a few pieces of slag were found throughout the layer.

Layer 3a contained many bricks (brick floor) and some ceramics (stoneware and earthenware). Layer 3b differs from the 3a through many small laterite pieces and less ceramics. Different amounts of ceramics appeared throughout layer 4: Layer 4a contained much brick rubble but a decreasing number of ceramic sherds. In layer 4b almost no sherds were found but many bricks and brick rubble appeared. The brick rubble continued in layer 4c which also contained some ceramics. Layer 4d had an increasing number of ceramic sherds and less brick rubble. Layer 5 is the natural layer which contained no artifacts.

STRATIGRAPHIC DESCRIPTION (Use this table to characterize each layer excavated in the trench).

Layer	Munsell color	Soil desc. ¹	Non-artifact inclusions ²	Disturbance ³	Artifacts present?	Additional notes/ interpretation ⁴
1a	10 YR 5/2 grayish brown	Sand, sandy loam, soft	Much debris (plastic, cloth etc.), few charcoal pieces, gravel	Modern debris, small tree roots	ceramics (mostly earthenware), some bricks	Top soil
1b	10 YR 5/2 grayish brown)	Sandy loam, soft	more charcoal, gravel	Modern debris, some small tree roots	Bricks, some ceramics	Still part of the top soil but more charcoal
1c	10 YR 5/3 brown	Sandy loam, hard	Some charcoal, some sandstone chips, a few stones	Less debris, some tree roots	Many brick rubble, some pieces of slag, some ceramics (S+E)	Still part of the top soil
2	10 YR 3/2 very dark grayish brown	Sandy clay with loam, hard	Many stones and gravels, some laterite	Tree roots	Many bricks (30-40%), many ceramic sherds and slag, a spindle whorl	Layer with many bricks (part of the floor or collapsed rubble)
3a	10 YR 4/3 brown	Clay with less sand and some loam, hard	Less gravel, some stones, much manganese, some charcoal	Few tree roots	Some bricks, ceramics(E+S), some slag	A brick floor is visible at the bottom of this layer in the northern part of the trench (Grid N), more charcoal especially in the area with the bricks. Layer 3a is cut by layer 3b.
3b	10 YR 3/2 very	Clay with less sand	High amount of small		Only few ceramics	Layer with much laterite (maybe a

	dark grayish brown	and some loam, hard	laterite pieces, manganes, small sized gravels			foundation layer of a later stage). 3b is cutting 3a but is not visible on the south wall.
4a	10 YR 3/2 very dark grayish brown	Sticky clay with a little sand, hard, many yellow clay spots	Some gravels, much charcoal	Few tree roots	Much brick rubble in Grid S, some ceramics on top of the layer and almost no ceramics at the bottom of the spit	Grid N was not excavated further. Much brick rubble but no visible structure. It might be a collapsed part of the brick floor. Decreasing amount of ceramics.
4b	10 YR 3/3 dark brown	Sticky clay with less sand, hard, yellow clay spots	Some gravel,		Many bricks (more than 50%), much brick rubble, very few ceramics	Many bricks that seemed like a part of the floor but also much brick rubble. Almost no ceramics.
4c	10 YR 3/2 very dark grayish brown	Sticky clay with less sand, hard, many yellow clay spots	Some charcoal, few small laterite pieces, few small gravels		Some brick rubble in different sizes, ceramics	Layer 4c occurs two times: 4c.1 is below 4b and above 4d, 4c.2 is below 4d and above 5. Both 4c layers are therefore separated by layer 4d. Almost no ceramics were found on top of layer 4c.1. 4c.2 on the other hand included more ceramic sherds especially underneath pieces of brick rubble which were removed.
4d	10 YR 3/2 very dark grayish brown	High amount of charcoal			Many ceramics sherds, few very small pieces of iron, some brick rubble	This layer especially distinguishes from layer 4c through a high amount of charcoal and ceramic sherds. It might be a

									habitation layer of an earlier stage.
--	--	--	--	--	--	--	--	--	---------------------------------------

¹ Describe soil color, sediment size, and density/compaction; describe soil structure or horizons if present; describe variation between levels if any exists

² Describe amount and size of **charcoal pieces**, presence and density of sandstone chips or laterite, amount of gravel, etc.

³ Describe kinds and amounts of animal disturbance, root disturbance, vandalism, etc.; also note any intrusive or overlying features; describe variation within levels if any exists

⁴ Discuss features and unusual patterns, excavation methods for those unusual deposits, variation between levels if any exists, etc.

GENERAL TRENCH INTERPRETATION (summarize comments here and add other information as desired)

The stratigraphy suggests that there were three different stages of occupation:

The first and latest stage is presented by the top soil (Layer 1a, 1b and 1c) which shows modern activities from recent owners in form of debris like plastic and cloths.

The second stage goes from spit 3 to spit 12 which include Layer 2, Layer 3a and b. Much brick rubble was found in layer 2 which could either have been part of a foundation layer or just rubble. Stoneware sherds which were found might date this layer to the Angkorian period.

The third stage from spit 12 to 24 includes Layer 4a-d. Layer 4a shows many bricks in a structure which seem to be a floor. Bricks and brick rubble which could be collapsed parts of the floor are continuing throughout the spits below. Layer 4d contains much more charcoal and ceramics than the other parts of layer 4 and therefore seems to have been a cooking place of an early occupation phase. The third stage is the earliest in this trench as layer 5 seems to represent the natural layer.

Trench 1 Artifacts

Trench 1: Khmer Stoneware and Tradeware

Count

Trench	Layer	Total	KS	KBG	KGG	TH	CH	VN	KGE
1	1	27	7	12	2		6		
1	2	110	8	34	8		56	4	
1	3	1		1					
1	4a-b								
1	4b								
1	4c								
1	4d								
Total		138	15	47	10		62	4	

Weight

Trench	Layer	Total	KS	KBG	KGG	TH	CH	VN	KGE
1	1	263	84	142	17		20		

1	2	1531.2	156	795	32.2		513	35	
1	3	21		21					
1	4a-b								
1	4b								
1	4c								
1	4d								
Total		1815.2	240	958	49.2		533	35	

**Trench 1: Earthenware
Count**

Trench	Layer	Total	E8a	E8b	E8c	E8sand	E8g	E8h	E9	E10	E11	E12
1	1	269	2		3	51	9					
1	2	418	6		11	341	9	1	7			9
1	3	64			1	56	2					5
1	4a-b	41				41						
1	4b	2			1	1						
1	4c	2				2						
1	4d	53	1			34	15					2
Total		849	9		16	526	35	1	7			16

Weight

Trench	Layer	Total	E8a	E8b	E8c	E8sand	E8g	E8h	E9	E10	E11	E12
1	1	988	10		28	353	63					
1	2	4398.6	43		125	2300	72	6	143			46
1	3	514			7	325	9					13
1	4a-b	456				223						
1	4b	40			5	5						
1	4c	8				6						
1	4d	721	6			363	159					19
Total		7125.6	59		165	3575	303	6	143			78

Trench 1: Other terracotta

Trench	Layer	Count				Weight			
		97	98	99	Modern	97	98	99	Modern
1	1		182	5	17		410	45	79
1	2	12	18	1	3	110	1532	0.5	21.1
1	3						160		
1	4a-b						233		
1	4b						30		
1	4c						2		
1	4d	1				34	140		
		13	200	6	20	144	2507	45.5	100.1

Trench 1: Miscellaneous Artifacts

Count

Trench	Layer	Total	Sandstone Chip	Laterite	Stone tool?	Bead	Slag	Iron	Bone	Wood	Stone
1	1	22			22						
1	2	58	14		11		31	1		1	
1	3	1	1								
1	4a-b										
1	4b										
1	4c										
1	4d	19			4		15				
		100	15		37		46	1		1	

Weight

Trench	Layer	Total	Sandstone Chip	Laterite	Stone tool?	Bead	Slag	Iron	Bone	Wood	Stone
1	1	114			114						
1	2	1034.1			124		904.1	4		2	
1	3										
1	4a-b										
1	4b										
1	4c										
1	4d	86			9		77				
		1234.1			247		981.1	4		2	

Trench 2

Trench 2 Summary

Archaeological site code: _ THALA 2014 Grid Trench Number 2

Excavator(s): Moul Komnet, Mak Deung, Um Vutha, Narith, Hoin Channara, Vitou Akphivath, Tho Thon, Chea, Ponlok

Date Started: Feb19, 2014 **Date completed:** Mar19, 2014

Associated trenches (list and explain relationship): N/A.

Type of archaeological feature (mound, depression, linear trace, etc.): This unit is located about 50m at NE of temple and at the east part of pond (Trapeang knar) about 3m

Location of Datum: NE corner

Beginning depth (cmbd): NE 3 SE 3 SW 4 NW 13 Average (MBD) 5.75 .

Ending depth (cmbd): NE 300 SE 310 SW 309 NW 300 Average (MBD) 304.75 .

EXCAVATION SUMMARY

Total number of levels (spits) excavated in trench: 14 spits excavated of unit 2 (20cm of spit 1 till 3; 10cm of spit 4 till 9, 20cm of spit 10, spit 11 till 13 excavated by layer, spit 14 no ceramic.

Total number of cultural layers (list all levels within each layer): Layer1, Layer2, Layer3, Layer4, Layer 5, layer 6, layer 7 and layer 8.

TRENCH RECORDS INVENTORY

Sections drawn (list): Section of North, East, South and West walls.

Photographs taken (list sequentially by photo number): IMG 2535, 2536, 2539, 2540, 2544, 2545, 2549, 2550, 2551, 2552, 2553, 2554, 2556, 2557, 2562, 2563, 2564, 2566, 2567, 2568, 2569, 2570, 2571, 2572, 2573, 2574, 2575, 2576, 2577, 2578, 2579, 2580, 2581, 2582, 2601, 2605, 2606, 2607, 2608, 2609, 2611, 2612, 2613, 2614, 2615, 2616, 2617, 2623, 2624, 2625, 2626, 0339, 0340, 0341, 0342, 5445, 5448, 5449, 5450, 5451, 5454, 5457, 5459, 5464, 5465, 5466, 5467, 5468, 5469, 5470, 5471, 5472, 5473, 5474, 5475, 5476, 5479, 5480, 5481, 5483, 5484, 5485, 5486, 5487, 5488, 5489, 5490, 5491, 5492, 5493, 5494, 5495, 5496, 5497, 5408, 5499, 5500, 5501, 5502, 5503, 5504, 5505, 5506, 5507, 5508, 5509, 5510, 5511, 5512, 5513, 5514, 5515, 5516, 5517, Soil Sample Location: 5560, 6662, 5563, 5564, 5565, 5567, 5568, 5569, 5572;

Walls Profiles: 5523, 5524, 5525, 5526, 5528, 5539, 5540, 5541, 5542, 5543, 5544, 5551, 5552, 5553, 5556, 5557, 5558, 5559, 5573, 5574, 5575, 5577, 5578, 5580, 5582, 5583, 5584, 5586, 5588, 5589, 5590, 5592, 5593, 5594, 5595, 5596, 5598; Bottom of the trench: 5620, 5621, 5622, 5625, 5628, 5630.

Artifact bags (list sequentially by bag number): surface thala2.1bag, thala2.1.1bag, thala2.2.1bag, thala2.3.1bag, thala2.4.1bag, thala2.5.1bag, thala2.6.1bag, thala2.7.1bag, thala2.8.1bag, thala2.9.1bag, thala2.10.1bag, ceramic and thala2.10.2 (2bag) charcoal; 2.11 (ceramic#1bag, charcoal#1bag), 2.12 (ceramic#1bag, Charcoal#1bag, 7 boxes of wood and coconut), 2.13 (ceramic#1bag, Charcoal#1bag, 11 boxes of wood and coconut).

Soil sample bags (list sequentially by bag number): 10 bags

Name of digital notebook file: Trench 2 Diary.doc

EXCAVATION RECORDS SUMMARY

CULTURAL FEATURES PRESENT (*nb*: in notes for postholes, list length/width/diameter and depth; level with which posthole is associated, and shape)

Feature no.	Level (and Cultural Layer)	Type of feature	SU numbers associated with feature	Notes

RADIOCARBON SAMPLE LIST/ASSESSMENT (*nb*: quality of sample refers to the size and integrity of each charcoal piece; in ranking please use 1-n)

C-14 sample SU	Level (cultural layer)	Context (association)	Assessment (quality of sample, association w/particular strat. or artifactual layer, etc.)	Rank within trench
10	3	18cm from northeast wall, 182cm from south wall, and with 149cm height level (from datum).	Small sample	3
11	4	46cm from south wall, 6cm from east wall with 200cm.	Small Sample	3
12	5&6	130cm from north wall, 12cm from east wall with 220cm.	Small sample	2
13	5&6	68cm from south wall, 8cm from east wall with 260cm.	Small sample	1

STRATIGRAPHIC LINKAGES WITHIN TRENCH (Use this table to associate each of your spits/features with specific stratigraphic layers).

US #	Description/Notes	Belongs to Layer
surface	The first 10cm loam. Only 2 pieces of modern ceramics occurred on the surface. The next 10cm soil is brown 7.5YR 4/4 and disturbed by a lot of coconut roots.	Layer 1
1	The soil is hard and sticky and brown 7.5YR 4/4. It composes of less sand with clay and is disturbed by coconut roots also.	Layer 1
2	The soil composes of clay with less sand (clay 90% , and sand 10%) and is mixed with some pieces of brick, a few pieces of stone, gravels, laterite, and a few earthenware ceramics.	Layer 1
3	The soil color is strong brown. It is sticky and composes of clay with less sand (clay 90%, and sand 10%) mixed with many laterite grains, a few manganese particles, gravels, and a few earthenware.	Layer 1
4	The soil color is strong brown. It is wet and very sticky. It composes of clay with less sand (clay 95% and sand 5%) and mixed with many	Layer 2

	pieces of the brick, manganese, small laterite grains, gravels, a few potsherds and small many tree roots.	
5	The soil color is brown. It is wet and very sticky and smelly (from decomposed plants). It composes of clay with less sand (clay 95% , and sand 5%) and mixed with some pieces of the brick, manganese, small laterite grains, a few gravels, a few potsherds at north-east corner, and small many tree roots.	Layer 2
6	The soil color is strong brown. The soil has foul smell of decayed organic materials. It is still wet and much stickier than spit 5. It composes of clay and less sand (maybe 96% of clay and 4% of sand) mixed with some gravels, laterite grains, pieces of brick, and a few pot sherds.	Layer 3
7	The soil color is strong brown. It composes of clay and less sand (almost none). It is wet and sticky. This spit is the same the previous one (spit 6)	Layer 3, 3a
8	The soil color is strong brown. It is the same spit 7, but it is very wet and sticky. It composes of clay and sand (nearly 0%), mixed with some pieces of the brick, gravels, few stones and few potsherds.	Layer 3, 3a
9	The soil color is strong brown. It is very wet and sticky. We reach the water table on the bottom of spit 9, which seeps through the northwest and southwest.	Layer 3, 3a
10	This spit continues to have water problem like the previous one. Water spurs out from the northwest and southwest. The soil itself is very sticky. The screen cannot be used. Crew members squeeze through the clay to get artifacts (unable to wet screen). On the west profile, brick and stone foundation appears to stop at SU9. 2 charcoals sample are connecting from the northeast. The charcoal≠ 1 is not clear. it was charcoal or oxidized iron or manganese.	Layer 3
11	The soil is clay and brown color 10YR5/3. This spit the water still spurs out from the east, west and northwest corner. We found some brick fragments, gravels, Charcoal and ceramics. There is a cluster of sherds near the east wall with the charcoal pieces.	Layer 4
12	The water still spurs out. The soil is hard. There are many pieces of charcoal in this layer. We sampled some pieces of charcoal, 2 bricks near SW and NE corner, and many fragments of wood, bamboo and coconut also a coconut husk and shell along the north wall.	Layer 5 and 6
13	This is a sand layer and its color is reddish brown. The water still continues to spur out. We continue to see the sandstone foundation below the bricklayer at the west wall. There are some charcoal fragments, gravels, a few of ceramic and many pieces of wood and coconut.	Layer 5 and 6
14	The last spit of this trench. We only excavate the south half of the trench. Two layers are clearly visible for this 40cm-thick section, but we did not find any artifacts. The first layer is clay with very minimal sand texture and mixed with manganese. The second layer is clay. Both layers are natural. We stop at 316cmbd deep.	Layer 7 and 8

Description of artifact variability (Describe kinds and relative density and distribution of artifacts across unit and between levels if any)

The ceramics occurred from surface till spit 13. There are few ceramics found in spit 1 till spit 9. The highest quantity of ceramics appeared in spit 10 till spit 13. Surprisingly, in this trench we found many pieces of wood, bamboo, and coconut in SU 12 and 13.

STRATIGRAPHIC DESCRIPTION (Use this table to characterize each layer excavated in the trench).

Layer	Munsell color	Soil desc. ¹	Non-artifact inclusions ²	Disturbance ³	Artifacts present?	Additional notes/interpretation ⁴
1	7.5YR5/4 Brown	Hard Sandy Clay	Gravels	Roots	Few to no artifact	
2	10YR5/6 Yellowish Brown	Hard Sandy Clay	Manganese, gravels	Roots	Earthenware and Chinese ware	Few artifacts
3	10YR5/8 Yellowish Brown	Hard Clay with Some sand	Manganese, gravels	Roots	Earthenware	Increasing artifacts
4	7.5YR5/2	Hard Clay with some sand	Manganese, gravels	Roots	Earthenware	Increasing artifacts
5	10YR3/1	Clay loam with some sand	Manganese, Wood, bamboo, Coconut	Minimal roots	Earthenware	Highest artifacts
6	5YR5/4	Sand Layer	Wood, bamboo, coconut	Minimal roots	Earthenware	Decreasing artifacts
7	10YR6/4	Hard Clay	Manganese	Minimal roots	No artifacts	
8	2.5Y8/4	Hard Clay	Manganese	N/A	No artifacts	

¹ Describe soil color, sediment size, and density/compaction; describe soil structure or horizons if present; describe variation between levels if any exists

² Describe amount and size of **charcoal pieces**, presence and density of sandstone chips or laterite, amount of gravel, etc.

³ Describe kinds and amounts of animal disturbance, root disturbance, vandalism, etc.; also note any intrusive or overlying features; describe variation within levels if any exists

⁴ Discuss features and unusual patterns, excavation methods for those unusual deposits, variation between levels if any exists, etc.

GENERAL TRENCH INTERPRETATION (summarize comments here and add other information as desired)

Trench 2 is located on a large temple platform of Trapeang Khnar. The trench is placed near the pond located at the western end of the terrace. The results suggest that there were three phases of activities. First, the trapeang was originally larger than the current size as many plant remains were recorded at the bottom of the trench. Then, at some point later, an easter portion of this trapeang was reclaimed by infilling with soil, ceramics, and brick pieces. A brick struture was added atop this reclaimed land. Lastly, the top layer contains minor evidence of the Angkorian period occupation.

Trench 2 Artifacts

Trench 2: Khmer Stoneware and Tradeware
Count

Trench	Layer	Total	KS	KBG	KGG	TH	CH	VN
2	1	1					1	
2	2							
2	3							
2	4							
2	5&6							
Total		1					1	

Weight

Trench	Layer	Total	KS	KBG	KGG	TH	CH	VN
2	1	.05					.05	
2	2							
2	3							
2	4							
2	5&6							
Total		.05					.05	

Trench 2: Earthenware
Count

Trench	Layer	Total	E8a	E8b	E8c	E8sand	E8g	E8h	E9	E10	E11	E12
2	1	25				16	6					
2	2	9				2	7					
2	3	64	1			35	11	15				
2	4	88	1			71	16					

2	5&6	79				20	50					
		265	2			144	90	15				

Weight

Trench	Layer	Total	E8a	E8b	E8c	E8sand	E8g	E8h	E9	E10	E11	E12
2	1	211				121	36					
2	2	120				59	53					
2	3	944.05	6			584.5	188	101				
2	4	823	15			606	157					
2	5&6	1578				214	1104					
		3676.05	21			1584.5	1538	101				

Trench 2: Other terracotta

Trench	Layer	Count				Weight			
		97	98	99	Modern	97	98	99	Modern
2	1	3				6	48		
2	2						8		
2	3	1		1		3	61.05	.5	
2	4						45		
2	5&6	9				244	16		
		13		1		253	178.05	.5	

Trench 2: Miscellaneous Artifacts

Count

Trench	Layer	Total	Sandstone Chip	Laterite	Stone tool?	Bead	Slag	Iron	Bone	Wood	Stone
2	1										
2	2										
2	3										
2	4										
2	5&6	2			2						
	Total	2			2						

Weight

Trench	Layer	Total	Sandstone Chip	Laterite	Stone tool?	Bead	Slag	Iron	Bone	Wood	Stone
2	1										
2	2										
2	3										
2	4										
2	5&6	68			68						
	Total	68			68						

Trench 3

Trench 3 Summary

Archaeological site code: _THALA 2014_____ Grid _____Trench Number ___3
 Excavator(s) _Komnet, Nara, Narith Date Started: _Feb25,2014_ Date completed: Feb 27, 2014.
 Associated trenches (list and explain relationship): trench number3 to expand from the southern part of trench number3.

Type of archaeological feature (mound, depression, linear trace, etc.): This trench number3 is located in northeast from 10m of house.

Location of Datum: SE corner.

Beginning depth (cmbd): NE ___1___SE ___0___SW ___1___NW ___1___ Average (MBD) _0.75.

Ending depth (cmbd): NE ___69___SE ___70___SW ___69___NW ___68___ Average (MBD) _69.

EXCAVATION SUMMARY

Total number of levels (spits) excavated in trench: 8 spits excavated of Trench 3.

Total number of cultural layers (list all levels within each layer): Layer 1 and Layer 2.

TRENCH RECORDS INVENTORY

Sections drawn (list): Section of North, East, South, West walls.

Photographs taken (list sequentially by photo number): _IMG_2591, 2594, 2595, 2621, 2639, 2641, 2642, 2644, 2646, 2647, 2651, 2652, 2653.

Artifact bags (list sequentially by bag number): surface thala3.1.1bag, thala3.2.1.1bag, thala3.3.1.1bag, thala3.4.1.1bag, thala3.5.1.1bag, thala3.6.1.1bag, thala3.7.1.1bag.

Soil sample bags (list sequentially by bag number) thala3.1 bag

Name of digital notebook file: T3 diary

EXCAVATION RECORDS SUMMARY

CULTURAL FEATURES PRESENT (*nb*: in notes for postholes, list length/width/diameter and depth; level with which posthole is associated, and shape)

Feature no.	Level (and Cultural Layer)	Type of feature	SU numbers associated with feature	Notes

RADIOCARBON SAMPLE LIST/ASSESSMENT (*nb*: quality of sample refers to the size and integrity of each charcoal piece; in ranking please use 1-n)

C-14 sample SU	Level (cultural layer)	Context (association)	Assessment (quality of sample, association w/particular strat. or artifactual layer, etc.)	Rank within trench
1	SU 3 Layer 1	Within brick rubbles	Not usable, too contaminated by modern debris such as plastics and others. Owners reported to use this place to raise a pig several years ago	0

STRATIGRAPHIC LINKAGES WITHIN TRENCH (Use this table to associate each of your spits/features with specific stratigraphic layers).

US #	Description/Notes	Belongs to Layer
1	The soil is loam with dark brown color 7.5YR 3/2. It is soft and composes of sand mixed with some brick fragments, laterite grains, a few gravels, and some potsherds. There are lots of disturbances in this spit.	Layer 1
2	Same as above	Layer 1
3	The soil is loam with dark brown color 7.5YR 3/2. It is soft and composes of sand mixed with many brick fragments, laterite grains, manganese, and a few pieces of sandstone chips. We found two pieces of charcoal (maybe recent charcoals) one is located of northeast and the other in the middle of the trench.	Layer 2
4	The soil is clay-loam with dark grayish brown color 10YR 4/2. It is hard and composes of clay with less sand (clay 70%, and sand 30%). We found many of bricks mixed with some laterites grains, earthenware, small tree roots, and brick pavement located at the northeast section.	Layer 2
5	Same as above. The brick pavement is clearly visible.	Layer 2
6	The soil is clay-loam with brown color 10YR 4/3. It is hard and much stickier than the previous spit. The matrix composes of some laterite grains, tree roots, brick fragments, and a few potsherds.	Layer 2
7	Same as above. The entire bottom is the brick pavement	Layer 2

Description of artifact variability (Describe kinds and relative density and distribution of artifacts across unit and between levels if any)

We found ceramics from spit 1 till spit 7. The spit 8 arrive the brick of the basement, No ceramic.

STRATIGRAPHIC DESCRIPTION (Use this table to characterize each layer excavated in the trench).

Layer	Munsell color	Soil desc. ¹	Non- artifact inclusions ²	Disturbance ³	Artifacts present?	Additional notes/ interpretation ⁴
Layer 1	7.5YR 4/3, 3/2 Brown	Clay-loam mixed with sand, hard and sticky	Brick fragments, plastics, cloths, charcoal, gravels, laterite particles, sandstone pieces	Roots, habitation	few potsherds	Disturbed by human from 2008
Layer 2	7.5YR 4/3 Brown	Clay-loam, hard and sticky	Brick fragments, plastics, charcoal, gravels	Roots, habitation	few potsherds	Angkor period

¹ Describe soil color, sediment size, and density/compaction; describe soil structure or horizons if present; describe variation between levels if any exists

² Describe amount and size of **charcoal pieces**, presence and density of sandstone chips or laterite, amount of gravel, etc.

³ Describe kinds and amounts of animal disturbance, root disturbance, vandalism, etc.; also note any intrusive or overlying features; describe variation within levels if any exists

⁴ Discuss features and unusual patterns, excavation methods for those unusual deposits, variation between levels if any exists, etc.

GENERAL TRENCH INTERPRETATION (summarize comments here and add other information as desired)

According to a combination of different ceramic types, brick basement and stratigraphic analysis, there are three phases of the human occupation:

1. **Phase 3:** The disturbance of human from the year 2008 according to the interview with the local people who are living on the mound and some other in the village.
2. **Phase 2:** The collapse brick structure possibly related to the Angkorian period occupation
3. **Phase 1:** The brick platform and four layers of brick basement belonged to the pre-Angkorian period

Trench 3 Artifacts

Trench 3: Khmer Stoneware and Tradeware

Count

Trench	Layer	Total	KS	KBG	KGG	TH	CH	VN
3	1	6		2	0		1	3
3	2	5		1	1		3	0
	Total	11		3	1		4	3

Weight

Trench	Layer	Total	KS	KBG	KGG	TH	CH	VN
--------	-------	-------	----	-----	-----	----	----	----

3	1	29.05		13			10	6.05
3	2	24.55		0.05	21		3.5	
	Total	53.6		13.05	21		13.5	6.05

**Trench 3: Earthenware
Count**

Trench	Layer	Total	E8a	E8b	E8c	E8sand	E8g	E8h	E9	E10	E11	E12
3	1	23	1			11	10					
3	2	44	5			19	14					
	Total	67	6			30	24					

Weight

Trench	Layer	Total	E8a	E8b	E8c	E8sand	E8g	E8h	E9	E10	E11	E12
3	1	208	7			57	47					
3	2	526	40			125	172					
	Total	734	47			182	219					

Trench 3: Other terracotta

Trench	Layer	Count				Weight			
		97	98	99	Modern	97	98	99	Modern
3	1	1	X			20	77		
3	2	6	X			68	121		
	Total	7	X			88	198		

**Trench 3: Miscellaneous Artifacts
Count**

Trench	Layer	Total	Sandstone Chip	Laterite	Stone tool?	Bead	Slag	Iron	Bone	Wood	Stone
3	1										
3	2	1						1			
	Total	1						1			

Weight

Trench	Layer	Total	Sandstone Chip	Laterite	Stone tool?	Bead	Slag	Iron	Bone	Wood	Stone
3	1										
3	2	6						6			
	Total	6						6			

Extension Trench 5

Trench 5 Summary

Archaeological site code: THALA 2014 Grid _____ Trench Number 5
 Excavator(s) Komnet, Nara, Narith Date Started: Feb28,2014 Date completed: March 05,2014.
 Associated trenches (list and explain relationship): trench number5 to expand from the southern part of trench number5.
 Type of archaeological feature (mound, depression, linear trace, etc.): This trench number3 is located in NE from 10m of house.
 Location of Datum: _____ NE _____.
Beginning depth (cmbd): NE__1__SE__-3__SW__-8__NW__1__ Average (MBD) 0.75.
Ending depth (cmbd): NE__61__SE__59__SW__60__NW__60__ Average (MBD) 60.

EXCAVATION SUMMARY

Total number of levels (spits) excavated in trench: _____ 5 spit excavated of trench5 _____.
 Total number of cultural layers (list all levels within each layer): _____ Layer1, Layer2, layer3 _____.

TRENCH RECORDS INVENTORY

Sections drawn (list): Section of North, East, South, West walls.
 Photographs taken (list sequentially by photo number): _IMG_2669, 2670,2672,2673,2674,2691,2692 ,2693,2694,2695,2696,1557,1558,1563,1564,1565,1567,1568,1571,1572,1576,5042,5043,5044, 5045, 5046, 5047,5048,5049,5050,5051,5052,5053,5054,5055,5056,5057,5058,5059,5060,5061,5062,5063, 5064,5065, 5066,5067,5068,5069,5070,5071,5072,5073,5074,5075,5076,5077,5078,5079,5080,5081, 5082, 5083,5084,5085,5086,5087,5088,5089,5090,5091,5092,5093,5094,5095,5096,5097,5098,5099, 5100, 5101, 5102, 5103,.
 Artifact bags (list sequentially by bag number): thala5.1.1bag, thala5.1.(1bag fired clay), thala5.2.1.1bag, thala5.3.1.1bag, thala5.3.1.1bag (charcoal), thala5.3.1.1bag (panting) , thala5.4.1.2bag(ceramic, celadon).
 Soil sample bags (list sequentially by bag number) to taken soil sample thala5.1bag. _____
 Name of digital notebook file: T5 diary

EXCAVATION RECORDS SUMMARY

CULTURAL FEATURES PRESENT (*nb*: in notes for postholes, list length/width/diameter and depth; level with which posthole is associated, and shape)

Feature no.	Level (and Cultural Layer)	Type of feature	SU numbers associated with feature	Notes

RADIOCARBON SAMPLE LIST/ASSESSMENT (*nb*: quality of sample refers to the size and integrity of each charcoal piece; in ranking please use 1-n)

C-14 sample SU	Level (cultural layer)	Context (association)	Assessment (quality of sample, association w/particular strat. or artifactual layer, etc.)	Rank within trench

STRATIGRAPHIC LINKAGES WITHIN TRENCH (Use this table to associate each of your spits/features with specific stratigraphic layers).

US #	Description/Notes	Belongs to Layer
1	The soil is sandy clay-loam, brown color 7.5YR 4/3; hard and sticky. It composes of a sandy clay matrix mixed with many brick fragments, many small tree roots, laterite grains, and some potsherds. At 20 cmbd, we found small pieces of fired clay or brick at the northern part of the trench.	Layer 1
2	The soil is sandy clay-loam, hard and sticky, dark grayish brown color 10YR 4/2. It composes of a sandy clay matrix mixed with many brick fragments, many small tree roots, laterite grains, a few pieces of charcoal found at north-west and south-west part, and some potsherds.	Layer 1
3	The soil is clay, brown color 7.5YR 4/3; hard and sticky. It composes of a sandy clay matrix mixed with many brick fragments, many small tree roots, laterite grains, a few pieces of charcoal, a few earthenware sherds, and Chinese ceramics.	Layer 2
4	Same as above. A fragment of a base belongs to a celadon bowl was found from the northeast wall. Additionally, there are many of manganese particles mixed with brick fragments.	Layer 2

Description of artifact variability (Describe kinds and relative density and distribution of artifacts across unit and between levels if any)

We start found potsherd from top, spit1 till spit 4. The highest quantity of ceramics start from spit 1 to spit 3.

STRATIGRAPHIC DESCRIPTION (Use this table to characterize each layer excavated in the trench).

Layer	Munsell color	Soil desc. ¹	Non-artifact inclusions ²	Disturbance ³	Artifacts present?	Additional notes/ interpretation ⁴
Layer 1	7.5YR 4/3, 3/2 Brown	Sandy clay-loam,	brick fragments, laterite	roots	earthenware	Disturbed by human from 2008

		hard and sticky	grains, charcoal			
Layer 2	7.5YR 4/3 Brown	Loamy clay, hard and sticky	brick fragments, laterite grains, manganese, charcoal	roots	Earthenware and stoneware	Angkorian period

¹ Describe soil color, sediment size, and density/compaction; describe soil structure or horizons if present; describe variation between levels if any exists

² Describe amount and size of **charcoal pieces**, presence and density of sandstone chips or laterite, amount of gravel, etc.

³ Describe kinds and amounts of animal disturbance, root disturbance, vandalism, etc.; also note any intrusive or overlying features; describe variation within levels if any exists

⁴ Discuss features and unusual patterns, excavation methods for those unusual deposits, variation between levels if any exists, etc.

GENERAL TRENCH INTERPRETATION (summarizes comments here and adds other information as desired)

See Trench 3 Summary

Trench 5 Artifacts

Trench 5: Khmer Stoneware and Tradeware Count

Trench	Layer	Total	KS	KBG	KGG	TH	CH	VN
5	1							
5	2	4					4	
	Total	4					4	

Weight

Trench	Layer	Total	KS	KBG	KGG	TH	CH	VN
5	1	400						
5	2	355					67	
	Total	755					67	

Trench 5: Earthenware

Count

Trench	Layer	Total	E8a	E8b	E8c	E8sand	E8g	E8h	E9	E10	E11	E12
5	1	55				9	1					
5	2	20				6	1					
	Total	75				15	2					

Weight

Trench	Layer	Total	E8a	E8b	E8c	E8sand	E8g	E8h	E9	E10	E11	E12
5	1	400				46	6					
5	2	288				53	6					
	Total	688				99	12					

Trench 5: Other terracotta

Trench	Layer	Count				Weight			
		97	98	99	Modern	97	98	99	Modern
5	1	45	X			316	32		
5	2	13	X			214	15		
	Total	58	X			530	47		

Trench 4

Trench 4 Summary

Archaeological site code: __THALA 2014__ Grid _____ Trench Number __4__.

Excavator(s): _ Phivath, Deoung, Vutha, Chea, Ponlork, Thun, Chantha, Sareung_ **Date Started:** _ Feb26, 2014_ **Date completed:** _Mar08, 2014__.

Associated trenches (list and explain relationship):

_____ N/A _____

Type of archaeological feature (mound, depression, linear trace, etc.): _Mound_.

Location of Datum: _____ NE corner _____.

Beginning depth (cmbd): NE_2.5cm_SE_10.5cm_SW__7cm__NW_12.5cm_Average (MBD) 8.125cm.

Ending depth (cmbd): NE_208__SE__220__SW__208__NW__206__ Average (MBD)_213cm_.

EXCAVATION SUMMARY

Total number of levels (spits) excavated in trench: 14 spits excavated (10cm of spit 1 till 9, 20cm of spit 10 till 14).

Total number of cultural layers (list all levels within each layer): There are 4 layers: 1, 2, 3 and 4.

TRENCH RECORDS INVENTORY

Sections drawn (list): Section of North, East, South and West walls.

Photographs taken (list sequentially by photo number): _IMG_: 4949, 4950, 4968, 4969, 4970, 4976, 4977, 4978, 4981, 4982, 4983, 4985, 4986, 5022, 5023, 5024, 5026, 5030, 5031, 5035, 5036, 5037, 5038, 5040, 5041, 0328, 0329, 0330, 5108, 5109, 5115, 5117, 5118, 5121, 5122, 5123, 5124, 5125, 5126, 5127, 5128;

5135, 5136, 5137, 5138, 5139, 5141, 5143 (east profile), 5147, 5148, 5149, 5150 (west profile), 5152, 5154, 5155 (south profile), 5157, 5158, 5159, 5160 (north profile), 5169, 5170, 5171 (soil sample location), 5219, 5220, 5221 (Bottom of the trench).

Artifact bags (list sequentially by bag number): Spit1 (#1 bag of ceramic), Spit2 (#1ceramic), Spit3 (#1 ceramic), Spit4 (#1 ceramic), Spit5 (#1 ceramic, #2 bags of charcoal), Spit6(#1 ceramic, #1 charcoal), Spit7(#1 ceramic, #1 charcoal), Spit8(#1 ceramic, #3of charcoal), Spit9(#1 ceramic, #2 charcoal), Spit10(#1 ceramic, #4 charcoal), Spit11 (#1 ceramic, #1 charcoal), Spit12(#1 ceramic, #3 charcoal), Spit13(#1ceramic, #1 charcoal), Spit14 (#1 ceramic).

Soil sample bags (list sequentially by bag number)

Name of digital notebook file: T4 diary

EXCAVATION RECORDS SUMMARY

CULTURAL FEATURES PRESENT (*nb*: in notes for postholes, list length/width/diameter and depth; level with which posthole is associated, and shape)

Feature no.	Level (and Cultural Layer)	Type of feature	SU numbers associated with feature	Notes

RADIOCARBON SAMPLE LIST/ASSESSMENT (*nb*: quality of sample refers to the size and integrity of each charcoal piece; in ranking please use 1-n)

C-14 sample SU	Level (cultural layer)	Context (association)	Assessment (quality of sample, association w/particular strat. or artifactual layer, etc.)	Rank within trench
5		20cm from the south wall, 13cm from the west wall at 39cmbd		4
5		38cm from the east wall, 498cm from the south wall at50cmbd		3
6		12cm from the west wall, 97cm from the south wall at 50 cmbd	Small sample in a good context. We found a fragment of earthenware stove	1
6		8cm from the north wall, 32cm from the east wall at 60cmbd		4

7		24cm from the north wall, 44cm from the west wall at 65cmbd		3
8		46cm from the south wall, 22cm from the west wall at 76cmbd		5
8		30cm from the west wall, 58cm from the south wall at 80cmbd		2
8		14cm from the north wall, 38cm from the west wall at 80cmbd		1
9		97cm from the north wall, 36cm from the west wall at 87cmbd		1
9		25cm from the east wall, 57cm from the north wall at 89cmbd		5
10		30cm from the south wall, 28cm from the west wall at 100cmbd		3
10		84cm from the north wall, 39cm from the west wall at 103cmbd		2
10		16cm from the south wall, 20cm from the west at 105cmbd		3
10		22cm from the south wall, 24cm from the east wall at 106cmbd		3
11		14cm from the west wall, 24cm from the north wall at 117cm.		2
12		20cm from the west wall, 104cm from the north wall at 130cmbd		1
12		12cm from the south wall, 14cm from west wall at 138cmbd		2
12		20cm from the south wall, 16cm from the west wall at 143cmbd		3
13		26cm from the north wall, 20cm from the west wall at 182cmbd	Very Large Sample	1

STRATIGRAPHIC LINKAGES WITHIN TRENCH (Use this table to associate each of your spits/features with specific stratigraphic layers).

US #	Description/Notes	Belongs to Layer
1	The soil was soft mixed with tree root. There were a few ceramics, gravel, brick fragments, and a modern ceramic sherd.	1
2	The soil is still soft mixed with many tree roots, few gravels, plastics, brick fragments, and few ceramics.	1
3	The soil was soft and color was dark brown. There were many tree roots, some brick fragments, insects, plastic bags, stone fragments, gravels, and a few pieces of ceramics (earthenware and stoneware).	1
4	The soil was soft. There were many tree roots, brick fragments, some gravels, some charcoal, manganese, and mostly ceramics.	1
5	The soil was hard and sandy loam. There were many tree roots, a few stone fragments, a few gravels, some brick fragments, manganese, and many ceramics at the west and south walls. There were many small charcoal fragments. We collected 2 pieces of charcoal for sample.	1, 2
6	The soil was hard and sandy, sticky. There were some tree roots, a few brick and brick of fragment, pieces of charcoal, some gravels, and manganese nodules. We found some pieces of ceramics and a fragment of earthenware stove. We collected two charcoal samples. One was near the stove fragment and another one came from the NE corner of the trench.	2
7	The soil was hard, sandy with clay a bit sticky. There were a few tree roots, gravels, stone fragments, brick fragments, charcoals, ceramics, and manganese nodules. We collect a charcoal sample near the north wall.	2
8	The soil was hard, sandy with clay, a bit sticky. There were some ceramics, gravels, brick fragments, few tree roots, many manganese nodules, a little stone fragment. We found many pieces of charcoals near the west wall and collected three charcoal samples in this spit. Two charcoals were located near the south wall.	2
9	The soil was still hard, sandy clay (a bit sticky). There were some pieces of ceramics, gravels, brick fragments, minimal roots, many manganese nodules and a few stone fragments. We saw many pieces of charcoals in this spit and collected 3 for sample. 2 charcoals located near the S wall were in good context.	2, 3
10	The soil was still hard. There are a few gravels, stone fragments and manganese nodules. No ceramic but there were many pieces of charcoal. We took 4 charcoal samples.	3
11	The soil was hard sandy clay. There were a few gravels, stone fragment, brick fragment, many manganese nodules, and some ceramics. The charcoal pieces were less than the previous spit. We took a charcoal near north wall for sample.	3
12	The soil was very hard sandy with clay (sticky). From this spit, we excavate 30cm per spit because there was minimal of ceramics. The ceramics, charcoal fragments, stone fragments, gravels, brick fragment were considerably less than previous one. There were many manganese nodules. 3 charcoal samples were collected from near the SW wall. The charcoal in 130cm was a good one.	4
13	The soil was very hard, sand with clay. We found very few ceramics, brick fragments, gravels, and a large charcoal fragment at the NW corner. A lot of	4

	manganese nodules (laterite?) appeared in the middle and along west wall of the trench.	
14	The soil was very hard with more clay than sand. We continued to see the laterite increase to most of the trench except at the S.E corner so we only excavated there. We found a few pieces of ceramics, few gravels and stone fragments at the S.E corner but no charcoal. At 230cmbd of SE corner, the laterite formation appeared and we could not dig down anymore. So, we decided to close the trench in this spit.	4

Description of artifact variability (Describe kinds and relative density and distribution of artifacts across unit and between levels if any)

We found ceramics from SU 1 till US 14. There were a few of ceramics found within SU 1, 2 and 3. The ceramics increased in SU 4 and 5, and decreased from SU 6 till 9. The ceramics increased again in SU 10 and 11 but decreased in SU 12, 13 and 14 (minimal ceramics in these SU). The highest quantity of ceramics appeared in SU 4 and 5.

STRATIGRAPHIC DESCRIPTION (Use this table to characterize each layer excavated in the trench).

Layer	Munsell color	Soil desc. ¹	Non-artifact inclusions ²	Disturbance ³	Artifacts present?	Additional notes/interpretation ⁴
1	7.5YR3/2 Dark Brown	A bit Hard Sand loam		Many Roots		Some artifact
2	7.5YR4/3 Brown	Hard Sandy clay	Few manganese nodules, charcoal	Decreasing root disturbance, but still some roots	Most ceramics identified in this layer. earthenware with some tradewares/stonewares/glazed wares, and a fragment of stove and roof tile	Increasing artifacts
3	7.5YR5/3 Brown	Hard Sand clay (50%)	Many Manganese nodules, charcoal	Minimal Roots	Most of them are earthenware	Decreasing artifacts
4	7.5YR4/3 Brown	Very hard clay less sand	Many manganese nodules, charcoal	Minimal Roots	Earthenware	Few to no artifacts

¹ Describe soil color, sediment size, and density/compaction; describe soil structure or horizons if present; describe variation between levels if any exists

² Describe amount and size of *charcoal pieces*, presence and density of sandstone chips or laterite, amount of gravel, etc.

³ Describe kinds and amounts of animal disturbance, root disturbance, vandalism, etc.; also note any intrusive or overlying features; describe variation within levels if any exists

⁴ Discuss features and unusual patterns, excavation methods for those unusual deposits, variation between levels if any exists, etc.

GENERAL TRENCH INTERPRETATION (summarize comments here and add other information as desired)

Two phases of occupations can be reconstructed based on the ceramics:

1. Phase 1: pre-Angkorian phase is limited mainly the Layer 3 and 4 where small amount of earthenware sherds appeared.
2. Phase 2: Angkorian occupation is evident by many ceramics of Layer 1, 2, and mixed with the pre-Angkorian sherds in Layer 3. The nearby brick temple likely belonged to this phase.

Trench 4 Artifacts

Trench 4: Khmer Stoneware and Tradeware

Count

Trench	Layer	Total	KS	KBG	KGG	TH	CH	VN
4	1	21	1	19	1			
4	2	7		2			5	
4	3	4					4	
4	4							
Total		32	1	21	1		9	

Weight

Trench	Layer	Total	KS	KBG	KGG	TH	CH	VN
4	1	842	17	754	22		49	
4	2	13		5			8	
4	3	2					2	
4	4							
Total		857	17	759	22		59	

Trench 4: Earthenware

Count

Trench	Layer	Total	E8a	E8b	E8c	E8sand	E8g	E8h	E9	E10	E11	E12
4	1	582				145	13		1			
4	2	303				103	1					

4	3	394	2			135						
4	4	55				3	1					
	Total	1334	2			386	15		1			

Weight

Trench	Layer	Total	E8a	E8b	E8c	E8sand	E8g	E8h	E9	E10	E11	E12
4	1	2605				1418	152		168			
4	2	1597				1095	27					
4	3	1653	10			924						
4	4	106				24	6					
	Total	5961	10			3461	185		168			

Trench 4: Other terracotta

Trench	Layer	Count				Weight			
		97	98	99	Modern	97	98	99	Modern
4	1	11	412			48	819		
4	2	5	194			63	412		
4	3	0	257				719		
4	4	0	51				76		
	Total	16	914			111	2026		

Trench 4: Miscellaneous Artifacts

Count

Trench	Layer	Total	Sandstone Chip	Laterite	Stone tool?	Bead	Slag	Iron	Bone	Wood	Stone
4	1	9									9
4	2	2									2
4	3	16									5
4	4	12									7
	Total	39									23

Weight

Trench	Layer	Total	Sandstone Chip	Laterite	Stone tool?	Bead	Slag	Iron	Bone	Wood	Stone
4	1	52									52

4	2	6									6
4	3	317									272
4	4	132									62
	Total	507									392

Trench 6

Trench 6 Summary

Archaeological site code: __Thala____ Grid _____ Trench Number _6_

Excavator(s) MK, VPV, VP, C Date Started: Mar 4, 2014 Date completed: Mar 16, 2014.

Associated trenches (list and explain relationship): N/A

Type of archaeological feature (mound, depression, linear trace, etc.): Located within a property, which was once a rice field and 40 m north of the new Mekong bridge. The area is known for gold looting.

Location of Datum: Southeast corner of Trench 0.01cm above ground.

Beginning depth (cmbd): NE_0.04_SE_0.01_SW_0_NW_0.03_ Average (MBD): 0.32

Ending depth (cmbd): NE_132_SE_169_SW_142_NW_135_ Average (MBD): 144.5

EXCAVATION SUMMARY

Total number of levels (spits) excavated in trench: 12 spits excavated of trench 6

Total number of cultural layers (list all levels within each layer): Layer 1, Layer 2, Layer 3a, Layer 3b, Layer 4.

TRENCH RECORDS INVENTORY

Sections drawn (list): Sections of North wall, East wall, South wall and West wall drawn by Moul Komnit.

Photographs taken (list sequentially by photo number): Unite IMG-1577, 1578, 1579, 1580, 1581, 1582, 1591, 1592, 1593, 1594, 1597, 1598, 1599, 1602, 1603, 1604, 1605, 1606, 1607, 1608, 1614-1616, 1629-1632, 1633-1635, 1636-1637, 1638-1641, 1647-1648, 1655-1656, 0286-0287 (Smey's camera), 5329-5336, 5384-5391 (Phivath camera), 5392-5411 (Profile).

Artifact bags (list sequentially by bag number): Thala 6.1.1, 6.4.1, 6.5.1, 6.6.1, 6.6.2, 6.6.3, Charcoal 6.6.1.6.6.2, 6.7.1, 6.7.2, 6.7.3, 6.7.4, 6.7.5, 6.7.6, 6.7.7, <6.7.6, 6.7.7> (from screen), Charcoal 6.7.1, 6.8.1, 6.8.2, 6.8.3, ,6.9.1, 6.9.2, 6.9.3, 6.9.4 (3bag), 6.9.5, 6.9.6, 6.10.1, 6.10.2, 6.10.3, 6.10.4, 6.10.3(from screen), 6.11.1

Soil sample bags (list sequentially by bag number):

Name of digital notebook file: Trench 6 notebook

EXCAVATION RECORDS SUMMARY

CULTURAL FEATURES PRESENT (*nb*: in notes for postholes, list length/width/diameter and depth; level with which posthole is associated, and shape)

Feature no.	Level (and Cultural Layer)	Type of feature	SU numbers associated with feature	Notes
N/A				

RADIOCARBON SAMPLE LIST/ASSESSMENT (*nb*: quality of sample refers to the size and integrity of each charcoal piece; in ranking please use 1-n)

C-14 sample SU	Level (cultural layer)	Context (association)	Assessment (quality of sample, association w/particular strat. or artifactual layer, etc.)	Rank within trench
6		61cm from the south wall, 36cm from the west wall at 87cmbd	best	5
7		90cm from the north wall, 15cm from the west wall and 102 cmbd	best	4
8		10cm from the south wall, 16cm from the west wall, and 125cmbd	best	3
9		32cm from the north wall, 20cm from the east wall, and 130cmbd	best	2
10		80cm from the west wall, 19cm from the east wall, and 160cmbd	best	1

STRATIGRAPHIC LINKAGES WITHIN TRENCH (Use this table to associate each of your spits/features with specific stratigraphic layers).

SU #	Description/Notes	Belongs to Layer
1	Top soil, the soil is sandy clay and hard with very dark gray color 7.5 Y/R 3/1. There are many modern debris and a few earthenware shards.	I
2	The soil is still sandy clay and hard and the color is 7.5 Y/R 3/1 very dark gray. There is no artifact.	I
3	The soil is still sandy clay and hard and the color is 7.5 Y/R 3/1 very dark gray. There are modern debris and no ceramic.	I
4	The soil is sandy loam and hard and the color is 7.5 Y/R 3/2 dark brown. There are many small brick fragments and many ceramics.	II
5	The soil is still hard and silty and contain laterite grains. The soil color is 5YR 5/2 Reddish gray. A lot of earthenware were present including Pinkware and fragments of fired clay.	II
6	The soil is hard, wet, and silty mixed with laterite grains. The soil color is 5YR 3/1 very dark gray. The number of ceramics is increased. These include Pinkware and a lot of black ware. There is one bead, 2 best quality charcoal pieces, and a few fragments of slag and stone tools.	IIIa

7	The soil is hard, more wet, loam. The soil color is 5YR 4/1 dark gray. The number of ceramics is increased. These include Pinkware and black ware and fragments of molds, wood, stone tools, beads and bangle fragment. There are a lot of small pieces of charcoal.	IIIb
8	The soil is clay loam mixed with laterite grains and not so hard compared to the previous spit. The soil color is 10YR 4/2 dark grayish brown. There are a lot of Pinkware and black ware, decrease of fragments of mold. There are some pieces of bones, beads, slags and charcoals (best quality).	IIIb
9	The soil is wet and sticky clay loam with less sand. The soil color is 10YR 3/2 very dark grayish brown. The matrix contains many ceramics and small pieces bones and brick fragments.	IV
10	The soil is clay loam, 10 YR 3/2 very dark grayish brown. There are many ceramics and charcoal pieces (best quality).	IV
11	The soil is clay loam, 10 YR 5/6 Yellowish brown. Decrease number of ceramics.	IV
12	It is the bottom of trench 6. It is a natural layer (yellow clay floor).	V

Description of artifact variability (Describe kinds and relative density and distribution of artifacts across unit and between levels if any)

We found ceramics from spit 1. The highest quantity of ceramics started from spit 5 till spit 12. We stop finding ceramics from spit 12 (Layer 5) till the last spit. The last spit (Layer 5) is clay floor contain no ceramic.

STRATIGRAPHIC DESCRIPTION (Use this table to characterize each layer excavated in the trench).

Layer	Munsell color	Soil desc. ¹	Non-artifact inclusions ²	Disturbance ³	Artifacts present?	Additional notes/interpretation ⁴
Layer 1	7.5YR 3/2 Dark brown	Soft, sandy clay		Roots	Many modern debris	Top soil
Layer 2	5YR 5/2 Reddish gray	Hard, Clay with less sand		Roots	earthenware including Pinkware and fragments of fired clay	A lot of artifacts
Layer 3a	7.5YR 4/1 Dark gray	Soft, Clay with less sand 20%		Roots	Pinkware and black ware, one bead, slags, and stone tools	Increase of artifacts
Layer 3b	7.5YR 4/2 Dark grayish brown	Soft, Clay with less sand 20%			Pinkware and black ware, and fragment of molds, woods, stone tools, beads, and slags	Increase of artifacts

Layer 4	10YR 3/2 Very dark grayish brown	Soft clay loam				earthenware	Decrease of artifacts
Layer 5	10YR 7/6 Yellow	Clay with laterite grains				No artifact	

¹ Describe soil color, sediment size, and density/compaction; describe soil structure or horizons if present; describe variation between levels if any exists

² Describe amount and size of **charcoal pieces**, presence and density of sandstone chips or laterite, amount of gravel, etc.

³ Describe kinds and amounts of animal disturbance, root disturbance, vandalism, etc.; also note any intrusive or overlying features; describe variation within levels if any exists

⁴ Discuss features and unusual patterns, excavation methods for those unusual deposits, variation between levels if any exists, etc.

GENERAL TRENCH INTERPRETATION (summarizes comments here and adds other information as desired)

There are three phases of occupation:

Phase 1: Early Historic burials

Phase 2: pre-Angkorian activities including metal craft and temple

Phase 3: Modern occupation

Trench 6 Artifacts

Trench 6: Earthenware

Count

Trench	Layer	Total	E8a	E8b	E8c	E8sand	E8g	E8h	E9	E10	E11	E12
6	1	6				1						
6	2	225		78		116	14	1				
6	3a	250		88		141	7					2
6	3b	1257	17	337	5	715	35	2	10	2		45
6	4	248		45		130	33	2				
	Total	1986	17	548	5	1103	89	5	10	2		47

Weight

Trench	Layer	Total	E8a	E8b	E8c	E8sand	E8g	E8h	E9	E10	E11	E12
6	1	19.5				7						
6	2	2656		538		702	79	4				

6	3a	2700		688		873	37					14
6	3b	11168	120	2724	32	4115	289	10	72	12		311
6	4	2768		434		1006	182	15				
	Total	19311.5	120	4384	32	6703	587	29	72	12		325

Trench 6: Other terracotta

Trench	Layer	Count				Weight			
		97	98	99	Modern	97	98	99	Modern
6	1		4		1		12		.5
6	2	16				176	1157		
6	3a	12				237	851		
6	3b	89				784	2699		
6	4	38				455	676		
	Total	155	4		1	1652	5395		.5

Trench 6: Miscellaneous Artifacts

Count

Trench	Layer	Total	Sandstone Chip	Laterite	Stone tool?	Bead	Slag	Iron	Bronze	Wood	Stone
6	1	2				2					
6	2	6		1	3		2				
6	3a	19	3		11		5				
6	3b	79			35	36	6		2		
6	4	9			5	4					
	Total	115	3	1	54	42	13		2		

Weight

Trench	Layer	Total	Sandstone Chip	Laterite	Stone tool?	Bead	Slag	Iron	Bronze	Wood	Stone
6	1										
6	2	104		8	73		23				
6	3a	380	42		270		68				
6	3b	955.05			821		134		.05		
6	4	361			361						
	Total	1800.05	42	8	1525		225		.05		

Trench 7

Trench 7 Summary

Archaeological site code: THALA 2014 Trench Number: 7
 Excavator(s): Muong Raksmeay, Hannah Arnhold, Halavan Monika, Thon, Chia, Thouch, Worn
 Date Started: March-05-2014; Date completed: March-13-2014.
 Associated trenches (list and explain relationship): N/A
 Type of archaeological feature (mound, depression, linear trace etc.): Unit 7 is located south of a small river and to the west of a modern road.
 Location of Datum: NE corner
Beginning depth (cmbd): NE: 5 SE: 9 SW: 8 NW: 6 Average (MBD): 0.
Ending depth (cmbd): NE: 163 SE: 164 SW: 164 NW: 160 Average (MBD): 162.

EXCAVATION SUMMARY

Total number of levels (spits) excavated in trench: 9 spits excavated of unit 7.
 Total number of cultural layers (list all levels within each layer):
 Layer 1 (Spit 1, Spit 2, Spit 3, Spit 4),
 Layer 2a (Spit 4, Spit 5, Spit 6),
 Layer 2b (Spit 5, Spit 6, Spit 7),
 Layer 3 (Spit 4, Spit 5, Spit 6, Spit 7),
 Layer 4 (Spit 5, Spit 6, Spit 7, Spit 8, Spit 9).

TRENCH RECORDS INVENTORY

Sections drawn (list): Section of North, East, South and West wall.
 Photographs taken (list sequentially by photo number): 0219, 0220, 0221, 0223, 0226, 0233, 0256, 0257, 0270, 0272, 0273, 0274, 0275, 0276, 0277, 0278, 0279, 0280, 0281, 0282, 0283, 0284, 0285, 0288, 0291, 0292, 0293, 0296, 0297, 0298, 0299, 0307, 0312, 0316, 0317, 0318, 0319, 0320, 0321 (MCR camera)
 5347, 5349, 5350, 5351, 5352, 5353, 5354, 5355, 5356, 5357, 5359, 5360. 5361, 5362, 5363, 5364, 5365 (VA camera)
 Artifact bags (list sequentially by bag number): Thala 1.1, 1.2, 1.3, 1.4, 1.5, 1.6, 1.7, 2.1, 2.2, 2.3, 2.4, 2.5, 2.6, 3.1, 3.2, 3.3, 3.4, 3.5, 3.6, 4.1, 4.2, 4.3, 4.4, 5.1, 5.2, 5.3, 5.4, 6.1, 6.2, 6.3, 6.4, 6.5, 7.1, 7.2, 7.3, 7.4, 7.5, 7.6, 7.7, 7.8, 8.1, 8.2.
 Soil sample bags (list sequentially by bag number): One bag for each layer: Layer 1, Layer 2a, Layer 2b, Layer 3, Layer 4.

Name of digital notebook file: Trench Diary_Trench 7

EXCAVATION RECORDS SUMMARY

CULTURAL FEATURES PRESENT (*nb*: in notes for postholes, list length/width/diameter and depth; level with which posthole is associated, and shape)

Feature no.	Level (and Cultural Layer)	Type of feature	SU numbers associated with feature	Notes

--	--	--	--	--

RADIOCARBON SAMPLE LIST/ASSESSMENT (*nb*: quality of sample refers to the size and integrity of each charcoal piece; in ranking please use 1-n)

C-14 sample SU	Level (cultural layer)	Context (association)	Assessment (quality of sample, association w/particular strat. or artifactual layer, etc.)	Rank within trench
SU 6 (#1)	2b	BSD: 109cm 7cm from south wall, 10cm from west wall	Medium sized piece but broken into small fragments	4
SU 6 (#2)	2b	BSD: 103cm 72cm from south wall, 6cm from west wall	Three medium sized pieces (found 8cm below a piece of bone)	1
SU 7 (#1)	2b	BSD: 120cm 2cm from south wall, 11cm from west wall	Small piece	3
SU 7 (#2)	2b	BSD: 120cm 30cm from south wall, 3cm from west wall	Medium sized piece but fragmented	2

STRATIGRAPHIC LINKAGES WITHIN TRENCH (Use this table to associate each of your spits/features with specific stratigraphic layers).

US #	Description/Notes	Belongs to Layer
1	Soft sand, many different kinds of ceramic sherds. One stone tool, some slag and brick pieces. Some modern debris like plastic. Some stones and many tree roots. 20cm spit.	Layer 1
2	Hard sand with little clay and many tree roots. A high number of ceramic sherds, some iron, slag, stones, gravels and charcoal. 20cm spit.	
3	Dry sand with little clay, many tree roots. Many ceramic sherds, a few modern iron pieces and slag. A few charcoal and laterite pieces. 20cm spit.	
4	Sandy clay, many tree roots. Many ceramic sherds, more charcoal, some slag, a few small pieces of bones. Stones, gravels and a few pieces of laterite. 20cm spit.	Layer 2a & 3
5	Soft, sandy clay with some yellow sand and many tree roots. Some charcoal and bone pieces. Less ceramics than in the spit before. A few pieces of slag and laterite. 20cm spit.	Layer 2a, 2b, 3 and 4
6	Soft, sandy clay with many tree roots and some yellow clay spots. The soil seems a bit darker and stickier in the southern part. Generally, less ceramics, but more ceramics in the south than in the north. Much charcoal but only in the south. Some pieces of bone and one piece of slag. 17cm spit.	Layer 2a, 2b, 3 and 4

7	Soft, sandy clay with a few yellow and light brown clay spots, some manganese, tree roots and many laterite grains. Some small pieces of bone and much charcoal in the south. Many ceramics in the SW corner, a few throughout the rest of the spit. 20cm spit.	Layer 2b, 3 and 4
8	Soft, sandy clay, reddish colour. Many laterite grains, manganese and some darker clay spots. No ceramics in the north, very few in the south. Less tree roots. 20cm spit.	Layer 4
9	Only the south (Grid S) was excavated. Sandy clay, reddish colour. Many small laterite grains and much manganese. A few stones. No ceramics or other artifacts. 15cm spit.	Layer 4

Description of artifact variability (Describe kinds and relative density and distribution of artifacts across unit and between levels if any):

Layer 1 which includes the first four excavated spits contained a high amount of ceramic sherds from different ceramic classes – earthenware, stoneware, KBG, KGG and fine orange ware.

Many sherds were also found in layer 2a and 2b which are visible only on the south and west wall near the SW corner. The number of ceramic sherds decreased from layer 3 on until the bottom of layer 4 where no more ceramics were found.

Layer 2a, 2b and 3 contained much more charcoal compared to the other layers. The highest amount of bone pieces was found in layer 2b, other layers close-by contained not more than a few small pieces.

STRATIGRAPHIC DESCRIPTION (Use this table to characterize each layer excavated in the trench).

Layer	Munsell color	Soil desc. ¹	Non-artifact inclusions ²	Disturbance ³	Artifacts present?	Additional notes/interpretation ⁴
1	7.5 YR 4/4 brown	Sand with little clay	Some debris (plastic, cloth etc.), gravels, stones, brick pieces, some charcoal, laterite	Modern debris, many tree roots	ceramics (many different kinds), a stone artifact (sword?)	The top soil of trench seems to be disturbed as there are many different kinds of ceramics. Maybe it was dug before, dumped from somewhere else or mixed through landuse over several decades
2a	10 YR 3/2 very dark grayish brown	Sandy clay, a bit sticky	Much charcoal, gravel, a few stones, laterite grains	many tree roots	Many ceramic sherds	Layer 2a is only visible on the south and west wall. It could be related to layer 2b and continue outside the trench in the direction of southwest.
2b	10 YR 3/2 very dark grayish brown	Sandy clay, a bit sticky	Much charcoal, gravels	some tree roots	Many ceramic sherds (also bigger pieces), some small	This layer is a rather small part in the SW corner. Small pieces of bone were found, some of them in the wall. It looks like the bones and some ceramic sherds

					pieces of bone, one very small piece of bronze was visible.	continue into southwest direction outside of the trench.
3	7.5 YR 4/6 strong brown	Sandy clay, soft, slightly reddish colour	Much charcoal, some laterite grains	Some tree roots	Less ceramics, especially in the north	Ceramics found were only earthenware and it seems like soil which was not disturbed. Might be a later stage of occupation.
4	7.5 YR 4/6 strong brown	Sandy clay, a bit harder, reddish colour turning darker towards the bottom	Much manganese and many laterite grains, less charcoal	Less tree roots	Less ceramics at the top, no ceramics at the bottom of the layer. No other artifacts.	Similar to layer 3 but with much more manganese and laterite. A decreasing number of ceramics. The natural layer was reached at the bottom of this layer. It might be part of the earliest stage of occupation.

¹ Describe soil color, sediment size, and density/compaction; describe soil structure or horizons if present; describe variation between levels if any exists

² Describe amount and size of **charcoal pieces**, presence and density of sandstone chips or laterite, amount of gravel, etc.

³ Describe kinds and amounts of animal disturbance, root disturbance, vandalism, etc.; also note any intrusive or overlying features; describe variation within levels if any exists

⁴ Discuss features and unusual patterns, excavation methods for those unusual deposits, variation between levels if any exists, etc.

GENERAL TRENCH INTERPRETATION (summarize comments here and add other information as desired)

Three different phases of occupation seem to appear in trench 7.

Layer 1 contained a large number of ceramic sherds. There were many kinds of sherds from different periods which makes it likely that this layer was disturbed. The top soil was either dug before (looters holes are common in that area), has been dumped from another place or is disturbed through landuse over several years. This layer represents the latest stage within the trench but is rather difficult to interpret as it seems disturbed.

Another phase of occupation is represented by layer 2a, 2b and 3. Layer 2a and 2b only appear near the SW corner and seem to continue into southwest direction outside of the trench. Some bones surrounded by many ceramic sherds were found and there might be a burial close to the SW corner of the trench. Some ceramics seemed to be black Phimai ware which could date this phase to the Iron Age. The third and therefore earliest phase of occupation visible in trench 7 is represented by layer 4 which shows a decreasing number of ceramics.

The natural layer was reached at the bottom of layer 4 when no more ceramics or other artifacts were found.

Trench 7 Artifacts

Trench 7: Khmer Stoneware and Tradeware Count

Trench	Layer	Total	KS	KBG	KGG	TH	CH	VN
7	1	1			1			
7	2&3							
7	4							
	Total	1			1			

Weight

Trench	Layer	Total	KS	KBG	KGG	TH	CH	VN
7	1	10			10			
7	2&3							
7	4							
	Total	10			10			

Trench 7: Earthenware Count

Trench	Layer	Total	E8a	E8b	E8c	E8sand	E8g	E8h	E9	E10	E11	E12
7	1	3716	33	59	15	2814	678	7		11	2	3
7	2&3	1155	4	2	2	935	193			2		
7	4	4		1		2						
	Total	4875	37	62	17	3751	871	7		13	2	3

Weight

Trench	Layer	Total	E8a	E8b	E8c	E8sand	E8g	E8h	E9	E10	E11	E12
7	1	38124	181	593	165	22399	5195	69		72	4	11
7	2&3	13452.1	42	14.05	12.05	8811	1447			16		
7	4	68		9		18						
	Total	51644.1	223	616.05	177.05	31228	6642	69		88	4	11

Trench 7: Other terracotta

Trench	Layer	Count				Weight			
		97	98	99	Modern	97	98	99	Modern
7	1	91		3		1660	7760	15	
7	2&3	17				186	2924		

7	4			1			35	6	
	Total	108		4		1846	10719	21	

**Trench 7: Miscellaneous Artifacts
Count**

Trench	Layer	Total	Sandstone Chip	Laterite	Stone tool?	Bead	Slag	Iron	Bone	Wood	Stone
7	1	135			34		94		4		3
7	2&3	41	4	6	7		19		5		
7	4	1							1		
	Total	177	4	6	41		113		10		3

Weight

Trench	Layer	Total	Sandstone Chip	Laterite	Stone tool?	Bead	Slag	Iron	Bone	Wood	Stone
7	1	5032			1218		3740		13		61
7	2&3	712.8	51	154	131		376		.8		
7	4	2							2		
	Total	5746.8	51	154	1349		4116		15.8		61

Trench 8

Trench 8 Summary

Archaeological site code: __Thala_____ Grid _____Trench Number _8_
 Excavator(s): Piphai, Phirom, Thon started: 12 March 2014
 Date completed: 14 March 2014
 Associated trenches (list and explain relationship):
 Type of archaeological feature (mound, depression, linear trace, etc.): Mound
 Location of Datum: North-East corner of Trench, 2cm above ground.
Beginning depth (cmbd): NE_2_SE_55_SW_54_NW_6_ Average (MBD): 29.25
Ending depth (cmbd): NE_31___SE_55___SW_54___NW_26_ Average (MBD): 41.5

EXCAVATION SUMMARY

Total number of levels (spits) excavated in trench: 1 spits excavated of trench 8
 Total number of cultural layers (list all levels within each layer): Layer 1

TRENCH RECORDS INVENTORY

Sections drawn (list): Sections of North wall, East wall, South wall and West wall drawn by Phirom.

Photographs taken (list sequentially by photo number): Unite IMG-1658-1660, 1661-1666, 1668-1677, 1680-1684, 1685-1688, 1689-1693, 1694-1713, 1716-1719, 1720-1722, 1723-1724 and 1725-1727.

Artifact bags (list sequentially by bag number): Thala 8.1.1, pot#1, pot#2, pot#3, bone#1, bone#2, bone#3, Charcoal 8.1.1, 8.1.2

Soil sample bags (list sequentially by bag number):

Name of digital notebook file: Trench 6 note book

EXCAVATION RECORDS SUMMARY

CULTURAL FEATURES PRESENT (*nb*: in notes for postholes, list length/width/diameter and depth; level with which posthole is associated, and shape)

Feature no.	Level (and Cultural Layer)	Type of feature	SU numbers associated with feature	Notes
N/A	N/A	N/A	N/A	N/A

RADIOCARBON SAMPLE LIST/ASSESSMENT (*nb*: quality of sample refers to the size and integrity of each charcoal piece; in ranking please use 1-n)

C-14 sample SU	Level (cultural layer)	Context (association)	Assessment (quality of sample, association w/particular strat. or artifactual layer, etc.)	Rank within trench

8.1.2	1		Small sample	
-------	---	--	--------------	--

STRATIGRAPHIC LINKAGES WITHIN TRENCH (Use this table to associate each of your spits/features with specific stratigraphic layers).

US #	Description/Notes	Belongs to Layer
1	Top soil, the soil is hard compact and stick, mostly clay mix with laterite.	1
1	The soil is very hard and compact due to a rock formation which cemented artifacts, bones, and laterite to a soft sedimentary rock. There are a lot of ceramics (all are earthenware) and human bones (only lower limbs).	2

Description of artifact variability (Describe kinds and relative density and distribution of artifacts across unit and between levels if any)

STRATIGRAPHIC DESCRIPTION (Use this table to characterize each layer excavated in the trench).

Layer	Munsell color	Soil desc. ¹	Non-artifact inclusions ²	Disturbance ³	Artifacts present?	Additional notes/interpretation ⁴
Layer 1	2.5YR 4/6 Red	hard, clay and laterite	laterite, rocks		No artifact	Clay mix with laterite grains
Layer 2	2.5YR 8/2 Pale brown	Hard, rock formation	Charcoal, laterite, rocks		earthenware	Burial layer with parts of human bone and many potteries

¹ Describe soil color, sediment size, and density/compaction; describe soil structure or horizons if present; describe variation between levels if any exists

² Describe amount and size of **charcoal pieces**, presence and density of sandstone chips or laterite, amount of gravel, etc.

³ Describe kinds and amounts of animal disturbance, root disturbance, vandalism, etc.; also note any intrusive or overlying features; describe variation within levels if any exists

⁴ Discuss features and unusual patterns, excavation methods for those unusual deposits, variation between levels if any exists, etc.

GENERAL TRENCH INTERPRETATION (summarizes comments here and adds other information as desired)

Trench 8 is located in Phum Kang Memay, south of Stung Treng, on an elevated ground. The trench is 1m x 2m (north to south = 2m and east to west = 1) covering part of a burial exposed by road cut. The results suggest that there is only one cultural phase associated with this burial. No evidence of other activities atop or beneath this burial. Burial goods associated with bowls, pedestalled ware, cordmarked carinated ware, and two blue beads suggest that this burial belonged to the Early Historic period. The AMS results verify the date by placing this burial between 79 CE and 247 CE.

Trench 8 Artifacts

Trench	Layer		E8sand	98	Beads
8	1	Count	365	x	2
		Weight	4986	899	x

Trench 9

Trench 9 Summary

Archaeological site code: __THALA 2014__ **Grid** _____ **Trench Number** __9__.

Excavator(s) Mak Deung, Som Thun, Loek Sarueoung, Chrai Chantha, Heng Piphai

Date Started: _Feb19, 2014_ **Date completed:** March 19, 2014

Associated trenches (list and explain relationship): N/A.

Type of archaeological feature (mound, depression, linear trace, etc.): This unit is located behind Sala Khum Sam Khuoy at the edge of the Ba Doem temple mound.

Location of Datum: NE corner.

Beginning depth (cmbd): NE__3__ SE__3__ SW__4__ NW__13__ Average (MBD)__5.75__.

Ending depth (cmbd): NE__300__ SE__310__ SW__309__ NW__300__ Average (MBD)__304.75__.

EXCAVATION SUMMARY

Total number of levels (spits) excavated in trench: 11 stratigraphic units (20cm)

Total number of cultural layers (list all levels within each layer): Layer 1, Layer 2a, Layer 2b, Layer 3a, Layer 3b, Layer 3c, Layer 4.

TRENCH RECORDS INVENTORY

Sections drawn (list): Section of North, East, South and West walls.

Photographs taken (list sequentially by photo number): _101-1755 to 1758, 101-1763 to 1765, 101-1769 to 1770, 101-1782 to 1784, 101-1787 to 1788, 101-1791 to 1793, 101-1802, 101-1805 to 1807, 101-1811, 101-1834 to 1835.

Soil Sample Location: South wall (see profile)

Walls Profile: Complete

Artifact bags (list sequentially by bag number): Thala2014.T9.2, T9.3, T9.4, T9.5, T9.6, T9.7, T9.8, T9.9.

Soil sample bags (list sequentially by bag number): 10 bags

Name of digital notebook file: Trench 2 Diary.doc

EXCAVATION RECORDS SUMMARY

CULTURAL FEATURES PRESENT (*nb*: in notes for postholes, list length/width/diameter and depth; level with which posthole is associated, and shape)

Feature no.	Level (and Cultural Layer)	Type of feature	SU numbers associated with feature	Notes

--	--	--	--	--

RADIOCARBON SAMPLE LIST/ASSESSMENT (*nb*: quality of sample refers to the size and integrity of each charcoal piece; in ranking please use 1-n)

C-14 sample SU	Level (cultural layer)	Context (association)	Assessment (quality of sample, association w/particular strat. or artifactual layer, etc.)	Rank within trench
8		mid unit 60cm from the north wall, 144cmbd.		3
7-2		SE on the S wall 140cmbd		
7-1		NW 139cmbd	Small Sample	3
6-3		SW 120cmbd best of the 6		
6-2		SE 107cmbd	Small sample	2
6-1		Center of unit 105cmbd	Small sample	1
5-3		SE 101cmbd		
5-2		SE 97cmbd best of SU4		
T9.5-1		SW 87cmbd		
4-2		E (80cm from S wall) 80 cmbd		
4-1		SE corner 70cmbd		
3		NE corner 53cmbd		

STRATIGRAPHIC LINKAGES WITHIN TRENCH (Use this table to associate each of your spits/features with specific stratigraphic layers).

US #	Description/Notes	Belongs to Layer
1	10YR 2/2 very dark brown, loam. Surface layer, hard but has a powder texture, root disturbance, modern debris (concrete, fiber roof), no ceramic.	Layer 1
2	10YR 3/2 very dark grayish brown, clay loam: hard and slightly sticky. Small brick fragments and sherds appear in the northern half where the elevation is higher; while the southern half still contains modern debris because it is on the lower slope. 1 bag of artifact.	Layer 1
3	7.5YR 2.5/2 very dark brown, clay: hard and sticky. The amount of brick and sherds fragments increased. 1 charcoal sample, 1 ceramic bag.	Layer 1
4	7.5YR 3/3 dark brown: Same with SU3. 2 charcoal samples, 1 ceramic bag.	Layer 2a

5	7.5YR 4/2 brown, clay, very hard, and sticky when wet. Ceramic and brick fragments decreased compared to SU3-4. Roots still occur at the corners. All are earthenware. 3 charcoal samples, 1 ceramic bag.	Layer 2b
6	7.5YR 4/2 brown, clay, very hard, and sticky when wet. More ceramics appear at the SW section of the trench. A small fragment of brick appeared at the NE corner. More charcoal concentrates on the southern portion of the trench. Root disturbance occurs on the walls. 3 charcoal samples, 1 bag of ceramics.	Layer 3
7	7.5YR 4/3 brown, clay, very hard, and sticky when wet. Decrease in the quantity of sherds and tiny brick fragments compare to the previous spits. More charcoal still appears on the southern portion. Root disturbance on the walls. 2 charcoal samples, 1 artifact bag.	Layer 3
8	7.5YR 4/4 brown, clay, very hard, and sticky when wet. Decrease in the quantity of sherds compare to SU7. Though more appear at the southern portion with fewer charcoal. Mn nodules appear in this spit. A smooth gravel was found here. Root disturbance on the walls. 1 charcoal samples, 1 artifact bag.	Layer 3
9	7.5YR 4/4 brown, clay, very hard, and sticky when wet. Very few sherds still appear at the southern portion and disappear from the north. Mn nodules is more common and root disturbance is seen on the walls. 1 artifact bag.	Layer 3-4
10	7.5YR 4/4 brown, clay, very hard, and sticky when wet. Only the southern half was excavated because it contained tiny pieces of burned clay or brick occur. There were more Mn nodules. No collection was made.	Layer 4
11	7.5YR 4/4 brown, very hard, and sticky when wet. Tiny pieces of burned clay or brick occur on the southern portion (no more after reaching 200cmbd), more Mn nodules. No collection was made.	Layer 4

Description of artifact variability (Describe kinds and relative density and distribution of artifacts across unit and between levels if any)

We found ceramics from surface till spit 13. There is a few of ceramics found in spit 1 till spit 9. The highest quantity of ceramics appeared in spit 10 till spit 13.

STRATIGRAPHIC DESCRIPTION (Use this table to characterize each layer excavated in the trench).

Layer	Munsell color	Soil desc. ¹	Non-artifact inclusions ²	Disturbance ³	Artifacts present?	Additional notes/interpretation ⁴
1	10YR 2/2 Very dark brown	Loam	Gravels, concrete, plastics	Roots	No artifact	
2a	7.5YR 2.5/3 Very dark brown	Hard Sandy Clay	Manganese, gravels	Roots	Earthenware and a piece of modern Chinese ceramic	Few artifacts

2b	7.5YR 4/2 Brown	Hard Clay with Some sand	Manganese, gravels	Roots	Earthenware	Increasing artifacts
3a	10YR 3/4 dark yellowish brown	Hard Clay with some sand	Manganese, gravels	Roots	Earthenware	Increasing artifacts
3b	10YR3/3 dark brown	Clay loam with some sand	Manganese, Wood, bamboo, Coconut	Minimal roots	Earthenware	Highest artifacts
3c	10YR 3/3 dark brown	Clay	Manganese,		earthenware	Very few sherds
4	5YR 4/4 reddish brown		Manganese, tiny pieces of burnt clay/brick		N/A	

¹ Describe soil color, sediment size, and density/compaction; describe soil structure or horizons if present; describe variation between levels if any exists

² Describe amount and size of *charcoal pieces*, presence and density of sandstone chips or laterite, amount of gravel, etc.

³ Describe kinds and amounts of animal disturbance, root disturbance, vandalism, etc.; also note any intrusive or overlying features; describe variation within levels if any exists

⁴ Discuss features and unusual patterns, excavation methods for those unusual deposits, variation between levels if any exists, etc.

GENERAL TRENCH INTERPRETATION (summarize comments here and add other information as desired)

This unit was placed at the edge of the mound and oriented north-south to probe both the formation of the Ba Doem mound as well as to increase the chance of finding the deep stratigraphic artifacts. The results suggest two major occupation phases: 1) Early Historic phase associated with Pinkware and cordmarked carinated ware of Layer 3 and 4. An AMS date from Layer 3 proves a date range between 251 CE and 398 CE. 2) pre-Angkorian phase associated with the brick structure of Layer 2. Layer 1 is disturbed by modern habitation.

Trench 9 Artifacts

Trench 9: Earthenware Count

Trench	Layer	Total	E8a	E8b	E8c	E8sand	E8g	E8h	E9	E10	E11	E12
4	1	112		8		101						
4	2	217		48	9	132	23					
4	3	74	1	31		18	17					
4	4	1				1						
	Total	404	1	87	9	252	40					

Weight

Trench	Layer	Total	E8a	E8b	E8c	E8sand	E8g	E8h	E9	E10	E11	E12
9	1	1446		80		733						
9	2	2999		331	95	954	120					
9	3	655.8	.8	100		106	107					
9	4	28				6						
	Total	5128.8	.8	511	95	1799	227					

Trench 9: Other terracotta

Trench	Layer	Count				Weight			
		97	98	99	Modern	97	98	99	Modern
9	1	2		1		76	549	8	
9	2	5				40	1459		
9	3	7				31	311		
9	4						22		
	Total	14		1		147	2341	8	

Trench 9: Miscellaneous Artifacts Count

Trench	Layer	Total	Sandstone Chip	Laterite	Stone tool?	Bead	Slag	Iron	Bone	Wood	Stone
9	1	5			4						1
9	2	4			4						
9	3	5			4						1
9	4										

	Total	14			12						2
--	-------	----	--	--	----	--	--	--	--	--	---

Weight

Trench	Layer	Total	Sandstone Chip	Laterite	Stone tool?	Bead	Slag	Iron	Bone	Wood	Stone
9	1	136			134						2
9	2	79			79						
9	3	144			129						15
9	4										
	Total	359			342						17

Trench 10

Note on Trench 10 excavation

The excavation of Trench 10 was conducted in a rush by using change in soil matrix, layer, as the stratigraphic unit. This because of the incidence occurred with the unfriendly landowner who was obsessed with his theory that each ceramic cluster seen in both soil trench of his property was gold treasure and that the crew came to loot his gold. He became extremely unfriendly after the excavation was already started, apparently, stoked by rumors across the village that the local authority was cooperating with the outsiders to loot treasure. Interventions from the head and deputy of the Khum only lowered his tone but not his suspicion. At first, he suggested that the site, especially the large trapeang located to the north of his property, was sacred and that any activities required offering (irony! since he did not offer anything when these soil trenches were excavated!). After the offering was made, nothing changed his perspective. The crew was committed to finish excavating this unit as soon as possible to avoid accelerating conflicts.

Trench 10 Summary

Archaeological site code: __THALA 2014__ **Grid** _____ **Trench Number** ____10____.

Excavator(s): _ Phivath, chantha, chea, ponlork_ **Date Started:** _ Mar23, 2014_ **Date completed:** _Mar27,2014_.

Associated trenches (list and explain relationship):

_____ N/A _____

Type of archaeological feature (mound, depression, linear trace, etc.): _bank of the river, near the temple_.

Location of Datum: ____NE corner ____.

Beginning depth (cmbd): NE_2cm__SE_3cm__SW_3cm__NW_3cm__ Average (MBD)_2.75cm__.

Ending depth (cmbd): NE_130cm__SE_130cm__SW_130cm__NW_131cm__ Average (MBD)_130.25cm_.

EXCAVATION SUMMARY

Total number of levels (spits) excavated in trench: 4 spits excavated (40cm of spit 1, 30cm of spit 2, 3 and 4).

Total number of cultural layers (list all levels within each layer): 4 layers: layer 1a, 1b, 2a, 2b, 2b', 3.

TRENCH RECORDS INVENTORY

Sections drawn (list): Section of North, East, South and West walls.

Photographs taken (list sequentially by photo number): _IMG_: 5842, 5843, 5848, 5849, 5868, 5870, 5884, 5887;; 5908, 5909, 5910 (Bottom of the trench), 5912, 5913 (west profile), 5814, 5915 (east profile), 5919, 5929, 5921, 5922, 5923, 5924 (north profile), 5926, 5929, 5930 (south profile), 5933, 5934 (soil sample location),

Artifact bags (list sequentially by bag number): Spit1 (#1 bag of ceramic), Spit2 (#3 ceramic and #2 charcoal), Spit3 (#2 ceramic and #1 charcoal), Spit4 (#1 ceramic and #1charcoal),

Soil sample bags (list sequentially by bag number): 6 bags.

Name of digital notebook file: N/A

EXCAVATION RECORDS SUMMARY

CULTURAL FEATURES PRESENT (*nb*: in notes for postholes, list length/width/diameter and depth; level with which posthole is associated, and shape)

Feature no.	Level (and Cultural Layer)	Type of feature	SU numbers associated with feature	Notes

RADIOCARBON SAMPLE LIST/ASSESSMENT (*nb*: quality of sample refers to the size and integrity of each charcoal piece; in ranking please use 1-n)

C-14 sample SU	Level (cultural layer)	Context (association)	Assessment (quality of sample, association w/particular strat. or artifactual layer, etc.)	Rank within trench
2	2a	28cm from the north wall, 73cm from the west wall with 52cm height.	Small sample	1
2	2a	12cm from the south wall, 22cm from the east wall with 57cm height.	Small sample	3
3	3	15cm from the south wall, 24cm from the east wall with 84cm height.	Small sample	4
3	3	2cm from the south wall, 58cm from the east wall with 94cmm height.	Small sample	2
4	3	1cm from the south wall, 50cm from the east wall with 115cm height.	Small sample	5

STRATIGRAPHIC LINKAGES WITHIN TRENCH (Use this table to associate each of your spits/features with specific stratigraphic layers).

US #	Description/Notes	Belongs to Layer
1	The topsoil is hard and disturbed by tree roots. The soil matrix contains brick fragments, very small charcoal particles, and many sherds began at 30-40 cmbd.	1a & 1b
2	The soil is hard disturbed by tree roots but less than the previous one. The soil is mixed with brick fragments, a few of charcoal pieces, gravels and stone. We found many sherds of earthenware and brick rubble from 40cmbd to 50cmbd mostly in the middle of the trench.	1b, 2a, & 2b
3	The soil is hard and sticky. The matrix contains manganese nodules and a few tree roots, a few ceramics, brick rubble, and gravels. We collect a charcoal sample near the S-E corner of the trench. The soil has a darker color at the NW corner.	2b, 2b', & 3
4	The soil is hard and sticky. The soil matrix contains manganese nodules, gravels, and few tree roots. There is no ceramics.	3

Description of artifact variability (Describe kinds and relative density and distribution of artifacts across unit and between levels if any)

We start to see the ceramics from SU1 until SU3 and no ceramic in SU4. The highest quantity of ceramics appeared in SU 2 and mostly come from middle of the trench.

STRATIGRAPHIC DESCRIPTION (Use this table to characterize each layer excavated in the trench).

Layer	Munsell color	Soil desc. ¹	Non-artifact inclusions ²	Disturbance ³	Artifacts present?	Additional notes/interpretation ⁴
1a	10YR 4/2 dark grayish brown	Hard Loam clay Less sand		Root	Some ceramics	
1b	10YR 4/2 dark grayish brown	Hard Loam clay less sand		Root	Many ceramics and brick rubble	
2a	10YR 4/3 brown	Hard Loam clay less sand	Manganese nodules, Charcoal	Root	Many ceramics and brick rubble	Increase ceramics
2b	10YR 4/2 dark grayish brown	Clay Less sand	Manganese nodules, charcoal	Root	Many ceramics and brick rubble	Decrease ceramics
2b'	10YR 4/3 brown	Clay Less sand	Manganese nodules, charcoal	Root		Decrease ceramics
3	7.5YR 4/4 brown	clay	Manganese nodules, charcoal		N/A	None

¹ Describe soil color, sediment size, and density/compaction; describe soil structure or horizons if present; describe variation between levels if any exists

² Describe amount and size of **charcoal pieces**, presence and density of sandstone chips or laterite, amount of gravel, etc.

³ Describe kinds and amounts of animal disturbance, root disturbance, vandalism, etc.; also note any intrusive or overlying features; describe variation within levels if any exists

⁴ Discuss features and unusual patterns, excavation methods for those unusual deposits, variation between levels if any exists, etc.

GENERAL TRENCH INTERPRETATION (summarize comments here and add other information as desired)

The results suggest that unlike the concentration of the complete cermaics observed in the nearby soil trenches, the context in this trench appears to be distubred in antiquity. Similar to the cermic cluster of the soil trenches, however, is the mixture between ceramics, brick rubble and a dark

charcoal layer concentrated in a pit matrix of layer 2b. This factor suggests that the pit feature, which contains a clusture of complete ceramcis, brick rubble, and dark charcoal layers (some of which contain small brone fragments), is very common within this area. An AMS sample from an interface between layer 2b and Layer 3 provides a date range of 652 CE adn 729 CE.

Trench 10 Artifacts

Trench 10: Earthenware Count

Trench	Layer	Total	E8a	E8b	E8c	E8sand	E8g	E8h	E9	E10	E11	E12
10	1&2	689	22			248	309		2			2
10	3	176				12	158					
	Total	865	22			260	467		2			2

Weight

Trench	Layer	Total	E8a	E8b	E8c	E8sand	E8g	E8h	E9	E10	E11	E12
10	1&2	11544	156			1825	1794		3			18
10	3	1765				85	1062					
	Total	13309	156			1910	2856		3			18

Trench 10: Other terracotta

Trench	Layer	Count				Weight			
		97	98	99	Modern	97	98	99	Modern
10	1&2	106	X			1659	6089		
10	3	6	X			54	564		
	Total	112	X			1713	6653		

Trench 10: Miscellaneous Artifacts

Count

Trench	Layer	Total	Sandstone Chip	Laterite	Stone tool?	Bead	Slag	Iron	Bone	Wood	Stone
10	1&2	11			7						4
10	3	3			2						1
	Total	14			9						5

Weight

Trench	Layer	Total	Sandstone Chip	Laterite	Stone tool?	Bead	Slag	Iron	Bone	Wood	Stone
10	1&2	112			76						36
10	3	22			16						6
	Total	134			92						42

Appendix G: AMS Analysis

Charcoal Samples from Thala Borivat (Cambodia)

Submitted to the University of Arizona AMS Laboratory 2014

Conventional Recording System

The recording system for each sample uses in this project is: **Project Name.Trench Number.Spit or Stratigraphic Unit (SU) number**. For instance: Thala14.5.1 means Thala Borivat 2014, Trench 5, SU 1

Unit 1:

1. **Thala14.1.21** a charcoal sample is taken from a compact layer below a brick foundation (CE 500-700)

Unit 2

2. **Thala14.2.12**: a charcoal was found mixing with brick fragments, sherds, and other organic materials within a waterlogged layer. (CE 500-700)
3. **Thala14.2.10**: This charcoal may associate with the brick foundation of this unit (CE 500-700)

Unit 4

4. **Thala14.4.13** Multiple charcoal pieces were found with ceramic and brick fragments. These are large size wood charcoals. One of which can still be identified as a tree branch. Here I took one small fragment of the smaller size sample. (CE 500-1200)

Unit 6

5. **Thala14.6.10** This charcoal sample is associated with a juvenile burial. (BCE 500-CE 300)
6. **Thala4.6.6** is associated with layer 3 which is likely the pre-Angkorian layer (CE300-600)

Unit 7 (All charcoals are found from Layer 2, a burial trench)

7. **Thala14.7.6** Charcoal associated with part of a burial located at the Southwest corner of the unit. (500 BCE-300 CE)

Unit 8

8. **Thala14.8.1** A small piece of charcoal is found with a burial (CE 100-500)

Unit 9

9. **Thala14.9.6** a charcoal was found mixing with brick fragments and few ceramic sherds

(CE 500-700)

Unit 10

10. **Thala14.10.4** a charcoal was found mixing with ceramics. (CE 500-700)



University of Arizona AMS Laboratory
Department of Physics
1118 East Fourth St
Tucson, AZ 85721-0081

Tel. (520) 621-6816
Fax. (520) 621-9619

Piphal Heng
Ph.D. Candidate, ABD
Department of Anthropology
University of Hawaii at Manoa
piphal@hawaii.edu
808-741-9052

03 feb 2015

Dear Mr Heng:

Attached is the tabular calibrated data for your sample suite, from OxCal version 4.2.4, based upon the IntCal13 calibration data set. As well the individual calibration plots follow.

Name	Unmodelled (BCE/CE)					
	from	to	%	from	to	%
R_Date AA104781	429	539	68.2	419	560	95.4
R_Date AA104782	665	769	68.2	649	875	95.4
R_Date AA104783	539	608	68.2	431	641	95.4
R_Date AA104784	-3511	-3354	68.2	-3628	-3125	95.4
R_Date AA104785	391	531	68.2	355	538	95.4
R_Date AA104786	230	334	68.2	138	380	95.4
R_Date AA104787	-111	3	68.2	-171	46	95.4
R_Date AA104788	130	220	68.2	79	247	95.4
R_Date AA104789	260	387	68.2	251	398	95.4
R_Date AA104790	660	764	68.2	652	769	95.4

I hope these are what you require.

Very best wishes,

A handwritten signature in blue ink, appearing to read "Greg Hodgins".

Greg Hodgins
Director



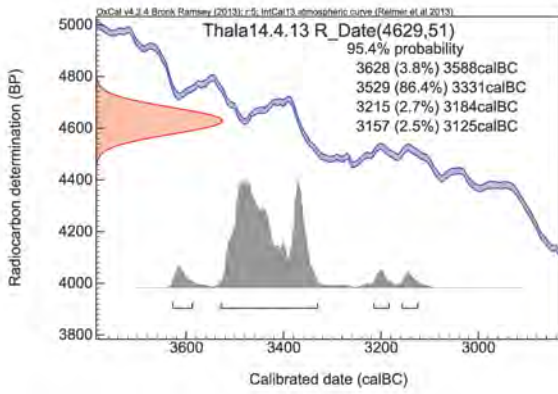
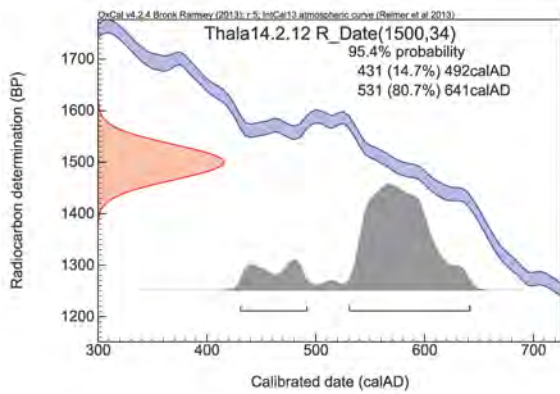
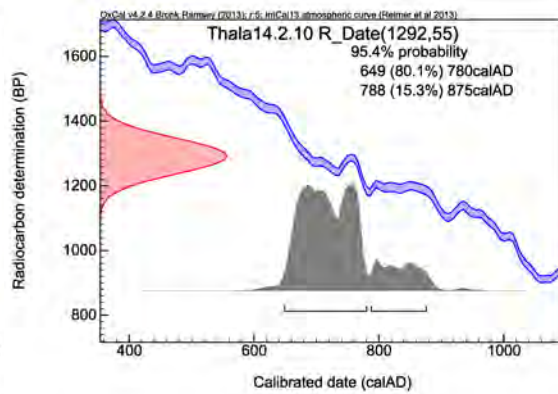
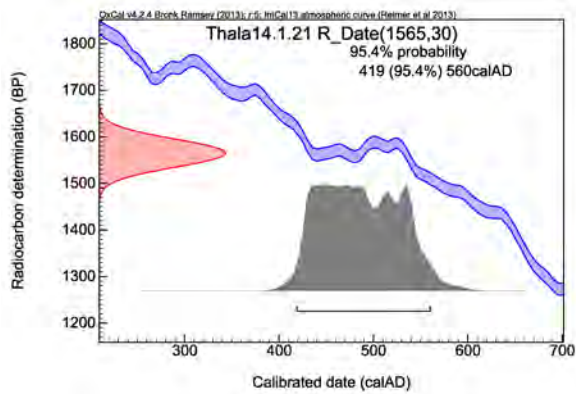
DATA REPORT

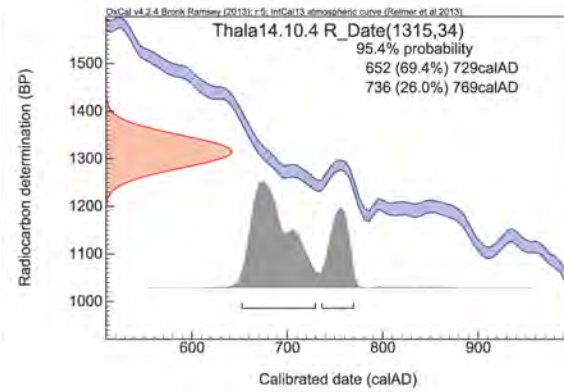
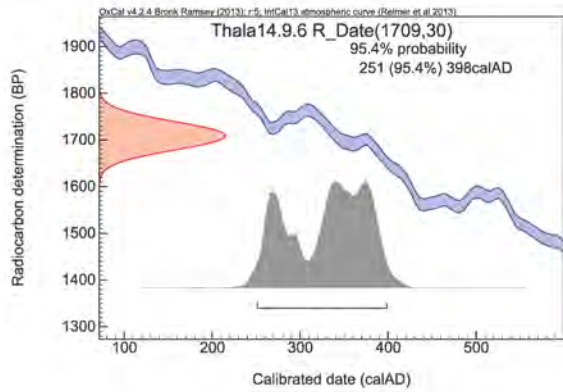
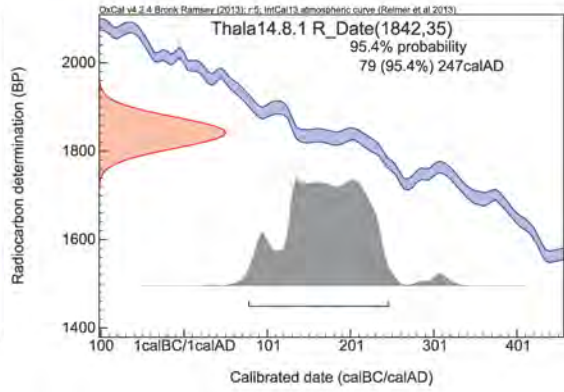
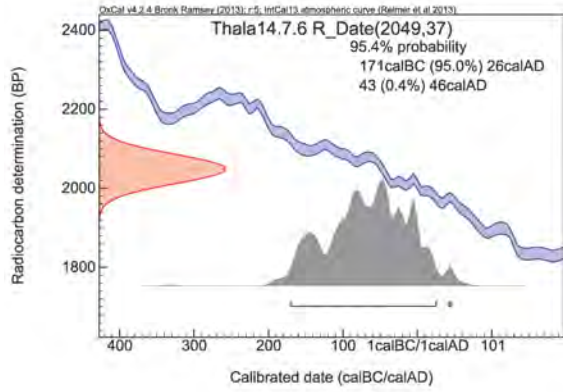
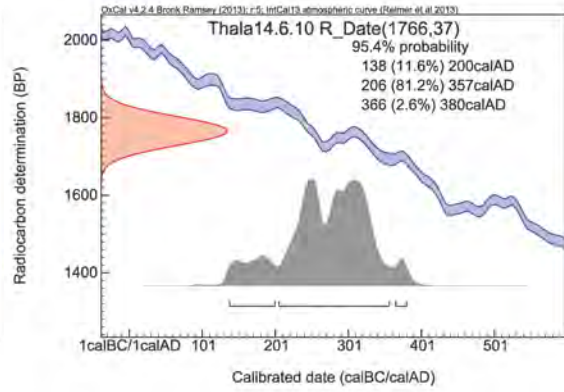
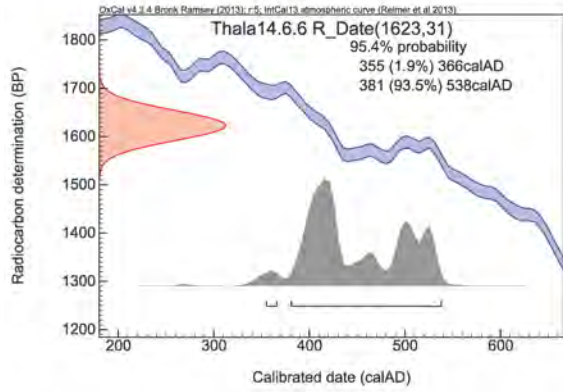
1118 E. 4th St.
PO Box 210081
Tucson, AZ 85721-

"radiocarbon age BP"

(520) 621-6810 (phone)
(520) 621-9619 (fax)
AMS@physics.arizona.edu

AA	lab #	sample ID:	Contact 1	MASS	d13C value	F (d13C)	dF (d13C)	14C age BP	d14C age
AA104781	B10185	Thala 14.1.21	Heng, P.	1.16mg	-27.3	0.8230	0.0031	1,565	30
AA104782	B10186	Thala14.2.10	Heng, P.	0.14mg	-27.5	0.8514	0.0058	1,292	55
AA104783	B10187	Thala14.2.12	Heng, P.	1.03mg	-28.1	0.8297	0.0036	1,500	34
AA104784	B10188	Thala14.4.13	Heng, P.	1.39mg	-28.7	0.5620	0.0036	4,629	51
AA104785	B10189	Thala14.6.6	Heng, P.	1.32mg	-26.4	0.8170	0.0031	1,623	31
AA104786	B10190	Thala14.6.10	Heng, P.	1.24mg	-27.6	0.8026	0.0037	1,766	37
AA104787	B10191	Thala14.7.6	Heng, P.	1.18mg	-28.9	0.7749	0.0036	2,049	37
AA104788	B10192	Thala14.8.1	Heng, P.	1.07mg	-26.7	0.7951	0.0035	1,842	35
AA104789	B10193	Thala14.9.6	Heng, P.	1.62mg	-25.7	0.8084	0.0030	1,709	30
AA104790	B10194	Thala14.10.4	Heng, P.	1.11mg	-22.9	0.8490	0.0036	1,315	34





Appendix H: INAA Analysis

From June-December 2014, Summer 2015 and 2016, KPX crewmembers selected and processed stoneware samples from both the surface collections (Phase 1, 2, &3 from Thala Borivat, Sambor, and Sambok), and excavated units. These samples include a total of 184 sherds (2300g) of stoneware (92 stoneware sherds [1332g] from Thala Borivat and 92 stoneware sherds [974g] from Sambor), and 30 earthenware sherds (280g) from Thala Borivat.



Thala Borivat earthenware samples. 1) Exterior view, 2) Interior View



Sambor's stoneware samples. 1) and 3) Exterior view, 2) and 4) Interior view



Thala Borivat's stoneware samples. 1) Exterior view of Phase I samples, 2) Interior view of Phase I samples, 3) Exterior view of Phase II samples, 4) Interior view of Phase II samples, 5) Exterior view of Phase III samples, and 6) Interior view of Phase III samples

Site Location: several locations (see context)

Recorder: Hannah and Raksmeij

Site Collaborator: Piphai

Surface collections

KPX#	Site	Site Register	Context (grid/lot/focus; tra)	Type	Group	Ware (green)	Texture	Form	Rim form	Size (S/M)	Decoration	Notes
88	Thala 2011	Tag # 001	Toul Die Ith	S	KGG	white	fine	body (close to the base)			one thick incised line/four thin incised lines	
89	Thala 2011	Tag # 005	007	S	KGG-Burirai	white	coarse	lid-knob			green glazed/four raised spiral lines	
90	Thala 2011	Tag # 006	Toul Dei Ith	S	S-IND	brown redd	coarse	body				
91	Thala 2011	Tag # 006	Toul Dei Ith	S	S-IND	greyish	coarse	roof tile				
92	Thala 2011	Tag # 007	Samkhouy	S	S-IND	reddish grey	coarse	body				
93	Thala 2011	Tag # 007	Badoem	S	S-CE	white greyis	fine	body			one raised line/Cheur (Cheung Ek ware)	
94	Thala 2011	Tag # 007	Badoem	S	KGG/bottle	white	coarse	rim	rolled rim		green glazed (light green)	
95	Thala 2011	Tag # 008	Badoem	S	KGG	white	coarse	body			green glazed (light green)	
96	Thala 2011	Tag # 008	Badoem	S	S-LDV?	brownish gr	fine	body				
97	Thala 2011	Tag # 008	Badoem	S	KBG	greyish	fine	rim	lip		brown glazed exterior	
98	Thala 2011	Tag # 008	Badoem	S	S-IND	pinkish	coarse	body			thin incised lines	
99	Thala 2011	Tag # 008	Badoem	S	S-IND	greyish	fine with	body			similar external texture to KPX91	
100	Thala 2011	Tag # 008	Badoem	S	S-IND	greyish	coarse	body			similar external texture to KPX91	
101	Thala 2011	Tag # 010	Samkhouy river site, behind	S	S-IND	light grey	coarse	rim	triangular shaped r		three thick raised line	Angkor?
102	Thala 2011	Tag # 013	Samkhouy	S	KBG-Burirai	grey	fine	body			brown glazed	
103	Thala 2011	Tag # 013	Samkhouy	S	KBG-Angkor	greyish black	coarse	flat base				
104	Thala 2011	Tag # 015	Samkhouy	S	S-IND	orange	fine	rim, body	straight r	small		Can be a PA hi-fired earthenware
105	Thala 2011	Tag # 019		S	KBG	black grey	coarse	rim	slightly curved inwards			water jar
106	Thala 2011	Tag # 020		S	S-IND	black white	coarse	body				white clay layer was probably app
107	Thala 2011	Tag # 024	Toul Nak Ta	S	S-IND	greyish	coarse	body				
108	Thala 2011	Tag # 029		S	KBG	light brown	coarse	body (shoulder)			brown glazed exterior/four incised lines	
109	Thala 2011	Tag # 029		S	KBG?	greyish brow	coarse	base		large		cutting marks on the exterior
110	Thala 2011	Tag # 029		S	KBG?	grey	coarse	base				
111	Thala 2011	Tag # 031		S	S-IND	cream	coarse	rim	lip, straight and thick			
112	Thala 2011	Tag # 031		S	S-IND	reddish	coarse	roof tile				
113	Thala 2011	Tag # 033		S	KGG-Burirai	cream	coarse w	body			green glazed exterior/three raised lines/one wavy line in	
114	Thala 2011	Tag # 033		S	KBG	greyish brow	coarse w	body			brown glazed exterior	
115	Thala 2011	Tag # 036		S	S-IND	greyish brow	coarse w	body			brown glazed	Modern?
116	Thala 2011	Tag # 039		S	S-IND	greyish black	coarse w	rim, body	lip, slightly curved		brown glazed	
117	Thala 2011	Tag # 039		S	KBG?	greyish black	coarse w	body				
118	Thala 2011	Tag # 048	Prasat O Trel S	S	S-IND	greyish crea	coarse	roof tile				
119	Thala 2011	Tag # 048	Prasat O Trel S	S	S-IND	reddish crea	coarse	roof tile				

Site Name: Thala 2011 Location of collection/Project Host Institution: USyd Christie Center

Site Location: several locations (see context) Recorder: Hannah and Raksmeay

Site Collaborator: Piphal Surface collections

KPX#	Site	Site Register Tag #	Context (grid/lot/locus; tra)	Type	Group	Ware (green)	Texture	Form	Rim form	Size (S/M)	Decoration	Notes
120	Thala 2011	Tag # 048	Prasat O Trel 5	S	S-IND	greyish crea	coarse	roof tile				
121	Thala 2011	Tag # 048	Prasat O Trel 5	S	S-IND	greyish brow	coarse	roof tile				
122	Thala 2011	Tag # 049		S	KBG	grey	coarse	body			brown glazed exterior/eight raised lines	
123	Thala 2011	Tag # 049		S	KBG	light grey	coarse w/	body			brown glazed exterior	
124	Thala 2011	Tag # 049		S	KBG	grey	coarse w/	body			brown glazed exterior/two thin incised lines	
125	Thala 2011	Tag # 049		S	KBG-Burirai	grey	coarse w/	body			brown glazed exterior	

Site Name: Thala 2012
 Site Location: several locations (see context)
 Site Collaborator: Piphai

Recorder: Hannah and Raksmeay
 Surface collections

KPX#	Site	Site Register#	Context (grid/focus; transect)	Type	Group	Ware (glaz texture)	Form	Rim form	Size (S/M/L)	Decoration	Notes
126	Thala 2012	004	Collection 003	S	IND	reddish brd	flat raised base			four raised lines above the base	
127	Thala 2012	004	Collection 003	S	IND	grey brown	body			thin incised and raised lines above the base	
128	Thala 2012	004	Collection 003	S	IND	grey	body, raised convex base				
129	Thala 2012	004	Collection 003	S	KBG	greyish brd	body				
130	Thala 2012	004	Collection 003	S	KBG	grey	body				
131	Thala 2012	004	Collection 003	S	KBG	brown	body			brown glazed exterior	
132	Thala 2012	005	Collection 004	S	KBG-Burra	cream	body			brown glazed exterior	
133	Thala 2012	005	Collection 004	S	KBG-Angk	white	base, body			green glazed/incised lines above the base filled with green glaze	
134	Thala 2012	010	Collection 005	S	IND	reddish brd	body (close to the base)				
135	Thala 2012	010	Collection 005	S	KBG	light brown	body			brown glazed exterior	
136	Thala 2012	022.03	Collection 006	S	KBG?	white grey	body				
137	Thala 2012	022.03	Collection 006	S	IND	pinkish	body				
138	Thala 2012	022.03	Collection 006	S	KBG?	grey	body				was probably brown glazed
139	Thala 2012	022.03	Collection 006	S	KBG-Burra	grey	body			brown glazed exterior/two incised lines	
140	Thala 2012	022.03	Collection 006	S	KBG-Burra	greyish wh	body			brown glazed exterior	
141	Thala 2012	022.03	Collection 006: Sala 8 Lveng	S	IND	brown	body				
142	Thala 2012	022.03	Collection 006: Sala 8 Lveng	S	IND	grey	raised flat base			incised lines above the base	many iron spots
143	Thala 2012	022.03	Collection 006: Sala 8 Lveng	S	KBG	light grey	body			brown glazed exterior	
144	Thala 2012	022.03	Collection 006: Sala 8 Lveng	S	KGG-Angk	white grey	ring base			green glazed/rainated above the base	some iron spots
145	Thala 2012	022.03	Collection 006: Sala 8 Lveng	S	KGG-Angk	white grey	flat reinforced base			green glazed	
146	Thala 2012	022.03	Collection 006: Sala 8 Lveng	S	KGG-Angk	white grey	rim	simple		green glazed	
147	Thala 2012	022.03	Collection 006: Sala 8 Lveng	S	KGG-Angk	white grey	body (close to the base)			green glazed	clay piece sticking to the ext. wall from stacking bowl for firing
148	Thala 2012	023.02	Collection 007	S	IND	grey	flat base				
149	Thala 2012	030.01	Collection 009	S	KBG	creamish b	flat raised base			brown glazed exterior/thin incised lines all over the body (above the base)	
150	Thala 2012	030.02	Collection 010	S	KBG-Burra	light grey	body			brown glazed	
151	Thala 2012	030.02	Collection 010	S	KBG?	brownish g	body				was probably brown glazed
152	Thala 2012	030.02	Collection 010	S	KBG-Burra	grey	body (shoulder)			brown glazed exterior/four incised/raised lines	

KPX#	Site	Site Register#	Context (grid/lot/locus; transect)	Type	Group	Ware (glaze)	Texture (c)	Form	Rim form	Size (S/M/L)	Decoration	Notes
153	Thala 2012	030.02	Collection 010	S	KBG	brownish	coarse with body	body			brown glazed exterior/two straight lines; wavy combed lines	was probably brown glazed
154	Thala 2012	030.02	Collection 010	S	KBG?	grey	coarse with body	body				was probably brown glazed
155	Thala 2012	030.02	Collection 010	S	KBG?	creamish b	coarse with body	body				was probably brown glazed
156	Thala 2012	031.02	Collection 011	S	IND	cream	fine	flat base				KBG?
157	Thala 2012	031.02	Collection 011	S	IND	reddish	fine	flat base				
158	Thala 2012	031.02	Collection 011	S	IND	grey	coarse	body				
159	Thala 2012	031.02	Collection 011	S	KBG?	grey	coarse with flat raised base	flat raised base			one raised line above the base	was probably brown glazed/some iron spots
160	Thala 2012	031.02	Collection 011	S	Angkor?	reddish grey	coarse with flat raised base	flat raised base				
161	Thala 2012	031.02	Collection 011	S	KBG-Angkor	reddish grey	coarse with body	body			brown glazed exterior/one thin incised line	
162	Thala 2012	031.02	Collection 011	S	KBG-Angkor	reddish grey	coarse with body	body				was probably brown glazed
163	Thala 2012	031.02	Collection 011	S	KBG	grey	coarse with body	body			brown glazed exterior/five thick incised lines	
164	Thala 2012	031.02	Collection 011	S	KBG-Angkor	grey	coarse with body	body			brown glazed exterior	
165	Thala 2012	031.02	Collection 011	S	KBG-Angkor	reddish grey	coarse with body	body			brown glazed exterior	
166	Thala 2012	032.01	Collection 012	S	KBG	creamish b	fine	flat base			brown glazed interior	
167	Thala 2012	032.01	Collection 012	S	KBG-Burial	light grey	fine	body				was probably brown glazed
168	Thala 2012	011	Collection 013	S	IND	dark red	coarse with body	body			shiny surface exterior	might be modern
169	Thala 2012	011	Collection 013	S	IND	reddish	coarse	body				High-fired
170	Thala 2012	011	Collection 013	S	IND	cream	coarse with flat base	flat base				
171	Thala 2012	011	Collection 013	S	KBG	reddish tan	coarse with body	body			brown glazed exterior	
172	Thala 2012		Prasat Bachung	S	IND	dark grey	coarse with body	body, flat base				
173	Thala 2012		Prasat Bachung	S	IND	orange	coarse with roof tile, flat	roof tile, flat				
174	Thala 2012		Prasat Bachung	S	IND	reddish grey	coarse with roof tile, flat	roof tile, flat				
175	Thala 2012		Prasat Bachung	S	IND	reddish	coarse with roof tile, flat	roof tile, flat				
176	Thala 2012		Prasat Bachung	S	IND	greyish bla	coarse with roof tile, flat	roof tile, flat				
177	Thala 2012		Prasat Bachung	S	IND	brownish	coarse with roof tile, flat	roof tile, flat				
178	Thala 2012		Prasat Bachung	S	IND	reddish grey	coarse with roof tile, round	roof tile, round				High-fired piece is too small determine whether it was round or flat
179	Thala 2012		Prasat Bachung	S	IND	orange	coarse with roof tile	roof tile				

Site Name: Thala 2014
 Site Location: several locations (see context)
 Site Collaborator: Heng Piphah

Recorder: Hannah and Raksmeey excavation

KPX#	Site	Site Registered	Context (grid/lot/locus, tra)	Type	Group	Ware (gr)	Texture	Form	Rim form	Size (S/M)	Decoration	Notes
205	Thala 2014		Trench 1, SU 1	S	KBG-Ang	grey	coarse w	body			brown glazed exterior	collector: Heng Piphah = HP, all Thala 2014 samples are excavated sherds
206	Thala 2014		Trench 1, SU 1	S	KGG-Ang	light brown	coarse	body			green glazed	
207	Thala 2014		Trench 1, SU 2	S	KBG?	light grey	coarse	flat base				
208	Thala 2014		Trench 1, SU 2	S	IND	dark red	coarse	body				
209	Thala 2014		Trench 1, SU 2	S	KBG-Buri	dark grey	coarse	body			brown glazed exterior	Angkor brown glaze
210	Thala 2014		Trench 1, SU 2	S	KBG	grey	coarse	body			brown glazed exterior	Buriram brown glaze
211	Thala 2014		Trench 1, SU 3	S	IND	reddish	coarse	body				
212	Thala 2014		Trench 1, SU 3	S	KBG-Ang	grey	coarse	body			brown glazed exterior	
213	Thala 2014		Trench 1, SU 5	S	IND	orange g	coarse	body (neck)				
214	Thala 2014		Trench 1, SU 5	S	IND	reddish g	coarse	body				
215	Thala 2014		Trench 1, SU 5	S	KBG	grey	coarse	rim	flattened rim		brown glazed	
216	Thala 2014		Trench 1, SU 5	S	KBG-Buri	grey	coarse	body			brown glazed exterior/thin incised line	
217	Thala 2014		Trench 1, SU 5	S	KBG	grey	coarse	body (close to the base)			brown glazed exterior/thin incised line	
218	Thala 2014		Trench 1, SU 5	S	KBG	pinkish g	coarse	body			brown glazed exterior/thin incised line	
219	Thala 2014		Trench 1, SU 6	S	KBG	grey	coarse	body			brown glazed exterior	
220	Thala 2014		Trench 1, SU 6:2	S	KBG	reddish g	coarse	body			brown glazed exterior/incised lines and waves	
221	Thala 2014		Trench 1, SU 6:2	S	KBG	reddish g	coarse	body			brown glazed exterior	
222	Thala 2014		Trench 1, SU 6:2	S	KBG-Ang	reddish g	coarse	body			brown glazed exterior	
223	Thala 2014		Trench 1, SU 6:2	S	KBG	pinkish g	coarse	body			brown glazed exterior	
224	Thala 2014		Trench 1, SU 7:1	S	KBG-Ang	brownish	coarse w	body			brown glazed exterior/incised lines and waves	
225	Thala 2014		Trench 1, SU 10	S	KBG-Buri	grey	coarse w	body			brown glazed exterior	

Site Name: Sambor

Location of collection/Project Host Institution: USyd Christie Center

Site Location: several locations (see context)

Recorder: Hannah and Raksmev

Site Collaborator: Piphai

Surface collections

KP#	Site	Site Register#	Context (grid/locus; transect)	Type	Group	Ware /glaz	Texture (c)	Form	Rim form	Size (S/M/L)	Decoration	Notes
32	Sambor		Collection 1	S	IND		coarse	body			Lie-de-vin	Piphai doesn't think that this is lie-de-vin. It is just a common high-fired ware.
33	Sambor		Collection 3: East Pound of Toul T	S	IND		coarse/ctes	body			smoothed/self-slipped	It looks like KBG although it is a little strange
34	Sambor		Collection 5: Toul Ta Neang	S	KBG?		fine	body		small		"Chinese"; it looks like KBG although the glaze is a little strange. It looks more Chinese to me.
35	Sambor		Collection 5: Toul Ta Neang	S	KBG?		coarse	body			unglazed	Small brown-glaze spots can be seen on the surface
36	Sambor		Collection 6: Toul Trapeng Khtorr	S	IND		fine	body			smoothed	
37	Sambor		Collection 6: Toul Trapeng Khtorr	S	IND		coarse	body			smoothed/self-slipped	
38	Sambor		Collection 6: Toul Trapeng Khtorr	S	IND		fine	body			smoothed	
39	Sambor		Collection 7: Toul Khna	S	KGG-Angkor		fine	cover		small	green glazed (light green)	
40	Sambor		Collection 7: Toul Khna	S	KGG-Angkor		fine	cover with	straight	small	green glazed interior/cari	was probably glazed exterior as well
41	Sambor		Collection 8: Toul Krous	S	KGG-Angkor		fine	body			green glazed	Kulen ware
42	Sambor		Collection 8: Toul Krous	S	KGG-Angkor		fine	cover			green glazed exterior/cari	Kulen ware
43	Sambor		Collection 8: Toul Krous	S	KGG-Angkor		fine	raised flat base		small	green glazed	potter's mark on the base
44	Sambor		Collection 8: Toul Krous	S	KGG-Angkor		fine	rim		small	raised line below the rim	
45	Sambor		Collection 9: North of Prasat Kom	S	IND		fine	body			self-slipped	
46	Sambor		Collection 9: North of Prasat Kom	S	IND		coarse	body			self-slipped/smoothed	
47	Sambor		Collection 9: North of Prasat Kom	S	IND		fine	body			self-slipped/carmated	
48	Sambor		Collection 9: North of Prasat Kom	S	IND	pinkish/gre	coarse	body			smoothed	Can be Bangkong or Cheung Ek
49	Sambor		Collection 9: North of Prasat Kom	S	CE		fine	body				Cheung Ek ware, black colour exterior from the firing
50	Sambor		Collection 9: North of Prasat Kom	S	CE		coarse	body			raised line/Cheung Ek styl	Cheung Ek ware
51	Sambor		Collection 9: North of Prasat Kom	S	KBG-Bunram		coarse	body			brown glazed exterior	
52	Sambor		Collection 9: North of Prasat Kom	S	KBG		coarse	body			brown glazed exterior/smoothed	
53	Sambor		Collection 9: North of Prasat Kom	S	KBG-CE		coarse	body			brown glazed exterior tw	Cheung Ek ware
54	Sambor		Collection 9: North of Prasat Kom	S	KGG-Angkor		fine	body			green glazed (light green)	Angkor Khmer green glaze
55	Sambor		Collection 10: 30m from Col. 9/ar	S	IND	reddish	fine	body			self-slipped	
56	Sambor		Collection 10: 30m from Col. 9/ar	S	IND	reddish	fine with gl	body				
57	Sambor		Collection 10: 30m from Col. 9/ar	S	IND	white/grey	fine with gl	body				
58	Sambor		Collection 10: 30m from Col. 9/ar	S	IND	reddish	fine with gl	body				HI-fired
59	Sambor		Collection 10: 30m from Col. 9/ar	S	CE		fine	body			one incised line	Cheung Ek ware
60	Sambor		Collection 10: 30m from Col. 9/ar	S	CE		fine	body			one incised line exterior	Cheung Ek ware
61	Sambor		Collection 10: 30m from Col. 9/ar	S	CE		fine	body (close to the rim)			two raised lines with Cheung Ek style incision in between	
62	Sambor		Collection 10: 30m from Col. 9/ar	S	IND	pinkish	coarse	body (close to the base)				was probably brown glazed exterior
63	Sambor		Collection 10: 30m from Col. 9/ar	S	KGG-Angkor		fine	body			green glazed (light green)	Angkor Khmer green glaze
64	Sambor		Collection 11: Mound North of Kd	S	IND		fine	body			green glazed (light green)	It looks like a KBG-CE to Piphai
65	Sambor		Collection 11: Mound North of Kd	S	IND		fine	body			five thin incised lines	
66	Sambor		Collection 11: Mound North of Kd	S	IND		fine with gl	body			self-slipped/smoothed	
67	Sambor		Collection 11: Mound North of Kd	S	CE		fine	body				Cheung Ek ware
68	Sambor		Collection 11: Mound North of Kd	S	CE		fine	body (collar)			raised double line (collar)	Cheung Ek ware
69	Sambor		Collection 11: Mound North of Kd	S	KBG		fine	body (shoulder)			brown glazed exterior	

Site Name: Sambor

Location of collection/Project Host Institution: U.Syd Christie Center

Site Location: several locations (see context)

Recorder: Hannah and Raksmeay

Site Collaborator: Piphai

KPX#	Site	Site Register#	Context (grid/lot/locus; transect)	Type	Group	Ware (glaz/texture)	Form	Rim form	Size (SIML)	Decoration	Notes
70	Sambor		Collection 13: dug mound bear M	S	KBG	coarse	raised flat base			brown glazed	
71	Sambor		Collection 14: in front of Prasat A	S	KBG	coarse with base	base				thick brown glaze exterior (firing mistake)
72	Sambor		Collection 14: in front of Prasat A	S	KBG	coarse with base	body (close to the base)			brown glazed exterior/two incised lines close to the base	Angkor Khmer green glaze/potter's mark on the base
73	Sambor		Collection 15: Mound Ta Ouk	S	KGG-Angkor	fine	raised convex base		small	green glazed	
74	Sambor		Collection 16: Mound Trapeang T	S	IND	coarse	body				CE???
75	Sambor		Collection 16: Mound Trapeang T	S	IND	fine with gl	body				
76	Sambor		Collection 16: Mound Trapeang T	S	IND	fine with gl	body				
77	Sambor		Collection 16: Mound Trapeang T	S	IND	fine with gl	base/body			self slipped	CE??
78	Sambor		Collection 16: Mound Trapeang T	S	IND	fine	body				
79	Sambor		Collection 16: Mound Trapeang T	S	KGG-Angkor	fine	rim/body (lip)		small	green glazed	Angkor Khmer green glaze
80	Sambor		Collection 16: Mound Trapeang T	S	KGG-Angkor	fine	body (carinated)			green glazed	Angkor Khmer green glaze
81	Sambor		Collection 17: Toul Trapeang Amp	S	KBG	coarse	body/base			self slipped	
82	Sambor		Collection 17: Toul Trapeang Amp	S	IND	fine	body			two incised lines	many iron spots. CE or Bangkok
83	Sambor		Collection 17: Toul Trapeang Amp	S	IND	coarse	body			self slipped	
84	Sambor		Collection 17: Toul Trapeang Amp	S	IND	coarse	body (neck/shoulder)			one raised line (neck)	
85	Sambor		Collection 17: Toul Trapeang Amp	S	IND	coarse	body				
86	Sambor		Collection 17: Toul Trapeang Amp	S	IND	coarse	body				
87	Sambor		Collection 17: Toul Trapeang Amp	S	KGG-Angkor	white	flat raised base			green glazed exterior	Angkor Khmer green glaze/potter's mark on the base
1141	Sambor 2014		Collection 19	S	IND	black	body			glazed exterior	
1142	Sambor 2014		Collection 20	S	CE	black/cream	body			brown glazed exterior/CE	CE = Cheung Ek
1143	Sambor 2014		Collection 20	S	IND	purple/red	body (near shoulder)			one incised line	CE???
1144	Sambor 2014		Collection 21	S	KGG-Angkor	whitish	cover rim	simple		green glazed exterior/one raised line	
1145	Sambor 2014		Collection 21	S	IND	light brown	body				
1146	Sambor 2014		Collection 21	S	IND	light grey	body				
1147	Sambor 2014		Collection 22	S	IND	reddish	body				
1148	Sambor 2014		Collection 22	S	KBG-Burial	whitish	body			green/brown glazed exterior	from Buriram (?)
1149	Sambor 2014		Collection 23	S	IND	red	body			slipped exterior	
1150	Sambor 2014		Collection 23	S	IND	whitish/light	body				Hi-fired
1151	Sambor 2014		Collection 26	S	KGG-Angkor	light grey	raised base		S	green glazed exterior	
1152	Sambor 2014		Collection 26	S	IND	dark grey	body				
1153	Sambor 2014		Collection 26	S	IND	grey	neck			two raised lines/one line	Hi-fired
1154	Sambor 2014		Collection 26	S	IND	grey	body				
1155	Sambor 2014		Collection 28	S	KBG-Burial	grey	body			brown glazed exterior/fou	glaze poorly preserved

Site Name: Thala 2014
Site Location: several locations (see context)
Site Collaborator: Heng Phiphal

Location of collection/Project Host Institution: USyd Christie Center
Recorder: Hannah and Raksmeey excavation

KPX#	Site	Site Register#	Context (grid/lot/locus)	Type	Group	Ware (glaze texture (cc)	Form	Rim form	Size (S/M/L)	Decoration	Notes
1300	Thala 2011		Collection 042	E	Buffware	buff	body				Buffware
1301	Thala 2014		Trench 1 SU 12:1	E	Buffware	buff fine no temper	body				Buffware
1302	Thala 2014		Trench 1, SU 13:1	E	Sand tempered Kendi	red-orange fine sand	body				Sand tempered Kendi
1303	Thala 2014		Trench 2 SU 10:1	E	Buffware kendi?	buff fine no temper	body				Buffware kendi?
1304	Thala 2014		Trench 6 SU 5: 1	E	Pedestaled Bowl	reddish brown fine sand	join				Pedestaled Bowl
1305	Thala 2014		Trench 6 SU 7:2	E	Reduced ware	black-gray fine	body			cordmarked	Reduced ware
1306	Thala 2014		Trench 6 SU 7:2	E	Bowl	reddish brown fine sand	rim				Bowl
1307	Thala 2014		Trench 6 SU 8:1	E	Buffware	buff fine	body				Buffware
1308	Thala 2014		Trench 6 SU 8:2	E	Industrial ware	black-pink fine	rim				Industrial ware
1309	Thala 2014		Trench 6 SU 9:4	E	Thala carinated ware	reddish grey fine sand with grog	rim				Thala carinated ware
1310	Thala 2014		Trench 6 SU 9:4	E	Thala carinated ware	reddish orange fine sand	shoulder			wave and cordmarked	Thala carinated ware
1311	Thala 2014		Trench 6 SU 9:4	E	Sand tempered Kendi	reddish orange fine sand	spout				Sand tempered Kendi
1312	Thala 2014		Trench 7 SU 3:3	E	Reduced ware	black fine	body			burnished exterior	Reduced ware
1313	Thala 2014		Trench 7 SU 3:3	E	Fine Orange Ware	gray-orange fine	body				Fine Orange Ware
1314	Thala 2014		Trench 7 SU 6:1	E	Burnished ware	gray coarse	body				Burnished ware
1315	Thala 2014		Trench 7 SU 8:1	E	Industrial ware	pinkish grey fine	rim				Industrial ware
1316	Thala 2014		Trench 7, SU 8:2	E	Burnished ware	brownish greyish coarse	body			burnished interior-exterior	Burnished ware
1317	Thala 2014		Trench 8 Pot 1	E	Thala carinated ware	reddish greyish fine	body				Thala carinated ware
1318	Thala 2014		Trench 8 Pot 2	E	Bowl	brownish grey-black fine	body				Bowl

Site Name: Thala 2014

Location of collection/Project Host Institution: U Syd Christie Center

Site Location: several locations (see context)

Recorder: Hannah and Raksmeijer

Site Collaborator: Heng Phiphal

excavation

KPX#	Site	Site Register#	Context (grid/lot/locus)	Type	Group	Ware (grae)	Texture (cc)	Form	Rim form	Size (S/M/L)	Decoration	Notes
1319	Thala 2014		Trench 8 Pot 2	E	Pedestaled Bowl	white grey	coarse	body				Pedestaled Bowl
1320	Thala 2014		Trench 8 Pot 3	E	Thala carinated ware	reddish gray	fine	body			cordmarked	Thala carinated ware
1321	Thala 2014		Trench 8 Pot 3	E	Bowl	brown-black	fine	body				Bowl
1322	Thala 2014		Trench 9 SU 3	E	Pedestaled Bowl	reddish gray	coarse	Join				Pedestaled Bowl
1323	Thala 2014		Trench 9 SU 5	E	Industrial ware	pinkish/gray	fine	rim				Industrial ware
1324	Thala 2014		Trench 9 SU 4	E	Bowl	red-black	fine	body				Bowl
1325	Thala 2014		Trench 9 SU 4	E	Thala carinated ware	reddish brown	fine	rim				Thala carinated ware
1326	Thala 2014		Trench 9 SU 5	E	Thala carinated ware	reddish brown	fine	shoulder			cordmarked and wave	Thala carinated ware
1327	Thala 2014		Trench 9 SU 7	E	Buffware	buff	fine	body				Buffware
1328	Thala 2014		Trench 10 SU 1	E	Sand tempered Kendi	reddish brown	coarse	spout				Sand tempered Kendi
1329	Thala 2014		Trench 10 SU 2	E	Buffware	buff-brown	fine	body				Buffware

Appendix I: Beads Analysis

Project Name: Thala Borivat Archaeological Project						Project Director: Piphall Heng			
Project Location: Thala Borivat and Sambor									
#	Site	Trench	SU	Date	Notes	Description	Complete?	Color	Size
1	Thala	6	7.4	3/8/14	Bead?	Flat piece, material?	Fragment	copper green	L=2.2
2	Thala	7	3.6	3/7/14	? 2g	Possibly glass bangle or vessel fragment	Fragment	Translucent light blue	L=1.8 W=1.8
3	Thala	6	6.3	3/7/14	2 pieces	One broken bead, cylindrical shape with very small hole	Broken bead in pieces	Dark blue	7.5mm
4	Thala	8	Pot #1	3/14/14	Beads (2)	Dark blue	Complete	Dark blue	7mm
5	Thala	8	Pot #1	3/14/14	Beads (2)	Dark blue, broken. Large hole	Broken bead in pieces	Dark Blue	6.5mm
6	Thala	6	10	3/15/14	screen	3 beads total. All drawn, one broken. Broken cylindrical with sharp edges	Complete	Dark blue	5mm
7	Thala	6	8	3/15/14	screen	9 beads plus 2 fragments, there is one small rock fragment	Complete	Opaque black, short cylindrical with flat sides	6.5mm
8	Thala	6	7	3/14/14	screen. 11 beads and 9 fragments	One of the 11 beads broke, so now there are 10 complete beads and	Bead fragment	Dark blue	N/A

						numerous fragments			
9	Thala	6	7	3/14/14	screen. 11 beads and 9 fragments	One of the 11 beads broke, so now there are 10 complete beads and numerous fragments	Bead fragment	One piece of broken green tubular bead	N/A
10	Thala	6	7	3/14/14	screen. 11 beads and 9 fragments	One of the 11 beads broke, so now there are 10 complete beads and numerous fragments	Complete	red opaque	2.75mm
11	Thala	6	7	3/14/14	screen. 11 beads and 9 fragments	One of the 11 beads broke, so now there are 10 complete beads and numerous fragments	Complete	yellow opaque	2.5mm
12	Thala	6	7	3/14/14	screen. 11 beads and 9 fragments	One of the 11 beads broke, so now there are 10 complete beads and numerous fragments	Complete	opaque green	3mm
13	Thala	6	7	3/14/14	screen. 11 beads and 9 fragments	One of the 11 beads broke, so now there are 10 complete beads and numerous fragments	Complete	light blue translucent	3mm
14	Thala	6	7	3/14/14	screen. 11 beads and 9 fragments	One of the 11 beads broke, so now there are 10 complete beads and	Complete	dark copper blue green-cylindrical with flat sides	4.5mm

						numerous fragments			
15	Sambor	Col-14		4/7/14	1 bead = 1g	Large barrel shaped drawn bead	Complete	Translucent copper blue	7mm

Thala Borivat bead samples

Brief report on beads from Thala Borivat and Sambor

Dr. Alison Kyra Carter

Prepared for Heng Piphah on 11 July 2016

Thala Borivat is an archaeological site located along the Mekong River in Stoeng Treng province, Cambodia. It was the location of an important pre-Angkorian center dating from approximately the 6-9th centuries CE. The site has remnants of brick architecture, habitation areas, and burial mounds. Survey and excavations were undertaken at the site directed by Mr. Piphah Heng (PhD Candidate, University of Hawaii). In the course of his excavations he uncovered approximately 40 glass beads. From this collection, 15 were selected for analysis in the Elemental Analysis Facility at the Field Museum of Chicago, Illinois, managed by Dr. Laure Dussubieux (Figure 1). The technique used, laser ablation- inductively coupled plasma- mass spectrometry (LA-ICP-MS), was selected, as it is virtually non-destructive and requires no sample preparation. (For a detailed discussion of the methods please see Carter 2013: 130-132). The compositions are listed in Appendix 1, with major elements presented as weight percent and minor elements in parts per million (ppm).

The beads primarily came from two contexts: Trench 6 and Trench 8. One bead included in the study came from surface collection at the site of Sambor (listed in the database as Thala03). Trench 6 is located at a Early Historic burial ground within the Thala Borivat region where brick architectures are located. The context of this trench appeared to be disturbed in antiquity, likely during the temple construction. Multiple beads were found mixed with smaller pieces of sherds and bones (likely human) as well as brick fragments. The associated AMS dates for this unit are from 138 to 380 CE and 355 to 538 CE. Trench 8 is located on the other side of the Mekong (east) at c. downstream within another Early Historic burial ground where there is

no evidence of the pre-Angkorian brick architecture. An incomplete juvenile burial was uncovered within this trench. The individual was interred with five pots, one of which contains two blue beads. The AMS date retrieved from one of the pot is 79 to 247 CE. Sambor or Sambhupura is another pre-Angkorian center located on the Mekong in eastern Cambodia. A surface survey was conducted for a comparative analysis purpose with Thala Borivat settlement patterns. Many ceramic sherds and one bead were systematically collected from the surface.

Of the 15 objects analyzed, 2 were not glass (Figure 1). A flat piece recorded in analysis as Thala15, was made of bronze containing high concentrations of tin and copper. The small green piece identified in analysis as Thala08 is made of an unknown material, but contained high levels of phosphorous, lead, calcium, and soda. The remaining glass beads could be classified into four different compositional groups (Figure 2).

Potash glass

Four beads can be classified as potash glass: **Thala03**, a light blue bead, **Thala05**, a glass bangle fragment, **Thala07**, a red opaque bead, and **Thala14**, a dark blue broken bead. Three of the beads have between 2-4% of both lime and alumina, indicating they belong to the subtype known as “potash with varying amounts of alumina and lime” (henceforth m-K-Ca-Al). One bead (Thala03) had higher alumina than lime, putting it in the m-Ka-Al sub-type. It should be noted that the red m-K-Ca-Al bead (Thala07) had elevated concentrations (1.75wt%) of magnesia (MgO). Elevated magnesia is seen in red and orange color high-alumina mineral soda glass and is related in this case to the coloring process of the glass (Dussubieux et al. 2011). The elevated magnesia in this bead may be due to a similar coloring process.

The m-Ka-Ca-Al glass type is fairly widespread in Southeast Asia and especially in southeast Cambodia (see Carter 2016, 2010). The m-Ka-Al glass type appears to be related to the m-K-Ca-Al glass type in that both frequently appear at the same sites (see Carter 2010; Lankton and Dussubieux 2013). However, as the manufacturing locations of potash glass is poorly understood, they are considered as distinct sub-types (Lankton and Dussubieux 2013). Due to the high quantities of this glass type found in northern Vietnam/southern China, it is possible this glass type was manufactured in this region. Potash glass is most common at sites across Southeast Asia during the Very Early period (5th century BCE – 2nd/1st century BCE) to

Early Periods (3rd/2nd century BCE – 4th century CE), but is regionally replaced by high-alumina mineral soda glass during the first few centuries CE (see Carter 2015, 2016; Lankton and Dussubieux 2013).

High-alumina mineral soda glass

Four beads had elevated levels of soda and alumina, putting them in high alumina mineral soda glass category (henceforth m-Na-Al). Furthermore, the lower concentrations of uranium and higher concentrations of barium mark them as specifically belonging to the m-Na-Al Type 1 sub-type, which is believed to have been manufactured in South Asia from the 4th century BCE to the 10th century CE (see Dussubieux et al. 2010). These beads were **Thala02**, an opaque black bead; **Thala09**, an opaque green bead; **Thala011**, a light blue bead, and **Thala012**, a dark blue bead.

As discussed above, this glass type becomes widespread in Southeast Asia from the early centuries CE and throughout the first millennium. In Cambodia, large amounts of high alumina soda glass have also been found at Phum Sophy, Phum Snay, Phum Lovea, Prei Khmeng, Phnom Borei, and Angkor Borei (Carter 2010, 2013, 2015). This glass type has also been identified at several sites in Thailand, including Promtin Tai, Noen U-Loke, and Ban Non Wat (Carter and Lankton 2012). It is likely the high quantity of this glass bead type is related to intensifying trade relationships with South Asia (Bellina and Glover 2004; Carter 2015).

Mineral soda glass with varying amounts of alumina and lime

Four dark blue beads (**Thala 01, 04, 10, 13**) colored with cobalt belong to a mineral soda glass with moderate amounts of both alumina and lime. Compositionally, this glass type looks quite similar to the m-Na-Al Type 1 glasses discussed above, but can be distinguished by their trace elements (Dussubieux and Gratuze 2010). Another factor distinguishing this glass type from the m-Na-Al Type 1 glass beads is the use of cobalt to color the glass. All four dark blue beads in this study contain elevated concentrations of cobalt (Figure 3).

This glass type first appears during the Early Period (3rd/2nd century BCE – 4th century CE) and shares a compositional similarity to a type of glass produced at Arikamedu, South India, called Arika glass (see Dussubieux and Gratuze 2013; Dussubieux et al. 2012; Lankton and Dussubieux 2013). However, m-Na-Ca-Al glass is also found in high quantities at the peninsular

Thai site of Phu Khao Tong, and craftspeople at this site might have been working raw glass into beads (Dussubieux et al. 2012: 326; see also Carter 2015). This particular glass type has been found at numerous sites dating from the late centuries BCE to the mid-first millennium CE, suggesting that its production was long-lived (Lankton and Dussubieux 2013). In Cambodia, this glass type has been found at Angkor Borei, Prohear, Phum Snay, and Prei Khmeng (Carter 2015).

Lead glass

One yellow bead, Thala06, had almost 20wt% concentration of lead, placing it in the lead glass category. In addition to lead, there were also elevated levels of tin (1.9wt%), which combined with lead likely acted as a colorant and opacifier (lead stannate). Also of note is the elevated concentration of soda (11wt%).

Lead beads are rare at Iron Age end Early Historic Southeast Asian archaeological sites. Dussubieux (2001) identified only six beads in her study, three from Angkor Borei, Cambodia and three from the 9th century CE site of Sarawak, Indonesia (Carter and Lankton 2012). Carter has also identified a yellow lead glass bead at the site of Prohear in Cambodia and at Ban Non Wat, Thailand (Carter 2013; Carter and Lankton 2012).

There appears to be considerable variability within the lead glass type. The lead glass beads at Angkor Borei were notable for their high barium content, a characteristic thought to usually indicate a Chinese origin (Stark and Dussubieux 2002). Lead glass beads from Ban Non Wat do not have a high barium content, but do have higher levels of soda, although not as high as the bead from Thala Borivat. It is clear that further research is needed to better understand these beads and the lead glass type.

Discussion

In my previous work (Carter 2010, 2013, 2015) I have observed a clear dichotomy between sites in southeast Cambodia that are dominated by potash glass beads (Prohear, Bit Meas, Village 10.8) and those in the Mekong Delta and northwest Cambodia that have higher concentrations of high-alumina mineral soda glass beads (Angkor Borei, Phnom Borei, Prei Khmeng, Phum Snay, as well as Phum Sophy and Lovea). I have attributed this to shifting exchange networks during the first few centuries CE and especially the growth of Angkor Borei

as a major trading center. Potash glass beads appear to be associated with a long-standing South China Sea exchange network that was largely linking coastal sites in mainland Southeast Asia. In contrast, high-alumina mineral soda glass is associated with expanding exchange networks, including further inland, and the influx of mass-produced goods and perhaps greater influence from South Asia (Carter 2015).

The presence of both glass bead types at Thala Borivat indicates to me that this is a location that may have been connected to both the m-Na-Al Type 1 and potash glass exchange networks. Sites with both types of beads are thus far rare in Cambodia. Two potash glass beads were found alongside four m-Na-Al Type 1 beads at Phnom Borei, and three potash glass beads were found at Phum Snay, which contained mostly m-Na-Al Type 1 glass beads (Carter 2010). No potash glass beads have been found at Angkor Borei, and no m-Na-Al Type 1 has been found at Prohear (Carter 2010). The radiocarbon dates from Thala Borivat overlap with the hypothesized time period when glass trade networks were shifting in Southeast Asia (approx. 200 BCE – 200 CE). The m-Na-Ca-Al glass is also found at sites that date from the late centuries BCE and early centuries CE. Overall, the bead collection from Thala Borivat is typical for an Iron Age site in mainland Southeast Asia and consistent with other sites in Cambodia.

It is possible to make some preliminary inferences about the total bead collection from Thala Borivat based on similarities between analyzed and unanalyzed beads (see Table 1). In this scenario, half of the bead collection from Thala Borivat likely belongs to the high-alumina mineral soda glass category. The potash glass category is comparatively minor, although it is unclear if the 10 unanalyzed red opaque beads may belong to the high-alumina mineral soda glass category, as this color is common in this glass type (see Dussubieux et al. 2011), or the low-lime potash glass type. Further analyses on the red opaque beads would help clarify this question. Similarly, future analyses on the blue beads, especially dark blue beads, would aid in determining if they belong to the potash glass, m-Na-Al Type 1 glass group, or the m-Na-Ca-Al group.

Glass Type	Estimated number of beads in this category
Potash (m-Ka-Ca-Al and m-Ka-Al)	3
Possible potash or m-Na-Ca-Al	1

m-Na-Al Type 1	20
Red opaque beads (could be m-Na-Al Type 1 or potash)	10
Lead	1
m-Na-Ca-Al	4

Table 1: Estimated quantities of different glass types at Thala Borivat based on similarities between analyzed and unanalyzed glass beads. The m-K-Al bead from Sambor is omitted from this table.

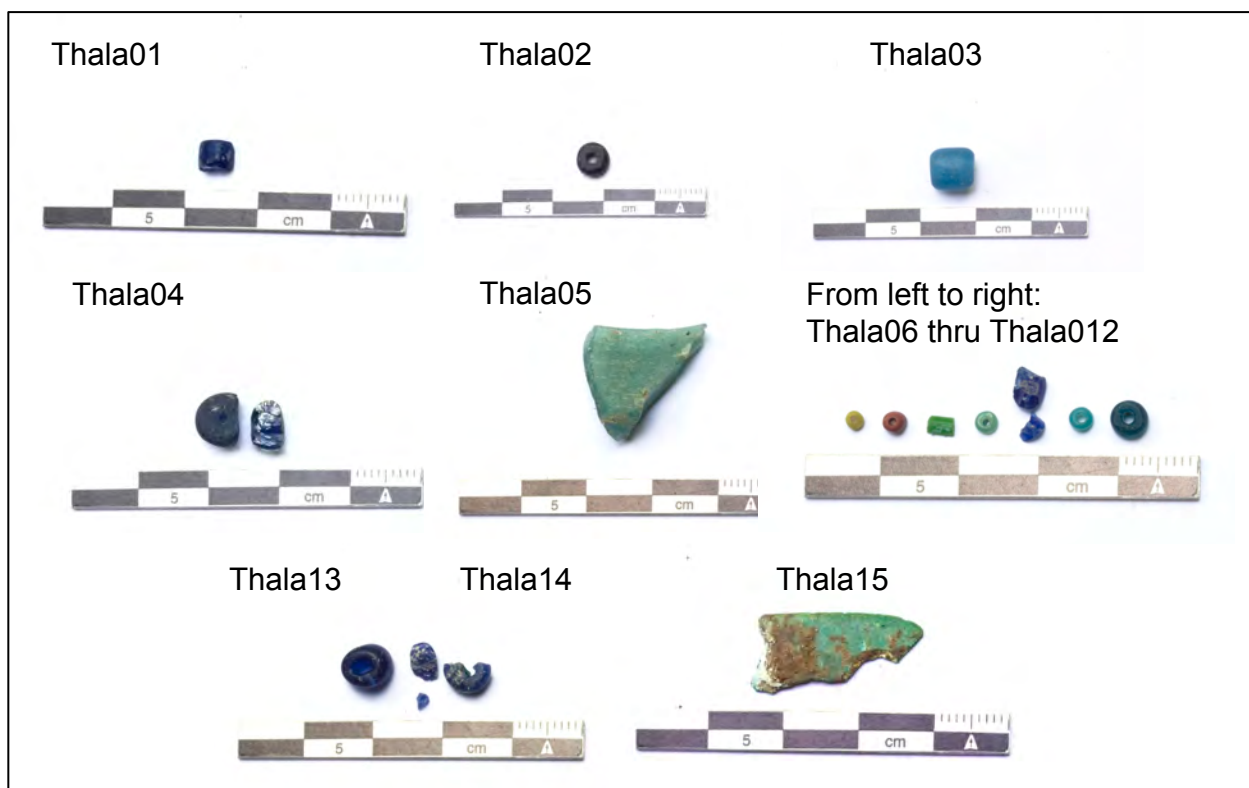


Figure 1: Objects analyzed in this study. The Thala03 bead comes from the Sambor site.

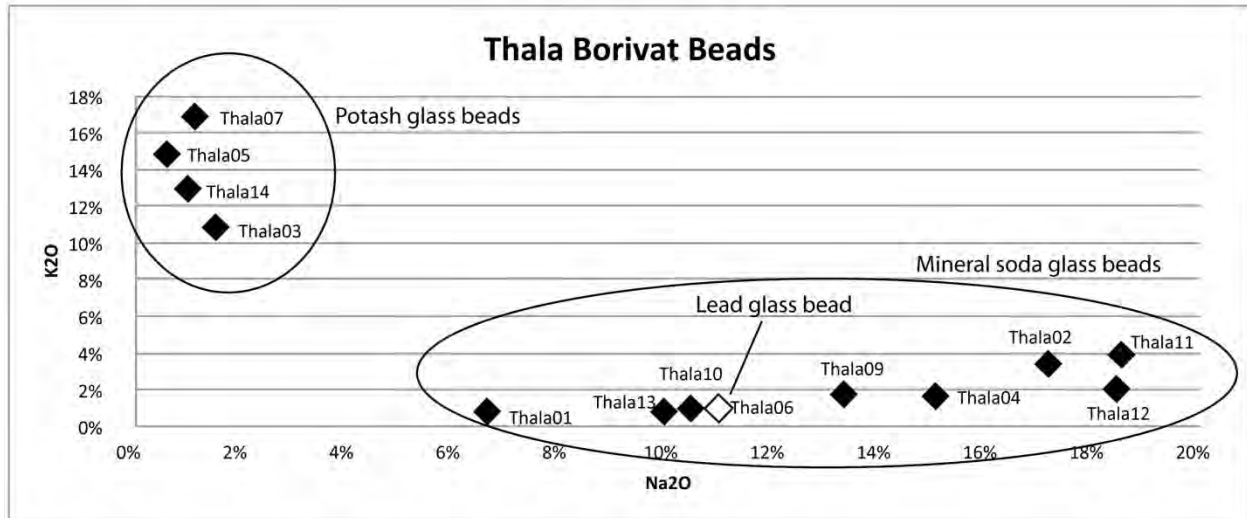


Figure 2: Biplot of potash (K₂O) and soda (Na₂O) showing the different groups of glass beads from Thala Borivat.

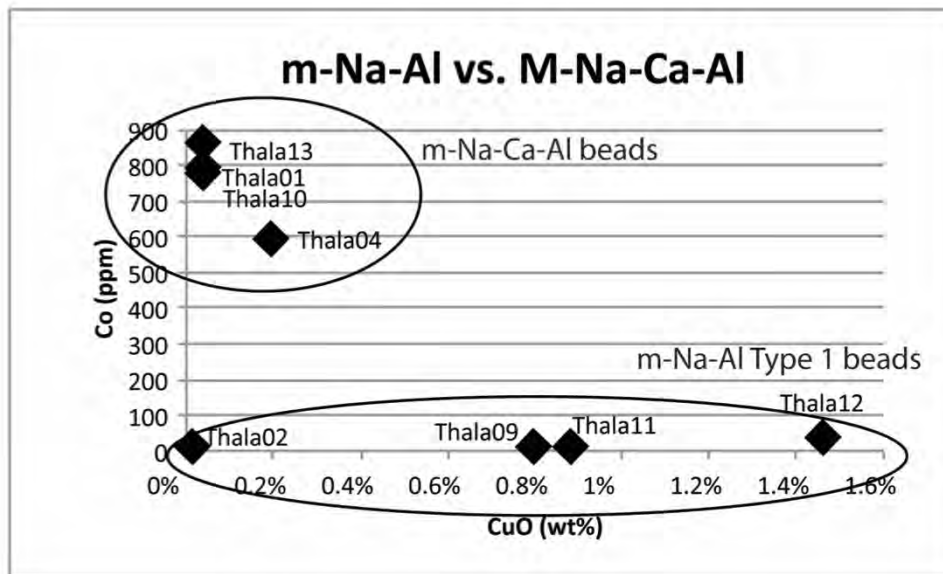


Figure 3: Biplot of copper (CuO) and cobalt (Co) used as colorants in beads from Thala Borivat. The addition of cobalt as a colorant helps differentiate the m-Na-Ca-Al beads from the m-Na-Al Type 1 beads.

References Cited for Report on Beads

Bellina, B., Glover, I., 2004. The archaeology of early contact with India and the Mediterranean world, from the fourth century BC to the fourth century AD. In: Glover, I., Bellwood, P. (Eds.), *Southeast Asia: From Prehistory to History*. RoutledgeCurzon, New York, pp. 68–87.

Carter, A.K., 2016, The Production and Exchange of Glass and Stone Beads in Southeast Asia from 500 BCE to the early second millennium CE: An assessment of the work of Peter Francis in light of recent research. *Archaeological Research in Asia*, 6, 16-29.

Carter, A.K., 2015. Beads, Exchange Networks and Emerging Complexity: a Case Study from Cambodia and Thailand (500 BCE–CE 500). *Cambridge Archaeological Journal*, 25, 733–757.

Carter, A.K., 2013. Trade, exchange, and socio-political development in Iron Age (500 BC- AD 500) mainland Southeast Asia: An examination of stone and glass beads from Cambodia and Thailand (PhD Thesis). Department of Anthropology, University of Wisconsin-Madison, Madison.

Carter, A.K., 2010. Trade and exchange networks in iron age Cambodia: preliminary results from a compositional analysis of glass beads. *Bulletin of the Indo-Pacific Prehistory Association* 30, 178–188.

Carter, A., Lankton, J., 2012. Analysis and comparison of glass beads from Ban Non Wat and Noen U-Loke. In: Higham, C.F.W., Kijngam, A. (Eds.), *The Origins of Angkor, Volume 6: The Iron Age: Summary and Conclusions*. Fine Arts Department of Thailand, Bangkok, pp. 91–114.

Dussubieux, L., 2001. L'Apport de l'ablation laser couplée a l'ICP-MS à la caractérisation des verres: Application a l'étude du verre de l'océan Indien (Ph.D.) Department of Chemistry, Université d'Orléans.

Dussubieux, L., Gratuze, B., 2010. Glass in Southeast Asia. In: Bellina, B., Bacus, E.A., Pryce, T.O., Wisseman Christie, J. (Eds.), *50 Years of Archaeology in Southeast Asia. Essays in Honour of Ian Glover*. River Books, Bangkok, pp. 247–260.

Dussubieux, L., Gratuze, B., Blet-Lemarquand, M., 2010. Mineral soda alumina glass: occurrence and meaning. *Journal of Archaeological Science*, 37 (7), 1646–1655.

Dussubieux, L., Gratuze, B., Blet-Mamarquand, M., 2011. Innovation dans les techniques de coloration: les verres rouges et orange en Asie du Sud. *Actes du deuxième colloque international de l'association Verre & Histoire*. Association Verre & Histoire, Paris (http://www.verre-histoire.org/colloques/innovations/pages/p101_01_dussubieux.html).

Dussubieux, L., Lankton, J.W., Bellina, B., Chaisuwan, B., 2012. Early glass trade in South and Southeast Asia: new insights from two coastal sites, Phu Khao Thong in Thailand and Arikamedu in South India. In: Tjoa-Bonatz, M., Reinecke, A., Bonatz, D. (Eds.), *Crossing Borders: Selected Papers from the 13th International Conference of the European Association of Southeast Asian Archaeologists, Volume 1*. NUS Press, Singapore, pp. 307–328.

Lankton, J., Dussubieux, L., 2013. Early glass in Southeast Asia. In: Janssens, K. (Ed.), *Modern Methods for Analysing Archaeological and Historic Glass*. Wiley and Sons, West Sussex, pp. 415–457.

Bibliography

- Adams, Robert McC. 1965. *Land behind Baghdad: A History of Settlement on the Diyala Plains*. Chicago: University of Chicago Press.
- . 1966. *The Evolution of Urban Society: Early Mesopotamia and Prehispanic Mexico*. Chicago: Aldine Pub. Co.
- . 1981. *Heartland of Cities: Surveys of Ancient Settlement and Land Use on the Central Floodplain of the Euphrates*. Chicago: University of Chicago Press.
- Alabouvette, B. 1973. *Carte géologique de reconnaissance 1/200000, Stung Treng*. Paris: Service national des mines de la géologie et du pétrole, éditions du bureau de Recherches géologiques et minières.
- Albrecht, Gerd, Miriam Noel Haidle, Sivleng Chhor, Leang Hong Heang, Sophady Heng, Than Heng, Someaphyvath Mao, et al. 2000. "Circular Earthwork Krek 52/62: Recent Research on the Prehistory of Cambodia." *Asian Perspectives* 39 (1/2): 20–46.
- Allchin, F. Raymond. 1995. "The Mauryan State and Empire." In *The Archaeology of Early Historic South Asia: The Emergence of Cities and States*, edited by F. Raymond Allchin, 187–221. Cambridge; New York, USA: Cambridge University Press.
- Allen, Jane. 1977. "Sea Traffic, Trade and Expanding Horizons." In *Sunda and Sahul: Prehistoric Studies in Southeast Asia, Melanesia and Australia*, edited by Jane Allen, J. Golson, and R. Jones, 387–417. London: Academic Press.
- . 1997. "Inland Angkor, Coastal Kedah: Landscapes, Subsistence Systems and State Development in Early Southeast Asia." *Journal of Indo-Pacific Archaeology* 16: 79–87.
- Anonym. 1913a. *Monographie de la province de Stung-Treng (Cambodge)*. Publications de la Société des études indochinoises. Géographie physique, économique et historique du Cambodge. 4 fasc. Saigon: C. Ardin. //catalog.hathitrust.org/Record/100160254.
- . 1913b. "Monographie de la province de stung-treng (cambodge)." *Bulletin de la Société des Études Indochinoises* 64: 5–32.
- Aung-Thwin, Michael. 1985. *Pagan: The Origins of Modern Burma*. Honolulu: University of Hawaii Press.
- Aymonier, Étienne. 1875. *Notice sur le Cambodge*. Paris: Ernest Leroux.
- . 1895. *Voyage dans le Laos*. Vol. 1. 2 vols. Paris: Ernest Leroux.
- . 1900. *Le Cambodge: Le Royaume Actuel, Vol 1*. Paris: Ernest Leroux.
- . 1901. *Le Cambodge: Les Provinces Siamoises, Vol 2*. Paris: Ernest Leroux.
- . 1904. *Le Cambodge: Le Groupe D'Angkor et L'Histoire*. Vol. 3. Paris: Ernest Leroux.
- Baines, John, and Norman Yoffee. 1998. "Order, Legitimacy, and Wealth in Ancient Egypt and Mesopotamia." In *Archaic States*, edited by G. M. Feinman and J. Marcus, 199–260. Santa Fe: School of American Research.
- Baird, Ian G. 1995. "A Rapid Study of Fish and Fisheries; and Livelihoods and Natural Resources along the Sesan River, Ratanakiri, Cambodia." *Unpublished Livelihoods and Natural Resources Study Report, Oxfam (UK and Ireland) and Novib, Ban Lung, Ratanakiri, Cambodia*, 54 pp.
- . 2000. "Dipterocarpus Wood Resin Tenure, Management and Trade: Practice of the Brao in Northeast Cambodia." M.A. Thesis.

- . 2010a. "Different Views of History: Shades of Irredentism along the Laos–Cambodia Border." *Journal of Southeast Asian Studies* 41 (02): 187–213.
- . 2010b. "Making Spaces: The Ethnic Brao People and the International Border between Laos and Cambodia." *Geoforum*, Themed Issue: Mobilizing Policy, 41 (2): 271–81. <https://doi.org/10.1016/j.geoforum.2009.10.005>.
- Baird, Ian G., and Meach Mean. 2005. "Sesan River Fisheries Monitoring in Ratanakiri Province, Northeast Cambodia." *Before and after the Construction of the Yali Falls Dam in the Central Highlands of Vietnam*. <http://www.3spn.org/wp-content/uploads/2012/01/Baird-Mean-2005-Sesan-River-Fisheries-Monitoring-Report.pdf>.
- Baran, Eric, Saray Samadee, Shwu Jiau Teoh, and Thanh Cong Tran. 2014. "Fish and Fisheries in the Sesan, Sekong and Srepok River Basins (Mekong Watershed). Chapter 3.1." In *ICEM, 2014. On Optimizing the Management of Cascades or System of Reservoirs at Catchment Level*. Hanoi, Vietnam: International Centre for Environmental Management.
- Barnes, Gina L. 1986. "Paddy Field Archaeology in Nara, Japan." *Journal of Field Archaeology* 13 (4): 371–379.
- Barth, August M. 1882. *Inscriptions sanscrites du Cambodge: Examen sommaire d'un envoi de M. Aymonier*. Extrait du journal Asiatique. Paris: Imprimerie nationale.
- . 1885. *Inscriptions sanscrites du Cambodge*. Extrait des notices et extraits des manuscrits de la bibliothèque nationale, Tome 27, 1er partie. Paris: Imprimerie nationale.
- Baty, Pierre, Annei Bolle, Socheat Chea, Jean-Baptiste Chevance, Armand Desbat, Leang Hong Heang, Narak Noun, et al. 2005. "Extension de l'Aéroport de Siem Reap. Rapport de Diagnostic Archéologique. Trapeang Thlok-Prasat Trapeang Ropou." Année 2004. France: APSARA-Base INRAP de Poitiers.
- Bellina, Bérénice. 2016. "Chapter 22: The Inception of the Trans-National Processes between the Indian Ocean and the South China Sea from an Early City-State on the Thai-Malay Peninsula (Fourth-Second Century Bce)." In *Ports of the Ancient Indian Ocean*, edited by Marie-Françoise Bousac, Jean-François Salles, and Jean-Baptiste Yon, 463–92. Delhi: Primus Books.
- Bellina, Bérénice, and Ian Glover. 2004. "The Archaeology of Early Contact with India and the Mediterranean World, from the Fourth Century BC to the Fourth Century AD." In *Southeast Asia: From Prehistory to History*, edited by Ian Glover and Peter Bellwood, 68–88. New York: Routledge Curzon.
- . 2009. "The Earliest Iconographic and Archaeological Evidence for Animal and Cultural Transfers Between South and Southeast Asia." In *Penser, dire et représenter l'animal dans le monde indien*, 383–401. Paris: Librairie Honoré Champion.
- Bénisti, Mireille. 1964. "Représentations khmères de viṣṇu couché." *Arts Asiatiques* 11: 91–117.
- . 1966. "Notes d'iconographie khmère: III. Au sujet d'un linteau de Sambor Prei Kuk." *Bulletin de l'Ecole française d'Extrême-Orient* 53: 71–75.
- . 1968. "Recherches sur le premier art khmer: I. les linteaux dits de Thala Borivat." *Arts asiatiques* 18 (1): 85–101. <https://doi.org/10.3406/arsi.1968.1605>.
- . 1969. "Recherches sur le premier art khmer: II. 'La bande à chatons', critère chronologique ?" *Arts asiatiques* 20 (1): 99–120. <https://doi.org/10.3406/arsi.1969.1010>.

- . 1974. "VI. Linteaux inédits et linteaux méconnus." *Arts Asiatiques* 30: 131–72.
- Bentley, G. Carter. 1986. "Indigenous States of Southeast Asia." *Annual Review of Anthropology* 15: 275–305.
- Billard, Roger, and J.C. Eade. 2006. "Dates des Inscriptions du Pays Khmer." *Bulletin de l'École française d'Extrême-Orient* 93: 395–428.
- Bishop, Paul, David C.W. Sanderson, and Miriam T. Stark. 2004. "OSL and Radiocarbon Dating of a Pre-Angkorian Canal in the Mekong Delta, Southern Cambodia." *Journal of Archaeological Science* 31 (3): 319–36.
- Blanton, Richard E., and Lane F. Fargher. 2009. "Collective Action in the Evolution of Pre-Modern States." *Social Evolution & History* 8 (2): 133–66.
- Boisselier, Jean. 1955. *La statuaire khmère et son évolution*. Publications de l'École française d'Extrême-Orient 37. Saigon: École française d'Extrême-Orient.
- . 1966. *Le cambodge*. Manuel d'archéologie d'extrême-orient, asie du sud-est. Paris: A. et J. Picard et Cie.
- Bong, Sovath. 2003. "The Ceramic Chronology of Angkor Borei, Takeo Province, Southern Cambodia." Doctoral Dissertation, Honolulu: University of Hawai'i at Mānoa.
- Brancaccio, Pia. 2010. *The Buddhist Caves at Aurangabad: Transformations in Art and Religion*. Vol. 34. Leiden: Brill.
- Briggs, Lawrence Palmer. 1951. "The Ancient Khmer Empire." *Transactions of the American Philosophical Society* 41 (1): 1–295.
- Bromberg, Benjamin. 1942. "The Origin of Banking: Religious Finance in Babylonia." *The Journal of Economic History* 2: 77–88.
- Bronkhorst, Johannes. 2011. "The Spread of Sanskrit in Southeast Asia." In *Early Interactions between South and Southeast Asia: Reflections on Cross-Cultural Exchange*, edited by Pierre-Yves Manguin, A. Mani, and Geoff Wade, 263–275. Singapore: Institute of Southeast Asian Studies. <https://www.cambridge.org/core/books/early-interactions-between-south-and-southeast-asia/421F1ADADADB5D38159BE2FCBB1DA8C>.
- Bronson, Bennet. 1977. "Exchange at the Upstream and Downstream Ends: Notes Toward a Functional Model of the Coastal State in Southeast Asia." In *Economic Exchange and Social Interaction in Southeast Asia: Perspectives from Prehistory, History, and Ethnography*, edited by K. L. Hetterer, 13:39–52. Ann Arbor: Centre for South and Southeast Asian Studies, University of Michigan.
- Brown, Robert L. 1992. "Indian Art Transformed: The Earliest Sculptural Styles of Southeast Asia." In *Indian Art and Archaeology*, edited by Ellen M. Raven and Karel R. Van Kooij, 40–53. BRILL.
- . 1996. *The Dvārāvātī Wheels of the Law and the Indianization of South East Asia*. Leiden ; New York: E.J. Brill.
- . 2004. Review of *Review of Society, Economics, and Politics in Pre-Angkor Cambodia: The 7th-8th Centuries*, by Michael Vickery. *Journal of the American Oriental Society* 124 (4): 795–98.
- . 2011. "The Importance of Gupta-Period Sculpture in Southeast Asian Art History." In *Early Interactions between South and Southeast Asia: Reflections on Cross-Cultural Exchange*, 317–32. ISEAS–Yusof Ishak Institute.

- Bruguier, Bruno, and Juliette Lacroix. 2017. *De Thala Borivat à Srei Santhor: le bassin du Mekong*. Vol. 4. Guide archéologique du Cambodge. Phnom Penh: JSRC Printing House.
- Cabaton, Antoine. 1908. "Quelques documents espagnols et portugais sur l'Indochine aux XVe et XVIIe siècles." *Journal Asiatique* 12 (10): 255–92.
- Calo, Ambra, Bagyo Prasetyo, Peter Bellwood, James W. Lankton, Bernard Gratuze, Thomas Oliver Pryce, Andreas Reinecke, et al. 2015. "Sembiran and Pacung on the North Coast of Bali: A Strategic Crossroads for Early Trans-Asiatic Exchange." *Antiquity* 89 (344): 378–96. <https://doi.org/10.15184/aqy.2014.45>.
- Carbonnel, Jean Pierre. 1972. *Le quaternaire cambodgien*. ORSTOM.
- Carbonnel, Jean-Pierre, and Edmond Saurin. 1974. "Evolution Préhistorique De La Péninsule Indochinoise D'après Les Données Récentes." *Paléorient* 2 (1): 133–65.
- Carter, Alison K. 2010. "Trade and Exchange Networks in Iron Age Cambodia: Preliminary Results from a Compositional Analysis of Glass Beads." *Bulletin of the Indo-Pacific Prehistory Association* 30: 178–188.
- . 2013. "Trade, Exchange, and Sociopolitical Development in Iron Age (500 BC – AD 500) Mainland Southeast Asia: An Examination of Stone and Glass Beads from Cambodia and Thailand." Madison: University of Wisconsin.
- . 2015. "Beads, Exchange Networks and Emerging Complexity: A Case Study from Cambodia and Thailand (500 Bce–Ce 500)." *Cambridge Archaeological Journal* 25 (04): 733–57. <https://doi.org/10.1017/S0959774315000207>.
- Chakrabarti, Dilip K. 1995. "Buddhist Sites across South Asia as Influenced by Political and Economic Forces." *World Archaeology* 27: 185–202.
- Champakalakshmi, Radha. 1987. "Urbanisation in South India: The Role of Ideology and Polity." *Social Scientist* 15: 67–117.
- . 2002. "State and Economy: South India circa AD 400–1300." In *Recent Perspectives of Early Indian History*, edited by Romila Thapar, 275–317. Bombay: Popular Prakashan.
- Chatelain, Henri. 1719. "Le Royaume Fe Siam Avec Les Royaumes Qui Luy Sont Tributaires et Les Isles de Sumatra, Andemaon, Etc. et Les Isles Voisine Sur Les Observations Des Jesuites Envoyez Par Le Roi Louis Xiv En Qualité de Ses Mathematiciens Dans Les Indes et á La Chine, Où l'on Voit Aussi La Route Qu'ils Ont Tenue Par Le Destroit de La Sonde Jusqu'à Siam." Amsterdam. https://www.raremaps.com/gallery/detail/35755/Le_Royaume_Fe_Siam_Avec_les_Royaumes_qui_luy_sont_Tributaires_et_.
- Chattopadhyaya, Brajadulal. 2002. "State and Economy in North India: Fourth Century to the Twelfth Century." In *Recent Perspectives on Early Indian History*, edited by Romila Thapar, 318–356. Bombay: Popular Prakashan.
- Chevance, Jean-Baptiste, Pierre Bâty, and Chantha Seng. 2013. "The Sources of the Khmer Empire." In *Unearthing Southeast Asia's Past: Selected Papers from the 12th International Conference of the European Association of Southeast Asian Archaeologists*, edited by Marijke J. Klokke and Marijke J. Klokke and Veronique Degroot, 257–74. Singapore: NUS Press Pte Ltd.
- Chhay, Rachna, Piphall Heng, and Visoth Chhay. 2013. "Khmer Ceramic Technology: A Case Study from Thnal Mrech Kiln Site, Phnom Kulen." In *Materializing Southeast Asia's Past: Selected Papers from the 12th International Conference of the European Association of*

- Southeast Asian Archaeologists, Volume 2*, edited by Marijke J Klokke and Véronique Degroot, 2:179–95. Singapore: NUS Press.
- Chhay, Visoth. 2007. "The Preliminary Stage of the Anlong Thom Kiln Excavation on Kulen Hill in Angkor (A Case Study of ALK 01)." Siem Reap.
- Childe, V. Gordon. 1950. "The Urban Revolution." *Town Planning Review* 21 (1): 3–17.
- Christie, Jan Wisseman. 1985. *Theatre States and Oriental Despotisms: Early Southeast Asia in the Eyes of the West*. Center for Southeast Asian Studies, Occasional Paper No. 10. England: University of Hull.
- . 1986. "Negara, Mandala, and Despotic State: Images of Early Java." In *Southeast Asia in the 9th to 14th Centuries*, edited by D.G. Marr and A.C. Milner, 65–93. Singapore: Institute of Southeast Asian Studies & the Research School of Pacific Studies, Australian National University.
- . 1990. "Trade and State Formation in the Malay Peninsula and Sumatra." In *The Southeast Asian Port and Polity: Rise and Demise*, edited by J. Kathirithimby-Wells and J. Villiers, 39–60. Singapore: Singapore University Press.
- . 1995. "State Formation in Early Maritime Southeast Asia: A Consideration of the Theories and the Data." *Tot De Taal-, Land -n Volkenkunde* 151: 235–88.
- CIK. 2017. "Inventaire CIK des inscriptions khmères." Corpus des inscriptions khmères-EFEO. <http://cik.efeo.fr/inventaire-cik-des-inscriptions-khmeres/>.
- Cisark. 2018. "La carte interactive des sites archéologiques khmers." Interactive map. 2018. <http://cisark.mcfa.gov.kh/>.
- Coedès, George. 1918. "Etudes cambodgiennes." *Bulletin de l'Ecole française d'Extrême-Orient* 18 (1): 1–28.
- . 1928. "Etudes cambodgiennes." *Bulletin de l'Ecole française d'Extrême-Orient* 28 (1): 81–146.
- . 1931. "Etudes cambodgiennes. xxv, Deux inscriptions sanskrites du Fou-Nan. xxvi, La date de Kôh Ker. xxvii, La date du Bàphûon." *Bulletin de l'Ecole française d'Extrême-Orient* 31 (1–2): 1–23.
- . 1953. *Inscriptions du Cambodge*. Vol. 5. EFEO. Collection des textes et documents sur l'Indochine. Hanoi: Imprimerie d'Extrême-Orient.
- . 1954. *Inscriptions du Cambodge*. Vol. 6. 8 vols. EFEO. Collection des textes et documents sur l'Indochine. Hanoi: Imprimerie d'Extrême-Orient.
- . 1956. "III. Nouvelles données sur les origines du royaume khmère: la stèle de Văt Luong Kău près de Văt P'hu." *Bulletin de l'Ecole française d'Extrême-Orient* 48 (1): 209–20.
- . 1966. *The Making of Southeast Asia*. Translated by H.H. Wright. London: Routledge and Kegan Paul.
- . 1968. *The Indianized States of Southeast Asia*. Honolulu: East-West Center Press.
- Coningham, Robin A. E. 2001. "The Archaeology of Buddhism." In *Archaeology and World Religion*, edited by Timothy Insoll, 61–95. London and New York: Routledge.
- Coningham, Robin A. E., Prishanta Gunawardhana, Mark Manuel, Gamini Adikari, Mangala Katugampola, Ruth Young, Armin Schmidt, et al. 2007. "The State of Theocracy: Defining an Early Medieval Hinterland in Sri Lanka." *Antiquity* 81 (313): 699–719.
- Constable, D. 2015. *Atlas of the 3S Basins*. Bangkok, Thailand: International Union for the Conservation of Nature.

- Contri, J. P. 1973. *Carte géologique de reconnaissance 1/200000, Kroch-Chhmar*. Paris: Service national des mines de la géologie et du pétrole, Editions du bureau de recherches géologiques et minières.
- Coral-Rémusat, Gilbert de. 1940. *L'art khmère: les grandes étapes de son évolution*. Les éditions d'art et d'histoire. Vol. 1. Études d'art et d'ethnologie asiatique. Paris: Van Oest.
- Cunningham, Sir Alexander. 1871. *The Ancient Geography of India: I. The Buddhist Period, Including the Campaigns of Alexander, and the Travels of Hwen-Thsang*. Trübner and Company.
- Dalet, Robert. 1939. "Recherches archéologiques au Cambodge. Note sur un linteau récemment découvert." *Bulletin de l'Ecole française d'Extrême-Orient* 39 (1): 222–23.
- . 1944. "Note Sur Les Styles de Sambor Prei Kuk, de Prei Kmen, de Kompon Prah et Du Kulen." *Bulletin de La Société Des Études Indochinoises* 19 (2): 7–83.
- Dalsheimer, Nadine, and Pierre-Yves Manguin. 1998. "Visnu mitrés et réseaux marchands en Asie du Sud-Est: nouvelles données archéologiques sur le 1er millénaire apr. J.-C." *Bulletin de l'Ecole française d'Extrême-Orient* 85 (1): 87–123.
- Dao, Linh Côn. 1998. "The Oc Eo Burial Group Recently Excavated at Go Thap (Dong Thap Province, Vietnam)." In *Southeast Asian Archaeology 1994: Proceedings of the 5th International Conference of the European Association of Southeast Asian Archaeologists Paris, 24th-28th October 1994*, edited by Pierre-Yves Manguin, 1:111–16. Centre for South-East Asian Studies, University of Hull.
- Dega, Michael F. 1999. "Circular Settlements within Eastern Cambodia." *Indo Pacific Prehistory Association Bulletin 18 Melaka Papers Volume 2*: 181–90.
- . 2001. "Prehistoric Circular Earthworks of Cambodia." Ph.D., United States -- Hawaii: University of Hawai'i at Manoa.
- Delvert, Jean. 1961. *Le paysan cambodgien*. Paris: Mouton.
- Demeter, Fabrice, Elise Patole-Edoumba, Philippe Düringer, Anne-Marie Bacon, Pheng Sytha, Maxim Bano, Vin Laychour, Mao Cheangleng, and Vân Sari. 2010. "Reinterpretation of an archaeological pebble culture from the Middle Mekong River valley, Cambodia." *Geoarchaeology* 25 (1): 75–95.
- Desbat, Armand, Adeline Beuken, Dominique Laduron, Eric Llopis, Christophe Pottier, Anne Schmitt, Soheat Chea, Savana Uong, and Alice ViersTraete. 2008. "Programme cerangkor: Recherches sur les ateliers de potiers angkoriens." Siem Reap: EFEO.
- Domett, Kate M., Dougald O'Reilly, and H. R. Buckley. 2011. "Bioarchaeological Evidence for Conflict in Iron Age North-West Cambodia." *Antiquity* 85 (328): 441–458.
- Drennan, Robert D. 2006. "Field Methods and the Database." In *Prehispanic Chiefdoms in the Valle de La Plata, Volume 5: Regional Settlement Patterns*, Edited by Robert D. Drennan, edited by Robert D. Drennan. Pittsburgh: University of Pittsburgh Memoirs in Latin American Archaeology, No. 16.
- Drennan, Robert D., C. Adam Berrey, and Christian E. Peterson. 2015. *Regional Settlement Demography in Archaeology*. Principles of Archaeology. Clinton Corners, New York: Eliot Werner Publications, Inc.
- Drennan, Robert D., and Christian E. Peterson. 2006. "Patterned Variation in Prehistoric Chiefdoms." *Proceedings of the National Academy of Sciences of the United States of America* 103 (11): 3960–3967.

- . 2008. "Centralized Communities, Population, and Social Complexity after Sedentarization." In *The Neolithic Demographic Transition and Its Consequences*, 359–386. Springer.
- Drennan, Robert D., Dale W. Quattrin, and Christian E. Peterson. 2006. "Distributional Patterns: Resources, Communities, and Polities." In *Prehispanic Chiefdoms in the Valle de La Plata, Volume 5: Regional Settlement Patterns*, edited by Robert D. Drennan, 5:99–154. University of Pittsburgh Memoirs in Latin American Archaeology, No. 6.
- Drennan, Robert D., Teng Mingyu, Christian E. Peterson, Gideon Shelach, Gregory G. Indrisano, Zhu Yanping, Katheryn M. Linduff, Guo Zhizhong, and Manuel A. Román-Lacayo. 2003. "Methods for Archeological Settlement Study." In *Regional Archeology in Eastern Inner Mongolia: A Methodological Exploration*, 122–51. Beijing: Science Press.
- Dupont, Pierre. 1952. "Les linteaux khmèrs du VIIe siècle." *Artibus Asiae* 15 (1/2): 31–83.
- . 1955. *La statue préangkorienne*. Vol. 15. Artibus Asiae Supplementum. Ascona: Artibus Asiae Publication.
- Ea, Darith. 2010. "Angkorian Stoneware Ceramics: The Evolution of Kiln Structure and Ceramic Typology." Doctoral Dissertation, Osaka: Ohtani University.
- Earle, Timothy K. 1987. "Specialization and the Production of Wealth: Hawaiian Chiefdoms and the Inka Empire." In *Specialization, Exchange, and Complex Societies*, edited by Timothy K. Earle and Elizabeth M. Brumfiel, 64–75. Cambridge: Cambridge University Press.
- . 2001. "Institutionalization of Chiefdoms Why Landscapes Are Built." In *From Leaders to Rulers*, edited by Jonathan Hass, 105–24. New York: Kluwer Academic / Plenum Publisher.
- Ebihara, May. 1977. "Residence Patterns in a Khmer Peasant Village." *Annals of the New York Academy of Sciences* 293 (1): 51–68. <https://doi.org/10.1111/j.1749-6632.1977.tb41805.x>.
- Evans, Caitlin, Nigel Chang, and Naho Shimizu. 2016. "Sites, Survey, and Ceramics: Settlement Patterns of the First to Ninth Centuries CE in the Upper Mun River Valley, Northeast Thailand." *Journal of Southeast Asian Studies* 47 (03): 438–67. <https://doi.org/10.1017/S0022463416000278>.
- Evans, Damian. 2002. "Pixels, Ponds and People: Urban Form at Angkor from Radar Imaging." BA Honor Thesis, Sydney: University of Sydney, Department of Archaeology.
- . 2007. "Putting Angkor on the Map: A New Survey of a Khmer 'hydraulic City' in Historical and Theoretical Context." Doctoral Dissertation, Sydney: University of Sydney.
- Evans, Damian, and Roland Fletcher. 2015. "The Landscape of Angkor Wat Redefined." *Antiquity* 89 (348): 1402–19. <https://doi.org/10.15184/aqy.2015.157>.
- Evans, Damian, Christophe Pottier, Roland Fletcher, Scott Hensley, Ian Tapley, Anthony Milne, and Michael Barbetti. 2007. "A Comprehensive Archaeological Map of the World's Largest Preindustrial Settlement Complex at Angkor, Cambodia." *Proceedings of the National Academy of Sciences* 104 (36): 14277–14282.
- FAO-UNESCO. 1979. *Soil Map of the World: Volume IX Southeast Asia*. Paris: Unesco.
- Farrington, Ian S. 1992. "Ritual Geography, Settlement Patterns and the Characterization of the Provinces of the Inka Heartland." *World Archaeology* 23 (3): 368–385.
- Fehrenbach, Shawn S. 2009. "Traditions of Ceramic Technology: An Analysis of the Assemblages from Angkor Borei, Cambodia." M.A., Honolulu, Hawaii: University of Hawaii at Manoa.

- Fehrenbach, Shawn S., and Michael Glascock. 2011. "Chemical Compositional Analysis of Late Prehistoric to Early Historic Earthenwares from Five Sites in Cambodia." Conference Presentation presented at the Society of American Archaeology, Sacramento, California.
- Feinman, Gary M. 2017. "Reframing Ancient Economies: New Models, New Questions." In *Eurasia at the Dawn of History: Urbanization and Social Change*, edited by Manuel Fernández-Götz and Dirk Krausse, 139–49. Cambridge University Press.
- Feinman, Gary M., and Linda M. Nicholas. 2017. "Re-Envisioning Prehispanic Mesoamerican Economies: Modes of Production, Fiscal Foundations of Collective Action, and Conceptual Legacies." In *Modes of Production and Archaeology*, edited by Robert M. Rosenswig and Jerimy J. Cunningham, 253–81. University Press of Florida.
- Finot, Louis. 1903. "Notes d'épigraphie III: Stèle de Çambhuvarman á Mĩ-søn." *Bulletin de l'Ecole française d'Extrême-Orient* 3 (1): 206–13.
- . 1912. "Notes d'archéologie cambodgienne." *Bulletin de la commission archéologique de l'Indochine* 1: 183–93.
- Finot, Louis, and George Coedès. 1926. *Inscriptions du Cambodge: publiées sous les auspices de l'Académie des inscriptions et belles-lettres*. Paris: P. Geuthner.
- Flad, Rowan, Timothy J. Horsley, Jade D'Alpoim Guedes, He Kunyu, Gwen Bennett, Pochan Chen, Li Shuicheng, and Jiang Zhanghua. 2013. "Survey, Excavation, and Geophysics at Songjiaheba—A Small Bronze Age Site in the Chengdu Plain." *Asian Perspectives* 52 (1): 119–44. <https://doi.org/10.1353/asi.2013.0006>.
- Fletcher, Roland, and Damian Evans. 2012. "The Dynamics of Angkor and Its Landscape: Issues of Scale, Non-Correspondence and Outcome." In *Old Myths and New Approaches: Interpreting Ancient Religious Sites in Southeast Asia*, edited by A. Haendel, 42–62. Melbourne: Monash University Publishing.
- Fletcher, Roland, Dan Penny, Damian Evans, Christophe Pottier, Mike Barbetti, Matti Kummu, Terry Lustig, and others. 2008. "The Water Management Network of Angkor, Cambodia." *Antiquity* 82 (317): 658–670.
- Fogelin, Lars. 2006. *Archaeology of Early Buddhism*. Lanham, MD: AltaMira Press.
- Forestier, Hubert, Heng Sophady, Simon Puaud, Vincenzo Celiberti, Stéphane Frère, Valéry Zeitoun, Cécile Mourer-Chauviré, Roland Mourer, Heng Than, and Laurence Billault. 2015. "The Hoabinhian from Laang Spean Cave in Its Stratigraphic, Chronological, Typo-Technological and Environmental Context (Cambodia, Battambang Province)." *Journal of Archaeological Science: Reports* 3 (September): 194–206. <https://doi.org/10.1016/j.jasrep.2015.06.008>.
- Forestier, Hubert, Heng Sophady, Simon Puaud, Roland Mourer, Laurence Billault, Marc Philippe, and Valéry Zeitoun. 2014. "New Evidence of Old Stone Tools from the Mekong Terraces, Cambodia." *Comptes Rendus Palevol* 13 (2): 109–20.
- Foster, Benjamin. 1981. "A New Look at the Sumerian Temple State." *Journal of the Economic and Social History of the Orient* 24 (3): 225. <https://doi.org/10.2307/3631906>.
- Fox, Jeff, and Judy Ledgerwood. 1999. "Dry-Season Flood-Recession Rice in the Mekong Delta: Two Thousand Years of Sustainable Agriculture?" *Asian Perspectives* 38: 37–50.
- Fox, John W., Garrett W. Cook, and Arthur A. Demarest. 1996. "Constructing Maya Communities: Ethnography for Archaeology." *Current Anthropology* 37: 811–30.

- Freter, Anne Corinne. 1994. "The Classic Maya Collapse at Copán, Honduras: An Analysis of Maya Rural Settlement Trends." In *Archaeological Views from the Countryside: Village Communities in Early Complex Societies*, edited by Glenn M. Schwartz and Steven E. Falconer, 160–76. Washington: Smithsonian Institution Press.
- Friedman, Jonathan. 1975. "Tribes, States and Transformations." In *Marxist Analyses and Social Anthropology*, 161–202.
- Friedman, Jonathan, and Michael Rowlands. 1977. "Notes towards an Epigenetic Model of the Evolution of Civilization." In *The Evolution of Social Systems*, 201–76. London: Duckworth.
- Garnier, Francis. 1885. *Voyage d'exploration en Indo-Chine: effectué par une commission française présidée par le capitaine de frégate Doudart de Lagrée: relation empruntée au journal "le Tour du monde."* Paris: Hachette et Cie.
- Garnier, Francis, and Louis Delaporte. 1996. *The Mekong Exploration Commission Report, 1866-1868*. Translated by Walter E. J. Tips. Bangkok: White Lotus Press.
- Gaucher, Jacques. 2003. "New Archaeological Data on the Urban Space of the Capital City of Angkor Thom." In *Fishbones and Glittering Emblems*, edited by Anna Karlström and Anna Källén. Southeast Asian Archaeology 2002. Stockholm: Museum of Far Eastern Antiquities.
- Geertz, Clifford. 1980. *Negara: The Theatre State in Nineteenth-Century Bali*. Princeton, N.J.: Princeton University Press.
- Gerritsen, Fokke. 2006. "Archaeological Perspectives on Local Communities." In *A Companion to Archaeology*, edited by John L. Bintliff, 141–54. Blackwell Companion to Archaeology. Malden, MA; Oxford: Blackwell.
- Giteau, Madeleine. 1975. *Iconographie du cambodge post-angkorien*. Paris.
- Glover, Ian. 1990. *Early Trade between India and Southeast Asia: A Link in the Development of a World Trading System*. Centre for Southeast Asian Studies, Occasional Papers No. 16 (2nd Ed.). Hull: Centre for Southeast Asian Studies.
- . 2016. "Connecting Prehistoric and Historic Cultures in Southeast Asia." *Journal of Southeast Asian Studies* 47 (03): 506–10. <https://doi.org/10.1017/S0022463416000291>.
- Glover, Ian, and Bérénice Bellina. 2003. "Alkaline Etched Beads in Southeast Asia." In *Ornaments from the Past, Bead Studies after Beck: A Book on Glass and Semiprecious Stone Beads in History and Archaeology for Archaeologists, Jewellery Historians and Collectors*, edited by Ian Glover, Helen Hughes-Brock, and Julian Henderson, 92–107. London: Bead Study Trust.
- . 2011. "Ban Don Ta Phet and Khao Sam Kaeo: The Earliest Indian Contacts Re-Assessed." In *Early Interactions between South and Southeast Asia: Reflections on Cross-Cultural Exchange*, 17–46. ISEAS–Yusof Ishak Institute.
- Goodall, Dominic. 2009. "Who Is Caṇḍeśa?" In *Genesis and Development of Tantrism*, edited by Shingo Einoo, 351–424. Institute of Oriental Culture Special Series 23. Tokyo: Institute of Oriental Culture, University of Tokyo.
- Grave, Peter, Miriam T. Stark, Darith Ea, Lisa Kealhofer, Bun Suy Tan, and Tina Tin. 2015. "Differentiating Khmer Stoneware Production: An NAA Pilot Study from Siem Reap Province, Cambodia: Differentiating Khmer Stoneware Production." *Archaeometry*, 1–12. <https://doi.org/10.1111/arc.12220>.

- Griffiths, Arlo. 2014. "Early Indic Inscriptions of Southeast Asia." *Lost Kingdoms: Hindu-Buddhist Sculpture of Early Southeast Asia*, 53–57.
- Groslier, Bernard Philippe. 1959. "Nouvelles recherches archéologiques à Angkor." *Comptes-rendus des séances de l'Académie des inscriptions et belles-lettres* 103 (2): 377–89. <https://doi.org/10.3406/crai.1959.11092>.
- . 1960. "Our Knowledge of Khmer Civilization, A Re-Appraisal." *Journal of the Siam Society* 48 (1): 1–28.
- . 1962. *Indochina: Art in the Melting-Pot of Races*. Art of the World. A Series of Regional Histories of the Visual Arts ; 9. London: Methuen.
- . 1974. "Agriculture et Religion Dans l'Empire Angkorien." *Études Rurales*, 95–117.
- . 1979. "La Cité Hydraulique Angkorienne: Exploitation Ou Surexploitation Du Sol?" *Bulletin de l'École Française d'Extrême-Orient* 66: 161–202.
- . 1981. "Introduction to the Ceramic Wares of Angkor." In *Khmer Ceramics 9th-14th Century*, edited by Diana Stock, 9–40.
- . 2006. *Angkor and Cambodia in the Sixteenth Century: According to Portuguese and Spanish Sources*. 1st English edition. Bangkok, Thailand: Orchid Press.
- Guérin, Mathieu. 2001. "Essartage et riziculture humide. Complémentarité des écosystèmes agraires à Stung Treng au début du XXe siècle." *Aséanie* 8 (1): 35–55. <https://doi.org/10.3406/asean.2001.1730>.
- . 2003. "Des casques blancs sur le Plateau des Herbes: La pacification des aborigènes des hautes terres du Sud-Indochinois, 1859-1940." Université Paris-Diderot-Paris VII. <https://hal.archives-ouvertes.fr/tel-00504474/>.
- . 2008. *Paysans de La Forêt à l'époque Coloniale : La Pacification Des Habitants Des Hautes Terres Du Cambodge*. EFEO. <https://hal.archives-ouvertes.fr/hal-00338283>.
- Guérin, Mathieu, and Kunthea Chhom. 2014. "Le périple de Khim et Nov de Stung Treng à Attopeu en 1883, récit d'exploration cambodgien du XIXe siècle." *Péninsule*, no. 69: 103–40.
- Guérin, Mathieu, and Jonathan Padwe. 2011. "Pénétration Coloniale et Résistance Chez Les Jarai. Revisiter Le Rôle Des Colonisés Dans La Mise En Place Des Frontières En Indochine." *Outre-Mers Revue d'Histoire, Société Française d'histoire d'outre-Mer* 98 (370): 245–272.
- Guérine, Alexandrine. 2002. "Étude préliminaire des céramiques de Sambor Prei Kuk provenant des fouilles de B.P. Groslier (1962) et conservées au musée national de Phnom Penh." In *Mafkata campagne rapport 2002*, edited by Christophe Pottier, 1:19–22. Siem Reap: EFEO Centre de Siem Reap.
- Guy, John, ed. 2014. *Lost Kingdoms: Hindu-Buddhist Sculpture of Early Southeast Asia*.
- Haidle, Miriam Noël. 2001. "Fragments of Glass Bangles from Krek 52/62 and Their Implications for the Dating of the Mimotien Culture." *Asian Perspectives* 40 (2): 195–208.
- Hall, Kenneth R. 1985. *Maritime Trade and State Development in Early Southeast Asia*. Hawaii: University of Hawaii Press.
- . 1992. "Economic History of Early Southeast Asia." In *The Cambridge History of Southeast Asia.*, edited by Nicholas Tarling, 1:185–275. Cambridge.: Cambridge University Press.

- . 2011. "The Temple-Based Mainland Political Economies of Angkor Cambodia and Pagan Burma, ca. 889-1300." In *A History of Early Southeast Asia: Maritime Trade and Societal Development, 100–1500*, 159–210. Rowman & Littlefield Publishers.
- Hall, Kenneth R., and George W. Spencer. 1980. "The Economy of Kañcīpuram A Sacred Center in Early South India." *Journal of Urban History* 6 (2): 127–151.
- Hall, Tegan, Dan Penny, Mitch Hendrickson, Colin Cooke, and Quan Hua. 2016. "Iron and Fire: Geoarchaeological History of a Khmer Peripheral Centre during the Decline of the Angkorian Empire, Cambodia." *Journal of Archaeological Science: Reports* 6 (April): 53–63. <https://doi.org/10.1016/j.jasrep.2016.01.028>.
- Halls, A.S., I. Conlan, W. Wisesjindawat, K. Phouthavongs, S. Viravong, S. Chan, and V.A. Vu. 2013. *Atlas of Deep Pools in the Lower Mekong River and Some of Its Tributaries*. Vol. 31. MRC Technical Paper. Phnom Penh, Cambodia: Mekong River Commission.
- Hauser-Schäublin, Brigitta. 2003. "The Precolonial Balinese State Reconsidered: A Critical Evaluation of Theory Construction on the Relationship between Irrigation, the State, and Ritual." *Current Anthropology* 44: 153–81.
- . 2011. "Land Donations and the Gift of Water. On Temple Landlordism and Irrigation Agriculture in Pre-Colonial Bali." *Human Ecology* 39 (1): 43–53. <https://doi.org/10.1007/s10745-011-9388-9>.
- Heitzman, James. 1987a. "Temple Urbanism in Medieval South India." *The Journal of Asian Studies* 46 (4): 791.
- . 1987b. "State Formation in South India, 850 -1280." *Indian Economic & Social History Review* 24 (1): 35–61. <https://doi.org/10.1177/001946468702400102>.
- . 2004. "Temple Economy in South Asia." *The World in the Year 1000*, 133–53.
- Hendrickson, Mitch. 2007. "Arteries of Empire: An Operational Study of Transport and Communication in Angkorian Southeast Asia (9th to 15th Centuries CE)." Sydney: University of Sydney.
- . 2010. "Historic Routes to Angkor: Development of the Khmer Road System (Ninth to Thirteenth Centuries AD) in Mainland Southeast Asia.(Research)(Report)." *Antiquity* 84 (324): 480(17).
- Heng, Piphall. 2012. "Speculation on Land Use in and around Sambor Prei Kuk." In *Old Myths, New Approaches*, edited by Alexandra Haendel, 180–98. Monash: Monash University Press.
- . 2016. "Transition to the Pre-Angkorian Period (300–500 CE): Thala Borivat and a Regional Perspective." *Journal of Southeast Asian Studies* 47 (03): 484–505. <https://doi.org/10.1017/S0022463416000369>.
- Heng, Sophady. 2005. "Village 10.8: Excavation Results of an Iron Age Cemetery in the Red Soil Region, Eastern Cambodia." *Ministry of Culture and Fine Arts, Cambodia*.
- . 2008. "A Study of Polished Stone Tools from Samrong Sen, Cambodia: The French Museum Collections." *Annali Dell'Università Degli Studi Di Ferrara*, 87–90.
- Heng, Sophady, Hubert Forestier, Valéry Zeitoun, Simon Puaud, Stéphane Frère, Vincenzo Celiberti, Kira Westaway, et al. 2015. "Laang Spean Cave (Battambang Province): A Tale of Occupation in Cambodia from the Late Upper Pleistocene to Holocene." *Quaternary International*, October. <https://doi.org/10.1016/j.quaint.2015.07.049>.

- Heng, Sophady, Than Heng, Tech Srun, Vuthy Voeun, Dany Eam, Valéry Zeitoun, and Alison K. Carter. 2013. "Kok Treas: Iron Age Mortuary Site at Banteay Chhmar." Phnom Penh, Cambodia: Ministry of Culture and Fine Arts.
- Henri, M. Bruel. 1916. *Monographie de la circonscription de Stung-Treng*. Saigon: C. Ardin et Fils, Imprimeurs-éditeurs.
- Higham, Charles F. W. 2002. *Early Culture of Mainland Southeast Asia*. Bangkok: River Books.
- . 2004. "Mainland Southeast Asia from the Neolithic to the Iron Age." In *Southeast Asia: From Prehistory to History*, edited by I. Glover and P Bellwood, 41–67. Curzon, London and New York: Routledge.
- . 2007. "Summary and Conclusions in the Excavation of Noen U-Loke and Non Muang Kao." In *The Origins of the Civilization of Angkor*, edited by Charles F. W. Higham, A. Kijngam, and et al., 2:595–609. Bangkok: Thai Fine Arts Department.
- . 2014. "From the Iron Age to Angkor: New Light on the Origins of a State." *Antiquity* 88 (341): 822–835.
- . 2015. "From Site Formation to Social Structure in Prehistoric Thailand." *Journal of Field Archaeology* 40 (4): 383–96. <https://doi.org/10.1179/2042458214Y.0000000010>.
- . 2016. "At the Dawn of History: From Iron Age Aggrandisers to Zhenla Kings." *Journal of Southeast Asian Studies* 47 (03): 418–37. <https://doi.org/10.1017/S0022463416000266>.
- Higham, Charles F. W., Judith Cameron, Nigel Chang, Cristina Castillo, Sian Halcrow, Dougald O'Reilly, Fiona Petchey, and Louise Shewan. 2014. "The Excavation of Non Ban Jak, Northeast Thailand-A Report on the First Three Seasons." *Journal of Indo-Pacific Archaeology* 34: 1–41.
- Higham, Charles F. W., A. Kijngam, and Sarah Talbot, eds. 2007. *The Excavation of Noen U-Loke and Non Muang Kao*. Vol. 2. The Origins of the Civilization of Angkor Volume. Bangkok: Fine Arts Department of Thailand.
- HOR, Sanara, Kei MIZUNO, Shintaro KOBAYASHI, and Tsugihiko WATANABE. 2014. "The Traditional Practice of Swidden Cultivation in the Djarai Ethnic Communities of Northeastern Cambodia." *システム農学(J.JASS)* 30 (4): 131–141.
- Hortle, K. G., Phnom Penh, S. Lieng, J. Valbo-Jorgensen, Mekong River Commission, and others. 2004. "An Introduction to Cambodia's Inland Fisheries." <http://agris.fao.org/agris-search/search.do?recordID=XF2015013192>.
- Hun, Sokhalay, Ir. Freddy Wens, and Lieven Geerinck. 2016. "Calibration of the Navigable Waterways on the Lower Mekong River into a Classification Standard." In *Unpublished Conference Paper for the PIANC – COPEDEC IX, 2016. Rio de Janeiro, Brazil*. [Http://Incomnews.Org/Images/Documents/Presentations_-_Workshop_INCOM_ECLAC_ANTAQ/52-_Annex_2_-_Waterways_calibration_Mekong__F_Wens_Oct_2016.Pdf](http://Incomnews.Org/Images/Documents/Presentations_-_Workshop_INCOM_ECLAC_ANTAQ/52-_Annex_2_-_Waterways_calibration_Mekong__F_Wens_Oct_2016.Pdf).
- Huntington, John C. 1985. "The Origin of the Buddha Image: Early Image Traditions and the Concept of Buddhadasanapunya." *Studies in Buddhist Art of South Asia, AK Narain, Ed.*, 23–58.
- Inomata, Takeshi, and Kazuo Aoyama. 1996. "Central-Place Analyses in the La Entrada Region, Honduras: Implications for Understanding the Classic Maya Political and Economic Systems." *Latin American Antiquity* 7: 291–312.

- International Rice Research Institute, New York State College of Agriculture and Life Sciences, and University Consortium on Soils for the Tropics. 1980. *Priorities for Alleviating Soil-Related Constraints to Food Production in the Tropics*. Manila, Philippines: International Rice Research Institute.
- Isendahl, Christian, and Michael E. Smith. 2013. "Sustainable Agrarian Urbanism: The Low-Density Cities of the Mayas and Aztecs." *Cities* 31 (April): 132–43. <https://doi.org/10.1016/j.cities.2012.07.012>.
- Jacob, Judith M. 1993a. "Pre-Angkor Cambodia: Evidence from the Inscriptions in Khmer Concerning the Common People and Their Environment." In *Early South East Asia: Essays in Archaeology, History, and Historical Geography*, edited by R. B. Smith and William Watson, 299–318. New York: Oxford University Press.
- . 1993b. "The Ecology of Angkor : Evidence from the Khmer Inscriptions." In *Cambodian Linguistics, Literature and History: Collected Articles*, edited by Judith M. Jacob and David A. Smyth, 280–83. New York: Routledge.
- Jacques, Claude. 1979. "'Funan', 'Zhenla': The Reality Concealed by These Chinese Views of Indochina." In *Early South East Asia: Essays in Archaeology, History, and Historical Geography*, edited by R. B. Smith and W. Watson, 371–379. New York: Oxford University Press.
- . 1986. "Le pays Khmer avant Angkor." *Journal des savants* 1 (1): 59–95.
- Jacques, Claude, and Philippe Lafond. 2004. *L'empire khmer: cités et sanctuaires, ve-xiie siècles*. Paris: Librairie Arthème Fayard.
- . 2007. *The Khmer Empire: Cities and Sanctuaries from the 5th to the 13th Centuries*. Bangkok: River Books.
- Jenner, Philip N. 1982. *A Chronological Inventory of the Inscriptions of Cambodia, Revised*. Second Edition, Revised. Southeast Asian Paper No. 19. Honolulu: Center for Southeast Asian Studies, School of Hawaiian, Asian, and Pacific Studies, University of Hawai'i at Mānoa.
- . 2009. *A Dictionary of Pre-Angkorian Khmer*. Edited by Doug Cooper. Canberra: Australian National University.
- . 2017. "SEA Classics Old Khmer Corpus." Online database. Classical Southeast Asian Texts and Reference. 2017. <http://sealang.net/ok/corpus.htm>.
- JICA. 2003. "Cambodia Reconnaissance Survey." Digital dataset. Kingdom of Cambodia: Ministry of Public Works and Transportation (MPWT) and Japan International Cooperation Agency (JICA).
- Junker, Laura Lee. 1993. "Craft Goods Specialization and Prestige Goods Exchange in Philippine Chiefdoms of the 15th and 16th Centuries." *Asian Perspectives* 32 (1): 1–36.
- . 1999. *Raiding, Trading, and Feasting: The Political Economy of Philippine Chiefdoms*. Honolulu: University of Hawai'i Press.
- . 2004. "Political Economy in the Historic Period Chiefdoms and States of Southeast Asia." In *Archaeological Perspectives on Political Economies*, edited by Gary M. Feinman and Linda M. Nicholas, 223–51. Salt Lake City: University of Utah Press.
- Keay, John. 2005. "The Mekong Exploration Commission, 1866–68: Anglo-French Rivalry in South East Asia." *Asian Affairs* 36 (3): 289–312. <https://doi.org/10.1080/03068370500276266>.

- Kersten, Carool. 2003. *Strange Events in the Kingdoms of Cambodia and Laos, 1635-1644*. Bangkok: White Lotus Press.
- . 2006. "Cambodia's Muslim King: Khmer and Dutch Sources on the Conversion of Reameathipadei I, 1642–1658." *Journal of Southeast Asian Studies* 37 (01): 1.
- Khin, Sok. 1980. "L'Inscription moderne de taprom (bati), K. 39." *Mon-Khmer Studies* 8: 77–89.
- Kirch, Patrick V., Regina Mertz-Kraus, and Warren D. Sharp. 2015. "Precise Chronology of Polynesian Temple Construction and Use for Southeastern Maui, Hawaiian Islands Determined by 230Th Dating of Corals." *Journal of Archaeological Science* 53 (January): 166–77. <https://doi.org/10.1016/j.jas.2014.09.025>.
- Kolb, Michael J. 2012. "The Genesis of Monuments in Island Societies." *The Comparative Archaeology of Complex Societies*, 138–64.
- Kowalewski, Stephen A. 2008. "Regional Settlement Pattern Studies." *Journal of Archaeological Research* 16: 225–85.
- Kowalewski, Stephen A., Richard E. Blanton, Gary Feinman, and Laura Finsten. 1983. "Boundaries, Scale, and Internal Organization." *Journal of Anthropological Archaeology* 2 (1): 32–56.
- Kowalewski, Stephen A., Gary M. Feinman, Laura Finsten, Richard E. Blanton, and Linda M. Nicholas. 1989a. "Hierarchy." In *Monte Albán's Hinterland, Part II: Prehispanic Settlement Patterns in Tlacolula, Etla, and Ocotlan, the Valley of Oaxaca, Mexico*, 76–81. Memoirs of the Museum of Anthropology, University of Michigan, No. 23. Ann Arbor: Museum of Anthropology.
- . 1989b. *Monte Albán's Hinterland, Part II: Prehispanic Settlement Patterns in Tlacolula, Etla, and Ocotlan, the Valley of Oaxaca, Mexico*. Memoirs of the Museum of Anthropology, University of Michigan, No. 23. Ann Arbor: Museum of Anthropology.
- Kozuh, Michael. 2008. "Temple, Economy, and Religion in First Millennium Babylonia." *Religion Compass* 2 (6): 929–948.
- Kraan, Alfons Van der. 2009. *Murder and Mayhem in Seventeenth Century Cambodia*. Leiden: Koninklijk Instituut voor.
- Kubo, Sumiko, Sae Shimamoto, Naoko Nagumo, Mariko Yamagata, Sophorn Him, Sokuntheary So, Vitharong Chang, Votey Lun, Ichita Shimoda, and Takeshi Nakagawa. 2012. "Geomorphology, Archaeo-Stratigraphy, and 14C Ages of Sambor Prei Kuk Pre-Angkorean Site. Central Cambodia." *Bulletin of the Graduate School of Education of Waseda University* 22 (March): 73–90.
- Kulke, Hermann. 1990. "Indian Colonies, Indianization or Cultural Convergence? Reflections on the Changing Image of India's Role in South-East Asia." In *Onderzoek in Zuidoost-Azië: Agenda's Voor de Jaren Negentig*, edited by H. Schulte Nordholt, 8–32. Leiden: Rijksuniversiteit te Leiden, Vakgroep Talen en Culturen van Zuidoost-Azië en Oceanië.
- Lajonquière, Lunet de. 1902. *Inventaire Descriptif des Monuments du Cambodge, Vol 1*. Paris: Ernest Leroux.
- . 1907. *Inventaire Descriptif des Monuments du Cambodge, Vol 2*. Paris: Ernest Leroux.
- . 1911. *Inventaire Descriptif des Monuments du Cambodge. Vol 3*. Vol. 3. Paris: Ernest Leroux.

- Lal, Makkhan. 1984. *Settlement History and Rise of Civilization in Ganga-Yamuna Doab from 1500 B.C. to 300 A.D.* Revised version of author's thesis (Ph. D.--Poona University). Delhi; New York: Delhi [India] : B.R. Publishing Co. ; New York, N.Y. : Distributed by APT Books.
- Langle, Fleuriot de. 1973. *Carte géologique de reconnaissance 1/200000, Ratanakiri*. Paris: Service National des Mines de la Geologie et du Petrole, Editions du Bureau de Recherches Geologiques et Minières.
- Lansing, J. Stephen, and Thérèse A. de Vet. 2012. "The Functional Role of Balinese Water Temples: A Response to Critics." *Human Ecology* 40 (3): 453–67. <https://doi.org/10.1007/s10745-012-9469-4>.
- Lansing, John Stephen. 2007. *Priests and Programmers Technologies of Power in the Engineered Landscape of Bali*. Princeton, N.J.: Princeton University Press. <http://www.aspresolver.com/aspresolver.asp?ANTH;1666398>.
- Lansing, Stephen et al. 2009. "A Robust Budding Model of Balinese Water Temple Networks." *World Archaeology* 41 (1): 112–33.
- Lavy, Paul A. 2003. "As in Heaven, So on Earth: The Politics of Visnu, Siva and Harihara Images in Preangkorian Khmer Civilisation." *Journal of Southeast Asian Studies* 34 (01): 21–39.
- . 2004. "Visnu and Harihara in the Art and Politics of Early Historic Southeast Asia." Thesis (Ph D), UCLA, 2004.
- . 2014. "Conch-on-Hip Images in Peninsular Thailand and Early Vaiṣṇava Sculpture in Southeast Asia." In *Before Siam: Essays in Art and Archaeology*, edited by Nicolas Revire and Stephen A. Murphy, 153–73. Bangkok: River Books.
- Le, Thi Lien. 2006. *Nghệ thuật Phật giáo và Hindu giáo ở Đồng bằng sông Cửu Long trước thế kỷ X (Buddhist and Hindu Art in the Cuu Long river Delta prior to 10th century A.D.)*. Hanoi: The Gioi Publishing House.
- . 2007. "Gold Plaques and Their Cultural Contexts in the Oc Eo Culture." *Bulletin of the Indo-Pacific Prehistory Association* 25 (0): 145–54. <https://doi.org/10.7152/bippa.v25i0.11930>.
- . 2011. "Hindu Deities in Southern Vietnam: Images on Small Archaeological Artefacts." In *Early Interactions Between South and Southeast Asia: Reflections on Cross-Cultural Exchange*, edited by Pierre-Yves Manguin, A. Mani, and Geoff Wade, 407–31. Singapore: Institute of Southeast Asian Studies.
- . 2015. "Hindu Beliefs and the Maritime Network in Southern Vietnam During the Early Common Era." *Journal of Indo-Pacific Archaeology* 39: 1–17.
- Leclère, Adhémar. 1890. *Recherches sur la législation cambodgienne (droit privé)*. Paris: Librairie Coloniale.
- . 1894a. *Recherches sur la législation criminelle et la procédure des cambodgiens*. Paris: Librairie Coloniale.
- . 1894b. *Recherches sur le droit public des cambodgiens*. Paris: Librairie Coloniale.
- . 1899. *Le buddhisme au cambodge*. Paris: Ernest Leroux.
- . 1903. "Mémoire Sur Une Charte de Fondation d'un Monastère Bouddhique Où Il Est Question Du Roi Du Feu et Du Roi de l'Eau." *Comptes Rendus Des Séances de l'Académie Des Inscriptions et Belles-Lettres* 47 (4): 369–378.
- . 1904. "Une campagne archéologique au Cambodge." *Bulletin de l'Ecole française d'Extrême-Orient* 4 (1): 737–49.

- . 1908. *Monographie de la province de Kratié*. Saigon: Impr. F.H. Schneider.
- Lévy, Paul. 1946. *Recherches préhistorique dans la région du mlu prei*. Hanoi.
- . 1970. “Thala Bōrivāt ou Stu’ñ Trèh: sites de la capitale du souverain khmer Bhavavarman Ier.” *Journal Asiatique* 258: 113–29.
- Lewitz, Saveros. 1972. “VII. Inscriptions Modernes d’Angkor 10, 11, 12, 13, 14, 15, 16a,16, et 16c.” *BEFEO* 59: 221–49.
- . 1973a. “IX. Inscriptions Modernes d’Angkor 26, 27, 28, 29, 30, 31, 32, 33.” *BEFEO* 60: 205–42.
- . 1973b. “VIII. Inscriptions Modernes d’Angkor 17, 18, 19, 20, 21, 22, 23, 24 et 25.” *BEFEO* 60: 163–203.
- Lorrillard, Michel. 2013. “Du centre à la marge: Vat Phu dans les études sur l’espace khmer ancien.” *Bulletin de l’École française d’Extrême-Orient* 97-98 (for 2010-2011): 187–204.
- . 2014. “Pre-Angkorian Communities in the Middle Mekong Valley (Laos and Adjacent Areas).” In *Before Siam: Essays in Art and Archaeology*, edited by Nicolas Revire and Stephen A. Murphy, 187–2015. Bangkok: River Books.
- Lucero, Lisa J. 2003. “The Politics of Ritual: The Emergence of Classic Maya Rulers.” *Current Anthropology* 44: 523–58.
- Lustig, Eileen. 2009a. “Money Doesn’t Make the World Go Around: Angkor’s Non-Monetisation.” In *Economic Development, Integration, and Morality in Asia and the Americas*, edited by Donald C. Wood, 1. ed, 165–99. *Research in Economic Anthropology* 29. Bingley: Emerald.
- . 2009b. “Power and Pragmatism in the Political Economy of Angkor.”
- Lustig, Eileen, Damian Evans, and Richards Ngaire. 2007. “Words across Space and Time: An Analysis of Lexical Items in Khmer Inscriptions, Sixth–Fourteenth Centuries CE.” *Journal of Southeast Asian Studies* 38 (01): 1.
- Ly, Vanna. 2002. “Rice Remains in the Prehistoric Pottery Tempers of the Shell Midden Site of Samrong Sen: Implications for Early Rice Cultivation in Central Cambodia.” *Aséanie* 9 (1): 13–34.
- . 2003. “The Archaeology of Shell Matrix Sites in the Central Floodplain of the Tonle Sap River, Central Cambodia: The Shell Settlement Site of Samrong Sen and Its Cultural Complexity.” *Doctoral Dissertation, Sophia University*.
<http://ci.nii.ac.jp/naid/500000231066>.
- Mabbett, Ian W. 1971. *Truth, Myth, and Politics in Ancient India*. New Delhi: Thomson Press (India), Publication Division.
- . 1977a. “The ‘Indianization’ of Southeast Asia: Reflections on the Historical Sources.” *Journal of Southeast Asian Studies* 8 (02): 143–161.
- . 1977b. “Varnas in Angkor and the Indian Caste System.” *The Journal of Asian Studies* 36 (3): 429.
- MacQuarrie, Patrick R., Rebecca Welling, Lalita Rammong, and Pangare Ganesh. 2013. *The 3S River Basin*. Gland, Switzerland: IUCN.
- Mak, Phoeun. 1981. *Chroniques royales du Cambodge*. Vol. 3. Ecole française d’Extrême-Orient.
- . 2002. “Essai de tableau chronologique des rois du cambodge de la période post-angkoriennne.” *Journal Asiatique* 1: 101–61.

- Makkay, J. 1983. "The Origins of the 'Temple-Economy' as Seen in the Light of Prehistoric Evidence." *Iraq* 45 (1): 1. <https://doi.org/10.2307/4200170>.
- Malleret, Louis. 1959a. "III. Ouvrages circulaires en terre dans l'Indochine méridionale." *Bulletin de l'Ecole française d'Extrême-Orient* 49 (2): 409–34.
- . 1959b. *L'archéologie du delta du Mékong*. Vol. 1. L'exploration archéologique et les fouilles d'Oc-Èo. Paris: Ecole française d'Extrême-Orient.
- . 1960. *L'archéologie du delta du Mékong*. Vol. 2. L'exploration archéologique et les fouilles d'Oc-Èo. Paris: Ecole française d'Extrême-Orient.
- . 1962. *L'archéologie du delta du Mékong*. Vol. 3. L'exploration archéologique et les fouilles d'Oc-Èo. Paris: Ecole française d'Extrême-Orient.
- . 1966. "Une nouvelle statue preangkoriennne de Surya dans le Bas-Mekong." *Artibus Asiae. Supplementum* 23: 109.
- Mam, Vannary, Serey Leakhena Ran, Sovath Bong, Kaseka Phon, Sytha Pheng, Chanthourn Thuy, Bion P. Griffin, Michael F. Dega, and Bertell D. Davis. 2004. "The East Cambodia Archaeological Survey: A Pilot Project to Evaluate the Implementation of a National Register of Historic Places for the Kingdom of Cambodia." Honolulu, Hawaii and Ratchaburi, Thailand.
- Manguin, Pierre-Yves. 2000. "City-States and City-State Cultures in pre-15th-Century Southeast Asia." In *An Investigation Conducted by the Copenhagen Polis Centre*, edited by M. H. Hansen. Copenhagen: C. A. Reitzels Forlag.
- . 2002. "The Amorphous Nature of Coastal Polities in Insular Southeast Asia: Restricted Centres, Extended Peripheries." *Moussons. Recherche En Sciences Humaines Sur l'Asie Du Sud-Est*, no. 5: 73–99.
- . 2004. "The Archaeology of Early Maritime Polities of Southeast Asia." In *Southeast Asia: From Prehistory to History*, edited by Ian Glover and Peter Bellwood. New York: Routledge Curzon.
- Manguin, Pierre-Yves, and Si Khai Vo. 2000. "Excavations at the Ba The/Oc Eo Complex (Vietnam): A Preliminary Report on the 1998 Campaign." In *Southeast Asian Archaeology 1998: Proceedings of the 7th International Conference of the European Association of Southeast Asian Archaeologists Berlin, 31 August-4 September 1998*, edited by Wibke Lobo and Stefanie Reimann, 107–21. Centre for South-East Asian Studies, University of Hull.
- Mansuy, Henri. 1902. *Stations préhistoriques de samrong-sen et de longprao (cambodge)*. Hanoi: F. H. Schneider.
- Marutani, Masaharu. 2006. "Final Report for Economic Geology FR-2: Sector Plan for Sustainable Evelopment of the Mining Sector in the Lao PDR." Washington D. C.: The World Bank.
- Meshkova, Liubov V. 2012. "Geomorphology and Channel Network Patterns of the Mekong River in Cambodia." University of Southampton. <http://eprints.soton.ac.uk/339991/>.
- Meshkova, Liubov V., and Paul A. Carling. 2012. "The Geomorphological Characteristics of the Mekong River in Northern Cambodia: A Mixed Bedrock–Alluvial Multi-Channel Network." *Geomorphology, Geomorphology of Large Rivers - cases from the 7th IAG Conference, Melbourne*, 147–148 (April): 2–17. <https://doi.org/10.1016/j.geomorph.2011.06.041>.

- Meyer, Charles. 1965. "Les mysterieuses relations entre le roi du cambodge et les 'po'tao' des jarai." *Études cambodgiennes* 4 (Octobre-Décembre): 14–26.
- Meynell, Peter-John. 2014. "The Sekong River in Viet Nam, Lao PDR and Cambodia (An Information Sourcebook for Dialogue on River Flow Management)." International Union for the Conservation of Nature. <http://3sbasin.org/>.
- Miksic, John N. 2003. *Earthenware in Southeast Asia: Proceedings of the Singapore Symposium on Premodern Southeast Asian Earthenwares*. NUS Press.
- Mollerup, Asger. 2012. *Ancient Khmer Sites in Eastern Thailand*. Bangkok: White Lotus Press.
- Morrison, Kathleen D. 1994. "States of Theory and States of Asia: Regional Perspectives on States in Asia." *Asian Perspectives*, 183–196.
- . 1995. "Trade, Urbanism, and Agricultural Expansion: Buddhist Monastic Institutions and the State in the Early Historic Western Deccan." *World Archaeology* 27 (2): 203–221.
- Mourer, Roland. 1988. "Préhistoire Du Cambodge." *Archéologia*, no. 233.
- MRC. 2003. *Social Atlas of the Lower Mekong Basin: March 2003*. Mekong River Commission.
- . 2005. "Overview of the Hydrology of the Mekong Basin." *Mekong River Commission (MRC), Vientiane* 82.
- . 2012. "Carriage, Handling and Storage of Dangerous Goods Along the Mekong River: Volume I: Risk Analysis." Mekong River Commission (MRC). <http://www.mrcmekong.org/about-mrc/completion-of-strategic-cycle-2011-2015/navigation-programme/dangerous-goods-risk-analysis/>.
- . 2015. "Design of a Master Plan for Regional Waterborne Transport in the Mekong River Basin. Final Report Volume 1." Mekong River Commission (MRC).
- Mudar, Karen. 1993. "Prehistoric and Early Historic Settlements on the Central Plain: Analysis of Archaeological Survey in Lopburi Province, Thailand." Dissertation, Michigan: University of Michigan.
- . 1995. "Evidence for Prehistoric Dryland Farming in Mainland Southeast Asia: Results of Regional Survey in Lopburi Province, Thailand." *Asian Perspectives* 34 (2): 157–94.
- Mulrooney, Mara A., and Thegn N. Ladefoged. 2005. "Hawaiian Heiau and Agricultural Production in the Kohala Dryland Field System." *The Journal of the Polynesian Society* 114 (1): 45–67.
- Murphy, Stephen A. 2013a. "Buddhism and Its Relationship to Dvaravati Period Settlement Patterns and Material Culture in Northeast Thailand and Central Laos c. Sixth–Eleventh Centuries A.D.: A Historical Ecology Approach to the Landscape of the Khorat Plateau." *Asian Perspectives* 52 (2): 300–326.
- . 2013b. "The Distribution of Sema Stones Throughout the Khorat Plateau During the Dvāravatī Period." In *Unearthing Southeast Asia's Past: Selected Papers from the 12th International Conference of the European Association of Southeast Asian Archaeologists*, edited by Marijke J. Klokke and Marijke J. Klokke and Veronique Degroot, 215–33. Singapore: NUS Press Pte Ltd.
- Odell, George H., and Frank Cowan. 1987. "Estimating Tillage Effects on Artifact Distributions." *American Antiquity* 52 (03): 456–84. <https://doi.org/10.2307/281594>.
- Oka, Rahul, and Chapurukha M. Kusimba. 2008. "The Archaeology of Trading Systems, Part 1: Towards a New Trade Synthesis." *Journal of Archaeological Research* 16 (4): 339–95. <https://doi.org/10.1007/s10814-008-9023-5>.

- O'Reilly, Dougald. 2003. "A Preliminary Report on the Excavation of a Late Prehistoric Cemetery in Northwest Cambodia." *Bulletin of the Indo-Pacific Prehistory Association* 24: 129–32.
- O'Reilly, Dougald, Kate Domett, and Sytha Pheng. 2006. "The Excavation of a Late Prehistoric Cemetery in Northwest Cambodia." *UDAYA: Journal of Khmer Studies* 7: 207–222.
- O'Reilly, Dougald, and Glen Scott. 2015. "Moated Sites of the Iron Age in the Mun River Valley, Thailand: New Discoveries Using Google Earth." *Archaeological Research in Asia* 3 (July): 9–18. <https://doi.org/10.1016/j.ara.2015.06.001>.
- O'Reilly, Dougald, and Louise Shewan. 2015a. "A Report on the 2011–2012 Excavation of Lovea: An Iron Age, Moated Settlement in Cambodia." *Archaeological Research in Asia* 1–2 (January): 33–47. <https://doi.org/10.1016/j.ara.2015.02.001>.
- . 2015b. "Prehistoric Mortuary Traditions in Cambodia." In *The Routledge Handbook of Bioarchaeology in Southeast Asia and the Pacific Islands*, edited by Marc Oxenham and Hallie Buckley, 45–67. Routledge.
- . 2016. "Phum Lovea: A Moated Precursor to the Pura of Cambodia? Sociopolitical Transformation from Iron Age Settlements to Early State Society." *Journal of Southeast Asian Studies* 47 (03): 468–83. <https://doi.org/10.1017/S002246341600028X>.
- Osborne, Milton. 1999. *River Road to China: The Search for the Sources of the Mekong, 1866-73*. Atlantic Monthly Press.
- . 2000. "The Strategic Significance of the Mekong." *Contemporary Southeast Asia; Singapore* 22 (3): 429–44.
- Ottens, Joachim. 1700s. "Le royaume de Siam avec les royaumes qui luy sont tributaires (the source reference is: Koeman, C., *Atlantes Neerlandici*. Bibliography of Terrestrial, Maritime and Celestial Atlases and Pilot Books, Published in the Netherlands up to 1880, (6 vols), Vol. II, C&M (80), p. 75. Parry, D., *The Cartography of the East India Islands, Insulae Indiae Orientalis*, p. 177. National Library of Australia, MAP RM 184.)." Amsterdam: (<http://www.geographicus.com/P/AntiqueMap/Siam-ottens-1710>).
- Oum, Boramey. 2006. "A Commercial Center at Thala Borivat (in Khmer)." BA Thesis, Phnom Penh, Cambodia: Faculty of Archaeology, Royal University of Fine Arts.
- Parmentier, Henri. 1914. "Le temple de vat phu." *Bulletin de l'école française d'extrême-orient* 14 (1): 1–32. <https://doi.org/10.3406/befeo.1914.2835>.
- . 1927a. *L'art khmèr primitif*. Vol. 1. 2 vols. Publications de l'École française d'Extrême-Orient. Paris: Librairie nationale d'art et d'histoire.
- . 1927b. *L'art khmèr primitif vol. 2*. Vol. 2. 2 vols. Publications de l'École française d'Extrême-Orient. Paris: Librairie nationale d'art et d'histoire.
- . 1935. "Complément à l'art khmèr primitif." *BEFEO* 35: 1–115.
- . 1937. "Chronique de l'année 1937." *Bulletin de l'Ecole française d'Extrême-Orient* 37 (1): 620–276.
- Parsons, Jeffrey R. 1991. "Political Implications of Prehispanic Chinamp Agriculture in the Valley of Mexico." In *Land and Politics in the Valley of Mexico : A Two Thousand Year Perspective*, edited by Herbert R. Harvey, 17–41. Albuquerque: University of New Mexico Press.
- Parsons, Jeffrey R., Charles M. Hastings, and Ramiro Matos Mendieta. 2000. *Prehispanic Settlement Patterns in the Upper Mantaro and Tarma Drainages, Junín, Peru*. Memoirs

- of the Museum of Anthropology, University of Michigan, No. 34. Ann Arbor, Mich.: Museum of Anthropology, University of Michigan.
- Pauketat, Timothy R., Lucretia S. Kelly, Gayle J. Fritz, Neal H. Lopinot, Scott Elias, and Eve Hargrave. 2002. "The Residues of Feasting and Public Ritual at Early Cahokia." *American Antiquity* 67 (2): 257–79.
- Pelliot, Paul. 1903. "Le Funan." *BEFEO* 3: 248–327.
- . 1951. *Mémoire Sur Les Coutumes Du Cambodge de Tchou Ta-Kouan, Version Nouvelle Suivie d'une Commentaire Inachevé*. Paris: Librairie d'Amérique et d'Orient Adrien-Maisonneuve.
- Penny, Dan, Christophe Pottier, Roland Fletcher, Mike Barbetti, David Fink, and Quan Hua. 2006. "Vegetation and Land-Use at Angkor, Cambodia: A Dated Pollen Sequence from the Bakong Temple Moat." *Antiquity* 80 (309): 599–614.
- Peterson, Christian E., and Robert D. Drennan. 2005. "Communities, Settlements, Sites, and Surveys: Regional-Scale Analysis of Prehistoric Human Interaction." *American Antiquity* 70: 5–30.
- Piobb, Pierre. 1895. "Les collègues mystérieux du roi sisowath." *A travers le monde*.
- Polkinghorne, Martin. 2008. "Ideals and Architects: Khmer Temple Pyramids (Eighth to Eleventh Century)." *Aséanie : Sciences Humaines En Asie Du Sud-Est Aséanie*, no. 21: 65–88.
- Pollock, Sheldon. 1996. "The Sanskrit Cosmopolis, 300-1300: Transculturation, Vernacularization, and the Question of Ideology." In *Ideology and Status of Sanskrit: Contributions to the History of the Sanskrit Language*, edited by Jan E. M. Houben, 197–247. Brill's Indological Library, v. 13. Leiden ; New York: E.J. Brill.
- Postgate, J. N. 1992. *Early Mesopotamia: Society and Economy at the Dawn of History*. London; New York: Routledge.
- Pottier, Christophe. 2006a. "Early Urban Settlements in Angkor." In *Reassessing East Asia in the Light of Urban and Architectural History*, 133–40. Kyoto.
- . 2006b. "Under the Western Baray Water." In *Selected Papers from the 10th International Conference of the European Association of Southeast Asian Archaeologists: The British Museum, London, 14th-17th September 2004*, edited by Elisabeth A. Bacus, Ian Glover, and Vincent C. Pigott, 298–309. Singapore: NUS Press.
- Pottier, Christophe, and Annie Bolle. 2009. "Le Prasat Trapeang Phong à Hariharâlaya: histoire d'un temple et archéologie d'un site." *Aséanie*, no. 24: 61–90.
- Pottier, Christophe, Annie Bolle, K. Rithy Chhem, Fabrice Demeter, Christophe Gabillault, Alexandrine Guerin, Than Heng, et al. 2004. "Mission archéologique franco-khmère sur l'aménagement du territoire angkorien (MAFAKATA): Rapport campagne 2004." Siem Reap: Ecole française d'Extrême-Orient.
- Pottier, Christophe, Annie Bolle, Dominique Soutif, Jean Baptiste Chevance, Socheat Chea, Sang Sum, Kamsan Heng, et al. 2006. "Mission archéologique franco-khmère sur l'aménagement du territoire angkorien (MAFAKATA): Rapport campagne 2006." Siem Reap: Ecole française d'Extrême-Orient.
- Pottier, Christophe, Phin Vichear Sachara, Heng Than, Chhay Rachana, Khieu Chan, and Fabrice Demeter. 2004. "Koh Ta Méas, un site préhistorique dans le Baray Occidental: rapport préliminaire." *UDAYA, Journal of Khmer Studies* 0 (5).

- Pou, Saveros. 1989. *Nouvelles inscriptions du cambodge*. Vol. 1. Paris: École française d'Extrême-Orient.
- . 2002. *Nouvelles inscriptions du cambodge: II & III*. Vol. 2 & 3. École française d'Extrême-Orient.
- . 2004. *Dictionnaire Vieux Khmer-Français-Anglais = An Old Khmer-French-English Dictionary = Vacanānukram Khmaer Cās-Pārāṃṅ-Qaṅles*. Paris, France: L'Harmattan.
- Pryce, Thomas Oliver, Mitch Hendrickson, Kaseka Phon, Sovichetra Chan, Michael F. Charlton, Stephanie Leroy, Philippe Dillmann, and Quan Hua. 2014. "The Iron Kuay of Cambodia: Tracing the Role of Peripheral Populations in Angkorian to Colonial Cambodia via a 1200 Year Old Industrial Landscape." *Journal of Archaeological Science* 47: 142–63. <https://doi.org/10.1016/j.jas.2014.04.009>.
- Ray, Himanshu Prabha. 1986. *Monastery and Guild: Commerce Under the Satavahanas*. Delhi; New York: Oxford University Press.
- . 1989. "Early Historical Trade: An Overview." *The Indian Economic and Social History Review* 26 (4): 437–57.
- . 2008. "Providing for the Buddha: Monastic Centres in Eastern India." *Arts asiatiques* 63 (1): 119–38.
- . 2017. *Archaeology and Buddhism in South Asia*. London and New York: Taylor & Francis.
- Reid, Anthony. 1988. *Southeast Asia in the Age of Commerce 1450-1680: The Land Below the Winds*. Vol. 1. 2 vols. New Haven: Yale University Press.
- . , ed. 1993. *Southeast Asia in the Early Modern Era: Trade, Power, and Belief*. Ithaca, New York: Cornell University Press.
- . 2000. "Negeri: The Culture of Malay-Speaking City-States of the Fifteenth and Sixteenth Centuries." In *A Comparative Study of Thirty City-State Cultures : An Investigation*, edited by Mogens Herman Hansen, 417–29. *Historisk-Filosofiske Skrifter* 21. Copenhagen: Kongelige Danske Videnskabernes Selskab.
- Reinecke, Andreas, Laychour Vin, Sonetra Seng, Laychour Vin, and Sonetra Seng. 2009. *The First Golden Age of Cambodia Excavation at Prohear*. Bonn: DAI, KAAK.
- Reynolds, Craig J. 1979. "Monastery Lands and Labour Endowments in Thailand: Some Effects of Social and Economic Change, 1868-1910." *Journal of the Economic and Social History of the Orient* 22 (2): 190.
- . 1995. "A New Look at Old Southeast Asia." *The Journal of Asian Studies* 54 (2): 419. <https://doi.org/10.2307/2058745>.
- Rhi, Juhung. 2003. "Early Mahayana and Gandharan Buddhism: An Assessment of the Visual Evidence." *The Eastern Buddhist (New Series)* 35 (1–2): 152–202.
- Rice, Prudence M. 2009. "On Classic Maya Political Economies." *Journal of Anthropological Archaeology* 28 (1): 70–84. <https://doi.org/10.1016/j.jaa.2008.09.001>.
- Ricklefs, M. C. 1967. "Land and the Law in the Epigraphy of Tenth-Century Cambodia." *The Journal of Asian Studies* 26 (3): 411.
- Rooney, Dawn F. 2003. "Kendi in the Cultural Context of Southeast Asia; a Commentary." *SPAFA Journal* 13 (2): 5–16.
- Roper, Donna C. 1976. "Lateral Displacement of Artifacts Due to Plowing." *American Antiquity* 41 (03): 372–75. <https://doi.org/10.2307/279527>.

- Rothman, Mitchell S. 1994. "Palace and Private Agricultural Decision-Making in the Early 2nd Millennium BC City-State of Larsa, Iraq." In *The Economic Anthropology of the State, Monographs in Economic Anthropology*, edited by Elizabeth M. Brumfiel, 149–168. 11. Lanham, Md: University Press of America.
- Ruohomäki, Olli. 2004. "Encounters in Borderlands: Social and Economic Transformations in Ratanakiri, Northeastern Cambodia." *Moussons*, no. 7 (September): 71–94. <https://doi.org/10.4000/moussons.2482>.
- Sahai, Sachchidanand. 2008. "Studies in Cambodian Epigraphy I-VII." *The Southeast Asian Review* 33 (1–2): 55–68.
- . 2012. *The Hindu Temples in Southeast Asia: Their Role in Social, Economic and Political Formations*. Shimla : New Delhi: Indian Institute of Advanced Study ; Aryan Books International.
- Sanders, William T., Jeffrey R. Parsons, and Robert S. Santley. 1979. *The Basin of Mexico : Ecological Processes in the Evolution of a Civilization*. Studies in Archaeology. New York: Academic Press.
- Sanderson, Alexis. 2003. "The Saiva Religion among the Khmers Part I." *BEFEO* 90–91: 349–462.
- Santoni, Marielle. 1990. "Excavations at Obluang, Chiang Mai Province (Thailand)." In *Southeast Asian Archaeology 1986: Proceedings of the First Conference of the Association of Southeast Asian Archaeologists in Western Europe. Institute of Archaeology, University College London, 8th-10th September 1986*, edited by I. Glover and E. Glover, 561:37–54. Oxford: BAR International Series S-561.
- Santoni, Marielle, and Christine Hawixbrock. 1998. "Laos. Fouilles et prospections dans la région de Vat Phu (province de Champassak, sud du Laos)." *Bulletin de l'Ecole française d'Extrême-Orient* 85 (1): 387–405.
- . 1999. "Laos. Prospections 1999 au sud de Vat Phou (province de Champassak) : du Houay Khamouane à la frontière cambodgienne." *Bulletin de l'Ecole française d'Extrême-Orient* 86 (1): 394–405.
- Santoni, Marielle, and Viengkeo Souksavatdi. 1996. "Fouilles sur le site de Vat Phou Champassak." *Ambassade de France au Laos*. 1996. <http://www.ambafrance-laos.org/Fouilles-sur-le-site-de-Vat-Phou>.
- Sar, Vutha. 2010. "The Current Conditions of Waterway Systems and Transport-Related Infrastructure in Cambodia." In *Unpublished Conference Paper for the Seminar on the Promotion of the Mekong River Cruise Tourism. Hotel Pacific Tokyo, 10 September 2010*. http://www.jterc.or.jp/koku/koku_semina/pdf/100910_seminer_Vutha.pdf.
- Sarkar, Himansu Bhusan. 1971. *Corpus of the Inscriptions of Java: Corpus Inscriptionum Javanicarum : Up to 928 A.D.* Vol. 1. 2 vols. Firma K. L. Mukhopadhyay.
- Sarkar, K. R. 1978. *Public Finance in Ancient India*. New Delhi: Abhinav Publications.
- Saurin, Edmond. 1966. "Le paleolithique du cambodge oriental." *Asian Perspectives* 9 (1): 96–110.
- Save Cambodia's Wildlife. 2014. *Atlas of Cambodia: Maps on Socio-Economic Development and Environment*. Edited by Sandoval Sandoval. Second Edition. Phnom Penh: Save Cambodia's Wildlife.

- Scarborough, Vernon L., John W. Schoenfelder, and Stephen J. Lansing. 1999. "Early Statecraft on Bali: The Water Temple Complex and the Decentralization of the Political Economy." *Research in Economic Anthropology* 20: 299–330.
- Schopen, Gregory. 2004. *Buddhist Monks and Business Matters: Still More Papers on Monastic Buddhism in India*. Studies in the Buddhist Traditions. Honolulu: University of Hawai'i Press.
- Sedov, Leonid A. 1963. "On the Problem of the Economic System in Angkor Cambodia in the IX-XII Centuries (Translated from Russian by Antonia Glasse for O. W. Wolters)." *Narody Asii i Afriki, Istorija, Ekonomika, Kul'tura, Akademija Nauk SSR*. 6, 73–81.
- . 1978. "Angkor: Society and State." In *The Early State*, edited by Henri J. M. Claessen and Peter Skalnik, 111–30. The Hague: Mouton.
- Sharma, Ram Sharan. 1958. "The Origins of Feudalism in India (c. A.D. 400-650)." *Journal of the Economic and Social History of the Orient* 1 (3): 297. <https://doi.org/10.2307/3596372>.
- . 2006. *Indian Feudalism, C. AD 300-1200*. Macmillan India.
- Shaw, Julia. 2004. "Nāga Sculptures in Sanchi's Archaeological Landscape: Buddhism, Vaiṣṇavism, and Local Agricultural Cults in Central India, First Century BCE to Fifth Century CE." *Artibus Asiae* 64 (1): 5–59.
- . 2011. "Monasteries, Monasticism, and Patronage in Ancient India: Mawasa, a Recently Documented Hilltop Buddhist Complex in the Sanchi Area of Madhya Pradesh." *South Asian Studies* 27 (2): 111–30. <https://doi.org/10.1080/02666030.2011.614409>.
- . 2013. "Archaeologies of Buddhist Propagation in Ancient India: 'Ritual' and 'Practical' Models of Religious Change." *World Archaeology* 45 (1): 83–108. <https://doi.org/10.1080/00438243.2013.778132>.
- Shaw, Julia, and John Sutcliffe. 2003. "Ancient Dams, Settlement Archaeology and Buddhist Propagation in Central India: The Hydrological Background." *Hydrological Sciences Journal* 48 (2): 277–291.
- Sherbondy, Jeanette E. 1994. "Water and Power: The Role of Irrigation Districts in the Transition from Inca to Spanish Cuzco." In *Irrigation at High Altitudes: The Social Organization of Water Control Systems in the Andes.*, edited by William P. Mitchell and David Guillet. Vol. 12. American Anthropological Association, Washington, D.C.: Society for Latin American Anthropology Publication Series. <http://www.cabdirect.org/abstracts/19946799210.html>.
- Shimada, Akira. 2013. *Early Buddhist Architecture in Context: The Great Stūpa at Amarāvātī (ca. 300 BCE-300 CE)*. Brill's Indological Library 43. Lieden ; Boston: Brill.
- Shimoda, Ichita, and Sae Shimamoto. 2012. "Spatial and Chronological Sketch of the Ancient City of Sambor Prei Kuk." *Aséanie*, no. 30: 11–74.
- Shott, Michael J. 1995. "Reliability of Archaeological Records on Cultivated Surfaces: A Michigan Case Study." *Journal of Field Archaeology* 22 (4): 475. <https://doi.org/10.2307/530195>.
- Sieng, Sotham. 2004. *Small-Scale Gold Mining in Cambodia: A Situation Assessment*. Edited by Carl Middleton. Oxfam America.
- Singh, Upinder. 1996. "Sanchi: The History of the Patronage of an Ancient Buddhist Establishment." *The Indian Economic & Social History Review* 33 (1): 1–35.
- Slaczka, Anna Aleksandra. 2012. "The Brick Structures of Go Thap—Tombs or Temples?" *Journal of Indo-Pacific Archaeology* 31: 109–117.

- Smith, Michael E. 2004. "The Archaeology of Ancient State Economies." *Annual Reviews of Anthropology* 33: 73–102.
- . 2006. "How Do Archaeologists Compare Early States?" *Reviews in Anthropology* 35: 5–35.
- . 2009. "V. Gordon Childe and the Urban Revolution: A Historical Perspective on a Revolution in Urban Studies." *Town Planning Review* 80 (1): 3–29.
- . 2014. "The Aztecs Paid Taxes, Not Tribute." *Mexicon* 36: 19–22.
- Smith, Monica L. 1999. "'Indianization' from the Indian Point of View: Trade and Cultural Contacts with Southeast Asia in the Early First Millennium C.E." *Journal of Economic and Social History of the Orient* 42 (1): 1–26.
- . 2006. "The Archaeology of South Asian Cities." *Journal of Archaeological Research* 14 (2): 97–142. <https://doi.org/10.1007/s10814-006-9002-7>.
- Souksavatdi, Viengkeo. 1998. "Sites de production de briques dans la ville ancienne près de Vat Phou." In *Southeast Asian Archaeology*, edited by Pierre-Yves Manguin, 2:21–26. Centre for South-East Asian Studies, University of Hull.
- Southall, Aidan. 1988. "The Segmentary State in Africa and Asia." *Comparative Studies in Society and History* 30: 52–82.
- Spiegel, Samuel J. 2014. "Rural Place-Making, Globalization and the Extractive Sector: Insights from Gold Mining Areas in Kratie and Ratanakiri, Cambodia." *Journal of Rural Studies* 36 (October): 300–310. <https://doi.org/10.1016/j.jrurstud.2014.09.007>.
- Spink, Walter M. 2006. *Ajanta: History and Development*. Vol. 2. 18 vols. Handbook of Oriental Studies. Section Two, India, Handbuch Der Orientalistik. Indien. Leiden ; Boston: Brill.
- Stanish, Charles. 1994. "The Hydraulic Hypothesis Revisited: Lake Titicaca Basin Raised Fields in Theoretical Perspective." *Latin American Antiquity* 5: 312–32.
- Stark, Miriam T. 1998. "The Transition to History in the Mekong Delta: A View from Cambodia." *International Journal of Historical Archaeology* 2 (3): 175–203.
- . 2000. "Pre-Angkor Earthenware Ceramics from Cambodia's Mekong Delta." *Udaya: Journal of Khmer Studies* 1: 69–90.
- . 2001. "Some Preliminary Results of the 1990-2000 Archaeological Field Investigations at Angkor Borei, Takeo Province." *UDAYA, Journal of Khmer Studies* 2 (1): 19–35.
- . 2003a. "Angkor Borei and the Archaeology of Cambodia's Mekong Delta." In *Art & Archaeology of Fu Nan: Pre-Khmer Kingdom of the Lower Mekong Valley*, edited by James Khoo, 87–106. Bangkok: Orchid Book.
- . 2003b. "The Chronology, Technology and Contexts of Earthenware Ceramics in Cambodia." In *Earthenware in Southeast Asia*, edited by John Miksic, 208–29. Singapore: Singapore University Press.
- . 2006a. "Early Mainland Southeast Asian Landscapes in the First Millennium A.D." *Annual Review of Anthropology* 35: 407–32.
- . 2006b. "From Funan to Angkor: Collapse and Regeneration in Ancient Cambodia." *After Collapse: The Regeneration of Complex Societies*, 144–167.
- . 2006c. "Pre-Angkorian Settlement Trends in Cambodia's Mekong Delta and the Lower Mekong Archaeological Project." *Journal of Indo-Pacific Archaeology* 26: 98–109.

- . 2016. "Inscribing Legitimacy and Building Power in the Mekong Delta." In *Social Theory in Archaeology and Ancient History: The Present and Future of Counternarratives*, edited by Geoff Emberling, 75–105. New York: Cambridge University Press.
- Stark, Miriam T., and S. Jane Allen. 1998. "The Transition to History in Southeast Asia: An Introduction." *International Journal of Historical Archaeology* 2 (3): 163–174.
- Stark, Miriam T., and Sovath Bong. 2001. "Recent Research on Emergent Complexity in Cambodia's Mekong." *Bulletin of the Indo-Pacific Prehistory Association* 21: 85–98.
- Stark, Miriam T., Damian Evans, Chhay Rachna, Heng Piphah, and Alison K. Carter. 2015. "Residential Patterning at Angkor Wat." *Antiquity* 89 (348): 1439–55. <https://doi.org/10.15184/aqy.2015.159>.
- Stark, Miriam T., P. Bion Griffin, Chuch Phoeurn, Judy Ledgerwood, Michael F. Dega, Carol Mortland, Nancy Dowling, et al. 1999. "Results of the 1995 - 1996 Archaeological Field Investigations at Angkor Borei, Cambodia" 38.
- Stark, Miriam T., D. Sanderson, and R. G. Bingham. 2007. "Monumentality in the Mekong Delta: Luminescence Dating and Implications." *Bulletin of the Indo-Pacific Prehistory Association* 26: 110–120.
- Stein, Burton. 1980. *Peasant State and Society in Medieval South India*. Oxford University Press.
- Stein, Gil J. 2004. "Structural Parameters and Sociocultural Factors in the Economic Organization of North Mesopotamian Urbanism in the Third Millennium BC." *Archaeological Perspectives on Political Economies*, 61–78.
- Stern, Philippe. 1927. *Le Bayon d'Angkor et l'évolution de l'art khmer: étude et discussion de la chronologie des monuments khmers*. Paris : P. Geuthner.
- . 1934. "Évolution du Linteau khmer." *Revue des Arts Asiatiques* 8: 251–56.
- . 1938. "II. Le style du Kulên (décor architectural et statuaire)." *Bulletin de l'École française d'Extrême-Orient* 38 (1): 111–150.
- Stuart-Fox, Martin. 1994. "Conflicting Conceptions of the State: Siam, France and Vietnam in the Late Nineteenth Century." *Siam Society* 82: 135–44.
- Sullivan, Michael. 1957. "Kendi." *Archives of the Chinese Art Society of America*, 40–58.
- Tambiah, Stanley J. 1977. "The Galactic Polity: The Structure of Traditional Kingdoms in Southeast Asia." *Annals of the New York Academy of Sciences* 293 (1): 69–97. <https://doi.org/10.1111/j.1749-6632.1977.tb41806.x>.
- Thapar, Romila. 2002. *History of Early India: From the Origins to AD 1300*. Penguin Books India.
- Thompson, Ashley. 1997. "Changing Perspectives: Cambodia after Angkor." In *Sculpture of Angkor and Ancient Cambodia: Millennium of Glory*, 22–32. Washington, D.C.: National Gallery of Art.
- . 1998. "The Ancestral Cult in Transition: Reflections on Spatial Organisation of Cambodia's Early Theravāda Complex." In *Southeast Asian Archaeology 1996. Proceedings of the 6th International Conference of the European Association of Southeast Asian Archaeologists, Leiden, 2-6 September 1996*, edited by Marijke J Klokke and Thomas de Bruijn, 273–95. Centre for Southeast Asian Studies, University of Hull.
- Thuy, Chanthourn. 2010. "The Discoveries of Iron Smelting Sites in Chaeb-Mlu Prei Region (in Khmer)." Fieldwork Report. Phnom Penh, Cambodia: Royal Academy of Cambodia.

- Tichelman, Fritjof. 1980. *The Social Evolution of Indonesia : The Asiatic Mode of Production and Its Legacy*. Studies in Social History 5. Hague ; Boston Hingham, MA: M. Nijhoff ; distributors for the U.S. and Canada.
- Tran, Ky Phuong, Thonglith Luongkhot, Kaseka Phon, and Pisith Phlong. 2014. "Cham Landscape Archaeology along the Ba River, Central Vietnam: Reconstructing Ancient Trading Routes Linking Champa Kingdom(s) and Khmer Empires Based on New Findings and CRM of the Lower Mekong." Conference Presentation presented at the IPPA, Siem Reap, Cambodia.
- Trawick, Paul. 2001. "The Moral Economy of Water: Equity and Antiquity in the Andean Commons." *American Anthropologist* 103 (2): 361–379.
- Trigger, Bruce G. 2003. *Understanding Early Civilizations: A Comparative Study*. Cambridge, UK; New York: Cambridge University Press.
- Ur, Jason A. 2010. "Cycles of Civilization in Northern Mesopotamia, 4400–2000 BC." *Journal of Archaeological Research* 18 (4): 387–431.
- Vallerin, Michèle, and Pierre-Yves Manguin. 1997. "Viêt Nam. La mission « Archéologie du delta du Mékong »." *Bulletin de l'Ecole française d'Extrême-Orient* 84 (1): 408–14.
- Van de Mierop, Marc. 1999. *Cuneiform Texts and the Writing of History*. London; New York: Routledge.
- Van Liere, Willem J. 1980. "Traditional Water Management in the Lower Mekong Basin." *World Archaeology* 11 (3): 265–280.
- Van Wuysthoff, Gerrit, and Francis Garnier. 1871. "Voyage inconnu des Néerlandais du royaume du Cambodge au pays de Louwen." Translated by Francis Garnier. *Revue de la Société de géographie*, no. sept-oct: 251–89.
- Vickery, Michael. 1977. "Cambodia after Angkor, the Chronicular Evidence for the Fourteenth to Sixteenth Centuries." Yale: Yale University.
- . 1985. "The Reign of Sūryavarman I and Royal Factionalism at Angkor (Updated in 2013)." *Journal of Southeast Asian Studies* 16 (02): 226–244.
- . 1986. "Some Remarks on Early State Formation in Cambodia." In *Southeast Asia in the 9th to 14th Centuries*, edited by David G. Marr and Anthony Crothers Milner, 95–116. Singapore: Institute of Southeast Asian Studies.
- . 1994. "What and Where Was Chenla?" In *Recherches Nouvelles Sur Le Cambodge. Publié Sous La Direction de F. Bizot*, 197–212. Paris: Ecole française d'Extrême-Orient.
- . 1998. *Society, Economics, and Politics in Pre-Angkor Cambodia: The 7th-8th Centuries*. Tokyo: Centre for East Asian Cultural Studies for Unesco, Toyo Bunko.
- . 2000. "Coedès' Histories of Cambodia." *Silpakorn University International Journal* 1 (1): 61–108.
- . 2003. "Funan Reviewed: Deconstructing the Ancients." *Bulletin de l'Ecole Française d'Extrême-Orient* 90–91: 101–143.
- . 2004a. "A Legend Concerning Jayavarman II." In *Unpublished Conference Paper*. Paris. <http://michaelvickery.org/vickery2004legend.pdf>.
- . 2004b. *Cambodia and Its Neighbors in the 15th Century*. Working Paper Series 27. Asia Research Institute, National University of Singapore.
- Vo, Si Khai. 1998. "Plans architecturaux des anciens monuments du Delta du Mékong du 1er au 10e siècles AD." In *Southeast Asian archaeology 1994: proceedings of the 5th*

- International Conference of the European Association of Southeast Asian Archaeologists Paris, 24th-28th October 1994*, edited by Pierre-Yves Manguin, 1:207–13. Centre for South-East Asian Studies, University of Hull.
- . 2003. "The Kingdom of Fu Nan and the Culture of Oc Eo." In *Art & Archaeology of Fu Nan: Pre-Khmer Kingdom of the Lower Mekong Valley*, edited by James C. M. Khoo, 35–86. Orchid Press.
- Vogel, Dr J. Ph. 1918. "The Yupa, Inscriptions of King Mulavarman, From Koetei (East Borneo)." *Bijdragen Tot de Taal-, Land- En Volkenkunde / Journal of the Humanities and Social Sciences of Southeast Asia* 74 (1): 167–232. <https://doi.org/10.1163/22134379-90001650>.
- Vong, Sotheara. 2010. *Pre-Angkor Inscriptions of Cambodia 1*. Second. Phnom Penh: Royal University of Phnom Penh.
- . 2011. "Recently Discovered New Inscriptions from Pre-Angkorian Cambodia in Stung Treng Province." *Saṅgama Sāstra Manussa Sāstra* 46 (76): 26–40.
- Wéber. 1895. "DE KRATIÉ A KHONE ET RETOUR: Voyage aux Rapides à bord du 'Bassac' du 15 au 29 juillet 1895." *Bulletin de la Société des Études Indochinoises* 30: 3–12.
- Welch, David J. 1985. "Adaptation to Environmental Unpredictability: Agricultural Intensification and Regional Exchange at Late Prehistoric Centers in the Phimai Region, Thailand." PhD, Honolulu: University of Hawaii.
- . 1989. "Late Prehistoric and Early Historic Exchange Patterns in the Phimai Region, Thailand." *Journal of Southeast Asian Studies* 20 (01): 11–26.
- . 1998. "Archaeology of Northeast Thailand in Relation to the Pre-Khmer and Khmer Historical Records." *International Journal of Historical Archaeology* 2 (3): 205–233.
- Welch, David J., and J. R. McNeill. 1988. "Excavations at Ban Tamyae and Non Ban Kham, Phimai Region, Northeast Thailand." *Asian Perspectives*, 99–123.
- Welch, David J., and Judith McNeill. 1991. "Settlement, Agriculture, and Population Changes in the Phimai Region, Thailand." *Bulletin of the Indo-Pacific Prehistory Association* 11: 210–28.
- Wheatley, Paul. 1979. "Urban Genesis in Mainland Southeast Asia." In *Early Southeast Asia*, edited by R.B. Smith and W. Watson, 288–303. New York: Oxford University Press.
- . 1983. *Nagara and Commandery: Origins of the Southeast Asian Urban Traditions*. Chicago, Ill.: University of Chicago, Dept. of Geography.
- White, Joyce C. 1995. "Incorporating Heterarchy into Theory on Socio-Political Development: The Case from Southeast Asia." *Archeological Papers of the American Anthropological Association* 6 (1): 101–123.
- White, Joyce C., and Chureekamol Onsuwan Eyre. 2011. "Residential Burial and the Metal Age of Thailand." In *Archeological Papers of the American Anthropological Association*, 20, 1:59–78. American Anthropological Association.
- Willey, Gordon R. 1965. *Prehistoric Maya Settlements in the Belize Valley*. Papers of the Peabody Museum of Archaeology and Ethnology, Harvard University v. 54. Cambridge: Peabody Museum.
- Willis, Michael D. 2009. *The Archaeology of Hindu Ritual: Temples and the Establishment of the Gods*. Cambridge; New York: Cambridge University Press.

- Wilson, David John. 1988. *Prehispanic Settlement Patterns in the Lower Santa Valley, Peru: A Regional Perspective on the Origins and Development of Complex North Coast Society*. Washington D.C.: Smithsonian Institution Press.
- Wolters, Oliver W. 1967. *Early Indonesian Commerce*. Ithaca, N.Y.: Cornell University Press.
- . 1974. "North-Western Cambodia in the Seventh Century." *Bulletin of the School of Oriental and African Studies* 37 (02): 355–384.
- . 1979. "Khmer 'Hinduism' in the Seventh Century." In *Early South East Asia*, Oxford University Press, Oxford, 427–442. Ithaca, New York: Southeast Asia Program, Cornell University.
- . 1982. "Historical Patterns in Inter-Regional Relations." In *History, Culture, and Religion in Southeast Asian Perspectives*, 16–33. Singapore: Institute of Southeast Asian Studies.
- . 1999a. "Again a Cultural Matrix." In *History, Culture, and Region in Southeast Asian Perspectives*, Revised Edition, 107–25. Ithaca, New York: Southeast Asia Program, Cornell University.
- . 1999b. "History, Culture, and Region in Southeast Asian Perspectives." *Southeast Asia Program Publications*.
- Woodward, Hiram. 2005. *The Art and Architecture of Thailand from Prehistoric Times Through the Thirteenth Century*. 2nd ed. Leiden; Boston: Brill.
- . 2011. "Dvaravati, Si Thep, and Wendan." *Bulletin of the Indo-Pacific Prehistory Association* 30: 87–97.
- Wright, Henri T. 2000. "Modeling Tributary Economies and Hierarchical Polities," 197–213.
- Yang, Bin. 2004. "Horses, Silver, and Cowries: Yunnan in Global Perspective." *Journal of World History* 15: 281–322.
- Yasuda, Yoshinori, ed. 2013. *Water Civilization*. Advances in Asian Human-Environmental Research. Tokyo: Springer Japan.
- Yasuda, Yoshinori, and Phoeurn Chuch. 2008. *Preliminary Report for the Excavation in Phum Snay 2007*. International Research Center for Japanese Studies.
- Yoffee, Norman. 1995. "Political Economy in Early Mesopotamian States." *Annual Review of Anthropology* 24: 281–311.
- . 2005. *Myths of the Archaic State : Evolution of the Earliest Cities, States and Civilizations*. Cambridge, UK ; New York: Cambridge University Press.
- You, Rithy, Vivien Kleinpeter, and Jean-Christophe Diepart. 2015. "Differentiation of Swidden Agriculture in Northeast Cambodia: Kavet Swiddeners, the State and the Markets in Kok Lak Commune." *Learning for Resilience*, 147–75.
- Zeitoun, Valéry, Hubert Forestier, Heng Sophady, Simon Puaud, and Laurence Billault. 2012. "Direct Dating of a Neolithic Burial in the Laang Spean Cave (Battambang Province, Cambodia): First Regional Chrono-Cultural Implications." *Comptes Rendus Palevol* 11 (7): 529–37.