HUANGTUCHENG REGIONAL ARCHAEOLOGICAL SURVEY

by

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(Under the Direction of Stephen A. Kowalewski)

ABSTRACT

This study examines the settlement patterns and evolution of social complexity of the upper Huai River region of China from 5000 B.C. to A.D. 220. This region is typically viewed as a peripheral area between core areas in Yellow and Yangtze River regions to the north and south. I argue that the Huai peoples should be viewed as having their own pathway to social complexity, rather than as passive receivers of influences from their neighbors to the north, south and east.

I interpret data from a 209 km^2 full-coverage pedestrian archaeological survey centered on the large, previously known Neolithic site of Huangtucheng. We conducted the work during 2006–2007, recorded 76 sites with 446 temporal components, and made 1102 collection units (most 50 m by 50 m), collecting over 10,000 artifacts.

Huangtucheng was the largest and most complex settlement in the survey area for most periods. We carried out detailed mapping and coring at it. It was probably a walled town in the Late Neolithic.

Survey data show a long continuity of occupation from 5000 B.C. onward, with demographic peaks in the Late Neolithic (3500–1900 B.C.) and slow growth in the Early Bronze Age (1900–1600 B.C.). People initially occupied small villages adjacent to watercourses in the Early Yangshao period (5000–4000 B.C.), then spread to occupy upland locations in the Late Longshan period (2500–1900 B.C.). At ~3500 B.C., Huangtucheng reached nearly 30 ha and dominated a three-tiered settlement hierarchy. Population increased in the Late Longshan period, when the survey area's population may have exceeded 10,000, and local settlement clusters became apparent. Settlement density and population markedly decreased at the Erlitou period (1900–1600 B.C.) with a dispersed pattern. The region regained its demographic density in the Late Shang and Western Zhou period (~1400–771 B.C.). Rural population approached modern levels in the Han Dynasty (206 B.C.).

This project is the first full-coverage survey in the understudied Huai River region. It provides a case study for comparison with other regions where states emerged. In addition, 12 Chinese archaeological students learned modern full-coverage survey methods.

INDEX WORDS: Archaeology; Regional full-coverage survey; Settlement pattern; Social complexity; Political economies; Early state formation; the Huai River region; the Yellow River; the Yangtze River; Chinese archaeology; Neolithic China.

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To my family, Steve and the people who live in the Huangtucheng area.

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CHAPTER 1

INTRODUCTION

China should be a commonly cited example in case studies of sociopolitical evolution; in reality, however, it is seldom discussed (Feinman and Marcus 1998; Feinman and Nicholas 2004; Wright 1986). The major impediment to the use of Chinese data is that Chinese archaeologists only infrequently apply an anthropological perspective to interpretations. Differences in research methods, especially the reliance on reconnaissance, selectively or randomly record important sites instead of full-coverage survey, complete coverage of a survey area, also limit comparability. As Cowgill (2004:531) pointed out, “scholars aware of what regional settlement-pattern studies in other parts of the world have accomplished have been frustrated by the absence of comparable data from China.”

Basic full-coverage survey data is crucial to understanding temporal and spatial change and continuity in political economies, producing the regional data that allows comparative studies. Full-coverage surveys yield basic data on settlement patterns and artifact distributions (e.g., lithics, ceramics, and metal items), while providing insights into longitudinal changes in, for example, central place patterns, central places are larger settlements having more and different functions, including decision-making, than other settlements. Full-coverage surveys provide better data for answering basic questions about political economies and demographic patterns than do reconnaissance surveys (Fish and Kowalewski 1990). By using generally accepted field and recording methods, full-coverage surveys can also facilitate multi-regional comparative analyses.

In anthropology, early state formation has long been discussed, yet is still a productive subject of debate (e.g. Gat 2003; Service 1962). The first state in China has been described mainly from historic textual records and is dated to the Xia period (2100–1600 B.C.) or Shang period (1600–1046 B.C.) (Keightley 1983; Liu 2004). Previous archaeological research has focused on recovering evidence for supporting historical documents, such as finding the capitals for the Xia dynasty. Most Chinese scholars agree that Erlitou was the capital of the Late Xia dynasty (ca. 1800 B.C.). Excavations of the Erlitou site and systematic survey in the surrounding areas in the Central Plains in Henan province have shown the association between political-economic strategies, the formation of state-level institutions, and fundamental changes in settlement patterns in this core area (Erlitou Team 2005). However, recent studies in a presumed border area, Northeast China, have shown that settlement hierarchy and social complexity are as developed there as in the presumed core areas (Linduff et al. 2002–2004). These findings suggest that regions defined as cores (politically dominant areas) and peripheries (politically subordinate areas) using historic texts from the later periods may not have played the same political-economic roles in earlier times.

In this dissertation, I present the findings of a regional settlement pattern study conducted in the Huangtucheng area, which is located in a cultural and ecological transition area in the Huai River region (Figure 1.1). Based on these data, I articulate settlement pattern changes, artifact distributions, and central place development from 5000 B.C. to the present. These data not only provide insights into change and continuity in the political economy of the Huangtucheng area, but also shed light on broader issues such as core-periphery relationships, interregional interactions, and political-economic strategies. I compare the Huangtucheng data to case studies from other regions in the world, and consider alternative pathways to social complexity and early state development in China.

1.1 The Origin of States and Urbanism in China

China is an example of a pristine state and, thus, is important in discussions of the origin of states and urbanism. Until now, neither Chinese archaeologists nor traditional Sinologists have provided satisfactory answers to this classic yet still significant issue of the origin of states and urbanism. As Shelach (1999:47) correctly pointed out, these two sides "both see China as a homogeneous cultural entity shaped by a unilinear sociopolitical process". Most studies on the origin of states have mainly been focused on the origin of the first pristine state, instead of searching for diverse pathways to social complexity.

In China, discussions of the origin of states and urbanism have long been under the influence of historiography and Marxism. Archaeology, in this perspective, seeks to support historical texts (Su 1991). Under the strong influence of a long tradition of antiquity and nationalism, most modern Chinese archaeological fieldwork, unfortunately, remains artifact-oriented and large-site oriented, although it has produced a laudable amount of archaeological data from across the country. Data from single-site excavations, large tombs, residential architecture, and artifact studies have provided basic chronologies for many regions. These data have been less useful for examining the development of social complexity and the diversity of early states.

Historical and materialist approaches provide the theoretical basis for explanations of the Chinese archaeological data. Indeed, Engels' *The Origin of the Family, Private Property and the State* (originally published in 1884) once provided the classic text for the theoretical framework of Chinese archaeology, and Engels' unilinear trajectory for the development of civilization was the orthodox approach for interpreting the nation's rich archaeological data. Thus, 1960s research, such as excavation of Banpo, interpreted its inhabitants as members of prosperous matrilineal societies (Chinese Academy of Social Science and Shaanxi Provincial Xi'an Banpo Museum 1963). This interpretation was based on the social evolutionary model that was first proposed by Morgan and then incorporated into Marxist theory by Marx and Engels. An unlinear sequence of stages such as primitive socieity, slave society and feudal society has been adopted in the development of Chinese history. In the tenet of Marxist's theory, societies developed from stages such as matrilineal society to patrilineal society and the ownership of property also changed from public to private. However, recently accumulated new archaeological data show increasing diversity, and archaeologists no longer are satisfied with such simple, unilinear models.

The centralized dynasty model in the Central Plains in the Yellow River region has formed most of our understanding of the mechanisms of state formation in China (Chang 1983; Liu and Chen 2003; Wittfogel 1957). This model theorizes that a centralized and urbanized society that collected tribute within a clearly delimited territory was first emerged in the Central Plains. Thus, most studies seeking to examine the origin of states and urbanism have been conducted in the Central Plains, mostly in the modern Shanxi and Henan provinces. The Yi-Luo River region, considered the core area of the legendary Xia dynasty, still receives considerable attention (Liu et al. 2002–2004). Recent national research projects, such as the Origin of Chinese Ancient Civilization, are still focused on the findings of prominent settlements in these areas, such as Wangchenggang walled town in Henan and Taosi in Shanxi.

In Immanuel Wallerstein's (1974) world-system theory, concepts of core and periphery were originally based on economic relationships in capitalist societies. Cores have higher technologies and produce complex products while peripheries provide raw materials, agricultural products and labors to cores via semi-peripheries. Core/periphery concepts have been found useful in explaining ancient settlement relations in pre-capitalist periods and have been explicitly defined in archaeological contexts (e.g. Chase-Dunn and Hall 1991, 1997, 2000; Hall 2000; Peregrine 1996a, 1996b). In the Chinese context, these terms have been used in the Epi-Neolithic and Early Bronze Age periods. Cores are politically, economically and culturally dominant areas, where walled towns were found as capitals in historical periods, such as the Central Plains; peripheries are subordinate and include those areas geographically outside the cores. These core areas usually receive great archaeological attention and have splashy archaeological findings including rich artifacts and large walled towns. For example, Erlitou, situated in the Central Plains, has been viewed as a core area in the Early Bronze Age (Liu and Chen 2006). Concepts of cores and peripheries, however, cannot be directly projected into the earlier periods. Core areas in the Early Bronze Age may or may not be cores in the Neolithic times and peripheries in the Early Bronze Age may or may not be peripheries in the earlier periods. Studies focused on the origin of states and urbanism should go beyond the presumed core areas such as the Central Plains.

One of the milestones in Chinese archaeology is the framework of Qu-Xi-Lei-Xing proposed by Su Bingqi. Su (1991) postulated a multi-centered origin for Chinese civilization and state formation in contrast with the single-center or mononuclear Central Plains model. Su proposed that the middle and lower Yellow River and the middle and lower Yangtze River comprised four of six regions important to the origins of Chinese civilization. Under the influence of Su's model, traditional reconnaissance survey and excavation projects with a regional focus seeking to examine the origins of civilization and to construct basic chronologies have been undertaken in these regions (Table 1.1). Archaeologists have conducted research to support the central role of each region in the nation's history, as outlined in Su's model. As Falkenhausen (1995) notes, the regionalist perspective parallels changes in China's modern political geography, in particular the decrease in centralized political controls imposed during the Maoist era. But, this regionalist perspective is seldom developed from settlement pattern data.

Thus, in China, discussions of the origin of the state fit within this traditional, unilinear, cultural-historical framework, evolving from a centralized early state form. Even the multi-center theory has been adapted to the centralized model, such that the Central Plains region is classified as a core, with neighboring regions analogous to leaves attached to the main stem of a plant (Yan 1992). In this model, the Central Plains absorbed basic traits from other cultures and eventually stood out in the Early Bronze Age.

In recent years, another theory postulating the Central Plains as the core became prominent in Chinese academia again. Zhao Hui (2000) proposes that beginning about 3000–2500 B.C. the Central Plains achieved dominance over other regions because of expertise it developed in political administration during interactions with neighboring polities. Thus, the Central Plains became dominant as the result of an historical process that had its antecedents in prehistory. Its ability to adapt and strengthen its administrative capabilities made its political system stronger relative to its neighbors to the east, south, and west, as evidenced by adoption in the Central Plains of, for example, the political ideological tripod *ding* vessel from the east and jade production and stone tools from the south. From regional interactions, the Central Plains peoples acquired writing, administration, and political systems, in addition to trade goods and technologies. This trend became more prominent after 2500 B.C. Zhao (2000) emphasizes that the rise of the Central Plains meant the concomitant collapse and decline of other regional polities during the Epi-Neolithic and early Bronze Age periods.

Zhao's interpretive framework seeks to explain what is now known about early Chinese history at the macroregional scale, while preserving the cultural-historical approach and a unilineal trajectory for early state formation. It has no room for variations in trajectories of state development. Also, these studies address incompletely issues such as political-economic strategies, core-periphery relationships, and interregional interaction. Research in other regions of the world indicates considerable variation in states within each region. Archaeologists are redefining older concepts and proposing new ones, for example, city-states, agrarian states, petty-states, etc. (Gat 2003; Hansen 2000, 2002; Nichols and Charlton 1997; Stanish 2003). The correlation of state formation and urbanism is challenged by alternative models, such as rural petty-state (Gat 2003; McIntosh 2005). According to Gat (2003:127), a rural petty state is a missing link between complex chiefdoms and developed states, it is a form "too centralized and developed to rank as chiefdom, while lacking a large nucleated urban center to be categorized as city-state."

Most discussions of prehistoric and historical China (the Xia dynasty is the dividing line between the prehistoric and historical periods) focus on the emergence of civilization. Recent large national projects, such as Xia-Shang-Zhou Chronology Project and the Origin of Chinese Ancient Civilization, have research designs within the prevailing paradigm, and have examined ritual activities, jade production and ideology linked to the origin of the dragon imagery, prestige goods in general, monumental architecture, and walled-towns. Research designs that focus on only a few aspects of civilization limit the possibilities for wide-ranging explanations of Chinese sociopolitical evolution. In addition, using an interpretive paradigm that is limited to the official orthodoxy of the Marxist historical-materialist approach in turn restricts the potential for building theoretical models for early state formation.

A few scholars have sought to bring western anthropological perspectives to early state studies in Chinese archaeology. K. C. Chang (1986) is probably among the first who attempted to bridge the gap between Chinese historic-oriented archaeology and Western anthropology-oriented approaches by applying the chiefdom concept to Longshan polities. Xie Weiyang (1995), a historian, made the first attempt to incorporate Service's band-tribe-chiefdom-state unilinear model into interpretations of the early state formation process in China. Liu Li (2004)'s *The Chinese Neolithic: Trajectories to Early States* is a systematic review of Chinese Neolithic data and also applies the chiefdom concept to the Longshan period.

Wright and Johnson (1975:267) define a state as "a society with specialized administrative activities," that is, a specialized bureaucratic government that has three or four hierarchical decision-making levels. Archaeologists have found examples of three- and four-level settlement and administrative hierarchies in Egypt, Mesopotamia, Mesoamerica, and the Andes that indicate state formation (Bauer and Covey 2002; Kowalewski et al. 1989; Patch 1991; Rothman 2001). In the Middle and Late Longshan period (2600–2000 B.C.), in southeastern Shandong there are four levels in the settlement hierarchy (Underhill et al. 1998). This could indicate state-level sociopolitical organization similar to "the first state-level society" identified in the Erlitou area in 1800 B.C., as Liu has argued (2004:225). Thus, it is reasonable under the multi-center paradigm to suggest that similar settlement and decision-making hierarchies existed elsewhere in China in the Longshan period, if not earlier, well before the Xia and Shang dynasties.

Given the complexity and dynamics of early state formation, it is important to distinguish mature states from pristine and early states. Recent anthropological literature extends theoretical concepts from large, centralized states to other entities such as archaic states, peer polities, segmentary states, city-states, petty rural states, etc., all of which should be considered in the Chinese context (Feinman and Marcus 1998; Gat 2003; Nichols and Charlton 1997; Renfrew and Cherry 1986). Also, some "alternative pathways" approaches focus more on processes and mechanisms than on unlinear and typological models (Kradin and Lynsha 1995; Mills 2000). These models propose key roles for political economy and ideology, in addition to environmental constraints, demographic variables, and agricultural intensification (Blanton et al. 1996; Brumfiel 1992, 1994; DeMarrais et al. 1996; Dietler and Hayden 2001; Earle and D'Altroy 1989; Marcus and Flannery 1996).

Among these alternative pathways, the corporate/network framework is an attempt to explain variation among societies that cross-cut evolutionary stages. The approach focuses on leadership strategies and structures. It was originally used to interpret the differences of political economies in the prehistoric Mesoamerica and has been used to interpret complexity in other hierarchical societies in the world, such as southwest United States, Angean and China (Blanton et al. 1996; Feinman 2000; Feinman et al. 2000; Liu and Chen 2006; Parkinson and Galaty 2007). Blanton and his colleagues (1996) emphasize in this dual-processual theory that corporate/network is a social continuum. Corporate strategies are associated with the even distribution of wealth, power, knowledge, communal ritual and staple finance; network strategies are associated with personalized wealth, prestige goods system, individualized power and staple finance (for a full list of tendencies see Feinman 2000:table 12.3). These basic traits of each political-economic strategy can be found both in one society at the same time; in other cases one strategy dominates over the other. Classic Teotihuacán is a great example of corporate politic-economic strategies since it shows faceless leadership as indicated by mural art, impersonal palaces and other public buildings, and no greatly distinguished personalized wealth in burials. In contrast, Classic Maya polities displayed network strategies in elites' portable prestige goods system, personalized wealth and individualized power (by inheritance). These interpretations, however, require many different kinds of data that are not always available and settlement pattern studies alone are probably not sufficient.

The nationalist paradigm also has influenced studies of urbanism. Chinese archaeologists have long sought to identify ancient capitals, whether of Xia or later historical states. They have understood urban centers to be square, walled enclosures surrounded by a moat and enclosing palatial architecture, temples and granaries. Thus, studies on the emergence and functions of walled towns are much discussed in Chinese archaeology in recent years (Ren 1998; Qian 2001; Zhao 2004).

Most studies of urbanism have focused on the larger, core settlements, without developing a regional view of surrounding settlements that were part of the same sociopolitical system. Even if outlying settlements are presented, it is seldom in a systematic fashion, making them difficult to utilize in regional comparisons. Recent projects have sought to address this problem. For example, excavations at Erlitou have been accompanied by a full-coverage survey centered at the Erlitou site (Erlitou Team 2005). Large-scale excavations on the Taosi site (dating to 2300–2000 B.C.) have been expanded from the site center to explore the details of the layout and rich contents of this large walled town. Work at the Shijiahe walled town in the Yangtze River region has also sought to produce a regional context (Peking University 1992). Still, the focus has remained on the largest walled towns. Studies of smaller settlements may be equally important as sources of data for alternative models for the origins of urbanism and the state.

China's distinctive pathway to state formation and urbanism can be compared to other examples, such as the Tigris and Euphrates River regions in Mesopotamia, Egypt, the Indus Valley, and the Andes. By comparing the development of social complexity and state formation in China with other ancient civilizations, Chang's (1989) pioneering work pointed out one basic difference between them: that is, Chinese civilization has tremendous continuity while the other civilizations suffered significant disruptions and transformations. Thus, comparative analysis enhances our understanding of state formation processes in general, and enriches our understanding of individual case studies (e.g., Peregrine et al. 2007).

Settlement pattern studies provide fundamental data for comparative studies of sociopolitical evolution at regional and macroregional scales. Regional, full-coverage survey methods have been standardized, and data from different regions are fairly comparable. Suitable data for comparison include population estimates, central place and other settlement patterns, urbanization, and timing and patterns of defensive settlements (e.g., Drennan and Peterson 2005; Redmond and Spencer 2006).

1.2 State Formation and Settlement Patterns—Regional Perspectives

Archaeological studies from around the globe have demonstrated the links among political-economic strategies, the formation of state-level institutions, and fundamental changes in settlement patterns and demography (e.g., Blanton et al. 1999; Lamberg-Karlovsky and Sabloff 1995; Wright 1986; Wright and Johnson 1975). Population centralization, increasing complexity, and the development of sociopolitical hierarchy are often assumed to closely coincide in time (Flannery 1972). In contrast, empirical case studies show these three do not always covary, especially in non-core areas, e.g., in southern Scandinavia (Thurston 2001). I argue that linkages among these should be examined using well-defined data sets instead of assuming their interrelationships.

Many of the assumptions that archaeologists use in linking settlement pattern data to political and economic hierarchies are derived from Central Place Theory. German Geographer Walter Christaller (1933, translated in English in 1966) developed this theory to explain spatial arrangements of settlements in terms of economic relations in market economies. Central places are established to provide services and goods to secondary centers or lower-order centers. These central places are set at roughly equal distances between each other. Though Central Place Theory has its assumptions of free market economy operating on a featureless plane, archaeologists find it useful in interpreting ancient settlements and road networks (Johnson 1972; Hassig 1991). Archaeologists have used thiessen polygons to identify the boundaries of zones dominated by centers. Straight lines between the nearest neighbors of the central places or largest settlements are drawn and perpendicular bisectors of these straight lines are connected together to form polygons. Archaeologists use these polygons to estimate the sizes and boundaries of political territories (i.e. Cherry 1986). The relationship between the central place and its lower-order centers as well as the relationships between the center and its sustaining or service area are important issues in settlement pattern studies.

Because states are a regional—or perhaps macroregional—scale sociopolitical formation, the appropriate scale of study is regional (Blanton et al. 1993, 1999; Smith 2002; Cowgill 2004). Regional, full-coverage survey of the Valley of Oaxaca provides an important case study of state formation based on settlement pattern and demographic data (Blanton 1978; Kowalewski et al. 1989). Later projects have expanded the surveyed area into neighboring regions such as the

Cuicatlán Cañada (Spencer and Redmond 1997) and Mixteca Alta (Balkansky et al. 2002), amplifying our understanding of interregional interaction, trade and exchange, and warfare. In Mesopotamia, Adams' (1981) pioneering settlement pattern studies are crucial to state formation studies there. Recent projects in nearby regions, including the Nippur-Adab and Uruk regions in southern Mesopotamia (Pollock 2001), the Susiana Plains in Southwestern Iran (Wright and Johnson 1975), and the Tigris Piedmont and Highland Western Iran (Rothman 2001), add to these data. When viewed as a whole, macroregional modeling is possible (Algaze 1993, 2001). In Peru, settlement pattern studies in the Cuzco Valley and Tiwanaku have examined the origin of the Inka and Tiwanaku states (Bauer and Covey 2002; Stanish and Bauer 2004). In these cases, our understanding of state formation processes is based on case studies at the regional scale.

Until recently, few projects in China sought to examine the origins of the state using full-coverage survey data to reveal settlement pattern dynamics. Shelach (1999) has reported on a multi-faceted investigation of leadership strategies, economic activities, and interregional interactions using settlement pattern data from part of the Chifeng area, in Northeastern China. Additional research in that area shows patterns of change at a larger scale (Chifeng International Collaborative Archaeological Research Project (CICARP) 2003; Linduff 2002–2004). Liu and Chen (2003) have combined settlement pattern studies with traditional reconnaissance survey and excavation data to examine the general process of state formation. They emphasize the leading role of the Central Plains sites and argue that "societies changed from regionalized to centralized, and from multiple loosely related local systems to an integrated core-periphery network which dominated a large part of the region" (Liu and Chen 2006:168). Long-term studies in Shandong on the southeastern coast discovered settlement patterns from ca. 5300 B.C.

to the Han dynasty (Underhill et al. 1998, 2002, 2008). Survey data from an 1120 km^2 region show that two possible early states developed here in the Longshan period (2600–2400 B.C.); they had large central settlements (272.5 ha and 367.5 ha), four-tiered settlement hierarchies, and a pattern of sociopolitical development that differed from that of the Central Plains (Underhill et al. 2008). Although these comprise just a few studies of a small portion of China, they show the promise that regional survey offers in elucidating variations in state formation, as Kowalewski (2008:228) has suggested, which contrasts with the antiquated centralized, Central Plains, single-core model.

Researchers worldwide have clearly demonstrated the value of settlement pattern data in describing settlement hierarchies, interpreting administrative hierarchies, estimating population, thus aiding in explaining the emergence of the state. Settlement hierarchy is “the set of all the cities, towns, villages, hamlets, and isolated residences in a region” (Blanton et al. 1999:69). It is determined on the basis of settlement sizes, that is, how many levels of settlements are above the smallest undistinguished settlements. Settlement or population hierarchy can be a proxy for decision-making administrative hierarchy—with caveats. On the other hand, emphasizing decentralized power, heterarchary provides another perspective on social organization (Crumley 1995), which is supported by evidence in Africa (McIntosh 1999). Settlement pattern changes may reflect political changes. Thus the analysis of hierarchy, or heterarchy, as evidenced in diachronic changes in settlement sizes, administrative architecture, and other measures, is an important tool in the interpretation of social evolution and the emergence of the state.

The Valley of Oaxaca presents an excellent case. As Spencer and Redmond (2004:173) stated, “Oaxaca currently provides the most compelling evidence for primary state formation in Mesoamerica.” Surveys in the Valley of Oaxaca have revealed that a four-level settlement hierarchy first appeared in late Monte Alban I phase (300–100 B.C.) in the Elta-Central subregion, at which there was only a three-level settlement hierarchy in Rosario phase (700–500 B.C.) (Kowalewski et al. 1989; Spencer and Redmond 2004). Civic-ceremonial architecture (mounds), reflecting administrative activities, were found in many settlements and were used to construct civic-ceremonial hierarchies indicating the "levels of political control" (Blanton et al. 1999:69). Population was estimated based on settlement sizes. Settlement and demographic hierarchies in the Valley of Oaxaca changed over time, especially in the transition from the Rosario phase to Monte Alban I, providing key evidence for interpreting the emergence of the first state in Mesoamerica.

Holistic studies of state formation should examine settlement pattern changes, but also political economy, ideology, and ritual. The roles of trade and interregional exchange, agricultural intensification, irrigation, craft production, and warfare have been widely discussed (e.g., Arkush and Allen 2006; Carneiro 1970; Wittfogel 1957). It is also important to evaluate central, civic-ceremonial architecture (Fox et al. 1996). Mesoamerican archaeologists examine ball courts and temple architecture, and Mesopotamian archaeologists look at administrative paraphernalia to complement settlement pattern studies and contribute to theory-building efforts.

Theories of state formation should also examine pre-state (e.g., chiefdom and other middle-range societies) and post-state (e.g., dynasties and empires) societies. I am not implying a single trajectory of political-economic development with each example proceeding through all stages. Archaeology is best positioned to provide data for such diachronic studies. Recent archaeological research has helped us understand the variability in the scale, form, and dynamism of chiefdoms, and this informs studies of state formation. For example, Hally (1996) proposes that Mississippian chiefdoms in southeastern North America controlled an area averaging 20 km in radius, a spatial estimate that allows comparison with other examples. Indeed, the distances between politically autonomies independent decision-making and between higher ranking central places and their satellite secondary centers, may be a way to distinguish chiefdoms and states. Distances between centers can also indicate territorial boundaries.

Complete settlement pattern studies map large centers and record the locations of all settlements, facilitating theory-building. Puleston's (1973) data from Tikal and its hinterland in Guatemala show the utility of such data for examining sociopolitical dynamics. The details of settlement layouts are also useful for examining various state forms, whether more or less centralized (e.g., city-states, agrarian states, and territorial states). The population dynamics of urban centers have a significant impact on state formation and the political economy of polities (e.g., Balkansky 1998; Kowalewski et al. 1989). Understanding how polities dovetail with central-place hierarchies and long-distance exchange patterns illuminate boundary formation and maintenance issues, and contribute data helpful in examination of other aspects of the political economy, for example, corporate and network strategies (Blanton et al. 1996) and staple and wealth finance (Earle 1997). Most extant data, however, come from core areas and the potential of boundary areas and hinterlands are incompletely realized (Schortman and Urban 1992).

The dynamic interplay between cores and peripheries has been addressed, with ample consideration of political economy and ideology (e.g., Chase-Dunn and Hall 1991; Donnan and Wilson 1994, 1999). Core areas may become peripheries, and vice versa (Blanton et al. 1993 for Mesoamerica; Kristiansen 2000 for Bronze and Iron Age Europe). Archaeological data on settlement size and spacing and ceramic style distributions from the Mixtec Sierra of highland Mesoamerica has been marshaled to show how boundaries and sociopolitical domination shifted over time in a peripheral area (Finsten 1996).

In modeling the formation of states in China, I believe we should avoid assuming that areas that were described as cores and peripheries in historical texts from later periods had the same political-economic roles in earlier periods. As a core area dominant in politics, economy and ideology in the Bronze Age, the Central Plains is often assumed to have had a similar status and role in the Neolithic times. Numerous archaeological researches are still focused in this area, and it is still the focal point of searching for the origin of Chinese civilizations. Studies have concentrated on how core areas in the Central Plains and the Jianghan Plains have dominated the more distant area in northwestern Hubei and southwestern Henan Provinces (Fan 2000). I suggest that we should investigate settlement systems in these presumed peripheries first before accepting the assumptions.

Indeed, systematic settlement pattern surveys in areas like southeastern Shandong and the Chifeng area have shown them to be less like peripheries than previously thought in Neolithic times. Systematic surveys revealed that these areas had much more settlement density and population than shown by traditional reconnaissance surveys. More important, southeastern Shandong and the Chifeng area saw the development of complexity just as early as the Central Plains. These new findings indicate the importance of regional-scale data and the productivity of full-coverage surveys.

1.3 Research Questions

If we dismiss unilinear, cultural-historical and single-core theoretical approaches as insufficient to explain the Chinese past, we must develop alternative theories that are supported by data, and obtain additional data that will aid in developing those theories. From settlement pattern studies in the areas of northeast China and southeastern Shandong, we see traditionally viewed peripheral areas do not conform to the older theories. While we have considerable data from reconnaissance survey and excavations in the Yellow River and Yangtze River regions, without application of regional and macroregional perspectives, these data cannot be appropriately examined and interpreted since they were obtained unsystematically and are thus difficult to compare among regions. Recent research in regions beyond the Central Plains, mostly regional full-coverage surveys, have indeed greatly enriched our knowledge of the diversity and complexity of Chinese early state forms (Linduff et al. 2002–2004; Underhill et al. 2008). These surveys have shown that the development of complexity occurred early in the areas outside of the Central Plains. For example, two large urban centers with a four-tier settlement hierarchy were established at the Late Longshan period in Southeast Shandong, much earlier than the single largest urban center Erlitou in the Central Plains in the Early Bronze Age. As we obtain regional-scale settlement pattern data from each region and can see the diachronic processes of sociopolitical evolution, we see variation in the development paths of each region. Nevertheless, we have no data from a geographical, ecological and cultural boundary area such as the Huai River region. It seems wise to begin new investigations in areas likely to be rich in archaeological remains pertinent to our understanding of the dynamics of the political economy; the Huai River region meets these qualifications.

China has a marked geographical and cultural boundary that divides it into North China and South China; the transition zone extends across northwestern Hubei province, southwestern Henan province, and southern Henan province. Indeed, Qin Mountain and the Huai River mark the transition between the northern subtropical and temperate zones, and the transition between the two current predominant crops, millet in the north and rice in the south. The Huai River watershed is an ecotone that offers extraordinarily rich and varied resources, such as minerals, salt, land, water, fishes and forest etc. The earliest known settlements date to 6000 B.C.

(Fangcheng Cultural Bureau 1983), but are poorly understood. Around 3500 B.C., a major sociopolitical change occurred: in several places, rows of long houses replaced smaller, nuclear family dwellings, and the number of settlements increased dramatically (Henan Provincial Museum and the Yangtze River Planning Office 1989). To both the north and south, people constructed fortified settlements, with rammed-earth walls in the Central Plains and earth-walled towns in the Jianghan Plains. Peoples to the east also constructed walled enclosures, and crafted exquisite pottery (Underhill 2002). So it is reasonable to ask: were similar changes in residential construction and settlement patterns, including fortifications, also happening in the Huai River boundary region?

Boundary areas are customarily viewed as cultural and political periphery. While anthropological studies have amplified our understanding of the political, cultural, and ideological interactions in peripheral areas (e.g., Chase-Dunn and Hall 1991; Lightfoot and Martinez 1995; Smith 2007), the long-term dynamics are less completely addressed, as is the variation among boundary areas. Some sociopolitical boundaries, for example, align with an ecological transition between agricultural and pastoral regions.

Liu (2004:250-251) has applied the corporate/network approach to core areas such as the Central Plains. This approach can be extended to the traditionally viewed peripheral areas, too. Corporate strategies are identified in the Central Plains based on standard limed-floor houses, the paucity of fancy prestige goods, and the walled towns of equal size. Network strategies are indicated by craft specialization in finely-made goods, prestige goods, fancy funerary tombs, and perhaps a deeper settlement hierarchy. Bear in mind that these are interpretations coming from various sources of survey and excavation data. I hypothesize that the Huai River region may have been structured along corporate and network lines depending on its relationship to other core areas, and perhaps at some times it was a core in its own right. These speculations need further investigation and more data of different kinds.

In this project, I focus on the poorly understood boundary area between North China and South China in the Huai River region, and ask three main questions. Beginning from the most empirically grounded and moving to more inferential, these are:

1. What were the dynamics of settlement, artifactual, and central place patterns in Huangtucheng, and its immediate hinterland, over ten phases from 5000 B.C. (or earlier) to the present?
2. How did major transformations—the first villages, the rise of middle-range societies, the emergence of the state and urbanism—take place in the region, and how do these changes in this particular area inform our understanding of state formation in China, and more generally?
3. How are political-economic strategies affected by being situated on a major cultural boundary, especially in terms of inter-regional interactions? Do the artifacts suggest changing cultural ties between Huangtucheng and the three surrounding major cultural regions to the North, South and East? Does Huangtucheng's demographic and settlement pattern history suggest it was a core or a periphery (as defined alone), and when? Do these patterns suggest hypotheses about variation in political-economic strategies?

For this research, I generated new data from a regional, full-coverage surface survey of a region centering around the large Neolithic site Huangtucheng, on the Huai River, Henan Province (called Huangtucheng Regional Archaeological Survey Project). Diachronic patterns in settlements, artifacts, and central place patterns from the Early Yangshao period (5000 B.C.) to modern times inform us of the basic regional history of this area. With the information on settlement pattern data, settlement hierarchy and changes over time, we are able to understand the fundamentals of the past societies in this area. Artifacts collected on surface, tabulated and analyzed in terms of styles and changes inform us of chronology and provide initial interpretations about the social distribution of wealth. The spacing of settlements and their hinterland provide hierarchical relations and structures.

Given its location in a geographical and cultural transition zone, the Huangtucheng area is especially important in interregional relations. Knowing the time of changes in settlement patterns and artifact styles influenced by interregional interactions contributes to our understanding of the macroregional network in which it functioned. Demographic estimates will show the extent of urbanism in comparison to that of other places and provide a line of evidence about the core or peripheral status of the region, as these changed over time. The stylistic ties that Huangtucheng may have had to the neighboring areas in the Central Plains to the North, Jianghan Plains to the South, and Shandong and the lower Yangtze River to the east should inform us about shifting macroregional relations of this cultural boundary area.

This study provides systematic regional-scale data that aids in generating macroregional-scale models. For example, Gat (2003) has recently asserted that, in China and most other places, rural petty states preceded large territorial states. Can Gat's claim of early small states and their subsequent counterparts be verified archaeologically, and if so, what was the timing? Was it in historical times (ca. 2000 B.C.) or did large territorial states appear much earlier, in about 3500 B.C.? Did this boundary area, as Liu (2004:252) argued, experience cultural constraints and not develop into state-level society at the time when the earliest state emerged at the Central Plains at around 1900 B.C.?

1.4 Dissertation Framework

In this chapter, I have briefly reviewed the history of the origin of the state studies and regional settlement pattern studies in China. I have proposed research questions that focus on three topics: 1) regional settlement pattern studies over 7000 years; 2) sociopolitical processes in the changes from the first sedentary village, to middle-range society, and to state formation and maintenance; and, 3) political economic strategies including core/periphery relations and interregional interactions at regional and macroregional scales.

In Chapter 2, I describe the geographic setting of the Huangtucheng project area and provide a brief background of its climate, hydrology, agriculture, and irrigation strategies, including a review of the history of the Huai River system. Then I review archaeological studies in this area and of nearby regions. I construct a chronology for the Huangtucheng area from 5000 B.C. to the present, divided into 17 phases. I also describe the basic diagnostic artifacts for each phase.

Chapter 3 details methods used in this regional full-coverage survey. I define key concepts in settlement pattern studies. I also describe how I define sites and what collection strategies I used. I also outline the mapping and subsurface coring methods used at the Huangtucheng site.

In Chapter 4, I describe the basic results of the 209 km^2 full-coverage survey, providing a map locating each site, and with descriptions of each site and of the tombs we located during fieldwork. I also note any special data for each settlement, and the preservation status of each site. I report on 76 sites and 451 temporal components.

In Chapter 5, I discuss the implications of the data presented in Chapter 4, in particular the diachronic changes in settlement patterns. I begin with the Early Yangshao period (5000

B.C.) and end with the Han period (206 B.C.), for a total of 12 phases in the Neolithic and Bronze Age out of 17 phases from 5000 B.C. to modern times. The later historical periods after the Han period are beyond the scope of this study, due to the insufficient understanding of the artifacts and the fact that these late historical sites are often the same places occupied by modern villages. I present a settlement pattern map for each phase, tabulating data on settlement area, and discuss settlement distribution patterns.

In Chapter 6, I estimate population in the Huangtucheng project area for all periods from the Neolithic through the Early Bronze Age based on the settlement pattern data. I analyze change and continuity in settlements, focusing on site area, the density of settlements, settlement distribution patterns and preferred locales, artifact patterns, and settlement hierarchy. I measure the distance from sites to rivers and to larger centers. By ranking temporal components, I can discern the association of large settlements with these variables. Nearest-neighbor analysis provides insights into settlement distribution patterns. I examine settlement hierarchy to evaluate changes in administrative levels, which in turn imply rearrangements in the political economy. I evaluate ceramic style shifts and discuss the implications for craft production and distribution, as well as interregional interaction, trade, and exchange. Finally, I briefly review the history of walled towns in the middle and lower Yellow and Yangtze basins, which has implications for the rise of Huangtucheng.

In Chapter 7, I compare the Huangtucheng data with those from neighboring areas, and of examples from Mesopotamia and the Indus Valley. This allows me to evaluate the scale and peculiarities of sociopolitical changes, and to assess the development of social complexity in the study area. I compare the populations I estimated in the Huangtucheng area to other societies with similar sociopolitical patterns. I present regional and macroregional perspectives on the settlement patterns, and conclude that the Huangtucheng area has its own pathway in the development of sociopolitical complexity. I emphasize the importance of this first regional full-coverage survey in the Huai River region, and describe how it illuminates our understanding of sociopolitical changes in the region, as well as across China. Finally, I point out the limits of this project and suggest directions for further research in this important boundary region.

The appendices list all archaeologist sites found by the Huangtucheng survey and stone and pottery artifacts.

Table 1.1. Chronology of the Upper Huai River Region and Neighboring Areas.

Dates	**Periods**	**U. Huai River**	**M. Yellow River** the Central Plains	**L. Yellow River** Shandong	**M. Yangtze River** Jianghan Plains	**L. Yangtze River** Jiangsu & Anhui
206 B.C.	Han Dynasty	Han	Han	Han	Han	Han
221 B.C.	Qin Dynasty	Qin	Qin	Qin	Qin	Qin
770 B.C.	Eastern Zhou	Chu	Han	Qi	Chu	Chu
1046 B.C.	Western Zhou	Zhou	Zhou	Zhou	Zhou	Zhou
1600 B.C.	Shang Dynasty	Shang	Panlongcheng	Shang	Shang	Shang
1900 B.C.	Erlitou	Erlitou	Erlitou & Xiaqiyuan	Yueshi	Erlitou	Erlitou
				Longshan		
3000 B.C.	Epi Neolithic	Longshan	Longshan		Shijiahe	Late Zhangsidun
		Shijiahe				
3500 B.C.	Late Late Neolithic	Qujialing	Miaodigou II	Dawenkou	Qujialing	Ludun
		Late Yangshao				Xujiagang
5000 B.C.	Early Late Neolithic	Middle Yangshao	Miaodigou	Beixin	Daxi	Beiyingyang
		Early Yangshao				
7000/6000 B.C.	Middle Neolithic		Peiligang	Houli	Chengbeixi	
10,000 B.C.	Early Neolithic					

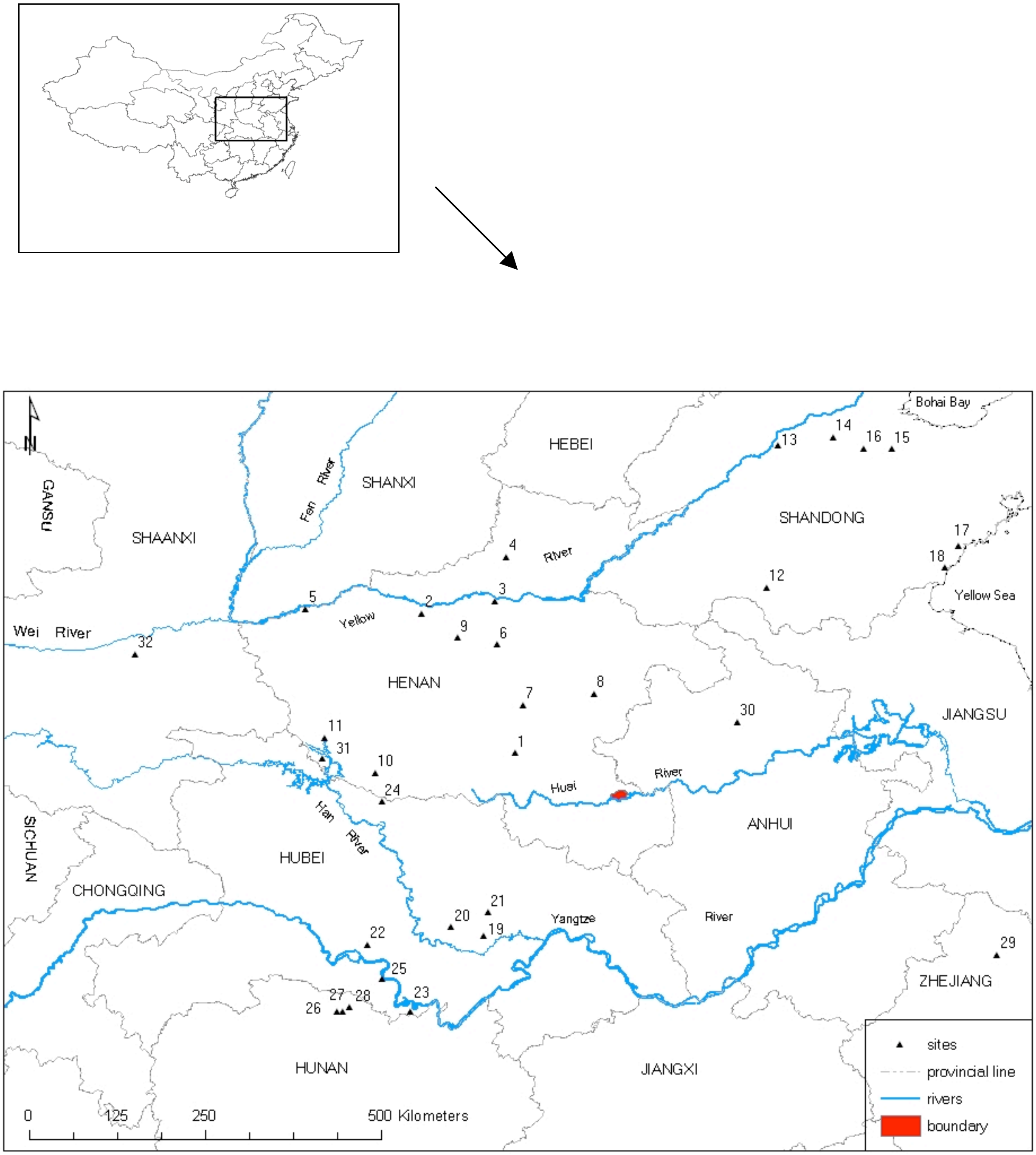


Figure 1.1 The Survey area and its neighboring areas.
Major sites mentioned in the text: 1. Yangzhuang 2. Erlitou 3. Xishan 4. Mengzhuang 5. Miaodigou 6. Guchengzhai 7. Haojiatai 8. Pingliangtai 9. Wangchenggang 10. Baligang 11. Xiawanggang 12. Xikangliu 13. Chengziyai 14. Dinggong 15. Bianxianwang 16. Tianwang 17. Liangchengzhen 18. Yaowangcheng 19. Qujialing 20. Shijiahe 21. Menbanwan 22. zinxiangcheng 23. Zoumaling 24. Majiayuan 25. Jimingcheng 26. Jijiaocheng 27. Chengtoushan 28. Pengtoushan 29. Mojiaoshan 30. Yuchisi 31. Taosi 32. Banpo.

CHAPTER 2

THE STUDY AREA

Huangtucheng means “a yellow walled town,” and is the term local people use for this large Neolithic and Early Bronze Age site in southeastern Henan Province in east-central China. Huangtucheng lies at the intersection of China’s traditionally designated northern, eastern, and southern cultural core areas, which had been focal areas in earlier studies of the origin of state and urbanism. I made Huangtucheng the center point for a full-coverage survey, and examined an area of about 209 km^2 surrounding the site (Figure 2.1). Huangtucheng’s location in this transition zone made it an excellent choice for this research because: 1) the area is even less understood than elsewhere in the transition zone; 2) the area is adjacent to the three traditionally-defined core areas; 3) the chronology and diagnostic artifacts are known for this region; and, 4) the Huangtucheng area has excellent surface visibility, making surface survey relatively efficient.

The survey area lies on flat terrain in the upper Huai River basin. Most of the study area is alluvial land along or near major drainages, with the Huai River forming the southern edge of the survey area.

2.1 Geographic Setting

The Huangtucheng study area is in Huaibin County, southeast of Xinyang City and north of Dabieshan Mountain (Figure 2.2). Huaibin County borders Fuyang and Linquan Counties in Anhui Province near the Hong River, which divides the upper and middle sections of the Huai River. The project area’s eastern boundary is the Jingjiu railroad, which logistically connects

Beijing to Kowloon. Huaibin County's neighbors to the south are Gushi and Huangchuan Counties, by the Bailu River. Xi County is to the west, across the Lü River. The study area lies within a 10 km radius circle around the area's largest archaeological site, Huangtucheng.

In general, the upper Huai River region runs from northwest to southeast, with mountainous terrain to the northeast, and mainly flat terrain in the southeast. The surface topography of the upper Huai region includes piedmont ridges, floodplains, and low-lying ground above the floodplains. The study area is flat alluvial ground (Figure 2.1), called the Huang-Huai Plains, mostly 32–36 m above sea level. The highest elevation is 47 m while the lowest elevation is 27.7 m above sea level. The highest area lies on the east edge of the survey area.

The floodplain floods frequently. There is an active floodplain terrace of 1 km width (Figure 2.1). Above that is a second terrace extending as far north as Luji, which, within the study area, covers an area of about 20 km^2.

Climate

The Huangtucheng project area is in a transitional zone between semi-tropical and temporal climates, and has a monsoon climate with four distinct seasons (Xinyang District History Office 1992). Winter lasts the longest, and is cold and dry. Summer is hot and wet. The rainy season begins in late April and ends in August. The average annual temperature is 15.5°C. December and January are the coldest months; January's average temperatures vary from 1.6–2.2°C. In the summer, the average temperature is 28°C. In the spring, the average rainfall is about 250–380 mm, and in the autumn it's about 170–270 mm. December is the driest month, with only about 20–30 mm of rainfall. The average annual rainfall from 1971–2000 is around

1105.7 mm (Yi and Liu 2005). The area experiences great fluctuations in rainfall, which results in flooding during periods of heavy precipitation.

2.2 Hydrology: The Huai River

The Huai is one of the major rivers in China, after the Yangtze River and the Yellow River. The Huai River arises on the northern flank of Tongbai Mountain in southwestern Henan Province. It's about 1000 km long, and runs through three eastern provinces (Henan, Anhui, and Jiangsu), and currently exits into the Yangtze River near Sanjiangying. The upper and middle sections of the Huai River are divided by the Hong River, which is the border between Henan and Anhui Provinces. The upper Huai, that is the subject of this study, is about 364 km long, and its catchment area is about 30,000 km^2.

The Huai River used to be an independent river system emptying into the Eastern Sea. For much of its length, it flows across relatively flat terrain, making it susceptible to flooding and shifts in channels. Many canals and dikes were constructed in eastern China by A.D. 1000, creating extensive canal networks (Pietz 2002:7). In A.D. 1128, soldiers deliberately breached its dikes and the Huai changed course and joined the Yellow River. Currently, it flows into the Yangtze River, and then into the Eastern Sea.

All the streams in the project area are within the Huai River drainage. Compared with other branches of the Huai in northern Henan, the drainage density in the study area is lower, especially in the northern part of our survey area. The fewer dissected watercourses may be due to the flatness of the area and the position near the major regional drainage. Since most archaeological sites, especially Neolithic sites, are near rivers, perhaps this explains the paucity of sites in the northern study area.

Most of the Huai's water comes from rainfall, which varies greatly depending on the season. In the summer (July–September), 50–69% of the river's flow derives from rainfall. In the winter, the precipitation is so minimal that the river usually dries up. Sudden changes in the amount of water in the river cause considerable sedimentation and flooding outside both banks (Peking University and Zhumadian Municipal Office for the Preservation of Ancient Monuments 1998:3). In addition, the water table is high, usually 1–2 m below the surface. Thus, during the rainy periods, flooding is common. Canals help control floods and provide irrigation waters during dry periods.

In general, northern bank of the Huai has long tributaries, although these river beds are relatively shallow. The southern tributaries are shorter and deeper. In July–September, the Huai usually carries so much water that it's in flood. Man-made levees along the banks of the Huai help keep waters in the channel, and the first terrace is often avoided for agricultural uses because of the risk of flooding.

In the project area, streams, rivers, lakes, marshes and seasonally flooded area are at least 20% of the total area. In the Huangtucheng area, the terraces immediately north of the Huai River, caused by the current active channel, are mostly sandy. Across nearly 20 km^2 of land we found no Neolithic or Bronze Age sites. The northern edge of this 20 km^2 area lie the terraces south of the modern town Luji and those terraces may actually be the old Huai river terraces. Earlier remains may be buried under sandy flood-borne sediments, or the Huai could have changed course in this area, so that this area was farther from the active watercourse. Geomorphologic studies may help resolve this issue.

The greatest challenges the Huai River region faces in these modern times are flood-prevention and environmental preservation. Along the Huai, large-scale dams and other constructions have been built to control flooding and erosion. In the study area, we found many sand extraction areas, and some clay mining. Sediments are extracted directly from the river bottoms, using suction machines aboard boats (Figure 2.3). This area used to have a boat-building industry, but that has diminished, and the rivers are now used less-frequently for transportation.

2.3 Agriculture and Irrigation

Agriculture is the dominant land-use in the Huangtucheng project area. Agricultural fields, modern settlements, rivers, canals, roads and sand/soil mining industries span the entire area. No wild forest or lands remain in the survey area. The land and climate are rich enough that crops are planted twice a year. Traditionally, the Huai River valley is the northern edge of rice cultivation, and millet is the dominant grain crop of northern China. Thus, the project area has fields of both rice and millet. The rice is usually planted in spring and late summer, with midsummer and fall harvest periods. Other prominent crops in this area are corn, potatoes, peanuts, sesame, and kenaf (*Hibiscus cannabinus*, a fiber plant). Along the northern bank of the Huai most of the soil is sandy and allocated to peanuts and millet. Soil types across the survey area include black soil, yellow brown soil, *chao* soil, and rice-paddy soil, which are rich rice soils (Peking University and Zhumadian Municipal Office for the Preservation of Ancient Monuments 1998:3). Since the study area is so flat, most of the fields are planted and cultivated by machine. Only in the eastern survey area are there higher elevation areas where machines are not used.

Channelized drainages and canals web the study area. Large drainages like the Wulong River have been channelized. Many canals were constructed during the 1960s and 1970s to improve agricultural production. Construction and maintenance of canals has exposed, disturbed, and destroyed archaeological sites. Reconnaissance surveys located some sites by examining canal profiles, like the Xiaozhongzi site by the Wulong River.

Recently, across China tens of thousands of rural people have migrated to the cities, and the Huangtucheng area is no exception. Even a small town like Maji, 5 km north of the Huangtucheng site, has long-distance bus services that run on a daily basis to large cities such as Shanghai and Shenzhen. Modern village demographics are skewed, with young people and male workers absent, so that most of the remaining people are children and the elderly. This area is one of the poorest areas in Henan Province, which in turn is one of the poorest provinces in China.

2.4 Chronology and Artifact Types

There have been no systematic archaeological studies in the Huangtucheng area, so I relied mostly on chronologies developed in neighboring, well-studied areas such as the Central Plains, the Yangtze River region and areas to the east. Reconnaissance surveys have produced coarse-grained chronologies for the upper Huai River region (HPICRA et al.1992; HPICRA and Xinyang Cultural and Archaeological Institute 2000, 2003). Local archaeologists and researchers borrowed general terms from the Central Plains, such as the Yangshao period and the Longshan period; from Jianghan Plains, they borrowed concepts such as the Qujialing culture and Shijiahe culture, etc. These terms represent prominent artifact styles, but do not adequately reflect full assemblages actually found in the Huai River region. For the Huangtucheng data, I have divided the chronology into 17 phases, extending from the Early Yangshao period to modern times (Table 2.1), of these 17, the first 12 are the temporal focus of my settlement pattern study. These 17 phases span three general periods: the Neolithic (phase I–V), the Bronze Age (phase VI–XI), the Han and later historical periods (phase XII–XVII). Unfortunately, the ceramic chronology for this area is far from refined, and more detailed studies are urgently needed.

We identified occupations from all 17 phases. Although we sought to identify all components with surface remains, in actuality fieldwork focused on occupations prior to the Han dynasty. This was because: 1) historical remains, especially after the Han dynasty, are complicated and rich and it would have been impossible to identify all the historical artifacts within the timeframe of the project; 2) previous studies of historical remains concentrate on large tombs and complete vessels, which are not particularly helpful for identifying the broken pieces recovered in surface surveys; 3) there are no systematic studies of plain vessels; 4) some porcelains were continuously used for multiple phases, making it difficult to know the phase in which they were actually made and/or used; and 5) the lack of above-ground architecture dating to the historical phases (most were made of wood and have not been preserved). Thus, for occupations dating to the Han dynasty and later, I note the presence of the site or deposit, and did not accurately determine the spatial extent of that period of settlement.

The earliest Neolithic phase found in the survey is phase I, or the Early Yangshao period (5000–4000 B.C.). Archaeological remains that are earlier than the Early Yangshao period have been found nearby but not in our survey area. Upper Paleolithic sites have been found in the Zhumadian area, west of the upper Huai River region. Peiligang sites (6000–5000 B.C.) have been found in the Xinyang area, also west of the upper Huai River region (National Bureau 1991). This long phase of the Early Yangshao period can be further subdivided, but for our survey area, we can only use this single long phase since the collection is rather small.

Early Yangshao ceramics are mainly made by hand and a few are made with slow wheel. Inclusions to the clay body are generally fine and small, so there are no great distinctions between coarse and fine wares. Sand, ashes, and grasses are used for tempering and the firing temperature was low. The sherds have small holes left when organic materials burned away during the firing process. Most ceramics are plain, with yellowish red the predominant color. We found a few painted ceramics; most of these have a red band around the exterior rim.

Vessel types mainly are *ding* tripods, *guan* jars, *wan* bowls and *dou* pedestal serving-stands (Figure 2.4). Tripods are usually decorated with ears, which have a pinched decoration on the edge and holes in the middle. Tripod vessels tend to have simple cylindrical or edge-pinched legs. Bowl rims are wide and thick. Jars have attached decorations with distinct finger-pinched decorations. In general, decorations are simple; they include carved lines, round pinched holes along rims and necks, and incised branched tree patterns. Similar artifacts have been found in Dazhangzhuang in Henan Province (Fangcheng Cultural Bureau 1983), and immediately to the west at Caodaichang and Wangtaizi sites in Luoshan County (HPICRA et al. 1992). In our project area, Huangtucheng and Xiaozhongzi are examples of sites with typical Early Yangshao ceramics. Diagnostic types make up a small percentage of phase I surface assemblages, but these types are easily to recognize and distinguish from phase II types.

The following period is phase II, or the Middle Yangshao period (4000–3500 B.C.). The majority of the phase II ceramics are yellowish red coarse and fine wares, tempered with coarse and fine sands, respectively. This phase has a greater variety of vessel types than the preceding phase; they include wide-leg *ding* tripods, *guan* jars with bird-shape ears and high cylindrical (*yuanzhui*) legs, *gang* large water containers, *gui* footed bowls, *dou* pedestal serving-stands, and *bei* cups etc. (Figure 2.5). Similar artifacts have been found in Luoshan County (HPICRA et al.1992: 47). Cup styles resemble those of the Jianghan Plains dating to the Early Qujialing period, such as the Youziling site (Jingzhou Museum 1994). Most ceramics are plain wares, although a few have linear punctuate decorations. We found only a very few ceramics, mostly bowls, painted with red and/or geometric patterns. A few bowl fragments have red-painted rims. Diagnostic types of this phase still make up a small percentage of surface assemblages. Some types, especially tripods, are difficult to distinguish from phase III types.

Phase III is the Late Yangshao period (3500–2900 B.C.), which has increased percentages of grey and black ceramics, although most of the collection is red and grey ceramics, especially greyish-black coarse wares. Most of the surface finds of tripods and jars have mixed or blended colors, and are not pure red or grey, probably due to usage in contrast to vessels from excavated contexts. Some black ceramics have mixed tempers including sand, ashes, and mica. Still, plain ceramics dominate the Late Yangshao assemblage, with a few polychromes that are mainly serving bowls. Polychromes resemble those of Dahecun (Zhengzhou Museum 1979). This phase has increased variation in decorations, including hollowed round holes carved in the main body of serving vessels such as *dou* pedestal serving-stands, line decorations, and attached decorations.

Ceramic vessel types have more variation, and include small-leg *ding* tripods, red and grey *bei* cups, black *dou,* serving bowls with bottom or pedestal serving-stands, *zeng* steamers, *weng* jars, and *pen* large basins (Figure 2.6). Tripod legs are usually shovel-shaped, small and short. Red pedestal cups are tall and have a wide base, while grey cups are thin-walled. Most ceramics were made by hand, although slow wheels were used to standardize shapes. Fast wheels were sometimes used, mainly in *dou* pedestal serving-stands and *bei* cups; the latter have clear marks indicating the use of fast wheels. We also found ceramic spindle whorls.

We found Late Yangshao ceramics in different sites across the project area, with the largest occupation at Huangtucheng. Along with the ceramics, we found stone tools, including an axe, adzes, and chisels (Appendix B). Spindle whorls are common; some are decorated with a simple cross, while others are plain. Similar ceramics and stone tools are found in other regions of the Huai basin, including the neighboring counties immediately to the west (Xi, Luoshan) and to the east (Huainan in Anhui Province). In general, most diagnostic types are easily recognized in this phase and they make up a large percentage of phase III surface assemblages.

Phase IV (2900–2500 B.C.), or the Early Longshan period, is the transition phase from the Late Yangshao period to Late Longshan period. The principal ceramics shift from red to grey in color, and the color diversity increases to include red, yellow, grey, black, and shiny black; however, grey dominates. Firing temperatures were high and complicated firing techniques were used. Large quantities of ceramics are still plain. Decorations from earlier, in the Yangshao period, continued to be used, including the *lanwen* basket-like pattern, *xianwen* line decor, crossover line decors, polychrome and carved hollow round holes. Large containers, e.g., pots, frequently exhibit a combination of the *lanwen* basket-like pattern and the *xianwen* line decor.

In a shift from the previous phase, phase IV ceramics are commonly made using a fast wheel; as a result, they are regularly shaped. The ceramic assemblage includes *guan* pots, *zun* jars, *pen* basins, *dou* pedestal serving-stands, longneck *weng* jars, *pan* small trays, *bei* cups, and *gui* tripod pitcher (Figure 2.7). In the Jianghan Plains, large pots, *quanzubei* footed cups, and *dou* pedestal serving-stands with hollow round holes are popular vessels during the contemporaneous late phase of the Qujialing culture (Shihe Archaeology Team 1990). Ceramics from the Huangtucheng area resemble those found on sites farther south in the middle Yangtze River region, despite their distinctive regional styles. Diagnostic types make up a large percentage of phase IV surface assemblages, and they are easily to recognize and distinguish from phase V types.

In the Late Longshan period (2500–1900 B.C.), or phase V, grey ceramics increase significantly as a proportion of the assemblage. Some grey wares have additional tempering, especially large vessels. Brownish and reddish yellow ceramics decrease in the assemblage. Most ceramics are plain, but those with decorations exhibit variety, although the *lanwen* basket-like pattern is the most popular, and mostly was applied to large cooking vessels and storage containers, including jars, pots, and tripods. Other common decorations include deeply carved lines inside basins, square crossover patterns, line decor, and attached decorations.

Most of the ceramics were made using wheels, with large jars, pots, basins, and stands the most common vessel types (Figure 2.8). Tripod legs include large wide-sized legs and short sharp plummet-shaped legs. Large jars, with *lanwen* all over the body, are also popular. Basins, with deep carved lines inside, are similar to contemporary artifacts from the Central Plains, such as Haojiatai phase IV and V (HPICRA and Yancheng County Memorial Hall of Xushen 1992). Some ceramics, e.g., tripods with wide legs and high-bottom cups, show commonalities with the Shijiahe culture from the Jianghan Plains in the south. A few ceramics show strong resemblances to Shandong wares, including the ghost-face tripod *ding* leg and shiny black vessels such as pedestal serving-stands and cups. Most of the assemblages, however, more closely resemble in style and vessel types those of assemblages from the Central Plains to the north.

The Neolithic ends with the Late Longshan period. The succeeding phase, phase VI (1900–1600 B.C.), is the transition from the Neolithic to the Bronze Age, when bronze vessels appear. Distinctive ceramic types include basin-shaped *ding* tripods and *jue* tripods. Firing temperatures are high and the ceramics are usually large and heavy, and not as refined as those from Neolithic times. Grey ceramics predominate. Decorations show continuity with Late Longshan styles, and most decorations conform to the *lanwen* type.

Typical Erlitou phase remains have been found in the areas centered at Yanshi, in Henan Province. Excavations at Erlitou in western Henan provide a refined chronology for this phase (Luoyang Team 1961; Erlitou Team 1984, 1986, 1992). Excavations at the Yangzhuang site in the upper Huai River region revealed assemblages that differ somewhat from the Xinyang area (Peking University and Zhumadian Municipal Office for the Preservation of Ancient Monuments 1998). We did not see ceramics typical of the Erlitou polity. We found only a few Late Longshan vessel types; they include deep *dou* pedestal serving-stands, *ding* tripods and *pen* basins (Figure 2.9). In the study area, however, typical Erlitou assemblages found in Yanshi or Yangzhuang, were not found here. The styles of this period at Huangtucheng are more similar to those of the Yueshi culture, which are found to the east.

In the succeeding Shang dynasty (1600–1046 B.C.), ceramics change dramatically in both vessel types and style. In the Early Shang dynasty (phase VII), grey clay pottery becomes dominant, although red, brownish, and white ceramics remain a small percentage. Black pottery or black-painted ceramics almost disappear. The hollow-legged tripod *li* was one of the major cooking vessels, replacing the solid-legged tripod *ding* characteristic of the Neolithic (Figure 2.10). *Li* legs were usually long and slender in this period. Other types of cooking vessels include *ding* tripods, *guan* jars, and *zeng* steamers. The types of drinking vessels increase; *gu* tall beakers and *jue* tripods were among the most popular. Large containers such as *weng* jars, *pen* basins, *gang* large jars and *zun* (jars with large flaring rim and wide neck) were commonly used. Thick, deep, cord-marked patterns were a common decoration. Other patterns include cloud-shapes and circles.

Late Shang dynasty (phase VIII) ceramic types include the major ceramic types from the previous phase, but styles and decorative motifs changed. The most prominent change is in the *li*, the principal cooking vessel form, which in this phase has short, wide legs, rather than the slimmer ones used previously. Most ceramics have a cord-marked decoration, but the cords vary, with some thick and others thin. The proportion of round, flat-bottomed vessels decreased, while stemmed vessels increased, especially containers like *dou* pedestal serving-stands. Only a few reddish ceramics were still used.

In the Western Zhou period, phase IX (1045–771 B.C.), the major pottery assemblage in this area is still *li* tripods (cooking vessels), *yu* bowls (water containers), *dou* pedestal serving-stands (serving vessels), and *guan* jars (large storage vessels) (Figure 2.11). The most popular decoration continued to be cord-marked, which had been used since the Late Shang dynasty. Drinking vessels such as *gu* tall beakers and *jue* tripods are seldom seen in this period.

In the Spring and Autumn period of the Eastern Zhou period, phase X (770–476 B.C.), fine grey wares predominate, with small amounts of reddish and brownish ceramics remaining in use. Special vessels made for cemetery rituals increase in numbers and types. Some ceramics purposely emulate high-status bronze vessels such as *ding* tripods and *pen* basins. Other ritual vessels include *li* tripods, *yu* bowls, *dou* pedestal serving-stands and *guan* jars (Figure 2.12). Cord-marked is still the major decoration. We also found pottery construction artifacts, especially *wa* roof tiles and *zhuan* bricks.

In the Warring States period of the Eastern Zhou period, phase XI (475–221B.C.), bronze and ceramic vessel shapes become more regular (Figure 2.13). The variety and colors of pottery decreases, while architectural ceramics, such as roof tiles and bricks, increase.

Qin and Han dynasties (221 B.C.–A.D. 220) ceramics in the Huangtucheng survey area were generally large, thick greywares (Figure 2.14). Most were cord-marked using coarse, wide cordage. Besides cemetery ritual vessels, we found many tomb bricks. The latter are usually decorated with cord-marks and geometric patterns. In the Han dynasty, painted bricks increased in popularity.

After the Han dynasty, pottery use decreased dramatically. Kiln technologies were improved and ceramic specialization appeared, so pottery became more standardized. We found a kiln dating to the Liuchao period (A.D. 220–581, from Three states, Jin, North and South dynasties), and it produced relatively standardized pottery (Figure 2.15). Proto-porcelain appeared. Later in the Iron Age, porcelain replaced ceramics in daily life. Since porcelain analysis involves complicated and detailed studies, we will not discuss the details of each historical period here.

2.5 Past Archaeological Studies

Prior to this project, the only archaeological investigations in the Huangtucheng area were a few reconnaissance surveys and excavations, which focused on establishing a checklist for sites and building a local chronology. As discussed in Chapter 1, this practice has deep roots in traditional Chinese archaeological theory and practice, which focused attention along the major rivers (e.g., Yellow, Yangtze), largely neglecting border areas that were assumed to be of lesser importance. As a result, no systematic studies have ever been conducted around Huangtucheng to determine its basic chronology and assess its cultural remains.

With the growing awareness of regionalism in archaeology in the 1990s, most local projects were conducted by provincial level archaeological institutes (Falkenhausen 1995). Our survey area remained neglected because its archaeological remains are modest compared to those of the Central Plains in western and central Henan. In addition, large salvage projects absorb most of the resources of provincial level archaeological institutes. Local archaeological institutions, especially at the county level, lack sufficient funding and resources, especially welltrained archaeologists, to conduct scientific research. The only excavations result from reports by local people of artifacts and sites encountered during construction (Yang 1981; Xinyang Prefectural Cultural Relics Administration Committee and Huaibin County Bureau 1981).

Only a few studies have been conducted in Huaibin County. A reconnaissance survey recorded 48 archaeological sites dating from the Neolithic to modern times (National Bureau 1991:491–494). These included 19 Neolithic sites; some of which were large, such as Huangtucheng, Liantaisi, and Shazhong. Other pre-Han dynasty sites include Qisi, a walled town dating to the Western Zhou dynasty, and Han dynasty sites such as Liuzhai. In my project area, only five sites were previously reported, including Huangtucheng, Dazhongzi, Xiaozhongzi, Liuzhai and Wangjiakong. Most of these date to the Neolithic.

The only reported excavation in Huaibin County is the Neolithic tomb in Zhaoji (Xinyang Prefectural Cultural Relics Administration Committee and Huaibin County Bureau 1981). This site is about 14 km north of my project's northern boundary. An old female was buried in this tomb, with 24 burial artifacts, including ceramics, pig bones, jade items, and animal teeth. Ceramics include *ding* tripods, *bei* cups, *guan* jars, *quanzupan* ring-footed basins, *danketao gaobingbei* eggshell stemmed cups, *dou* pedestal serving-stands, *qizuo* stands, *qigai* lids, and *fanglun* spindle whorl (Figure 2.16). These items are similar to burial goods dating to the Late Qujialing culture of the Qujialing site, Hubei, especially the tripods, basins, jars, and cups. The eggshell stemmed cup is similar to those found in Shandong (Xinyang Prefectural Cultural Relics Administration Committee and Huaibin County Bureau 1981: 4). Based on these artifacts, this tomb is dated to no later than the Longshan period.

Reconnaissance surveys and excavations made in the neighboring counties, especially western Luoshan County and the eastern Anhui Province, provide useful information for interpreting data gathered in the Huangtucheng survey area. In 1991, the Henan Provincial Institute of Cultural Relics and Archaeology (HPICRA) sought to understand the complex cultural remains in the upper Huai River region. Joining with local archaeological institutes, they made a preliminary survey of seven counties in Xinyang Prefectural district, including Xinyang, Guangshan, Huangchuan, Xi, Huaibin and Gushi Counties. They published detailed results on large sites in *Huaxia Archaeology* (National Bureau 1991; HPICRA et al. 1992). Archaeologists from HPICRA and Xinyang Cultural and Archaeological Institute (2000, 2003) also excavated several sites in Luoshan County to help refine the basic chronology. Excavations at the Yangzhuang site, in the Zhumadian district, constitute one of the major studies conducted in the upper Huai River region (Peking University and Zhumadian Municipal Office for the Preservation of Ancient Monuments 1998). This study provides basic environmental data, and hypothesizes about settlement patterns. In Anhui Province, southeast of the Huangtucheng survey area, Chinese Academy of Social Science (CASS) also did a reconnaissance survey of its western area in the early 1990s (Anhui Team 1996). Their report lists Neolithic and Bronze Age sites, and describes settlement patterns, thus providing useful comparative data.

Other than the Yangzhuang report, environmental studies of nearby areas are scarce. Recently, however, several researchers have examined floral data from the Huai River region. A study of Yuchisi, a Late Dawenkou (2900–2500 B.C.) site in the middle Huai region, included detailed studies of floral and faunal remains (Institute of Archaeology 2001). A recent systematic survey of rice agriculture suggests earlier origins than previously thought. Zhang et al. (2004) suggest that domestication began by at least 5000 B.C., based on the presence of domesticated rice in adobes found in Shuangdun, Houjiazhai and Hongdunsi sites, all in Anhui Province.

These earlier studies suggest the archaeological remains in the upper Huai River region are more complex and rich than previously thought. Although the reconnaissance surveys and excavations dealt mainly with artifacts, they still revealed variations among sites and the richness of artifact types and styles. During the long Neolithic, the upper Huai River area peoples were influenced by neighbors to the north, south, and east. The survey in Luoshan County shows Early and Middle Yangshao Period (phase I and II) artifacts resembling those of Houjiazhai phase I and II from the middle Huai River region (Chan 1989; HPICRA et al.1992: 59). In the Late Yangshao, cultural remains in the upper Huai started to resemble some styles from the Central Plains and the Jianghan Plains. In the Early Longshan Period, styles of the Central Plains, the Jianghan Plains, and Shandong coexisted in this area. In the Late Longshan period, it displays a strong resemblance to the Central Plains. As at Yangzhuang and Anhui Province sites, Early Longshan period materials show Shandong's Dawenkou culture dominated in both areas. This suggests that either there was considerable cultural diversity in the upper and middle Huai River region, or we insufficiently understand the Huai's own distinctive characteristics. Further, Du Jingpeng (1992) suggests that the Huai River, including our survey area, is the southern margin of a subtype of the Dawenkou culture that originated in Shandong.

Recently attention has turned to the Huai River, including several conferences on social complexity. The most recent was titled "Discussion of the Process of Social Complexity in the Huai River Region," and held in 2004 (Sun 2004). A few general studies address the entire Huai River system (Gao and Shao 2004; Yang and Sun 2006). Yang and Sun (2006) briefly reviewed the long chronology from the earliest sedentary life (the Peiligang period) to the Han dynasty across the entire Huai River region, including both the Huai and its branches. Commendably, they point out the special contribution and significance of the Huai during the prehistoric and historical periods, but their study is too general to illuminate the development of social complexity. In order to do that, we not only need data from individual sites, we also need research at the regional scale; and we need to understand the settlement pattern and idiosyncrasies of each region.

Table 2.1. Chronology of Huangtucheng Survey Area.

Ages	Phase	Period	Dates
	XVII	Modern times	A.D. 1911–1949
Iron	XVI	Ming and Qing	A.D. 1368–1911
	XV	Song and Yuan	A.D. 960–1368
	XIV	Sui and Tang	A.D. 581–907
Age	XIII	Liuchao	A.D. 220–581
	XII	Qin and Han	221 B.C.–A.D. 220
Bronze	XI	Warring States (Eastern Zhou)	475–221 B.C.
	X	Spring and Autumn (Eastern Zhou)	770–476 B.C.
	IX	Western Zhou	1045–771 B.C.
Age	VII–VIII	Shang dynasty (Early and Late Shang)	1600–1046 B.C.
	VI	Erlitou	1900–1600 B.C.
Late	V	Late Longshan	2500–1900 B.C.
	IV	Early Longshan	2900–2500 B.C.
Neolithic	III	Late Yangshao	3500–2900 B.C.
	II	Middle Yangshao	4000–3500 B.C.
	I	Early Yangshao	5000–4000 B.C.

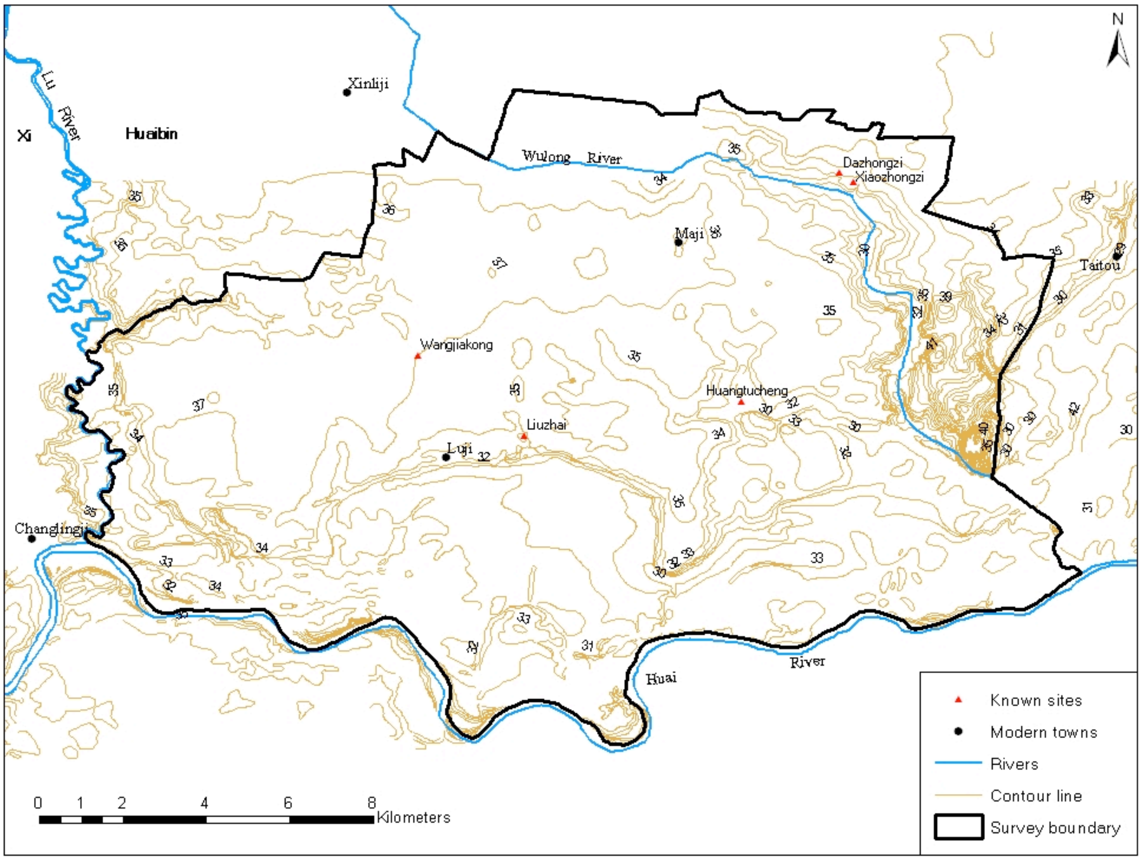


Figure 2.1 The Huangtucheng project area.

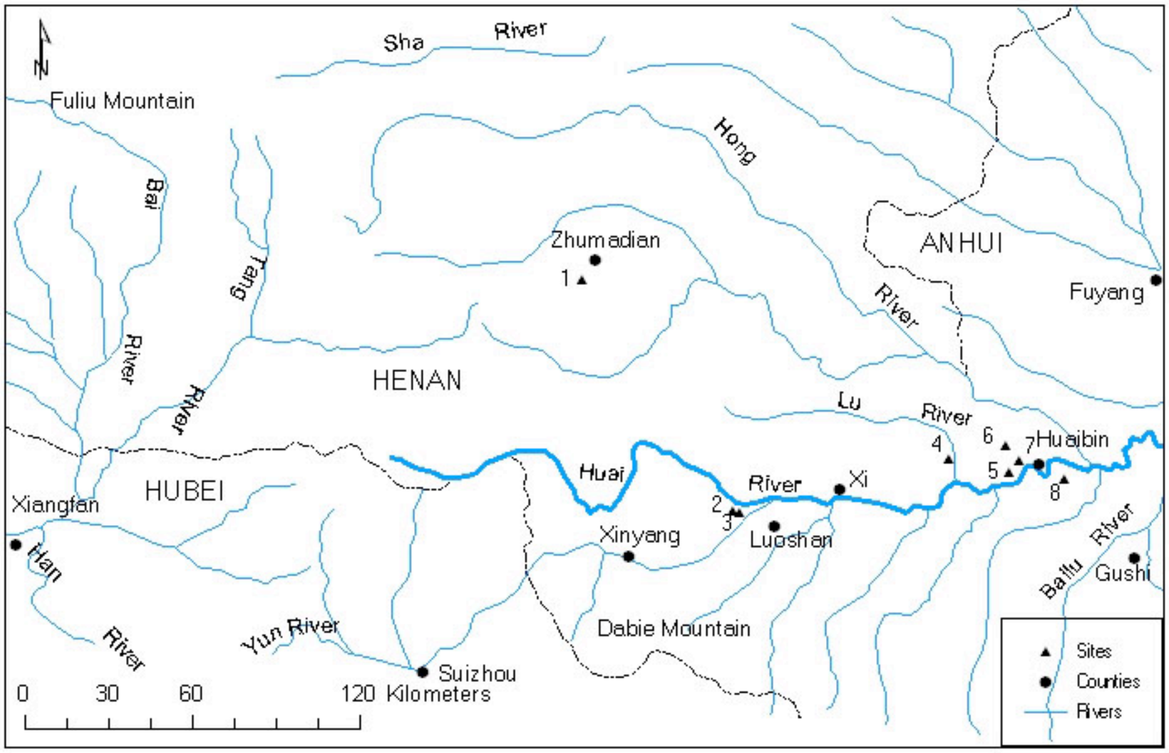


Figure 2.2 The upper Huai River region.
Major sites mentioned in the text: 1. Yangzhuang 2. Leitaizi 3. Lishangwan 4. Wanglou
5. Huangtucheng 6. Zhaoji 7. Liantaisi 8. Qisi.

Figure 2.3 Modern sand extraction industry in the Huai River.

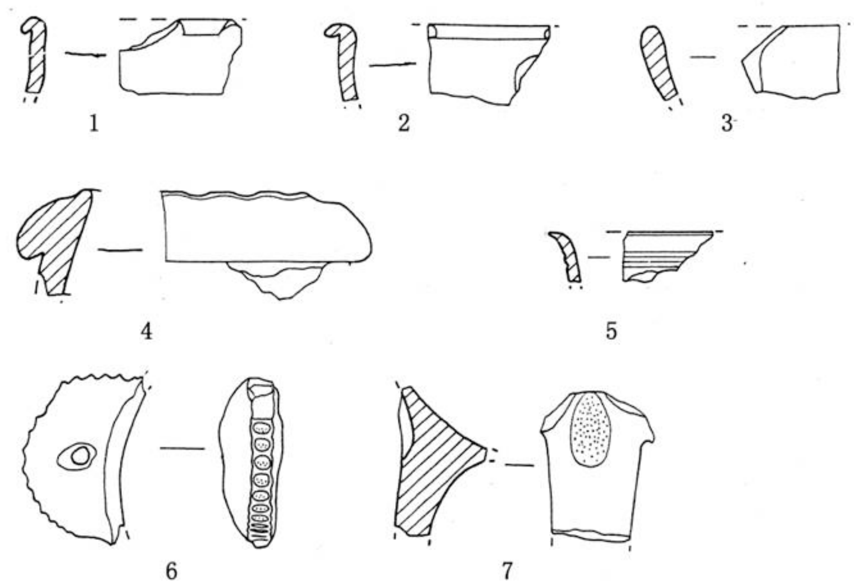


Figure 2.4 Early Yangshao (phase I) ceramic assemblage in the survey area.
1. HRP001C343:15 *guan* jar or *ding* tripod rim; 2. HRP001C352:9 *pen* basin rim;
3. HRP001C354:7 *bo* bowl rim; 4. HRP001C343:12 *gang* large jars; 5. HRP001C349:11 *bei* cup;
6. HRP001C342:1 ear of *guan* jar; 7. HRP001C343:11 *ding* tripod leg.
Scale: 1-8, 1:2.

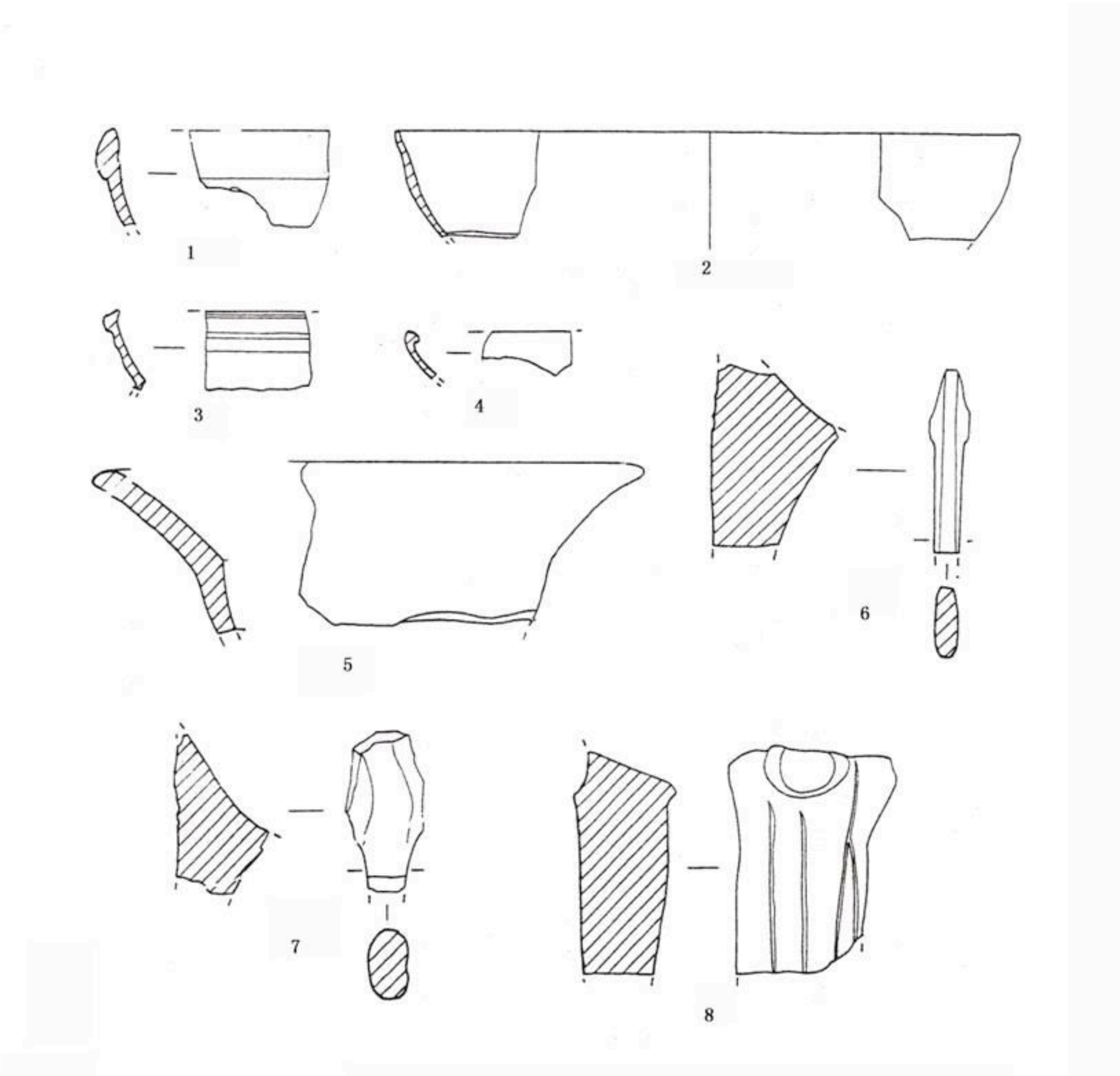


Figure 2.5 Middle Yangshao (phase II) ceramic assemblage in the survey area.
1. HRP001C303:10 *pen* basin rim; 2. HRP001C354:8 *pen* basin; 3. HRP001C386:21 *ding* tripod or *guan* jar rim; 4. HRP001C451:17 *bo* bowl rim; 5. HRP001C303:12 *zun* jar; 6. HRP001C385:25 *ding* tripod leg; 7. HRP001C228:2 *ding* tripod leg; 8. HRP001C358:3 *ding* tripod leg.
Scale: 1-7, 1:2; 8, 1:1.

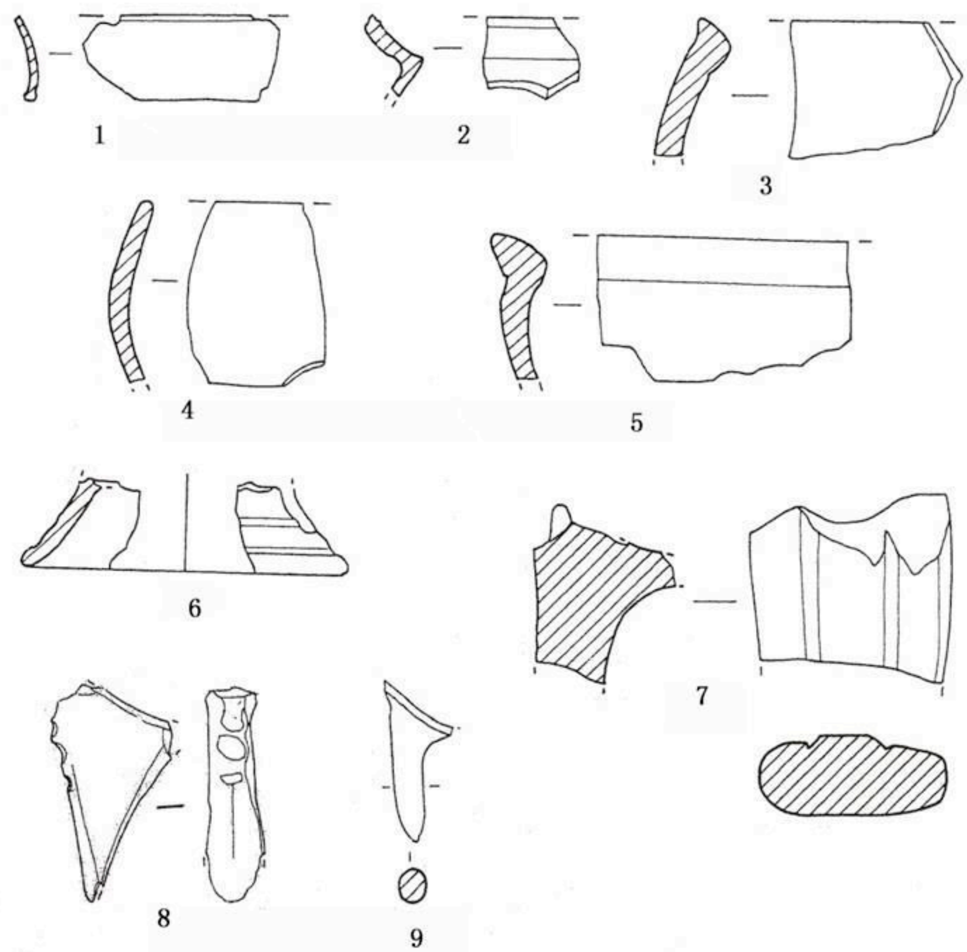


Figure 2.6 Late Yangshao (phase III) ceramic assemblage in the survey area.
1. HRP001C452:1 *guan* Jar or *ding* tripod rim; 2. HRP001C517:60 *guan* jar rim; 3. HRP001C346:1 *guan* jar rim; 4. HRP001C344:18 *bo* bowl rim; 5. HRP001C450:2 *pen* basin; 6. HRP001C303:1 *qizuo* stand; 7. HRP001C517:57 *ding* tripod leg; 8. HRP040C292:4 *ding* tripod leg; 9. HRP018C121:3 *ding* tripod leg.
Scale: 1-8 1:2, 9 1:1.

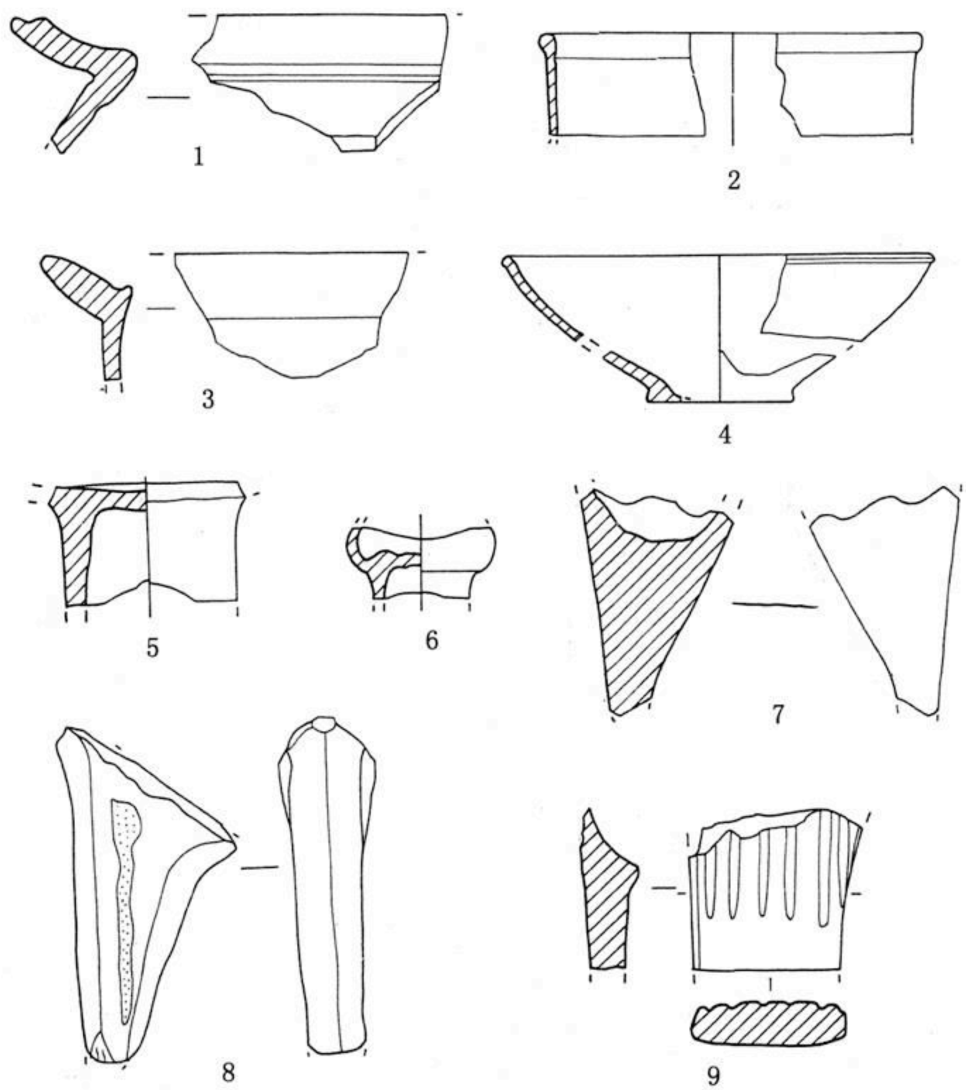


Figure 2.7 Early Longshan (phase IV) ceramic assemblage in the survey area.
1. HRP001C517:8 *guan* jar rim; 2. HRP001C346:19 *guan* jar; 3. HRP048C302:2 *pen* basin rim; 4. HRP017C118:2 *wan* bowl; 5. HRP001C301:3 *dou* stemmed cup; 6. HRP047C358:1 *gaobingbei* cup ;7. HRP001C178:8 *gui* tripod leg; 8. HRP001C364:4 *ding* tripod leg; 9. HRP001C517:68 *ding* tripod leg.
Scale:1,3,5,7,8 1:1; 2,4,6,9 1:2.

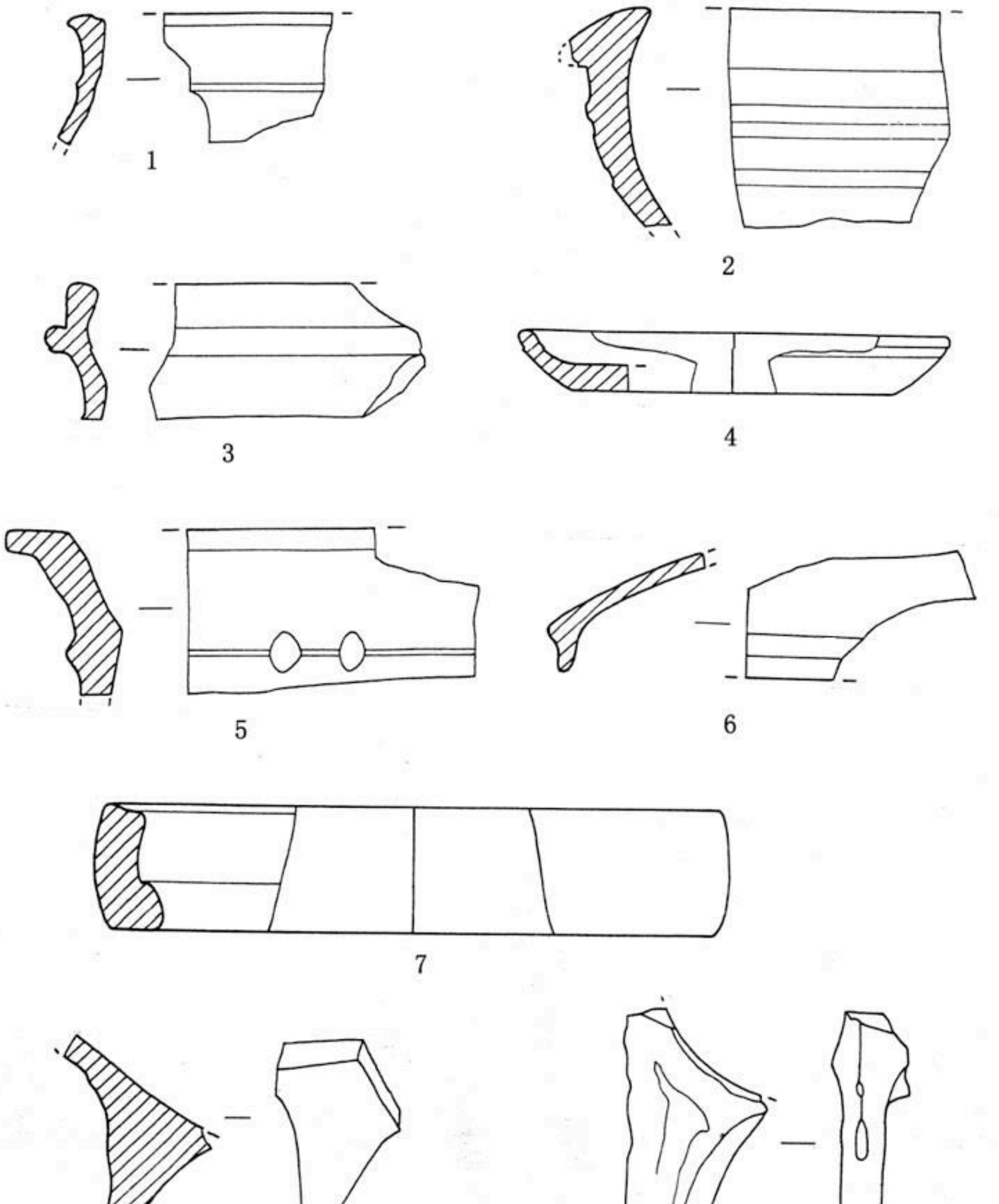


Figure 2.8 Late Longshan (phase V) ceramic assemblage in the survey area.
1. HRP001C239:11 *guan* jar rim; 2. HRP0013C091:2 *pen* basin or basin-shaped *ding* tripod rim; 3. HRP001C517:56 *pen* basin rim; 4. HRP028C194:1 *pan* plate; 5. HRP001C283:2 *gui* tripod rim; 6. HRP001C240:9 *qigan* lid; 7. HRP001C413:1 *qizuo* stand; 8. HRP001C360:16 *ding* tripod leg; 9. HRP040C296:3 *ding* tripod leg.
Scale: 1,3,4,7,9 1:2; 2,5,6,8 1:1.

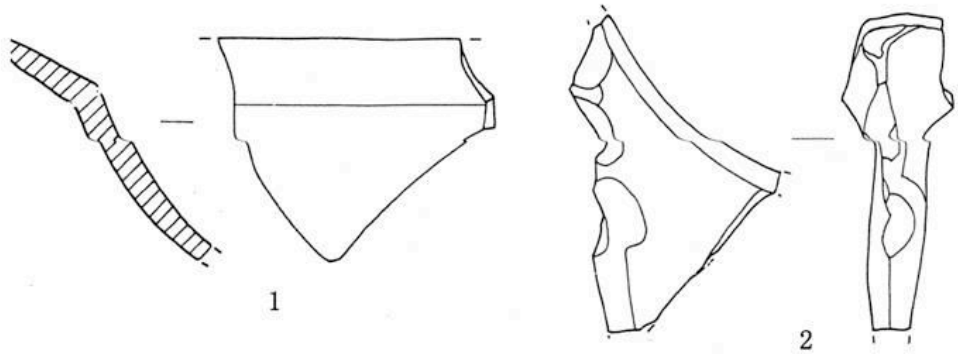


Figure 2.9 Erlitou (phase VI) ceramic assemblage in the survey area.
1. HRP001C239:3 *dou* stemmed dish; 2. HRP030C240:1 *ding* tripod leg.
Scale: 1-2, 1:1.

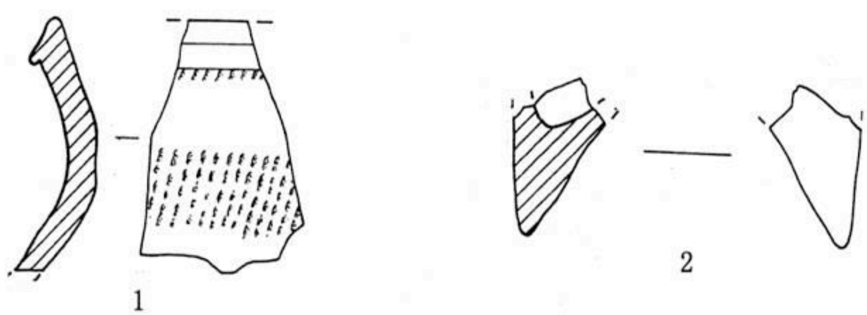


Figure 2.10 Shang (phase VII) ceramic assemblage in the survey area.
1. HRP028C194:4 li tripod rim, 2. HRP001C364:1 li tripod leg.
Scale: 1, 1:1; 2, 1:2.

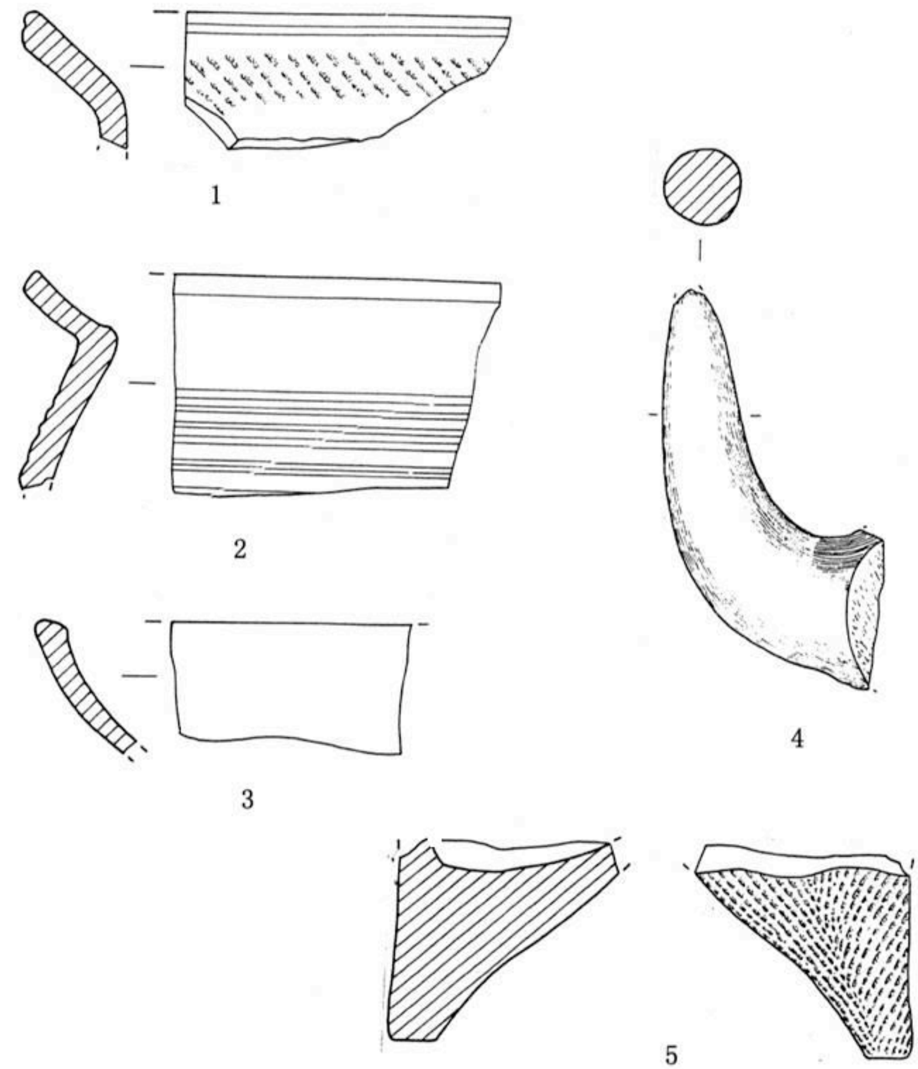


Figure 2.11 Western Zhou (phase IX) ceramic assemblage in the survey area.
1. HRP002C015:43 *li* tripod rim; 2. HRP005C035:16 *guan* jar rim; 3. HRP001C442:3 *dou* pedestal serving-stand rim; 4. HRP005C035:20 *jiaoba* horn; 5. HRP040C295:8 *li* tripod leg. Scale: 1-5, 1:1.

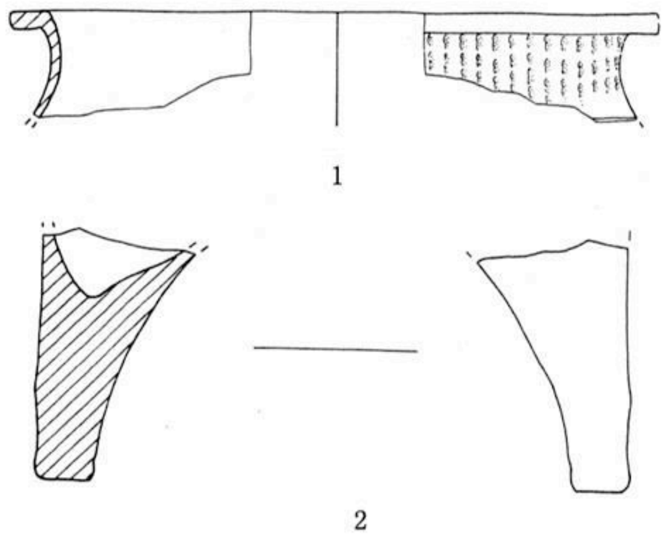


Figure 2.12 Spring and Autumn (phase X) ceramic assemblage in the survey area.
1. HRP019C126:4 *li* tripod rim; 2. HRP019C216:3 li *tripod* leg.
Scale: 1-2, 1:2.

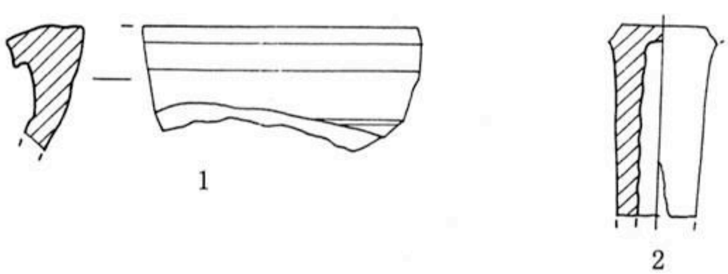


Figure 2.13 Warring States (phase XI) ceramic assemblage in the survey area.
1. HRP055C465:1 *li* tripod rim; 2. HRP019C126:2 *dou* pedestal serving-stand.
Scale: 1, 1:1; 2, 1:2.

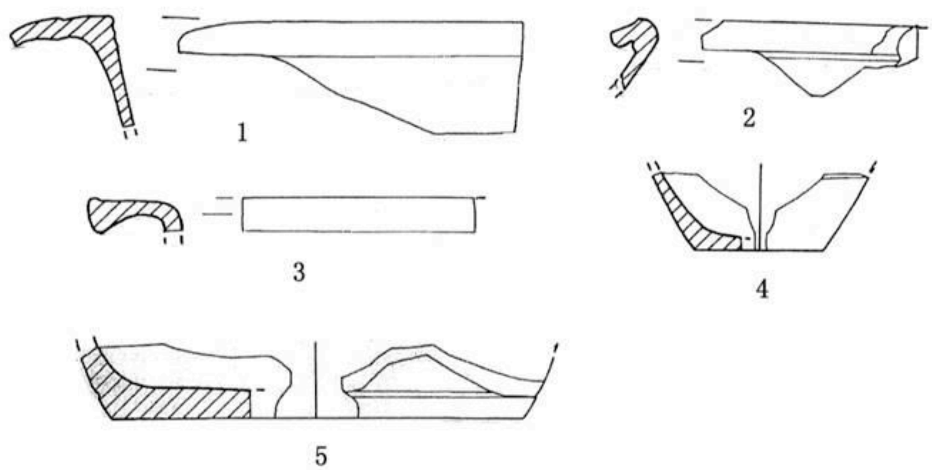


Figure 2.14 Qin and Han (phase XII) ceramic assemblage in the survey area.
1. HRP011C110:6; 2. HRP008C066:11; 3. HRP056C480:1; 4. HRP053C392:1; 5. HRP053C392:2.
Scale: 1-5, 1:2.

Figure 2.15 Liuchao (phase XIII) ceramics found in the Lüdianzi site (HRP010), Huaibin County.

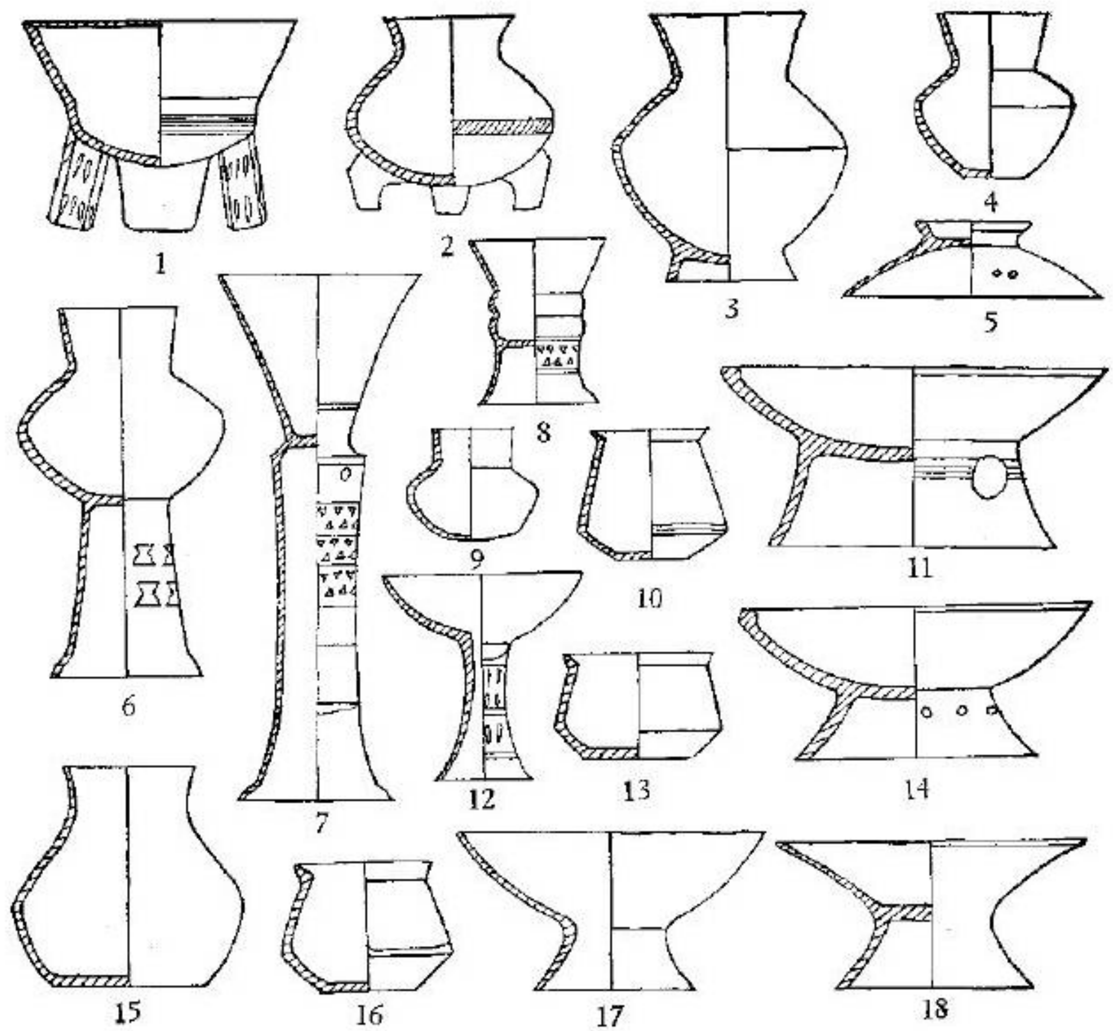


Figure 2.16 Ceramic assemblage in a Neolithic tomb in Zhaoji, Huaibin County.
1-2. *ding* tripod; 3,4,6 ,9. *guan* jar; 5. *qigai* lid; 7,8,10,13,16. *bei* cup; 11,14. *pan* plate; 12,18. *dou* pedestal serving-stands;17. *qizuo* stand. (Scale: 1-4, 6-9, 11, 12,14 1:5; 5,10,13, 15-18 1:2.) (Adapted from Xinyang Prefectural Cultural Relics Administration Committee and Huaibin County Bureau 1981:figure 4).

CHAPTER 3

METHODS

This research focuses on a regional, full-coverage, pedestrian survey centered on the known, large site of Huangtucheng, 5 km north of the Huai River in east-central China (Figure 3.1). Centering a survey area on a large and known center has practical merits; it reveals relationships between the sociopolitical and demographic center, and its hinterland, sustaining areas. Examples of such surveys include those around Teotihuacán (Sanders 1965), Tikal (Puleston 1973), and Monte Albán (Kowalewski et al. 1989), all in Mesoamerica. Fortunately, the archaeological sequence of the Huangtucheng region is known, so I could distinguish components and readily assess change and continuity (Institute of Archaeology 2001; Peking University and Zhumadian Municipal Office for the Preservation of Ancient Monuments 1998) when fieldwork began.

To answer the research questions, the goals during fieldwork were to: 1) determine site size through time; 2) make systematic collections of sherds, lithics, and metal artifacts; 3) assemble present and past land use data; 4) map the locations of drainage and irrigation canals; 5) map architecture, especially at Huangtucheng; 6) assess the immediate environment of all sites, including elevation and landform, especially of river terraces, natural levees, etc.; 7) record soil types; 8) discover and record other natural resources; and, 9) interview farmers to obtain local knowledge of the survey area. While in the field, I also noted any additional natural or cultural processes that may have affected the archaeological record.

3.1 Systematic Full-Coverage Regional Survey

Systematic, regional, full-coverage surface survey is an effective method for determining settlement pattern, assessing social stratification, and providing insights into the human-environment relationship (Fish and Kowalewski 1990). Supplemented with additional fieldwork like systematic collection areas or excavations, surface surveys provide data on site function (e.g., settlement types), and spatial data on distances between sites. Regional, full-coverage surveys provide spatial data that allows analysis at different social scales and facilitates comparative studies among regions (Drennan and Peterson 2005).

For this fieldwork, I adapted methods used in large surveys in Shandong, the Yi-Luo River region, and the Chifeng area. The Chifeng report discussed survey methods and collection and analysis strategies in detail, and pointed out the importance of adjusting to various landscapes and scales of analyses (CICARP 2003). Full-coverage survey projects began in China in the 1990s (Li et al. 1993; Underhill et al. 1998). Since then, similar surveys also have been conducted in the Huan River and Yi-Luo River region in Henan Province and in the Chifeng area in the Inner-Mongolia Autonomous District (CICARP 2003; Huanhe River Valley Archaeology Team 1998; Institute of Archaeology et al. 1999; Linduff et al. 2002–2004; Liu et al. 2002–2004). Regional, full-coverage surveys in these areas have discovered more sites than reconnaissance surveys, and detailed spatial relationships and provided data on settlement hierarchy. Moreover, they constitute a dataset of one of the world's most ancient civilizations that is comparable to those from other areas of the world.

For this fieldwork, I adapted methods used in large surveys in Shandong, the Yi-Luo River region, and the Chifeng area. The Chifeng report discussed survey methods and collection

and analysis strategies in detail, and pointed out the importance of adjusting to various landscapes and scales of analyses (CICARP 2003).

Survey requires that artifacts be present at surface and that the surface be visible. The Huangtucheng area meets both criteria. Across the Huangtucheng survey area, we discovered that most surfaces are on dark soils on low rises, and near modern villages. Artifacts are exposed at surface, either by plowing or erosion. Although surface visibility across the survey area generally was good in the agricultural fields, it varied by the surface vegetation, and the speed the crop grew. Most of the survey area was planted in millet. Other fields were of rice, which is harvested in the summer, and kenaf, which is used for fiber and is harvested in the fall (September–October). The best season for surface visibility, and thus for survey, is mid-October to December. After February, the millet grows rapidly, making survey conditions challenging. Generally, we found visibility was better on higher landforms (a relative term on this flat plain). We could see the soil stratigraphy along terrace edges or in man-made cuts. Some of the latter were along the margins of brick-making operations, which created ditches and holes in the landscape by removing the clays (Figure 3.2). Of course, these extensive excavations also may have obliterated archaeological sites.

Successful survey requires that artifacts are not covered by alluviation, that is the rate of soil deposition is not greater than the rate of processes that maintain artifacts on the surface, such as plowing. Huangtucheng survey shows that these processes contribute to present visibility of post middle Neolithic sites for the area north of the ancient river terraces south of Luji. Below those terraces people either did not settle because of flooding or the evidence has been removed or covered.

The Huangtucheng survey teams consisted of experienced field technicians from local archaeological institutions—the Henan Provincial Institute of Cultural Relics and Archaeology and the Xinyang Municipal Bureau of Cultural Relics—as well as undergraduate and graduate students from Wuhan University. In the initial training phase, the survey team was five people; later, we had ten people, and broke into two survey teams. We used a survey interval of 25 m between surveyors, checking all available terrain within the project area boundaries. Team members carried the standard items necessary for regional survey, including notebooks, pens, pencils, hand-held global position system (GPS) devices, maps, tags, reclosable plastic (zipper) bags, artifact collection bags, water, food, hats, rainy gear, and sun-screen. Weather and surface conditions affected our progress; severe weather such as fog and unexpected rain hindered us, while nice weather and good surface conditions helped us easily achieve our daily goal, which was at least 2 km^2 per day. Streams and canals are common across the project area, yet we were surprised to find a canal not indicated on our 1970s-era map that required extra effort to detour. We found cellular phones useful for communicating between teams.

Originally, we planned only to cover the area within 7 km radius of the site of Huangtucheng; however, soon realized that expanding the survey area to allow examination of river terraces and banks would provide significant regional archaeological data. Accordingly, we extended the survey area farther south to include the first terrace of the northern bank of the Huai River, which included at least 2 km of sandy loam floodplain soils along the river channel. These flat bottomlands have few residences; instead, residential buildings were built atop levees used to prevent flooding. Another part of the northern boundary is a man-made canal. We extended the western boundary of the survey area to Lü River, a tributary of the Huai, which divides Xi County in the west and the Huaibin County in the east. The Huai River forms the southern boundary of the survey area, and the Jingjiu railroad, which connects Beijing and kowlong, Hong Kong, forms the eastern boundary.

Lacking aerial photos, we used 1:50,000 and 1:10,000 scale topographic maps obtained from the Henan Survey Bureau to guide us in the field. The higher resolution 1:10,000 map series dated to the 1970s, and we used them for our daily planning and while surveying. We mostly used the 1:50,000 series maps for cross-reference and to monitor our progress. To make the large 1:10,000 maps easier to use in the field, we cut them into six pieces, each 8.5 x 11 inches. Sometimes the village locations and names were more accurate on the 1:50,000 scale maps. While in the field, we marked the locations of sites and artifact collection areas in pencil on the 1:10,000 maps. Later, we used a blank piece of paper as an overlay for the map to trace the outlines of each component, the occupation of a site during a particular phase. Since there were few obvious landmarks, we found the GPS units a necessity; we used them to record our starting locations and to record center points of collection units.

Using survey separation intervals of 20–50 m, surveyors systematically covered the entire area (Figure 3.3). The transect interval varied based on the elevation of the survey area (and thus the landform). At the beginning of the survey, we used a 20 m interval, and discovered we could increase it to 25 m without loss of information, which we used for most of the project area. The exception is the floodplain area along the Huai River in the southern project area, where we used 50–100 m intervals. On average, we covered 2–3 km^2 per day; however, of course our pace varied based on survey conditions and the density of any cultural materials we encountered.

When we found cultural materials, we determined the extent of the scatter, then measured site sizes by pacing, aided by GPS. Finally, we mapped this information on the topographic map. We determined site limits based on the presence of artifacts (including pottery sherds, stone artifacts, terra-cotta, metal objects, porcelain, etc.), architectural foundations, earthen walls, and other archaeological remains. We found ceramics to be the most common artifacts, and the most dependable evidence of sites. Soil-caked ceramics are difficult to identify while in the field. By leaving artifact identification to the subsequent laboratory analysis phase, we made the collection process easier.

3.2 Artifact Collection and Analysis

For this project, an archaeological site is at least one artifact diagnostic of a certain chronological period. For the Liangchengzhen area in Shandong Province, researchers also used one artifact, but in the Chifeng area in Inner Mongolia researchers required three artifacts (Underhill et al. 1998; CICARP 2003). In general, we found earlier artifacts were more poorly preserved than later artifacts, and they appeared in lesser quantities. This was especially true for the Early to Middle Yangshao ceramics, which were also of lesser durable. Had we required more than one diagnostic artifact, we would have recorded fewer sites. The one-artifact criterion has been used in other areas (i.e. Underhill et al. 1998). The one-artifact minimum also recognizes that the earlier components would be more deeply buried, with plowing moving fewer of them to the surface than for later components. Thus, it is reasonable to require only a single diagnostic artifact for components dating to the early periods.

We determined the limits of each archaeological site based on the concentration of artifacts, with or without evidence of architecture. If there was a gap in the surface scatter of more than 100 m, and no other evidence to suggest the occupation was continuous, we recorded the scatters as two separate sites. If we found a single non-diagnostic sherd more than 100 m from a site, we discarded it, assuming it did not indicate a habitation area. The 100 m distance is arbitrary, but has been used elsewhere in the world (e.g., Mesoamerica, Kowalewski et al. 1989).

Because one aspect of modern agriculture in this area involves drastic reshaping of the landscape, artifacts in theory could be redistributed, creating false sites, but we found no cases that made us suspect such a process in this project area. We assigned site numbers to areas that had an abundance of artifacts, generally combined with rich or dark soils, evidence of features, subsurface cultural layers (visible in cuts), or higher elevations.

We used a controlled collection strategy. Once we determined we were on a site, we used GPS devices to set a center point for a grid, then establish either a 25 m or a 50 m grid, with the boundary of the grid generally determined by the distribution of artifacts. We marked the corners of the grid with kenaf poles. Whereas in Mesoamerica, 3 m diameter circles would yield sufficient diagnostic artifacts, here we needed the larger collection areas to garner sufficient diagnostic artifacts to determine components. The smaller 25 x 25 m grid was used only at the largest site, Huangtucheng. By using identical sized collection areas, we can assess variations in artifact density across a site, or even among sites. This collection strategy also allowed us to become familiar with the diagnostic artifacts peculiar to this area at the beginning of the project, and to use surveyors who were less familiar with the diagnostic artifacts peculiar to this area. In addition, soil-caked ceramics are difficult to identify while in the field. By leaving artifact identification to the subsequent laboratory analysis phase, we made the collection process easier. We used two collection methods, tailored to artifact density. Our standard collection was 20 artifacts per 50 x 50 m collection unit, an area of 2500 m^2. On low-density sites, with less than 20 artifacts in the collection unit, we collected all the artifacts. For higher-density collection units, we systematically collected all artifacts within a circle of known radius, usually 1.5 meters. If we found less than 20 artifacts within that circle, we enlarged its radius. Final site boundaries were made after recording the collection units in the field.

The component, or occupation of each temporal phase, is the basic temporal-spatial unit for this study. Accurate identification of each component at a site is key to understanding change and continuity in settlement patterns. Component analysis was divided into two steps, the first in the field, and subsequently during laboratory analysis. I have identified 17 phases from 5000 B.C. to present. I have also identified three periods prior to the Longshan Period, which had not previously been identified by reconnaissance surveys. For component analysis, I classify components by size in two ways: in chapter 5 that describes settlement patterns, by "natural breaks" apparent in the size distributions for each time period, and then in Chapter 6, I use a single scheme with intervals of smaller than 2 ha, 2 to 10 ha, and larger than 10 ha, for purposes of comparison among components over time and with other areas.

Field crew members learned the basic characteristics of artifacts of all phases, to get a rough idea of what comprised diagnostic artifacts. They made collections of the diagnostic sherds, excluding obscure, eroded, even-experts-can-not-tell sherds. We used artifact bags made of plastic or fabric, and marked them with the date, collector's name, collection unit number, collection unit geographical coordinates (usually the center of the collection unit), quantity, and field chronology assessment. They also recorded the same information in their notebooks. Artifacts were then transferred to the laboratory for cleaning, analysis, and tabulation.

The field crews also did the laboratory work, on rainy days when we could not do fieldwork, evenings after fieldwork, and after a week of sunny days when we did fieldwork and accumulated artifacts. We divided into two groups, and one would wash artifacts, while the other would input daily findings from the notebooks into databases on laptops. During especially busy periods, we hired local laborers to wash artifacts. We were extremely careful to keep identification tags with collections at all times. We worked in pairs to analyze artifacts, first dividing them into material—e.g., pottery, stone, porcelain, or metal. Stone artifacts are unanalyzed in this study and the information are included in Appendix B. Pottery tools are present in Appendix C.

Pottery is the key diagnostic artifact, so accurate ceramic analysis is the basis for determining site area for each phase, which allows us to plot changes in settlement patterns. To aid the crew in identifying the diagnostic artifacts, we made a pottery chart that included the major characteristics of the pottery of each phase: color, texture, temper, types, and ceramic assemblage. We tabulated counts of each pottery type, and then used these data for additional analysis of artifact densities.

During analysis, we also selected a sample of the most diagnostic sherds. These sherds were each marked in ink with their locations, using site number, collection unit, and their serial number in the collection unit, e.g., HRP001C519:20. We recorded a list of these sample artifacts in notebooks and in a computer database. We also photographed these artifacts, and generated a photo log in both notebooks and in a computer database. After analysis, tabulation, and photography, we bagged together all sample artifacts by phase for each site. All artifacts are now stored in Xinyang City Archaeological Institute.

3.3 Mapping Huangtucheng

Huangtucheng (HRP001) is by far the largest site in the surveyed area. A reconnaissance survey in the 1970s estimated its area as 10 ha (National Bureau 1991:492), but Huangtucheng project revealed that it is much larger. Land use across the site today is a mosaic of small agricultural fields interspersed with drainage ditches. Huangtucheng includes four visible mounds and is on landforms higher than the surrounding terrain, making the site visible from a distance.

We used a total station to map Huangtucheng (Figure 3.4). Our field crews were assisted by technicians from the survey department at Wuhan University, and by personnel from the Xinyang and the Luoshan County archaeological institutes. We plotted coordinates using a computer-aided design (CAD) program. We also used Surfer (a commercial contouring and surface plotting program) to generate custom three-dimensional maps.

Clearly, the relatively flat nature of the site area made elevation-mapping extremely important; we mapped elevation changes at 1 m intervals, especially in places with abrupt elevation changes. Compared to the project area as a whole, however, elevation changes within the site are large. A 1 m wide irrigation channel, excavated in the 1960s to improve drainage for agricultural fields, cuts through the southern part of the site. One artifact concentration is about 100 m south of this drainage ditch. A small channelized ditch is about 100 m north of the north mound. A tiny drainage ditch also runs along the western site limits. The land west of this mound is low floodplain and is presently used to grow rice. Thus, low ground and watercourses surround the site, suggesting possible moats for a walled town since ancient walled towns are usually surrounded by moats. Excavation would reveal Huangtucheng was a walled town; this is consistent with Neolithic sites elsewhere, in the Yangtze River region such as Yinxiangcheng and Zoumaling, which are walled and surrounded by water (Jingzhou Museum 1998; Jingzhou Museum et al. 1998). Given the complexities of the site's layout, making a detailed map was important; it both deepened our understanding of the site layout and will be an important guide for future research, including excavation. Our goal in mapping Huangtucheng was to include all areas we identified as part of the site.

3.4 Coring Huangtucheng

Intensive survey and collection at Huangtucheng clearly demonstrate the richness of the occupation. It is the only site in the project area that produced evidence of all 17 chronological phases identified for this region. During fieldwork, we found adobe bricks on the higher landforms, and some trash pits exposed in the walls of agricultural terraces. We found no remains of earthen walls on the surface, which is not surprising, since the soils in this locale are very sticky and difficult to identify as having been hammered and used to construct architecture, as in northern Henan (Ren 1998:7). Elderly residents of nearby communities told us that a splendid city was here long ago; but people moved north and south, dividing it into two cities. The fact that the site of Huangtucheng is surrounded by watercourses combined with this folklore supports the possibility that it was a walled town in early periods.

Coring is one of the most efficient ways to solve this puzzle by producing data about the subsurface nature of a site without destroying evidence in the process. We undertook the coring in hopes of discovering the remains of subsurface walls, especially dating to the period of peak occupation, the Late Yangshao period. Previous studies (Zhao 2004) have identified two kinds of walls: 1) piled walls mostly in the Yangtze River region; 2) hammered walls, mostly in the Yellow River region, which were the prototype of walled towns in the Bronze Age in the Central Plains. It is meaningful to determine which type of walls Huangtucheng has.

We used a Luoyang coring tool (Figure 3.5). This tool was invented by tomb-looters working in the Luoyang city, in central Henan and has been adopted by archaeologists. A Luoyang coring tool has an extra-long wooden handle with a metal blade at the bottom. It makes holes about 3 cm in diameter, and allows the operator to pull up the soil core, so the profile can be examined with relative ease. We cored to a maximum of 1.5 m. We did not go deeper because of the high water table and sticky soils, which made it impossible to continue, even for an experienced technician. Most core holes on Huangtucheng filled with water when excavated to only 1 m, so it was only holes on the highest landforms that could be excavated to 1.5 m.

The cores were dug by technicians from local archaeological institutes, assisted by local farmers we hired to increase the speed of the testing program. Two people worked on each core, one technician and one laborer. The technician recorded all relevant data including core location, descriptions and depths of soil layers and horizons, soil characteristics (color, texture, context, cultural materials, etc.). We used a GPS to record the location of each core, so we could include it later in the Surfer plot. After we excavated a core hole, we could examine the exposed profile for soil horizons that differed in color, texture, and content, or to spot architectural remains.

To focus our coring efforts on areas where we discovered structural remains, we used a two-tiered coring strategy. First, we cored in a wide-interval grid to prospect across the entire site. Then, if we discovered architectural remains or soil horizons of interest, we began close-interval testing to discover the orientation and map the extent of walls and foundations. We began coring on a 20 x 50 m grid across the entire site, beginning (as we had with the collection unit grid) in the northeast corner of the site. We dug cores in a row at intervals of 20 m all the way to the canal edge at the western margin of the site. Then we dug a second row, 50 m south of the first row, continuing in this fashion across the entire site. We used a cruciform pattern for the close-interval testing, reducing the coring interval to ten, five, or even one meter to discover the orientation of foundations. Using close-interval coring, we could follow a foundation to a corner and then test further along a perpendicular wall. By combining the data from these two strategies, we could determine changes in wall foundation layouts with minimal destruction to them.

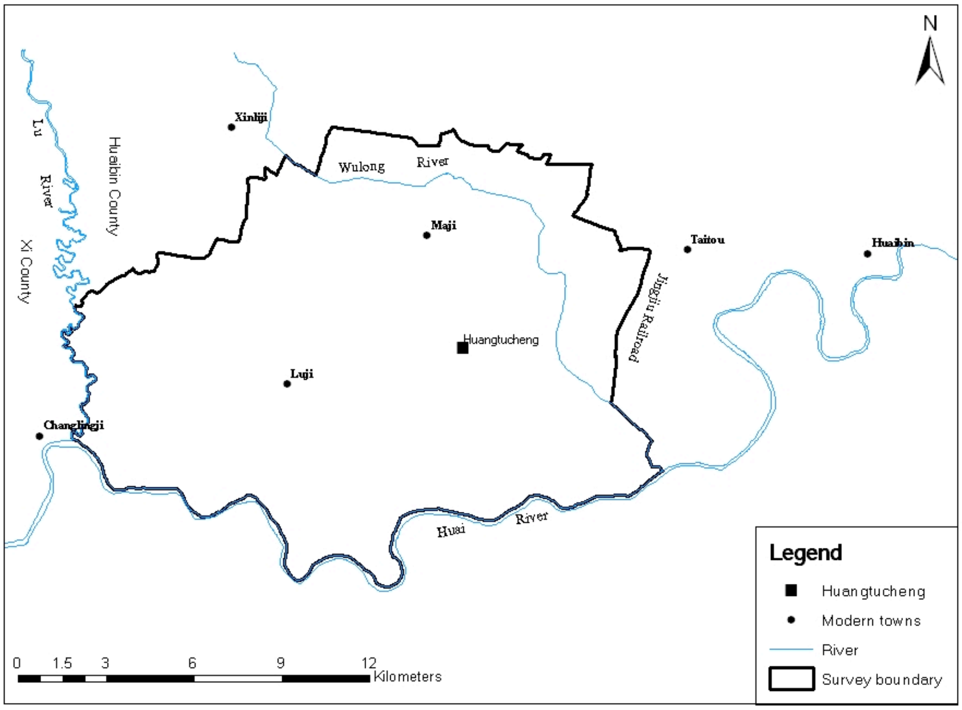


Figure 3.1 Huangtucheng regional archaeological survey boundary.

Figure 3.2 Archaeological site profile exposed by modern brick-making operations.

Figure 3.3 Full-coverage pedestrian survey in the survey area.

Figure 3.4 Mapping Huangtucheng using a total station.

Figure 3.5 Coring using the Luoyang shovel in the survey area.

CHAPTER 4

SITE DESCRIPTIONS

The Huangtucheng Regional Archaeological Survey located 76 archaeological sites across the 209 km^2 project area (Figure 4.1). These sites include multi-component habitation sites and single-component tombs and cemeteries. A reconnaissance survey in the 1980s recorded five habitation sites in the survey area: Huangtucheng, Dazhongzi, Xiaozhddongzi, Wangjiakong and Liuzhai (National Bureau 1991). This research shows the earlier survey consistently underestimated the number of sites, the size of the sites and missed occupation periods. For example, Huangtucheng was recorded as a 10 ha Longshan settlement, although this survey found a multi-component occupation measuring up to about 30 ha. We surveyed, collected, and recorded all sites except Wangjiakong, which is now inundated by water in an irrigation canal and no longer accessible. This chapter provides details on each habitation site in the project area.

HRP001—The Huangtucheng Site

Huangtucheng is by far the largest site found in the survey area. It was occupied during all 17 phases, from the earliest Yangshao period to modern times. It is a wonderful example of a large regional center.

Huangtucheng is surrounded by modern villages and overlooks a small river along its eastern edge. The Huai River is 5 km south of the site. The Dengzhou road parallels the small river 200 m farther east. The site contains four mounds (Figure 4.2)—a northern pair and a southern pair**.** The line east of the mounds on Figure 4.2 is a creek that flows to the south. The southern margin of the southern pair of mounds has been disturbed by a modern irrigation canal, which was built in the 1960s. Overall, the site has been partly disturbed by erosion, modern irrigation and plowing in agricultural fields. Agricultural fields currently cover the site.

Artifact density at Huangtucheng is high, especially on the elevated mound areas. This could be a product of erosion, since the gradual loss of top soil reveals previously buried artifacts. Furthermore, frequent flooding removes additional topsoil. The northern mounds have large quantities of adobes (Figure 4.3). On the southern mounds, we found evidence of trash pits in several locations. However, we found few diagnostic sherds on lower elevation areas within the site limits, especially in the area between the mounds.

Because of the high artifact density, we used small collection units. We began in the northeast corner of the site area, and created a grid of 25 x 25 m squares, which came to a total of 532 collection units. The grid has a canal on the north, a small river to the east, the modern village of Chenqiangpu in the south, and a tiny irrigation canal to the west.

The site area varies by component or phase of occupation (Table 4.1). The site goes through dramatic changes during the long course of the Neolithic times and the Bronze Age (Figure 4.4). Early Yangshao period artifacts are mainly concentrated on two separate locations about 300 m apart on mound 1 (0.6 ha) and mound 3 (2.6 ha). We used a single site number (HRP001) because of the similarity in ceramic styles and landform, although this violated the 100 m rule. In the Middle Yangshao period, occupation on mound 3 expanded to 9.6 ha while occupation on mound 1 reduced to only 2.1 ha. In the Late Yangshao period, the site area increased substantially to 28.1 ha, when it was by far the largest settlement in the region. The closest contemporaneous settlement is 10 km distant. During the transition to the Early Longshan period, the size of Huangtucheng decreased to 18.1 ha, and small satellite settlements were established. In the Late Longshan period, Huangtucheng peaked with an area of over 30 ha, and an increase in satellite settlements. Huangtucheng was also a large settlement in Late Shang and Western Zhou period, but was smaller than in the earlier Late Yangshao and Longshan periods. This sequence shows Huangtucheng was occupied across all historical periods. Even now, the surrounding village is one of the largest in the town of Maji.

Table 4.1 shows that the major occupations at Huangtucheng are in the Late Yangshao and the Late Longshan periods. During the entire span of occupation at Huangtucheng, the occupied areas were always on the mounded, high elevation areas. During the phases when the settlement was larger, it spread some distance from the mounds. The sharpest decreases in site area occurred in these transitions: from the Late Yangshao period to the Early Longshan period, and from the Late Yangshao period to the Erlitou period. Not only did the Huangtucheng's area decrease at those times, but the artifact and settlement pattern changes altered concurrently across the region. Indeed, we see marked changes in settlement pattern and political economy across the whole Central Plains and in the Yangtze River region, indicated by changes in residential architecture and ceramic styles, and the appearance of walled towns and state-level social organization in Shandong and the Central Plains (Erlitou team 2005; Underhill et al. 1998).

Across Huangtucheng, we made a large artifact collection, totaling 4695 items from 532 collection units. The artifacts include ceramics, stone artifacts, shell, bone, metal artifacts, and porcelain. Eighty-eight percent of the artifacts are pottery sherds. Huangtucheng's artifacts constitute 39.5% of the artifacts collected during the project, the largest from any site. Ceramic vessel types include cooking, serving, and storage vessels. We also collected pottery-making tools and other craft products like spindle whorls. Most of the ceramics are plain, but some are decorated with a basket-like decoration, a pinched pattern, are cord-marked, or exhibit bands or dots. Depending on tempers and firing temperature, colors include red, grey, brownish variations, yellow, and black. We found only a few polychromes on the surface. Tempers varied, and included sand and organic materials such as grass ash. The Neolithic ceramics comprise the richest collections.

We also found a large, varied assortment of stone artifacts, including axes, chisels, choppers, knives, and arrowheads, mostly dating to Neolithic periods (Appendix B). The raw materials are from various sources, and include sedimentary and metamorphic rocks. Some small stone tools are exquisitely crafted. This toolkit suggests Neolithic inhabitants engaged in a variety of agricultural and hunting activities.

We found no complete house foundations or other structural evidence on the surface of Huangtucheng, but we did find large adobe chunks on mound 1. They suggest a habitation area of some sort, but we cannot identify its component or components. It may be Neolithic since nearby surface ceramics mostly date to the Late Yangshao and the Late Longshan periods.

Huangtucheng's large size and special layout (the mounds and watercourse around the site) make it exceptional in this region. It is surrounded by watercourses in all four directions: a river to the east, a small canal to the north and south, and a low-elevation area to the west. The western area is now converted to rice fields, suggesting there used to be a small river in that area, or otherwise had been low-lying at one time. Archaeological investigations in the Jianghan Plains have uncovered several Middle and Late Neolithic period walled towns that were surrounded by watercourses, and served as important political, economic and cultural centers. Zoumaling, Yingxiangcheng and Majiayuan, dating to the Qujialing period (3500–2600 B.C.), are good examples of such walled towns. All are on locally-higher elevation landforms, and surrounded by water, which offers important riverine resources. Excavations at these towns have revealed walls of hammered earth. Unfortunately, we did not find any walls above ground at Huangtucheng. Based on the large size and the contemporaneity of those Qujialing walled towns, we strongly suspect that Huangtucheng could be one of the few walled towns in the Huai River region, where no walled towns have been found yet. This hypothesis can be tested by excavation.

We undertook coring at Huangtucheng to investigate subsurface remains. Due to the high water table and sticky soils, we were unable to detect definite wall remains. Coring confirmed higher artifact densities on top of the mounds and lower densities on lower landforms. It also confirmed the site limits we determined based on surface artifact distributions recorded during survey and from the collection units.

In sum, Huangtucheng is a relatively well-preserved site. It was listed as an important site for protection and preservation at the provincial level in 2006. As the largest Yangshao and Longshan site found so far in the upper Huai River region, Huangtucheng needs further investigation into its features and changes and continuities to better understand its role and significance in the political economy of this area.

HRP002—The Wulou Site

Wulou is typical of the Late Neolithic and Early historical period sites we found in this area, in that it is located on an elevated landform that has dark surface soils and a relatively dense scatter of easily identified artifacts on the surface. The modern town of Dengwan is to the east. During the pedestrian survey we could not determine if the landform Wulou is on is a natural terrace or an artificial, man-made mound. The soils on the crest of the landform are dark grey with fresh yellowy soils in lower areas. The southern part of the site is destroyed by a modern fish pond, with a large modern irrigation canal 100 m farther south, and a winding, north-south river at the east end of the canal.

Table 4.2 shows Wulou's three occupation phases. Initial occupation was during the Late Longshan period, when only the top of the landform was occupied and the occupation area was only 2.8 ha. After several periods when it was unoccupied, Wulou was reoccupied in the Late Shang and Western Zhou period, when it covered 4.8 ha and the entire landform. As mentioned in Chapter 2, artifact styles of the Late Shang and Western Zhou periods are difficult to distinguish because of their continuous use. The Late Shang and Western Zhou period artifacts were concentrated on top of the landforms, and collection unit C015 alone produced about 100 pottery sherds. The typical ceramic assemblage from the Central Plains dating to this period includes *li* tripod, *yu* container, *dou* pedestal serving-stands, and *guan* pot, which all were found here. Subsequently, Wulou decreased to 0.3 ha in the Spring and Autumn period. Today, the site is abandoned and is now agricultural fields.

We found no architecture or archaeological features on the site surface. We did find adobe fragments and *wa*, a roof tile material used in historical periods; these date to the Late Shang and Western Zhou period, if not earlier. From a profile at the edge of the site, we also identified ceramics that date to phase VIII–IX and small carbon particles in the middle of the grey soil on that profile.

Wulou's occupation was most prominent in the Late Shang and Western Zhou period. The main components focused on the elevated landform and did not extend beyond the mound. The southern part of the site has been destroyed and other parts of the site are disturbed by many modern tombs. Local people call this area "Zhongzidi," a cemetery on high mounds.

HRP003—The Chenweizi Site

Chenweizi is an excellent example of an archaeological site mostly destroyed by a modern brick-making operation. The site is on a small terrace, with a large brick factory to the south. We found artifacts along the east side of a country road that bypasses the village of Chenweizi. This road destroyed the west edge of the site. Local informants told us that this area had a higher landform that was leveled in the 1960s. The southern site margins were destroyed when soils were removed and made into bricks. In the profile of that hole we found cultural deposits and artifacts dating to the Yangshao and Longshan periods. The area of the site that remains is less than 2.0 ha (table 4.3), but the site probably was larger originally. The profile in the bricks extraction hole in the southern part of the site shows cultural horizon soils are grayish-yellow and loose in texture, and contained stone tools and tripod leg.

Chenweizi generally has low artifact density due to poor surface visibility and heavy disturbance; however, artifact types and temporal components are rich and varied. Occupations span the Neolithic and historical periods, including the Middle Yangshao period, Late Yangshao to Early Longshan period, Late Longshan period, Erlitou period, Shang dynasty, Western Zhou dynasty, Eastern Zhou dynasty, Sui and Tang dynasty. Unfortunately, because of extensive disturbance, I cannot determine site area for all components. Based on current surface artifact distribution, the Late Shang and Western Zhou period component is the largest with an area of 1.6 ha, while for all other periods the occupation was only 0.3–0.5 ha.

HRP004—The Bali Site

This site is southwest of Huangtucheng and has distinctive Erlitou (phase VI) remains. There is a large modern irrigation canal north of the site. The site is atop a platform that currently is 20–30 cm high. We found large pieces of artifacts, including red cord-marked pottery, near the edge of the platform, along with carbon particles and trash pits. We also found remains dating to the Longshan period and the Shang and Zhou period (Table 4.4).

The site apparently extended farther south, but that part was destroyed by construction of three modern ponds. Habitation areas were surrounded by these ponds and these habitation areas were abandoned old villages from 20 to 100 years ago. Residences, usually on platforms, surrounded by man-made moats or ditches remain popular today. Interestingly, He Nu (1996:30) reports that in Qujialing and Sanwangcheng Neolithic sites in the Jianghan Plains, "Yan-ju-shi" residences surrounded by man-made moats or ditches are one of the principal residence types. We also found artifacts on house platforms that were surrounded by water. This site is also disturbed by a modern irrigation canal in the north and a fish pond to the west. The surviving Erlitou remains cover about 2.6 ha.

HRP005—The Qianzhangweizi Site

Qianzhangweizi is an excellent example of a site overlaid by a modern village. The site is on a hill, and bisected by a local lane. North of the lane is a vegetable garden while south of the lane is planted with millet. An abandoned part of old Qianzhangweizi village has disturbed the western side of the site, while the current village is north of the site.

Qianzhangweizi's remains are mostly contemporaneous with the Huangtucheng site, and the site is only 100 m northwest of Huangtucheng. Clearly, these two sites coexisted from the Late Longshan period to at least the Han dynasty, based on artifact styles and occupations. Qianzhangweizi's most distinctive occupation dates to the Erlitou period (phase VI), which was uncommon at Huangtucheng (Table 4.5).

Qianzhangweizi was largest in the Late Shang and Western Zhou dynasty. The Late Shang and Western Zhou dynasty artifacts comprised a typical assemblage, yielding great quantities, and included *li* tripods, a serving pot with handles, and other pot forms. Cord-marked decorations are the most common, and the average artifact density was over 20 pieces per collection unit. We also found a worked horn in collection unit C035, along with more than 50 sherds of Late Shang and Western Zhou period ceramics.

The largest occupation that survives modern disturbance is 1.5 ha and dates to the Erlitou to Early Shang period (phaseVI–VII); site area decreases after that. The total occupation area should be considered to have been larger than 1.5 ha, since the northern site edge extended beneath the modern village, and could not be recorded. Qianzhangweizi's close proximity to Huangtucheng makes this occupation interesting and important. Further attention on their relationship is needed.

HRP006—The Jinan Site

Jinan is atop a small hill, overlooking a river to the east, with the modern town of Dengwan to its east. A modern revolutionary site—the Yuhuang temple—is northeast, across the river. To the east, across the river, the land has no surface visibility, because it is planted in orchid trees. The west side of the site ends at the Huai River levee. Surface visibility around the hill is very poor, since it is covered with rice field.

Jinan has low artifact density, and only small quantities of artifacts; however, we found many adobes exposed by plowing, which indicates a subsurface architectural feature. We found small quantities of Shang artifacts on the surface (Table 4.6). Jinan was also occupied during the Eastern Zhou dynasty.

The hill's area is about 0.75 ha. Artifacts were concentrated atop the hill. Since the eastern part of the site was covered with rice fields, we could not determine how far the site's boundary extended in that direction.

HRP007—The Lüdianzi Site

Lüdianzi is on a terrace that gradually increases in elevation from east to west. It is west of the modern village of Lüdianzi, one of the largest villages in the survey area. The site was planted in millet at the time of survey, and visibility was good, especially between the millet fields.

The site was mostly occupied during phase III (the Late Yangshao period) to phase XII (Qin and Han dynasty). The largest occupation was during the Neolithic (Table 4.7). We made only four collection units (C057–C060), each 50 m by 50 m, which cover the entire terrace. Artifact density was high in all four, and we collected over 100 artifacts. We saw small Late Longshan period artifacts 100 m west of the collection areas, but did not include them in the site because of their paucity and eroded nature. We found many adobes on the surface, indicating the presence of subsurface features, although we could not determine the shape or functions of those features. They could be house floor remains or something else.

HRP008—The Hongtangmiao Site

Hongtangmiao is a good example of a single-component Late Neolithic site. It is atop a 1–2 m high plaza that measures 50 m by 60 m. The southern plaza presently is used for drying rice. We found no artifacts in this part of the plaza because the surface was hammered and as dry and hard as concrete. From two collection units (C066 and C067), we collected stone tools and typical Longshan pottery sherds. The parts of the Longshan and historical period occupations that survive cover 0.3–0.4 ha (Table 4.8).

Other than the plaza, Hongtangmiao was planted in millet. Everywhere on the surface we saw construction materials from late historical periods, at least after the Han dynasty, such as grey bricks. The local people say there was a historical-period temple on the plaza that was later abandoned. This is a common phenomenon—prehistoric settlements were usually built on landforms with higher elevations, which were seen as sacred by later peoples, who then used the same spots to build temples. Another well-known Longshan site, Liantaisi, in the town of Taitou 5 km east of the survey area, still has a modern temple on top of it.

HRP009—The Miaoxi Site

Miaoxi is on a low terrace, and measures 150 m by 120 m. The ground is littered with large, grey bricks that are Han dynasty construction materials. We also found a few ceramics that date to the Middle and Late Yangshao period, but the Neolithic occupation area is only 0.3 ha (Table 4.9). The Han occupation became larger, reaching 4.1 ha. The local people said there had been a temple on the site, but it was destroyed in 1959 during the Earth Movement.

HRP010—The Taoyao Site

Taoyao is within the modern village Lüdianzi, and is a good example of historical sites that remain occupied today. The Lüdianzi village is quite large, extending east-west along the north bank of a small river, with hundreds of residents. The entire village is located on high river terraces.

Taoyao is on a 1.5 m high rise next to a local road, and currently has no modern houses on it. Many artifacts have washed into the road along a stretch of about 200 m. The road cut shows a stratigraphy with layers of large pottery sherds (Figure 4.5). Most sherds are dark brownish or grey. The vessel diameters are standardized and show no use-wear. We also found burned adobes in the road cut. These stacks of new vessels and red adobes on the profile of the site suggest this area was a historic-period kiln, dating back to the Liuchao period (phase XIII).

The modern village includes several other higher landforms. One is 4–5 m high and overlooks the river, with a modern house atop it. We carefully examined this landform, but found no artifacts. This village may encompass more sites, but due to the high density of modern occupation, we did not discover them.

HRP011—The Lügangtou Site

Lügangtou is on river terrace that gradually increases in elevation from south to north. The north side of the site is the same elevation as the nearby modern villages of Lüdianzi and Longgang. The river to the south was channelized in modern times to improve irrigation.

Lügangtou has a rich and complicated past, with occupations across the entire chronology in this area. The site was first occupied in the Early Yangshao period, and was continuously occupied through prehistoric and historical periods, until modern times (Table 4.10). The occupation area varied through time, ranging from 2.4–4.5 ha. The densest occupations were in the Yangshao period, Longshan period, and the Late Shang and Western Zhou dynasty.

Lügangtou has a relatively high artifact density, and the average number of artifacts in each collection unit exceeds 20 pieces. Most artifacts are ceramics, and we also collected stone tools, spindle whorls, terra cotta, and earthenwares. We found adobes in collection units C073 and C076, along with large concentrations of Late Neolithic sherds.

This site, like modern villages to the north, is linear and extends along river terraces that align east-west, and are narrow north-south. Several modern residences have disturbed places along the southern terrace margins. Modern villages are 100–200 m north of the site. Lügangtou may have been abandoned because of river flooding because of its close proximity to river, and people may have moved north to higher terrain.

HRP012—The Yaozhuang Site

Yaozhuang is a mound-shaped site on a small rise that measures 100 m by 80 m at its base. It is named after the modern village of Yaozhuang that is 50 m north of the site. We found no early ceramics on the ground surface (Table 4.11). Most surface remains were grey bricks with cord-marking and geometric patterns typical of Eastern Han dynasty tomb construction materials in this area. Local people told us that these bricks originally were laid in a circular pattern. The surface soil is brownish, and the mound was planted in winter millet. The millet plants were stunted, however, because of poor growing conditions due to subsurface architectural remains. These data suggest this place has a Han dynasty tomb.

HRP013—The Liuzhai Site

Liuzhai is one of the larger and more complicated sites we recorded (Table 4.12). A 1980s reconnaissance survey described it as a Han dynasty site measuring 1.5 ha and listed it as an important cultural property at the county level to be protected and preserved (National Bureau 1991). Unfortunately, the site's condition was so poor that we could not even find the marker stone installed by the Huaibin County Cultural Relics Bureau.

The site is cut into two parts by a river, and is on both the eastern and western banks. The river was broadened in modern times, disturbing part of the site. A large, modern irrigation canal lies to the north. The site includes several mounds, two on the west side and a large one on the east side. Liuzhai also is surrounded by modern villages, especially to the north and south.

The densest artifact concentration is on the west side of the river. Collection units C092–C095 yielded large quantities of Late Yangshao period to Early Longshan period ceramics, and collection unit C094 alone produced 75 sherds. Although prehistoric rims and body sherds were plentiful, the largest quantities of ceramics belonged to the western Zhou period and came from a small mound. North of this mound, we found most of the Han dynasty artifacts, including cord-marked bricks and other architectural materials. The soil in that area is dark grey, indicating a long human occupation.

In contrast to the west bank, artifact density is low on the east bank of the river. The mound there is pure brown (not dark grey as on the west side), and the top is covered with modern tombs. We found a stone artifact and small quantities of cord-marked ceramics dating to the Late Shang and Western Zhou dynasty. It is notable that we also found several mollusks on the surface; although it is not surprising to find mollusks at riverside settlements, we only found a few at some of the larger sites. We made fewer collection units on the east side because of the paucity of sherds (C106–C108). These artifacts are attributable to the same periods as those from the west bank, including the Late Yangshao period and the Late Shang and Western Zhou dynasty; we gave both banks the same site number. Although its artifact densities are lower, we suspect that the eastern side of the site may be better preserved. The river may have deposited more sediments, capping the cultural horizons; this would account for the pure brown surface soils and the scarcity of surface artifacts.

The archaeological remains from the different periods are in different areas of the site. The earliest occupation was limited to the west side, with an area of 1.5 ha. In the Late Yangshao period to the Early Longshan period, the occupation shifted to a bit higher area and quickly expanded to 3.6 ha. The largest occupation came in the Late Longshan period with an area of 4.6 ha. It decreased in area in the Eastern Zhou dynasty, then Liuzhai peaked again in the Han dynasty with an area of 4.3 ha.

In summary, Liuzhai was a relatively large riverside village since the Middle Yangshao period. The Neolithic occupation was quite stable and increased steadily, peaking in the Late Longshan period, covering 4.6 ha. At the transition from the Late Neolithic to the Early Bronze Age, the occupation decreased, finally returning to its earlier expanse in the Late Shang and

Western Zhou dynasty. During the Han dynasty, Liuzhai retained its large size and supported a population of approximately the same size as the modern community.

HRP014—The Qianlou Site

Qianlou is an example of a site largely disturbed by modern occupation. Our first find was a red *li* tripod leg from the backyard of a modern house in the village of Qianlou. All village houses face north, and are immediately adjacent to a modern road. We were told that the entire village recently had been moved north close to the road. A small irrigation ditch runs south of the backyards. Across the stream, we found large rim sherds, along with adobes and grey soil in the exposed profile of a rice drying area, which had a flat, hard surface. To the west, we found similar sherds in another profile 80 m distant. The ceramics dated to the Early Longshan period, the Shang dynasty, and the Han dynasty (Table 4.13).

The site lies within the boundaries of a modern village, with part of the site under modern houses and agricultural fields. We estimate the total remaining site area as less than 1 ha, based on the remaining scatter. Judging by the size of the platform where we found artifacts, however, we suspect that during the Longshan period the site covered at least 3.6 ha.

HRP015—The Luzhong Site

Luzhong is also among dense modern residences, only 100 m west of Qianlou (HRP014). It is atop a river terrace, with an elevation of 34.9–35.9 m, and much higher than areas somewhat below 32 m only 200 m south of this site. The site is on a rise, with good surface visibility. The northern site area is disturbed by a large wall associated with a middle school in the town of Luji. The wall surrounds the school's outdoor activity area, making it impossible to find artifacts on the surface. The southern site area has been disturbed by a modern brick factory. In fact, the southern border of our collection unit was adjacent to the brick drying area.

The five collection units (C112–C116) we made on Luzhong produced large quantities of ceramics. Indeed, we found more than 20 diagnostic sherds each in collection units C113 and C114, including pot rims and *ding* tripod legs. Many sherds date to the Late Yangshao and the Early Longshan periods (Table 4.14). A few sherds date to the Shang dynasty. The largest occupation dates to phase III–IV (Late Yangshao to Early Longshan period), and extends to about 1 ha, although it could have been larger because part of the site has been disturbed by modern land use activities.

HRP016—The Zhanglouyaochang Site

Zhanglouyaochang is within a large-scale brick factory, which has completely destroyed the site (Figure 4.6). Large quantities of grey bricks, cord-marked with geometric patterns, are our only clue to the presence of an occupation in this spot. We found at least 20 fragments around a large hole made by removal of clay for modern brick-making. Factory workers told us they found four round-shaped piles of grey bricks where the hole now is. The hole is presently filled with water to a depth of over 6 m, making it impossible for us to check the now-submerged profiles. We suspect this site was a large Han tomb or cemetery, since these grey bricks are typical of Eastern Han tomb bricks. Its size is impossible to estimate.

HRP017—The Kongxiaozhuang Site

Kongxiaozhuang is also on a river terrace, at a similar elevation as and in line with Qianlou (HRP014) and Luzhong (HRP015). We found artifacts in a kitchen garden in the backyard of a modern house. This area once was used for drying rice. In the freshly-loosened soil, we found newly-broken large pieces, including rims and body sherds of a fine grey container called *dou*, a typical artifact of the Late Longshan period. We also found adobes and other artifacts dating to the same period. South of the site are lower-elevation rice fields, where we found a single vessel base, which could have been transported there by farming activities.

The major occupation at Kongxiaozhuang dates to the Early Longshan period, with the surviving site area approximately 0.9 ha (Table 4.15). An earlier occupation dates to the Late Yangshao period. We could not accurately estimate the site area because the land to the north had no surface visibility. It is now a modern cemetery, and covered with grass. Coring and excavation could address this problem.

HRP018—The Lijin Site

Lijin is one of the major early prehistoric sites identified in this area. It is also on a river terrace, west of Qianlou (HRP014), Luzhong (HRP015), and Kongxiaozhuang (HRP017) and at a similar elevation. There is a small river to its east, and the site is on a mounded area. Unfortunately, part of the site is in a grove, with poor visibility between the rows of trees due to leaves on the ground. Despite the low visibility, we found a concentration of artifacts in the grove. Collection unit C122 had more than 50 diagnostic sherds that date from phase I (Early Yangshao) to III (Late Yangshao). More than 50% of the collections are phase I ceramics, mostly small fragments from utilitarian vessels that were fired at low temperatures. We also collected a few bone fragments and adobes from that same collection unit.

The majority of the remains date to the Yangshao period (Table 4.16). The occupation area peaked at 1.4 ha in the Late Yangshao and Early Longshan periods, with the artifacts concentrated at the center of the scatter. It was again occupied during the Shang and Zhou dynasties, although the site area shrank to 0.3 ha. We found a concentration of used bricks and roof tiles in the southern site area, which we suspect were the remains of abandoned modern house foundations. It is unclear if any early remains were buried under these house foundations.

Lijin is one of the earliest sites in the survey area and its occupations concentrate in the Neolithic. Due to poor surface visibility, we could only delineate part of the site area; the actual site should be larger were it not for the low visibility in the grove, and disturbance by modern architecture.

HRP019—The Zhaoying Site

Zhaoying is largely destroyed by a modern brick factory north of the modern village of Zhaoying. We found cultural remains in a high profile revealed by removal of soil for brick-making. The site is on a high terrace that extends north from the village for at least 500 m. The remaining site area is in the middle of an abandoned brick factory. To the west is a hole where soil was removed that is now filled with water. The remains are on a small 1–2 m high platform that survives, although the soil has been cut away on all sides.

The platform was planted in vegetables and millet. We found large quantities of potsherds in the profiles along the platform's sides. We made a systematic collection of all diagnostic sherds within a 3 m diameter circle. The remaining archaeological stratum is 0.5 m thick. We found only small quantities of artifacts on the platform's surface because visibility was obscured by the crops. Zhaoying's major occupation dates to the Eastern Zhou period (Table 4.17). The site had an earlier occupation, including some Shang dynasty ceramics.

The remaining portion of the site should be only a small part what was originally a large settlement. Due to modern, large-scale damage, we could not determine the western site limit. The remaining site area dates mainly to the Eastern Zhou period, and the richness of the artifactual remains provide useful information about the local chronology.

HRP020—The Chenying Site

This site is 10 m north of a modern road. The remains were on a small hill, now planted in millet and some pine trees. The surface visibility was poor, and we could only make a single collection unit. We found Late Yangshao and Early Longshan ceramics. West of this scatter we saw some remains in the profile of a cut at a modern irrigation facility. The surviving occupation area is very small, estimated to be less than 1 ha.

HRP021—The Dongzhuang Tomb

This site is on a 3-meter high hill, overlooking the modern village of Dongzhuang to the south. The site has many small modern tombs, and some small trees since no crops would survive on this land. The surface has a scatter of patterned grey bricks, typical of Eastern Han tomb bricks in this area. Villagers told us that they found similar bricks when they have excavated holes for planting the trees. The entire cemetery is about 7772 m^2.

HRP022—The Yangzhong Tomb

This site is a large mound-shaped landform on the south side of the modern village of Yangzhong that is visible from a distance. Looters have left two large holes on the top of the hill, which reveal the site's poor preservation. The grave goods have been stolen, and only the pieces of large grey bricks indicate that a large Han dynasty tomb used to be here. During the social upheaval of the 1950s, people leveled high hills like this and utilized the grey bricks they uncovered. We saw some used as foundation bricks in one backyard. The style and pattern of the bricks indicate they date to the Eastern Han dynasty. Yangzhong is a good example of a site plundered by modern looters.

HRP023—The Yangshulin Site

This site is in the middle of a grove of trees, 1 km south of the busy modern Xinfu Road. We probably would not have found any artifacts, but the farmer was loosening the soil the day we surveyed there. The site is on top of a small hill, whose height increases gradually from north to south, and covers about 4 ha (400 m by 100 m). The site is only 1.3 km from the contemporaneous site of Qianzhangweizi (HRP005).

We found cord-marked red and grey sherds on the surface. The soil was white, except for the newly turned soils, which were grey. Nevertheless, the surface visibility was low, since most of the site area was covered by grass. We found potsherds in five collection units, and some were heavily eroded. Most indicate a Late Shang and Western Zhou dynasty occupation (Table 4.18) that was contemporaneous with those of Qianzhangweizi to the southwest. Earlier and succeeding occupations were much smaller.

HRP024—The Zhaozhuang Site

The Zhaozhuang site is an excellent example of a local center that was occupied in late prehistoric and early historical times. Occupation began in the earliest phase, the Early Yangshao period, and continued through the entire Neolithic (Table 4.19). Growth slowed in the Erlitou period (phase VI), then rapidly expanded to its largest extent in the Late Shang and Western Zhou dynasty. Indeed, it was even larger during the Shang/Zhou dynasty than the contemporaneous site of Huangtucheng. The site size decreased from the Han dynasty onward. At its peak, Zhaozhuang's site reached almost 30 ha, and it was the largest of all the sites newly recorded during the Huangtucheng survey.

Zhaozhuang is along the Wulong River, a tributary of the Huai. The modern village of Zhaozhuang is at its southwest corner. The site is on a terrace that is visibly higher than the surrounding terrain. A modern highway, called the Mabao Road, runs across the site's north side, destroying part of the remains. The site is bounded on the north by the Wulong River, on the west by Zhaozhuang village, and Sunzhuang village on the south. It extends eastward to a flat area.

The site is divided into east and west parts by a local road that cuts north–south through the middle. We made 77 collection units of 50 m by 50 m. In the western part of the site, the soil was rich and dark, with a coarse texture; it was planted mostly in millet, and visibility was good, especially in units that were not planted. Some collections units had quite high artifact densities, especially in exposures along a ditch profile. The bulk of the identifiable artifacts date to the occupations beginning with the Late Longshan period, and through the Late Shang and Western Zhou dynasty, including the Erlitou period. This continuity was rare at other sites. The principal vessel types include tripods, pots, and food containers.

The eastern part of the site lies on terraces that are somewhat lower. Surface visibility and artifact density were both lower than for the western side. We made 37 collection units on the eastern part. Artifact density averaged around ten per collection unit, and some were diagnostic. I hypothesize three possible explanations for this pattern: 1) the artifacts on the lower eastern site area are washed in from the higher western part; 2) the eastern part may have been a peripheral area, thus with lower-density occupation; or, 3) construction of modern temples in the western part may have brought more artifacts to the surface, while the eastern site area remains better preserved. These could be tested by coring and excavation.

In conclusion, after Huangtucheng, Zhaozhuang is the largest site we found in the survey area. Actually Zhaozhuang's Shang/Zhou dynasty component (28.5 ha) was even larger than that of the Huangtucheng site (17.5 ha). It expanded to become a regional center in the Middle

Yangshao period, and retained its importance—with its satellite communities along the Wulong River—for the entire Neolithic, and through early historical periods. Its largest occupation was in the Late Shang and Western Zhou period, when it was larger than any center in this area, even Huangtucheng, which was 10 km distant. The relationship between these two communities needs further investigation.

HRP025—The Kongyao Site

Kongyao is a small site with two major occupations during the Neolithic and Han dynasty periods. It is on a small terrace, between the villages of Kongyao to the north and Quzhai to the south. The western part of the site is higher than the rest. Surface visibility was good, and soils were dark grey. The area was planted in rice, and just freshly loosened when we surveyed. We found potsherds, including plain red sherds and grey rims decorated with basket-like pattern, as well as body sherds. We also found an exquisite sharp stone chisel on the surface, but could not date it because that style of chisel was used over a long time from the Neolithic to early historical periods.

The major periods of occupation extend from the Middle Yangshao period, through the Early and the Late Longshan period to the Han dynasty, and subsequently (Table 4.20). Site size did not change much. On the higher western side of the site, the surface is covered with modern trash, which may obscure earlier remains.

HRP026—The Sunzhuang Site

Sunzhuang is on the southern bank of the Wulong River, only 1 km east of the large site of Zhaozhuang (HRP024). The site is on a landform that is slightly higher than the surrounding terrain. It is split into eastern and western portions by a local road. The modern busy Mabao Road is just north of the site, with poplar trees planted along it.

Most of the artifacts were textile-patterned grey bricks and plain grey rim and body sherds dating to the Han dynasty (Table 4.21). The total area for the Han-period site is about 2.8 ha. The earliest occupation dates to phase II (the Middle Yangshao period). We also found small amounts of Longshan period and Shang and Zhou period remains. We found the typical Longshan *dou* pedestal serving-stands and cord-marked sherds diagnostic of the Late Shang and Western Zhou dynasty. Unfortunately, the artifact density on Sunzhuang was quite low; we could better understand its occupations if we had found more diagnostics on the surface.

HRP027—The Yinweizibei Site

Yinweizibei is located on two connected platforms that are longer north-south. The platforms are northeast of the modern village of Yinweizi, and planted in millet and vegetables. It is surrounded by irrigation canals on all four sides. As noted previously, platforms surrounded by water are usually old village sites.

We made a single collection unit (C188) on the north platform, since it was too small for more. The entire platform had grey brick fragments and plain grey sherds from later historical periods, mixed with modern construction remains and trash. Most remains date later than the Han dynasty, ranging from the Liuchao period to Song and Yuan dynasties. We found no earlier remains on this platform.

The southern platform is larger, and we made three collection units (C189–C191). The earliest occupation dates to the Early Longshan period, as evidenced by plain grey rim and body sherds. In collection unit C189, we found a typical Western Zhou dynasty *li* leg of red pottery, cord-marked and tempered with fine sand. We also found late historical period artifacts that included blue and white porcelain fragments, mainly dating to the Tang and Song dynasty and later. In collection unit C190, we found two red adobes with a single cord-marked sherd. Local informants told us this area used to be used for drying tobacco. We found no other archaeological features in this part of the site.

HRP028—The Yinweizinan Site

One hundred meters south of Yinweizibei (HRP027) is the Yinweizinan site, southeast of the modern village of Yinweizi. Most of the site is on a terrace. The eastern portion of the site is lower than the terrace, and there is a small pond east of the site. The land adjacent to the pond is a vegetable garden, while the rest was planted in millet.

The archaeological remains are concentrated on the higher, western portion of the site. We made five collection units (C192–C195) on the terrace and one collection unit (C196) in the eastern part. Surface visibility was good on the top of the terrace and artifact density was high. For example, collection unit C192 produced 83 diagnostic sherds, with the majority dating to the Late Shang and Western Zhou dynasty (Table 4.22). Most were decorated with fine and coarse cord-marking. We also found many adobes and carbon particles mixed into the soil, although we could not attribute them to any visible archaeological feature. Earlier Late Longshan period (phase IV–V) remains concentrate mostly in the middle of the terrace in a 0.3 ha area. Artifact density was much lower on the eastern side, but in a profile we could see cord-marked sherds and carbon particles in a distinct 10-cm thick archaeological stratum.

For the most part, Yinweizinan was occupied in the Late Shang and Western Zhou dynasty, and the remaining portions of the site measures about 1.3 ha. The site may have extended under the modern village, which is at the same elevation as the terrace, so that the occupations would have been larger. The site dates back to the Late Neolithic, to at least the Late Longshan period, if not earlier. The Neolithic occupations are much smaller than later occupations. This could be because the earlier occupation layers are buried under Late Shang and Western Zhou remains, and therefore not disturbed much by plowing.

Yinweizinan occupations were matched with contemporaneous settlements at Yinweizibei (HRP027) in Late Neolithic and Early historical times, but their areas and largest occupation periods are quite different. Yinweizibei was mainly occupied at the Late Shang and Western Zhou period, while Yinweizinan was heavily occupied after the Han period. Despite their differences, the close proximity of the two sites is noteworthy.

HRP029—The Fengzhuang Site

This site is 200 m south of the Wulong River on flat land 500 m north of the modern village of Fengzhuang. Most artifacts concentrate along both sides of a local road that leads to the river. The site measures about 100 m by 50 m.

We made only two collection units (C237–C238) on Fengzhuang. Both had large quantities of grey construction bricks and roof tiles with cord-marked patterns. We even found a complete grey shingle (*banwa*) in collection unit C238. These materials suggest this site had a Han structure, either a house or construction built atop a tomb. We found red and grey cord-marked sherds that mainly date to the Western Zhou to Eastern Zhou dynasties. Some basin rims indicate the presence of large serving bowls. According to villagers from Fengzhuang, this location had an old cemetery that was destroyed in the 1960s. The artifacts may have been burial goods.

HRP030—The Yuchang Site

This site is one of the most complex yet heavily disturbed sites in the area. It is in the middle of a Huaibin County fishing facility and connects to the Wulong River to the north. We found the archaeological remains in the middle of a platform that is surrounded by fish ponds.

There are modern houses atop the platform, surrounded by trees and vegetable gardens; the rest is planted in millet. The fish ponds on the east and north sides of the platform are now abandoned.

Yuchang had good surface visibility except in the disturbed areas. Soils are loose and dark grey. We saw artifacts everywhere on the surface of the platform. For the most part, the abandoned, dry fish ponds had no artifacts. However, the profiles of the ponds showed a 10–30 cm archaeological layer beneath the surface soil horizon. We collected large rim and body sherds from these profiles, and found mollusks and adobes in one abandoned fish pond (C244). We found an exquisite stone axe in collection unit C249.

The site is heavily disturbed and the remaining parts must be only a portion of the original extent. We made 12 collection units, but they do not reflect the size of the larger original site area. The archaeological remains were rich and complicated. The site was occupied continuously from the Early Yangshao phase to the Han dynasty, and then reoccupied (Table 4.23). The site size was largest in the Longshan and Shang and Zhou periods. The surviving portion of the Longshan occupation is 1.5 ha. The settlement expanded to 1.8 ha in the Shang dynasty, and peaked at 3.2 ha in the Shang and Zhou period.

The staff in the fishing facility told us that this area had been a much higher terrace prior to construction of the fish ponds. There was an old temple atop the platform that was later destroyed. Construction of the fish ponds revealed many artifacts. Thus, Yuchang is heavily disturbed by modern land use and the original site size is unclear. A large amount of artifacts were exposed, especially the later Late Shang and Western Zhou materials. Almost every collection unit had more than 60 sherds. We could not check the area bounding the Wulong River to the north because of a dense stand of bamboo there, so the site's northern boundary may be north of what we recorded, and extend to the edge of the terrace where the bamboo is growing.

HRP031—The Dawangzhuang Site

This is another riverine site along the south bank of the Wulong River. It is only 1 km east of Yuchang (HRP030). The site is on a terrace and measures 250 m by 200 m; it is bordered on the east by a dry irrigation canal. The top of the terrace had good visibility, with sparse millet and dark, loose soils. Longshan remains dominated, with red and grey basket-like decorations and cord-marking, *ding* tripod legs, and parts of large red containers mixed with early historical artifacts and modern trash (Table 4.24). We saw few artifacts in the northern part of the site, which was lower in elevation. Because the Wulong River channel was enlarged and reshaped in the 1960s, we suspect the northern part of the site once flooded frequently.

Dawangzhuang has been a favored settlement location since the Early Yangshao period. The settlement began as a small hamlet, reached the relatively large size of 2.6 ha in the Late Yangshao period, and became an even larger village in the Late Longshan period. During the transition to the early historical periods, this site lost area. It never returned to its Neolithic maximum.

Dawangzhuang is one of the major Longshan sites in this area, at 3.2 ha. The high density of Longshan period sherds on the surface suggests the site was churned by modern activities. Irrigation construction may have brought these artifacts to the surface.

HRP032—The Shuaidong Site

Shuaidong is on a small terrace west of the Wulong River, where the channel bends from east-west to north-south. The modern village of Shuaidong is just west of the site. The eastern part of the site is covered by birch trees, and the agricultural fields were planted with millet and other grains. This made for poor surface visibility, and artifact densities were low. Also, the artifacts were heavily eroded. We found only small quantities of diagnostic Neolithic sherds, which dated from the Yangshao period to the Longshan period (Table 4.25). We saw cord-marked sherds and textile-impressed historical artifacts, also in low quantities; they date from the Shang and Zhou dynasties to the Han dynasty.

Shuaidong should be relatively well-preserved, since no construction has occurred on the site, although a modern village is only 50 m away. A better collection situation or test excavations may reveal that this site has been continuously occupied since the Late Neolithic.

HRP033—The Shuidongnan Tomb

This Han dynasty tomb is on a small terrace surrounded by irrigation canals adjacent to the south side of the village of Shuidong. This terrace had been part of the village, but is now abandoned. Previously, it was a cemetery but was destroyed in the 1970s. We saw coarse cord-marked grey bricks that are typical of Han tombs in this area; they have been reused for modern tombs. We saw no other early artifacts or any features. We saw no Han burial goods, although villagers said that grave goods and tomb bricks had been exposed during the 1970s destruction.

HRP034—The Shizhuang Site

Shizhuang site is on a small terrace west of the Wulong River, 200 m west of the large modern village of Shizhuang. The land to the north, south, and west of the site are low in elevation, and now used as rice fields. The site's soil is dark brown and the artifact density is moderately low.

We made only two collection units (C273 and C274). Most collected artifacts date to the Longshan period (phase IV–V) (Table 4.26). Diagnostic sherds include some decorated with the basket-like pattern, and others with the square pattern. A few earlier sherds date to the Late

Yangshao period to the Early Longshan period. The Longshan occupation area was about 0.5 ha. In short, this is a Late Neolithic habitation site on the riverbank with no other archaeological remains.

HRP035—The Wangliuzhuang Site

This site is on a terrace that is slightly higher than its surrounds. It is 50 m east of the modern village of Wangliuzhuang. South of the site is a large, modern irrigation canal. The site is planted in millet and rice.

The artifacts we collected came from an area with freshly loosened soil; most are ceramics. Most sherds have fine cord-markings, and are dark red and brown. Most date to the Eastern Zhou period, although a few date to the earlier Western Zhou period. Due to low surface visibility, we could not identify more archaeological remains. Site area cannot be determined because visibility was too poor to discover the extent of the scatter.

HRP036—The Chenzhuang Site

This site is on a small terrace on the west bank of the Wulong River. It is 200 m east of the modern village of Chenzhuang. The site's landform is higher in the west and lower in the east, closer to the Wulong. Except for in the east, the other three sides of the site are surrounded by lower terraces. The site could be on an artificial platform that was surrounded by water in the past, which is similar to the modern village pattern.

Most of the archaeological remains date to the early historical periods, from the Late Shang to the Han dynasty (Table 4.27). The majority of the remains date to the Eastern Zhou dynasty, represented by fine cord-marked sherds. Collection unit C269 alone produced 44 Eastern Zhou artifacts. Identifiable vessel types include grey pots and *dou* pedestal serving-stands. Earlier remains were sparser; we only identified and collected a few Longshan ceramics.

Chenzhuang is a small residential settlement that was occupied since the Early Longshan period. In the Late Shang dynasty, this settlement expanded and reached its largest occupation. Although we found a high density of Eastern Zhou dynasty ceramics, they only cover a small area of about 0.8 ha. Given the site's proximity to the Wulong River, the site may have been frequently flooded, so that earlier remains remain buried beneath later historical strata.

HRP037—The Liuzhuang Site

This site is on a terrace 200 m north of the Wulong River and immediately east of the modern village Liuzhuang. The west edge of the site follows the eastern boundary of the village. Additional remains may be buried beneath the modern village. The middle part of the site is a platform slightly higher than the rest of the site. The site is cut into two parts by an irrigation canal. Otherwise, the site is relatively well preserved. Most of its surface is covered in millet fields and birch trees, and the western part of the site is used for drying rice. We found the artifact density highest on the platform, in newly-loosened soil. The rest of the site has relatively low surface visibility, and sherds were smaller and more eroded.

Liuzhuang has many Neolithic period ceramics, dating from phase II to V (Table 4.28). The major types were red and grey sherds with sandy temper, including rims and *ding* tripod legs. Some pots had uneven surface color, indicating they had been used for cooking. We also found large chunks of adobe. This site should have architectural features, although we could not determine whether the adobes came from house foundations or other kinds of features.

In summary, this site was mainly occupied from the Middle Yangshao period to the Late Longshan period, and then continually occupied from the Late Shang and Western Zhou dynasty until at least the Han dynasty. The size of the settlement was largest from the Early Longshan period to Late Longshan period, reaching 2.8 ha or perhaps even larger. At the beginning of the early historical periods, the site area gradually decreased and then the major occupation area moved to the western part, that is, the modern location of the village. Liuzhuang was one of the largest villages in the Longshan period in this area.

HRP038—The Jinzhuang Site

This site is 600 m from the Liuzhuang site (HRP037), and 300 m from the Wulong River on the second terrace. The modern village of Jinzhuang is 50 m west of the site and Liuzhuang village is to the east. The site is atop a low, yet noticeable, hill about 0.5 m high.

The exposed artifacts concentrated in the center of the scatter. Most artifacts were cord-marked grey wares, dating to the Late Shang and Western Zhou dynasty, although we found some artifacts that dated as early as the Late Yangshao period (Table 4.29). This settlement must have coexisted with its neighbor to the east, Liuzhuang. Whereas Liuzhuang's largest area was during the Longshan, Jinzhuang's was largest during the Late Shang and Western Zhou period, although even during the Late Shang and Western Zhou dynasty Jinzhuang was much smaller than Liuzhuang.

We made only four collection units at Jinzhuang (C285–C288). Artifacts were concentrated on the hilltop, indicating that was the settlement center, and were sparse near the modern village of Jinzhuang. It is possible that earlier remains may be sealed by later strata, and well-preserved.

HRP039—The Luciyuan Tomb

The Luciyuan Tomb overlooks the Wulong River to the east. The modern village of Luciyuan is west of the site. Across the site, we found large pieces of grey bricks, decorated with cord-marking and geometric patterns. Along with these typical Eastern Han tomb bricks, we found some eroded grey wares on the surface. Local villagers told us that many pots and similar goods were exposed and destroyed during the Earth Movement in the 1960s. All artifacts suggest this was a Han tomb.

HRP040—The Xiaolizhuang Site

Xiaolizhuang site is outside a tight bend in a small river, where it shifts direction from south-east to north-south. The site lies on terraces west of the river, and on a high-elevation platform, about 1 m above the surrounding terrain. The modern village of Xiaolizhuang is between the third and fourth terraces west of the river, and at elevations even higher than the archaeological site. A major road connecting Xinyang, Henan province, to Fuyang, Anhui province, is 100 m north of the site.

Xiaolizhuang has fairly rich archaeological remains. We found many surface artifacts, most of them grey wares that were cord-marked and incised. The assemblage includes rims, *ding* tripod legs, *li* tripod legs, and many body sherds. Their dates range from the Late Yangshao period, through the Longshan period to the Zhou dynasty (Table 4.30). The settlement was largest in the Late Neolithic and the Late Shang and Western Zhou period, with a maximum area of 1.9 ha.

We found many diagnostic artifacts at Xiaolizhuang. C292 produced over 80 diagnostic sherds. Among them, diagnostic Longshan sherds are over 40, much dense than most of the collection units (less than 20) found at the similar time in the Huangtucheng area. Typical Longshan sherds include black shiny pottery, egg-shell pottery sherds, *gui* red drinking vessel, and pottery-making tools. C292 also had adobes. Though I could not find any features on the surface, clearly this settlement had a long occupation of considerable density.

HRP041—The Qianwanglou Site

This site is on flat land currently used for growing rice between the modern villages of Qianwanglou and Houwanglou. Because the land is currently much lower than the current villages, I suspect the elevation was higher in the past, and the soil has been moved for road construction or for leveling modern house foundations.

We found large quantities of grey wares in the loose soil, including *dou* pedestal serving-stands and pot rims with cord-marked decorations. Most date to the Eastern Zhou dynasty (Table 4.31). We also found a few Middle to Late Yangshao period red sherds and Early to Late Longshan grey wares. The collection areas were quite low compared to a platform on the north side of the site, which had the foundation of an old house. We examined the surface of the platform carefully, but found only modern trash, and nothing contemporaneous with the archaeological remains.

HRP042—The Xulou Site

This site is on a terrace north of the Wulong River. Artifacts concentrated on a damaged platform that measures 33 m by 78 m. The surface soil is dark grey and rather sandy; the sands have settled out of flood waters.

We found archaeological remains in the profile of the platform. We made two collection units (C310–C311). Surface artifacts included plain grey bowl bases and legs from *ding* tripod vessels, which are typical Late Longshan artifacts. C310 produced a cord-marked *li* tripod leg and some other cord-marked Shang and Zhou sherds. Some later remains dated to Eastern Zhou and the Han dynasty. We also found some earlier artifacts, such as plain red sherds from the Late Neolithic, but they were quite eroded.

The area of the site that remains is about 0.3 ha. The size for the Late Shang and Western Zhou component could not be ascertained due to the disturbed condition of the site. I suspect the site area was larger than we recorded because of the site's location on a river terrace and the reduced size of the platform. Local people have frequently mined the platform for fill, which has disturbed the archaeological remains.

HRP043—The Lizhuangbei Site

Lizhuangbei is a good example of a site with few artifacts on the surface. It is on a high platform in the midst of modern villages; Xulou is to the north, Lizhuang is southeast, and Luozhuang is to the northwest. The platform is 160 m by 75 m. Lizhuangbei is one of a cluster of settlements, with neighboring sites (e.g., HRP042 and HRP044) only 500 m to 2 km distant.

Surface visibility was poor and the soils were grey. We found a Western Zhou *li* tripod leg on surface, but could find no other contemporaneous artifacts. The west side of the platform was altered to make a small vegetable garden. In the profile, we saw an archaeological horizon beneath the modern plow zone with charcoal, adobes, and some porcelain sherds. The landowner told us that many red and grey sherds had been discarded into a nearby ditch as part of the plowing. Given the elevation of the landform, the artifacts, and the horizon visible in the profile, I suspected this is a well-preserved site. Indeed, remains earlier than the Shang dynasty may be sealed beneath the horizon we saw. Coring on this site confirmed this suspicion. Additional fieldwork would clarify this site's periods of occupation.

HRP044—The Xiaozhongzi Site

Reconnaissance surveys had recorded Xiaozhongzi as a Neolithic site measuring 4500 m^2, with 2 m deep deposits (National Bureau 1991:492). It is on a terrace north of the Wulong. The surface height increases from south to north, and the site is 60–70 cm above the surrounding terrain. A modern canal runs north-south, cutting off the west edge of the site. During construction of the canal in the 1980s, the Huaibin County Cultural Relics Bureau (National Bureau 1991:492) found and collected large quantities of ceramics and stone tools, including stone axe, choppers and arrowheads, some of which I used for references for artifact dates during the preparation for the Huangtucheng survey.

Most of the site is vegetated with trees, making surface visibility low. The top of the landform has dark grey soils. Sherds are in small fragments, and density varies across the site. We made six rows of collection units, for a total of 18 units. Two rows cross the landform at its highest point and those units have the highest density of artifacts. The 18 collection units produced 232 artifacts, with more than 50% of the artifacts coming from the two higher rows. The ceramics include a red pottery *ding* tripod leg, a *gui* drinking vessel, and other rim sherds, mainly dating from the Early Yangshao period to the Longshan period (Table 4.32). We found a stone chisel on the northern site boundary.

Xiaozhongzi appeared in the Early Yangshao period; at 1.9 ha, it was a relatively large village for this area. It increased in size over succeeding periods, reaching a maximum in the Late Longshan period, when it measured almost 5 ha. Xiaozhongzi lost size dramatically at the beginning of the Erlitou period, but rapidly reexpanded in the Late Shang and Western Zhou dynasty. Following that, the site’s area decreased, and eventually it was abandoned.

HRP045—The Dazhongzi Site

The local people call this place Dazhongzi, which means a place with a high hill, and commonly refers to a large tomb (Fig 4.7). The site is on an elevated, symmetrical, mound-like area on a terrace north of the Wulong River, and only 100 m west of Xiaozhongzi (HRP044). This site was recorded by a previous reconnaissance survey (National Bureau 1991:492), which found it to have an area of 1800 m^2, with 2–5 m thick deposits. The site is important and is preserved by Huaibin County.

Dazhongzi has one of the richest assemblages we found in this area, especially for the Late Shang and Western Zhou period (Table 4.33). We collected more than 500 sherds from the site, and more than 60% dated to the Late Shang and Western Zhou period. Some sherds dated to the Early Yangshao period, and this scatter was limited to the northeast corner of the site. Most collection units yielded Longshan sherds. The site also has small amounts of Shang, Eastern Zhou and Han dynasty ceramics.

Dazhongzi is an excellent example of a Late Shang and Western Zhou settlement. It is on a mounded, higher-elevation landform typical of sites that date to this period. We found many artifacts on the surface, which are eroded from exposure to the weather. This site became a large village in the Longshan period, and expanded to its largest size in the Shang and Zhou period, after which the site's area decreased.

Dazhongzi and its close neighbor Xiaozhongzi were simultaneously occupied during many periods, and their sizes during the Longshan and Shang and Zhou periods were similar. Interestingly, in Neolithic periods, especially the Early Yangshao period and Late Longshan period, their areas were quite different. Two other nearby settlements date to the Late Shang and Western Zhou dynasty and are close to 5 ha in size, and comprise a settlement cluster along this stretch of the Wulong River.

HRP046—The Xiaolizhuangbei Site

Xiaolizhuangbei is on a terrace on the inside of a bend in a small river, opposite Xiaolizhuang (HRP040). The artifacts suggest occupations at these two sites were contemporaneous and they could almost be treated as a single sociopolitical unit. However, this site has much sparser surface visibility, and its soil, artifact density, and preservation condition are quite different. To be consistent, we made these two sites, with separate collection units.

Having already collected Xiaolizhuang (HRP040), we expected the artifacts on this site to be better preserved than we found them to be. We found red and grey wares, plain and patterned with basket-like decorations. We found rim sherds, stemmed bowl bases, and *ding* tripod legs characteristic of Late Yangshao and Early Longshan collections (Table 4.34). We also found a few red-brown cord-marked sherds, indicating occupation during the Late Shang and Western Zhou dynasty. Most artifacts, however, dated from the Late Yangshao period to the Early Longshan period.

A quick comparison of the dates of occupation for Xiaolizhuangbei and Xiaolizhuang (HRP040; Table 4.33) shows the contemporaneity of the two settlements. Xiaolizhuangbei has a denser Late Yangshao scatter, although it was a bit smaller than contemporaneous Xiaolizhuang across the river. During the Late Shang and Western Zhou period, however, we found a richer assemblage at Xiaolizhuang than at this site. During the later Yangshao period, Xiaolizhuangbei's area slightly exceeded 1 ha, after which residents probably resettled to the opposite side of the river.

HRP047—The Zhanggang Site

Zhanggang is at the confluence of two small rivers, and Lijin (HRP018) is across the river on its eastern bank. Zhanggang is on a high hill (high for this area, about 2–3 m higher than surrounding areas). From the east, this landform is very obvious, but from the west its elevation is barely noticeable. The modern village of Zhangyin is north of the site. The south side of the site borders a large, deep canal. Pure red soil deposited during dredging covers both sides of the canal, capping the original ground surface, making collection conditions impossible.

Zhanggang has a rich, early assemblage, although its artifact density is low even where there's good surface visibility; however, in one field we found more than 100 sherds in an area of 20 m^2. Ceramics concentrated in a square feature, possibly a house foundation, recently disturbed by plowing, with much ash and many adobes. Most sherds from this feature were decorated with basket-weave patterns. We also found incised sherds, a pinched *ding* tripod leg, and shiny black eggshell sherds—mostly utilitarian vessels. We also identified some artifacts dating earlier than the Longshan period in this feature; they date as early as the Middle Yangshao period. We also collected spindle whorls, stone tools, and small quantities of cord-marked sherds from the surface.

Zhanggang was first occupied in the Early Yangshao period (Table 4.40), the same as its neighbor Lijin to the east across the small river. Settlement area increased from the Late Yangshao period through the Early Longshan period, reaching an area of 3.0 ha. In the Late Longshan, population decreased dramatically and the site area was only 0.5 ha. The site was continuously occupied through the Late Shang and Western Zhou dynasty to the Han dynasty, and after, although it was only a small settlement. The surface artifact density, however, is lower than that of contemporaneous settlements, less than 1.3 ha in area. This settlement was larger in the earlier Neolithic periods than in the later historical periods. Abandonment between the Neolithic periods and the Early Bronze Age indicates a shift in settlement and sociopolitical organization in this area.

HRP048—The Zhangying Site

Zhangying is a Neolithic site with low surface visibility and low artifact density. The site is at the southeast corner of the modern village of Zhangyin, and is cut by a canal along its south edge. We made only four collection units on this site. In the profile of a hole excavated to plant a tree, we found sherds with basket-weave decorations. Diagnostic ceramics included a triangle-shaped *ding* tripod leg and a wide-style *ding* tripod leg, along with some rim sherds. The height of the millet across much of the area reduced our visibility when we recorded Zhangying.

The assemblages indicate Zhangying was mainly occupied in the Neolithic, in a span from the Middle Yangshao period through the Longshan period (Table 4.35), although the occupied area was less than 1 ha. Originally, the site may have been larger, and extended south into the area disturbed by the canal. The site was continuously occupied from the Zhou dynasty to the Han dynasty, also with only small occupations. In sum, Zhangying is relatively well-preserved and a good choice for further research.

HRP049—The Weizhuang Site

Weizhuang is on a terrace and measures 400 m by 220 m. It is on the south bank of a small river that's a tributary of the Lü River, which in turn is a tributary of the Huai. The site is north of and between the modern villages of Weizhuang and Liuzhuang. Weizhuang has loose soil that is whitish-grey in color, which is very different from the pure yellow soils of the surrounding terrain.

Weizhuang is one of several complex multi-component sites in this area (Table 4.36). The surface artifact scatter is low density. Given the site's location adjacent to the river, many sherds may have been washed away or eroded during flooding. Early artifacts came mostly from the western part of the site, and also were sparse. Diagnostic pottery includes plain grey bowl rims, *gui* red drinking vessel sherds, and *ding* tripod legs. We also found a few Shang and Zhou ceramics, including cord-marked grey sherds, *li* tripod legs, etc. We found high-fired grey vessels from the Han dynasty and white porcelain sherds from later historical periods (Song and

Yuan dynasty) scattered across the entire site, but we did not do a chronological analysis of the latter.

Weizhuang is a well-preserved riverside site. Its close proximity to water made it an ideal location for residences, both for obtaining water for to participate in a trade network along the river. Settlements dating to different periods are along this river. The closest is only 100 m away on the opposite bank. Neolithic peoples first colonized this site, and settlement expanded to 3.9 ha in the Late Longshan period. The settlement peaked in the Han dynasty, when it reached 4.5 ha. Weizhuang is one of the densest and largest Han settlements in this survey area.

HRP050—The Chenxiaozhuang Site

Chenxiaozhuang is one of the few single-component settlements found in the survey area. It is on the south bank of a tributary of the Lü River, and 500 m west of the Weizhuang (HRP049) site. It is on a natural terrace that has been leveled to facilitate rice farming.

We found many grey ceramics with coarse cord-marking typical of Han dynasty roof tiles. We also found large pieces of plain grey wares that had been fired at high temperatures. The surviving site area is about 4.3 ha. We also collected brick fragments from 400 m north of Chenxiaozhuang. We estimate that this had been a continuous settlement, and the original site area was much larger than the remaining portion.

HRP051—The Xueying Tomb

The Xueying Tomb is on a slope west of the modern village of Xueying. We found tomb bricks patterned with coarse cord-marking scattered across a 50 m by 50 m area that had good surface visibility. We saw no other exposed contemporaneous artifacts or grave goods. These tomb bricks were commonly used during the Eastern Han dynasty.

HRP052—The Gaodazhai Tomb

This tomb is near the modern village of Gaodazhai. The surface visibility was good, and we found Han dynasty tomb bricks, decorated with cord-marking and geometric patterns. We also found grave goods such as plain grey bowl bases nearby. All evidence suggests this was a typical Eastern Han tomb.

HRP053—The Songwa Site

The site is southeast of the modern Songwa village; it measures 400 m by 200 m. The middle section of the occupation area is slightly higher than the rest of the site. The site area was planted in millet, but visibility was good.

Songwa is one of the largest Han habitation sites in the Huangtucheng survey area. Surface artifacts were mainly fragments of grey bricks, high-fired plain grey pot rims, and other plain grey sherds. The site area reach at least 9.1 ha, and it may have been larger (Table 4.37). The ceramic distribution suggests the scatter extended under the modern village. We found a few diagnostic Longshan sherds, including plain grey bowl bases and body fragments, across a relatively small area (only 1.8 ha). This settlement remained large after the Han dynasty, although its size gradually decreased in the late historical periods.

HRP054—The Beiliuzhuang Site

This site is on a terrace next to a tributary of the Lü River; the surface is not flat and includes a relatively steep area from 32.0–36.1 m in elevation. The surface soil is dark grey and visibility was good in the millet fields, although the millet was denser in the eastern site area, with lower visibility.

Places with the highest elevation had the highest concentration of artifacts. Remains dated from the Early Yangshao period to the Longshan period on top of the landform, mostly in collection units C435, C436, and C440. A low profile in collection unit C435 showed that the archaeological horizon was 30–40 cm thick, with large pottery fragments and adobes. Early Yangshao artifacts include red bowl rims tempered with carbon particles; they were usually light in weight and fired at a low temperature. We also found plain red bowl bases dating to the Middle Yangshao period, plain red rims and *ding* tripod legs dating to the Late Yangshao period, and grey-ware sherds and bases, along with shiny black pottery dating to the Longshan period. We found various lithics, including a stone axe, and chisel and chopper fragments. Most sherds were large enough to identify vessel types; decorations were quite variable. Beiliuzhuang was continuously occupied since Neolithic times (Table 4.38); it also produced early historical period sherds dating to the Late Shang and Western Zhou dynasty, and later historical period artifacts across the entire site.

Beiliuzhuang is one of the earliest and richest of the river bank sites. It was settled in the Early Yangshao period, grew substantially in the Middle Yangshao period to 4.7 ha, and peaked in the Longshan period at 7.8 ha. The rich Neolithic assemblage from this site illuminates style changes over time. People continued to reside on this terrace until modern times.

HRP055—The Liuying Site

Liuying is atop several platforms 500 m east of the Lü River, a large branch of the Huai River. The site overlooks open lands to its west between it and the river. It is just north of the modern village of Liuying, and less than 500 m from the Beiliuzhuang site (HRP054). It is a good example of a river-edge site with a long occupation.

We made 19 collection units across 8 ha. Many fields had tall plants, which limited visibility; however, we did find Early Longshan period sherds and fine cord-marked sherds dating to the Late Shang and Western Zhou. Most artifacts were cord-marked grey bricks and grey *dou* pedestal serving-stand fragments, which we found across the site. We also found coarse cord-marked ceramics that were largely used in the Han dynasty and later periods.

Liuying's area varied substantially through time (Table 4.39). It began as a 0.3 ha settlement in the Early Longshan period, and rapidly grew to a large village in the succeeding phase, and kept increasing to be a 4.4 ha dense occupation in the Late Shang and Western Zhou dynasty. The settlement sharply decreased in size in the Eastern Zhou dynasty, and it bounced back during the Han dynasty to 4.9 ha. Liuying's major occupations were in the Late Shang and Western Zhou and the Han.

This site is a good example of a multi-component terrace site. The earliest artifacts are from the Longshan period, although earlier remains may be buried and not exposed on the surface due to the preservation condition and proximity to the Yangshao site (Beiliuzhuang). Another peak occupation was during the Late Shang and Western Zhou period. The Han remains were quite impressive, although it is not as large as its northeastern neighbor Beiliuzhuang. At its largest, Liuying's settlements approached the scale of modern villages.

HRP056—The Gaozhuangnan Site

Gaozhuangnan, now an abandoned old village, is on a high platform south of the modern village of Gaozhuang. The surface is covered by large brick fragments and porcelain fragments that are all modern. Most of the old sherds dated to the Han dynasty and later periods. The majority are high-fired grey wars and bricks with coarse cord-marking. We found a few sherds dating to the Late Longshan and the Late Shang and Western Zhou periods. I suspect this is the ancestral (Neolithic) village site for modern Gaozhuang, based on their close proximity.

HRP057—The Gaozhuangxi Site

Gaozhuangxi is on the west side of the modern village of Gaozhuang. Like Gaozhuangnan (HRP056), which is only 100 m away, is also on a higher landform. The archaeological remains are quite similar to those of Gaozhuangnan, except that it lacks Late Shang and Western Zhou artifacts. Most surface finds dated to the Han period, and Gaozhuangxi had a Han occupation of close to 1 ha. We also found lots of grey bricks dating to later periods. We found only a few Longshan sherds. In short, occupations at this site mostly overlapped with those at its neighbor site, Gaozhuangnan, and the modern settlement of Gaozhuang may have been settled by its residents.

HRP058—The Waliuzhuangbei Site

Waliuzhuangbei has been heavily disturbed by brick-making, and its extent is difficult to discern. The site is 300 m east of Huangtucheng and west of a modern road. To the east is a pond and modern house. The site is on higher ground than the terrain to the south.

We found plain grey wares from large Late Longshan vessels. We only made a surface collection from a 50 m by 50 m area, but the site may have been larger, and extended east across the area of the house and pond. Based on this fieldwork, it is difficult to determine the function and nature of Waliuzhuangbei, although its close proximity to Late Longshan Huangtucheng makes the occupation interesting.

HRP059—The Waliuzhuangnan Site

This site is about 300 m south of Waliuzhuangbei (HRP058), and around 300 m east of Huangtucheng. The area now has an abandoned modern brick kiln. To the south is a pond, created by mining soils for the bricks. As with its neighbor, this site is heavily disturbed by modern brick-making.

In the profile of the pond, we saw large quantities of late historical artifacts, including small grey bricks and white and yellow porcelain pieces that date to phase XIII and later. We also collected many plain grey body sherds, similar to those we saw at Waliuzhuangbei and date to the Late Longshan period. We made this a separate site because the two loci were 300 m apart, although it is possible that they are two sections of a single occupation, especially in the Late Longshan period. Certainly, the two occupations were contemporaneous, and coexisted at the same time as their large neighbor Huangtucheng.

HRP060—The Yangwafang Site

Yangwafang is one of the largest sites near a branch of the Lü River. It is on a terrace opposite the Weizhuang site (HRP049) across the river. Yangwafang is surrounded by water on three sides: south is the river, and branches of the river are to the east and west. A large mound sits on the southwestern corner of the site.

Yangwafang is extremely rich in Han remains (Table 4.40). We found large pieces of grey bricks and white and blue porcelain sherds across the entire site; these date to the Han dynasty, when the settlement measured 6.7 ha, and to subsequent periods. We also identified artifacts from earlier periods. The settlement was established during the Longshan period, when it was 5.0 ha. The subsequent Erlitou period occupation was much smaller, although the settlement grew in the Late Shang and Western Zhou dynasty. The largest occupations were in the Longshan and Han periods.

This site sits across the river from Weizhuang. Both were large habitation areas during the Han dynasty and subsequently, and resemble modern villages in area. The proximity to the river and its membership in a settlement cluster make this site special.

HRP061—The Balidong Site

Balidong is on a raised area inside a cluster of other settlements. It is 300 m west of the Huangtucheng site, 200 m south of the Qianzhangweizi site, and 250 m north of the Bali site. It is close to the east side of the modern village of Bali. The south part of the landform is used for drying rice, and has no surface visibility.

The surface soils are dark grey; the artifact density is not as high as on nearby sites, and some of the sherds are eroded. We found red and greyish-brown plain body sherds dating to the Late Longshan period and similar to the Yueshi style from eastern China. We also collected plain rims from large bowls, and sherds with fine cord-marking and attached decorations. We found grey bricks and porcelains that date to the Han dynasty and later. Although the artifacts date to many periods, we only found them in small quantities on the surface.

This multi-component site is one of a cluster of contemporaneous settlements. Surface remains date from the Late Longshan period through the Shang dynasty, the Western Zhou dynasty, the Eastern Zhou dynasty, the Han and after to modern times (Table 4.41). These periods overlap with occupations at Huangtucheng to the east. The two settlements were separated by lower terrain, currently used as rice fields. Balidong was largest in the Longshan period and the Late Shang and Western Zhou period, at 4.8 ha and 4.4 ha respectively. Though this settlement doesn't compare in area to Huangtucheng, it may have had a special relationship to that central place. Unfortunately, we found no evidence of features on the surface of Balidong.

HRP062—The Maweizi Site

This site is on a high terrace, and has been heavily disturbed by a large, modern irrigation canal just south of the site. The modern village of Maweizi is northeast of the site. The surface soils are dark grey and full of modern porcelain sherds. There were a few plain red and grey plain sherds from the surface that date to the Longshan period. Judging by the number of modern artifacts, this was recently modern village. I suspect the Longshan remains used to spread across a larger area, which now is destroyed by the canal, so that we cannot determine more about the original nature of this settlement.

HRP063—The Liupozhai Site

This site is between the modern villages of Liupozhai and Liuzhai. During our fieldwork, it was planted in rice. The soil was dark grey and the scatter measured 50 m by 50 m. Many artifacts were grey cord-marked brick fragments, and cord-marked brownish and grey body sherds. Decorations included square patterns, incised, fine cord-marking, and coarse cord-marking. Our collection includes diagnostic sherds dating to the Early Longshan period, the Late Longshan, and the Shang dynasty to the Han dynasty.

Occupation at this site was contemporaneous with that of Liuzhai (HRP013). The two settlements were only 500 m apart on either side of the same modern village. I suspect part of the occupation is buried beneath the modern occupation, and constituted a single settlement. However, during this research we were unable to determine the extent of this site.

HRP064—The Liupozhaixi Site

This site is located on an abandoned village site surrounded by water. The modern village of Liupozhai is to the east. We collected a few grey plain sherds, including rims from a *li*, or tripod cooking vessel. Most artifacts are Han dynasty construction materials, including bricks and roof tiles. This occupation was contemporaneous with settlement at the Liupozhai site (HRP063) in the Shang dynasty and Han dynasty. The two archaeological sites are only 500 m apart, separated by a large, modern irrigation canal. Further investigation may reveal the relationship between the two sites.

HRP065—The Wangxinzhuang Site

This is a historical site mainly dating to the Han dynasty and subsequently. It is on raised ground east of the modern village of Wangxinzhuang. The northern portion has a higher elevation than the rest of the site, and had higher visibility. We collected plain grey wares from this area; they were mixed with middle and late historical and modern porcelain sherds. Based on the landform, this settlement measured at least 2 ha. Due to limited surface visibility, however, we made only a single collection unit.

HRP066—The Yinzhuang Site

This site is located on a platform that also has the remains of an abandoned modern village. The surface soil is dark grey. We found large quantities of grey and red sherds, both cord-marked and plain, in the freshly-loosened soil; they date to the Han dynasty. We also collected a few diagnostic Longshan grey cord-marked and plain sherds, but there were no earlier artifacts. Porcelain sherds document the later historical occupation. This site is about one collection unit in area, about 50 m by 50 m.

HRP067—The Sunzhuangbei Site

This site is south of the Wulong River, and north of the large modern road called the Maobao Road. The southern part of the site has been disturbed by the road. The modern village of Sunzhuang is to the south. The surface soil is loose and grey.

The artifact density is low and most sherds were in small pieces. They dated to the span from the Late Yangshao to the Late Longshan period (Table 4.42). Although this site is near the Yinzhuang site (HRP026), they date to different time periods; this site has an earlier occupation. However, Sunzhuangbei was contemporaneous with its neighbor to the southwest, Zhaozhuang

(HRP024). This settlement was much smaller than 20 ha Zhaozhuang in the Longshan period. As one of Zhaozhuang's satellite settlements, this site deserves further research.

HRP068—The Dachaozhai Site

This site is on raised ground that is higher toward the north and lower toward the south. There is a canal to the east, and the village of Dachaozhai lies to the south. The surface soil is dark grey.

Artifact density is generally low on this site; the southern part of the site had the highest densities, however. We found plain and cord-marked sherds and bricks, in various types. We found a plain red *ding* tripod leg dating to the Middle Yangshao period (Table 4.43). The Longshan period occupation was about 0.5 ha, but may have been larger before disturbance by canal construction. We also collected some historical period sherds, including from a cord-marked serving bowl (*doupan*).

Erlitou period artifacts were obvious. We found Yueshi-style brown serving bowls and *li* tripod vessels, which were distinctive artifacts that we found only in a few places.

This site is only 1.5 km north of the river. It is part of a large cluster of settlements along the Wulong River. Dachaozhai's occupations are contemporaneous with other large river-oriented settlements, including Yangshao period and the Longshan period settlements such as Xiaozhongzi (HRP044) and Dazhongzi (HRP045).

HRP069—The Liulou Site

This site is east of Dachaozhai (HRP068), and south of the village of Liulou. East of the site is a large irrigation canal. Surface vegetation was sparse, and we saw artifacts mostly near the canal.

Liulou's occupations are contemporaneous with those of its neighbor Dachaozhai. We found large quantities of eroded, coarse, cord-marked greyware sherds in a style that resembles Yueshi, that mostly date to the Late Longshan period, although some date to the Erlitou period. We also found some Eastern Zhou dynasty sherds on surface. We found artifacts only in a small area; they may have been exposed by construction of the canal. I suspect that the actual site area is greater than the single collection unit we made. The relationship of the Late Longshan settlement with that of Dachaozhai needs further investigation.

HRP070—The Huzhai Site

Huzhai is a mysterious site for its unknown size and function. It is on a terrace 300 m east of the Wulong River. The elevation increases from the west to the east away from the Wulong River. East of the site is the Jingjiu Railroad, which connects Beijing and Kowlong.

Surface finds were mostly thin fine grey sherds, some decorated with cord-marking. These high-fired sherds are typical of Early Longshan assemblages from this area. We also identified and collected a few Late Shang and Western Zhou dynasty sherds. We were able to make one collection unit where the artifacts were most concentrated, but could not determine the area of the occupation.

HRP071—The Tongzhuang Tomb

This tomb site is north of the Huai River, between the villages of Qianfanzhuang and Houfanzhuang. We found coarse cord-marked grey bricks scattered on the surface. Local people told us they had dug up large quantities of bricks from depths less than 2 meters. These are typical Eastern Han tomb bricks. We found no other burial goods on the surface.

HRP072—The Liuzhuang Site

This site is on a small raised area south of the village of Liuzhuang. The artifact density was low, although the surface visibility was moderately good. The surface soils were grey-white. We identified plain grey rim sherds, brown cord-marked sherds, and grey brick fragments that all date to the Han dynasty. We found more remains that date to later periods. Nevertheless, the artifact scatter was so limited that we made only a single collection unit. The site was occupied during the Longshan period, the Late Shang and Western Zhou period, and the Han dynasty and later. Site area should have been at least 0.5 ha, or even larger based on artifacts distribution.

HRP073—The Renzhuang Site

This site is 2.5 km north of the Xinfu Road. We found small quantities of cord-marked grey sherds among the orchids planted behind the village of Renzhuang. The ground surface is now flat, but has been raised by the topsoil that villagers have brought in to improve their gardens. We only identified and collected a few Longshan and Eastern Zhou dynasty sherds. The site is largely destroyed by these modern agricultural activities, which makes estimation of site area impossible with this level of fieldwork.

HRP074—The Chenxiaozhuangbei Site

This site is on a terrace south of a tributary of the Lü River. It measures 300 m by 100 m. Local residents told us that the landform was higher before the Earth Movement in the 1960s. The surface artifact density was low. The only diagnostics included one plain Longshan sherd and a few plain Han dynasty sherds. Given the site's location, I would expect this site to have been occupied from the Longshan period onward. Frequent flooding and the soil movement may account for the scarcity of artifacts. This site is only 400 m west of the Han site of

Chenxiaozhuang (HRP050). These two settlements may have had interactions during the Han dynasty.

HRP075—The Xueyingdong Site

This site is east of the village of Xueying and divided north-south into two parts by a modern levee. The site is atop several platforms surrounded by water. These platforms also supported modern abandoned houses.

The earliest remains date to the Longshan period and are on the northern part of the site. We also identified the Late Shang and Western Zhou dynasty and Han dynasty bricks in the middle and south of the site. The surface visibility was too low in the southern part of the site to find many diagnostic artifacts. The Han occupation covered about 0.7 ha, and I suspect the earlier occupations were larger, especially in the Late Shang and Western Zhou dynasty.

HRP076—The Liuzhaibei Site

This site is on a relatively high landform, approximately 2 m above the surrounding terrain. The south edge of the site is cut by a large modern irrigation canal. This site is part of a cluster of settlements that includes Liuzhai (HRP013) 100 m to the south, and Liupozhaixi (HRP064) to the west, which has contemporaneous occupations.

We identified plain red and yellowish sherds as ranging from the Late Yangshao period through the Longshan period. A few Late Longshan period sherds were in a style similar to those of Dachaozhai (HRP068), and unlike typical Late Longshan ceramics from the Central Plains. The site is close to the canal, which may have destroyed part of the archaeological remains. The remains at Liuzhaibei are far less rich and complex than at its neighbor Liuzhai (HRP013).

The Wangjiakong Site

This site was recorded by the 1980s reconnaissance survey (National Bureau 1991:492), but has been totally destroyed since then. When the irrigation canal was built, local people reported that they found stone tools in this locale. When we visited, the site was flooded, with only a small vegetable garden above the water level. We found no artifacts on the surface.

Table 4.1 Huangtucheng (HRP001) Site Area by Component.

Period	Phase	Area (ha)
E Yangshao	IA	2.6
	IB	0.6
M Yangshao	IIA	2.1
	IIB	9.6
L Yangshao	III	28.1
E Longshan	IV	18.8
Longshan	IV–V	20.2
Late Longshan	V	30.1
Longshan to Erlitou	V–VI	5.1
Erlitou	VI	0.2
Erlitou to E Shang	VI–VII	2.3
E Shang	VII	7.6
Shang	VII–VIII	19.8
L Shang	VIII	0.3
L Shang and Western Zhou	VIII–IX	17.5
Western Zhou	IX	10.6
Eastern Zhou	X-XI	0.5
Warring States to Qin and Han	XI–XII	7.2
Qin and Han	XII	26.4
Liuchao	XIII	7.1
Liuchao to Sui and Tang	XIII–XIV	1.6
Sui and Tang	XIV	9.0
Sui, Tang, Song and Yuan	XIV–XV	0.1
Song, Yuan, Ming and Qing	XV–XVI	7.5
Ming and Qing	XVI	27.6
Ming and Qing to Modern Times	XVI–XVII	1.1
Modern Times	XVII	30.9

Table 4.2 Wulou (HRP002) Site Area by Component.

Period	Phase	Area (ha)
L Longshan	V	2.8
L Shang and Western Zhou	VIII–IX	4.6
Spring and Autumn	X	0.3

Table 4.3 Chenweizi (HRP003) Site Area by Component.

Period	**Phase**	**Area (ha)**
L Longshan	V	2.8
L Shang and Western Zhou	VIII–IX	4.6
Spring and Autumn	X	0.3

Table 4.4 Bali (HRP004) Site Area by Component.

Period	**Phase**	**Area (ha)**
Longshan	IV–V	0.3
L Longshan	V	0.3
Erlitou	VI	2.6
Erlitou to E Shang	VI–VII	0.3
L Shang and Western Zhou	VIII–IX	0.8
Spring and Autumn	X	0.3
Modern Times	XVII	0.3

Table 4.5 Qianzhangweizi (HRP005) Site Area by Component.

Period	**Phase**	**Area (ha)**
L Longshan	V	0.5
Erlitou to E Shang	VI–VII	1.5
L Shang and Western Zhou	VIII–IX	1.1
Western Zhou	IX	0.8
Qin and Han	XII	0.3

Table 4.6 Jinan (HRP006) Site Area by Component.

Period	**Phase**	**Area (ha)**
Longshan	IV–V	0.3
Erlitou to E Shang	VI–VII	0.3
E Shang	VII	3.0
Western to Eastern Zhou	IX–X	0.3
Eastern Zhou	X–XI	0.3
Modern Times	XVII	0.3

Table 4.7 Lüdianzi (HRP007) Site Area by Component.

Period	Phase	Area (ha)
L Yangshao to E Longshan	III–IV	0.4
Longshan	IV–V	0.9
L Longshan to Erlitou	V–VI	0.5
Erlitou	VI	0.7
L Shang and Western Zhou	VIII–IX	0.7

Table 4.8 Hongtangmiao (HRP008) Site Area by Component.

Period	Phase	Area (ha)
L Longshan	V	0.4
Warring States to Qin and Han	XI–XII	0.3
Qin and Han	XII	0.4
Ming and Qing	XVI	0.3

Table 4.9 Miaoxi (HRP009) Site Area by Component.

Period	Phase	Area (ha)
M to L Yangshao	II–III	0.3
L Yangshao	III	0.3
Qin and Han	XII	4.1

Table 4.10 Lügangtou (HRP011) Site Area by Component.

Period	Phase	Area (ha)
E Yangshao	I	2.4
M Yangshao	II	2.9
L Yangshao	III	2.7
L Yangshao to E Longshan	III–IV	1.5
E Longshan	IV	2.2
Longshan	IV–V	2.0
L Longshan	V	3.6
L Longshan to Erlitou	V–VI	0.3
E Shang	VII	0.3
L Shang and Western Zhou	VIII–IX	4.5
L Shang	VIII	0.3
Western Zhou	IX	0.3
Spring and Autumn	X	0.3

Period	Phase	Area (ha)
Eastern Zhou	X–XI	0.6
Qin and Han	XII	3.5
Liuchao	XIII	0.3
Modern Times	XVII	2.8

Table 4.11 Yaozhuang (HRP012) Site Area by Component.

Period	Phase	Area (ha)
Qin and Han	XII	0.8

Table 4.12 Liuzhai (HRP013) Site Area by Component.

Period	Phase	Area (ha)
M Yangshao	II	1.5
L Yangshao	III	3.6
E Longshan	IV	3.3
L Longshan	V	4.6
L Longshan to Erlitou	V–VI	0.3
Shang	VII–VIII	1.0
L Shang and Western Zhou	VIII–IX	4.2
Western Zhou	IX	2.9
Eastern Zhou	X–XI	0.3
Warring States	XI	1.5
Warring States to Qin and Han	XI–XII	1.5
Qin and Han	XII	4.3

Table 4.13 Qianlou (HRP014) Site Area by Component.

Period	Phase	Area (ha)
E Longshan	IV	0.6
Shang	VII–VIII	0.3
Qin and Han	XII	0.3

Table 4.14 Luzhong (HRP015) Site Area by Component.

Period	Phase	Area (ha)
L Yangshao	III	0.3
L Yangshao to E Longshan	III–IV	0.8
E Longshan	IV	0.5

Period	Phase	Area (ha)
Longshan	IV–V	0.8
L Longshan	V	0.3
Shang	VII–VIII	0.8
Qin and Han	XII	0.3
Liuchao	XIII	0.3

Table 4.15 Kongxiaozhuang (HRP017) Site Area by Component.

Period	Phase	Area (ha)
L Yangshao	III	0.3
E Longshan	IV	0.9
Longshan	IV–V	0.3

Table 4.16 Lijin (HRP018) Site Area by Component.

Period	Phase	Area (ha)
E Yangshao	I	0.5
M Yangshao	II	0.9
L Yangshao	III	1.4
E Longshan	IV	1.4
Longshan	IV–V	0.9
L Longshan	V	0.9
Modern Times	XVII	0.3

Table 4.17 Zhaoying (HRP019) Site Area by Component.

Period	Phase	Area (ha)
Shang	VII–VIII	0.3
Eastern Zhou	X–XI	0.4

Table 4.18 Yangshulin (HRP023) Site Area by Component.

Period	Phase	Area (ha)
L Yangshao to E Longshan	III–IV	0.3
L Shang and Western Zhou	VIII–IX	1.3
Eastern Zhou	X–XI	0.3

Table 4.19 Zhaozhuang (HRP024) Site Area by Component.

Period	Phase	Area (ha)
E Yangshao	I	1.7
M Yangshao	II	17.6
L Yangshao	III	18.5
E Longshan	IV	16.3
Longshan	IV–V	23.2
L Longshan	V	20.5
Erlitou	VI	10.3
Shang	VII–VIII	0.7
L Shang and Western Zhou	VIII–IX	28.5
Western Zhou	IX	6.5
Spring and Autumn	X	1.9
Eastern Zhou	X–XI	2.4
Warring States	XI	0.3
Warring States to Qin and Han	XI–XII	8.9
Qin and Han	XII	11.1
Liuchao	XIII	2.8
Song and Yuan	XV	0.3

Table 4.20 Kongyao (HRP025) Site Area by Component.

Period	Phase	Area (ha)
M Yangshao	II	0.3
E Longshan	IV	0.3
L Longshan	V	0.3
Qin and Han	XII	0.3
Liuchao	XIII	0.5

Table 4.21 Sunzhuang (HRP026) Site Area by Component.

Period	Phase	Area (ha)
M to L Yangshao	II–III	0.3
Longshan	IV–V	0.3
L Shang and Western Zhou	VIII–IX	0.3
Spring and Autumn	X	0.3
Eastern Zhou	X–XI	0.3
Qin and Han	XII	2.8

Table 4.22 Yinweizinan (HRP028) Site Area by Component.

Period	Phase	Area (ha)
Longshan	IV–V	0.3
L Longshan	V	0.3
E Shang	VII	0.5
L Shang and Western Zhou	VIII–IX	1.3
Western Zhou	IX	0.9

Table 4.23 Yuchang (HRP030) Site Area by Component.

Period	Phase	Area (ha)
E Yangshao	I	0.9
M Yangshao	II	1.0
L Yangshao	III	1.9
E Longshan	IV	1.0
Longshan	IV–V	1.5
L Longshan	V	1.5
Erlitou	VI	0.3
Erlitou to E Shang	VI–VII	0.3
Shang	VII–VIII	1.8
L Shang and Western Zhou	VIII–IX	3.2
Western Zhou	IX	1.6
Western Zhou to Spring and Autumn	IX–X	0.3
Qin and Han	XII	0.3
Song and Yuan	XV	0.3

Table 4.24 Dawangzhuang (HRP031) Site Area by Component.

Period	Phase	Area (ha)
E Yangshao	I	0.3
M Yangshao	II	2.2
L Yangshao	III	2.6
E Longshan	IV	2.5
Longshan	IV–V	2.9
L Longshan	V	3.2
L Longshan to Erlitou	V–VI	1.2
Erlitou	VI	1.8
Erlitou to E Shang	VI–VII	0.3
Shang	VII–VIII	0.3
L Shang and Western Zhou	VIII–IX	0.7

Table 4.25 Shuaidong (HRP032) Site Area by Component.

Period	**Phase**	**Area (ha)**
M Yangshao	II	0.3
L Yangshao	III	0.3
E Longshan	IV	0.3
L Longshan	V	0.3
L Shang and Western Zhou	VIII–IX	0.5
Spring and Autumn	X	0.3
Qin and Han	XII	0.3
Ming and Qing	XVI	0.3

Table 4.26 Shizhuang (HRP034) Site Area by Component.

Period	**Phase**	**Area (ha)**
L Yangshao to E Longshan	III–IV	0.3
Longshan	IV–V	0.5

Table 4.27 Chenzhuang (HRP036) Site Area by Component.

Period	**Phase**	**Area (ha)**
E Longshan	IV	0.3
L Longshan	V	0.3
L Shang and Western Zhou	VIII–IX	0.9
Eastern Zhou	X–XI	0.8
Qin and Han	XII	0.3

Table 4.28 Liuzhuang (HRP037) Site Area by Component.

Period	**Phase**	**Area (ha)**
M Yangshao	II	0.6
L Yangshao	III	1.4
L Yangshao to E Longshan	III–IV	2.2
E Longshan	IV	1.3
Longshan	IV–V	2.8
L Longshan	V	0.6
L Shang and Western Zhou	VIII–IX	1.5
Eastern Zhou	X–XI	1
Qin and Han	XII	0.3

Table 4.29 Jinzhuang (HRP038) Site Area by Component.

Period	Phase	Area (ha)
L Yangshao	III	0.3
L Yangshao to E Longshan	III–IV	0.3
L Longshan	V	0.8
Erlitou	VI	0.3
L Shang and Western Zhou	VIII–IX	1.2
Liuchao	XIII	0.3

Table 4.30 Xiaolizhuang (HRP040) Site Area by Component.

Period	Phase	Area (ha)
L Yangshao	III	1.1
E Longshan	IV	1.6
Longshan	IV–V	1.4
L Longshan	V	1.9
L Shang and Western Zhou	VIII–IX	1.9
Western Zhou	IX	1.1
Eastern Zhou	X–XI	0.7

Table 4.31 Qianwanglou (HRP041) Site Area by Component.

Period	Phase	Area (ha)
M to L Yangshao	II–III	0.3
L Yangshao	III	0.3
E Longshan	IV	0.3
L Shang and Western Zhou	VIII–IX	0.5
Eastern Zhou	X–XI	0.5

Table 4.32 Xiaozhongzi (HRP044) Site Area by Component.

Period	Phase	Area (ha)
E Yanghso	I	1.9
M Yangshao	II	2.6
L Yangshao	III	2.4
E Longshan	IV	4.2
Longshan	IV–V	3.0
L Longshan	V	4.9
L Longshan to Erlitou	V–VI	1.1

Period	Phase	Area (ha)
L Shang and Western Zhou	VIII–IX	4.8
Eastern Zhou	X–XI	0.3
Qin and Han	XII	0.9

Table 4.33 Dazhongzi (HRP045) Site Area by Component.

Period	Phase	Area (ha)
E Yangshao	I	0.3
M to L Yangshao	II–III	0.3
E Longshan	IV	1.3
Longshan	IV–V	3.2
L Longshan	V	2.4
L Longshan to Erlitou	V–VI	1.5
Erlitou	VI	0.5
Shang	VII–VIII	1.3
L Shang and Western Zhou	VIII–IX	4.8
Western Zhou	IX	1.0
Western Zhou to Spring and Autumn	IX–X	0.3
Spring and Autumn	X	0.9
Eastern Zhou	X–XI	1.7
Qin and Han	XII	0.9

Table 4.34 Xiaolizhuangbei (HRP046) Site Area by Component.

Period	Phase	Area (ha)
L Yangshao	III	0.9
E Longshan	IV	0.3
L Longshan	V	0.3
L Shang and Western Zhou	VIII–IX	1.1

Table 4.35 Zhangying (HRP048) Site Area by Component.

Period	Phase	Area (ha)
L Yangshao to E Longshan	III–IV	0.3
E Longshan	IV	0.3
Longshan	IV–V	0.5
L Longshan	V	0.3
L Shang and Western Zhou	VIII–IX	0.3
Eastern Zhou	X–XI	0.4

Table 4.36 Weizhuang (HRP049) Site Area by Component.

Period	Phase	Area (ha)
L Yangshao	III	0.6
L Yangshao to E Longshan	III–IV	2.0
E Longshan	IV	1.3
L Longshan	V	3.9
L Shang and Western Zhou	VIII–IX	1.6
Western Zhou	IX	0.3
Western Zhou to Spring and Autumn	IX–X	0.3
Qin and Han	XII	4.5
Liuchao	XIII	0.3
Song and Yuan	XV	0.3

Table 4.37 Songwa (HRP053) Site Area by Component.

Period	Phase	Area (ha)
L Yangshao to E Longshan	III–IV	0.3
L Longshan	V	1.8
Qin and Han	XII	9.1
Liuchao	XIII	5.6
Song and Yuan	XV	0.3

Table 4.38 Beiliuzhuang (HRP054) Site Area by Component.

Period	Phase	Area (ha)
E Yanghso	I	0.9
M Yangshao	II	4.7
L Yangshao	III	7.1
E Longshan	IV	5.3
L Longshan	V	7.8
Erlitou to E Shang	VI–VII	0.3
L Shang and Western Zhou	VIII–IX	6.0
Western Zhou	IX	0.7
Eastern Zhou	X–XI	1.5
Warring States to Qin and Han	XI–XII	2.0
Qin and Han	XII	1.0
Liuchao	XIII	1.7

Table 4.39 Liuying (HRP055) Site Area by Component.

Period	**Phase**	**Area (ha)**
E Longshan	IV	0.3
L Longshan	V	2.9
L Shang and Western Zhou	VIII–IX	4.4
Eastern Zhou	X–XI	0.5
Warring States	XI	0.3
Warring States to Qin and Han	XI–XII	0.9
Qin and Han	XII	4.9
Song, Yuan, Ming and Qing	XV–XVI	0.3

Table 4.40 Yangwafang (HRP060) Site Area by Component.

Period	**Phase**	**Area (ha)**
Longshan	IV–V	5.0
L Longshan to Erlitou	V–VI	1.1
L Shang and Western Zhou	VIII–IX	2.2
Warring States to Qin and Han	XI–XII	0.3
Qin and Han	XII	6.7
Liuchao	XIII	1.0

Table 4.41 Balidong (HRP061) Site Area by Component.

Period	**Phase**	**Area (ha)**
L Longshan	V	4.8
Shang	VII–VIII	1.4
L Shang and Western Zhou	VIII–IX	4.4
Eastern Zhou	X–XI	0.3
Warring States	XI	0.3
Qin and Han	XII	0.3
Liuchao to Sui and Tang	XIII–XIV	0.3
Sui, Tang, Song and Yuan	XIV–XV	0.3
Song, Yuan, Ming and Qing	XV–XVI	0.3
Modern Times	XVII	1.1

Table 4.42 Sunzhuangbei (HRP067) Site Area by Component.

Period	Phase	Area (ha)
L Yangshao to E Longshan	III–IV	0.3
L Longshan	V	0.7

Table 4.43 Dachaozhai (HRP068) Site Area by Component.

Period	Phase	Area (ha)
M Yangshao	II	0.3
L Longshan	V	0.5
Erlitou	VI	0.3
L Shang and Western Zhou	VIII–IX	0.3
Modern Times	XVII	0.3

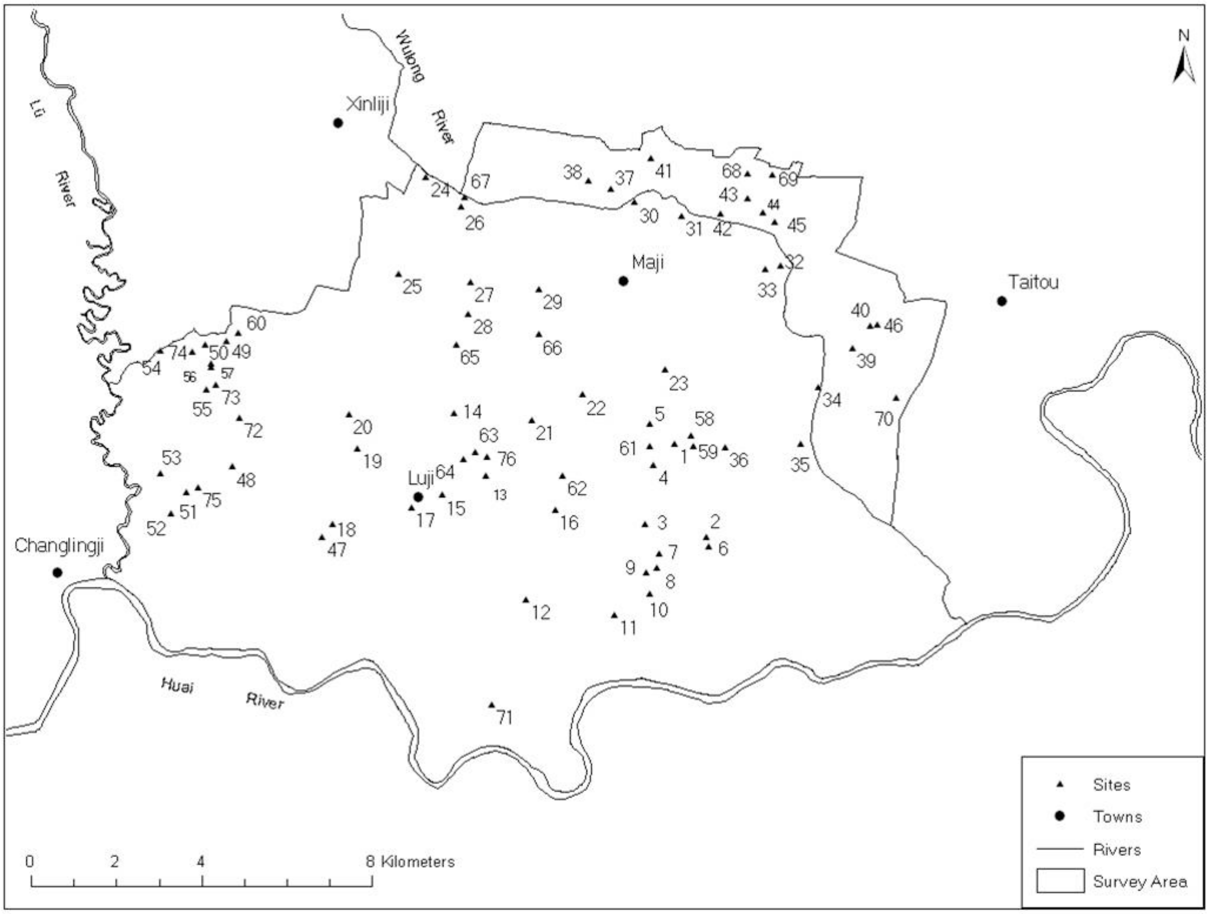


Figure 4.1 Habitation sites in Huangtucheng regional archaeological survey area.
Note: numbers stand for site numbers, for example, “1” stands for site HRP001.

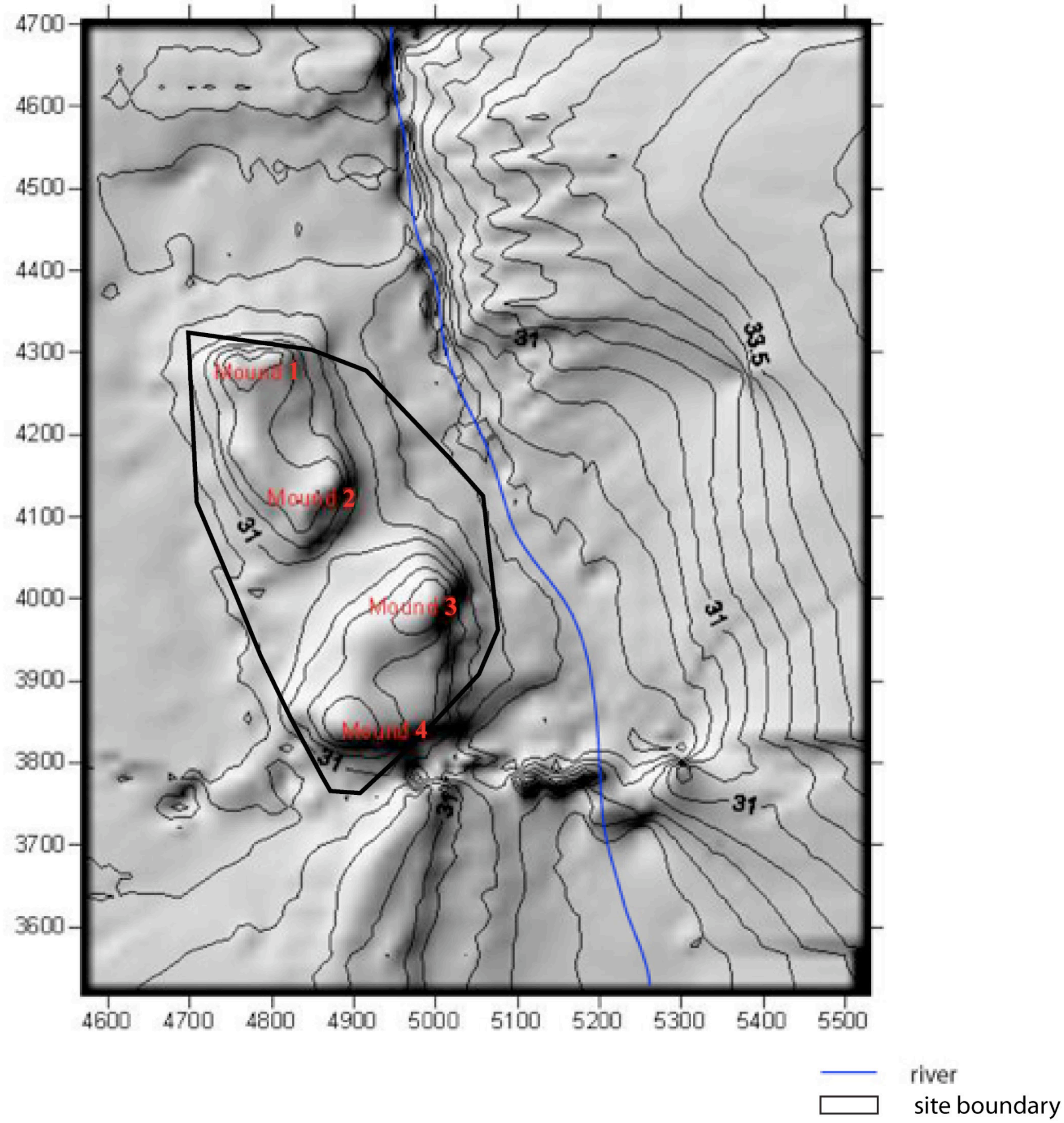
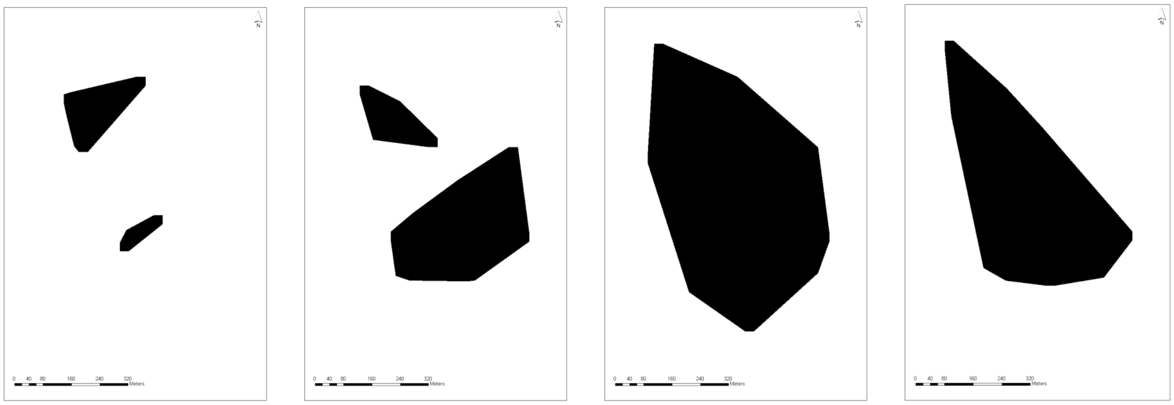
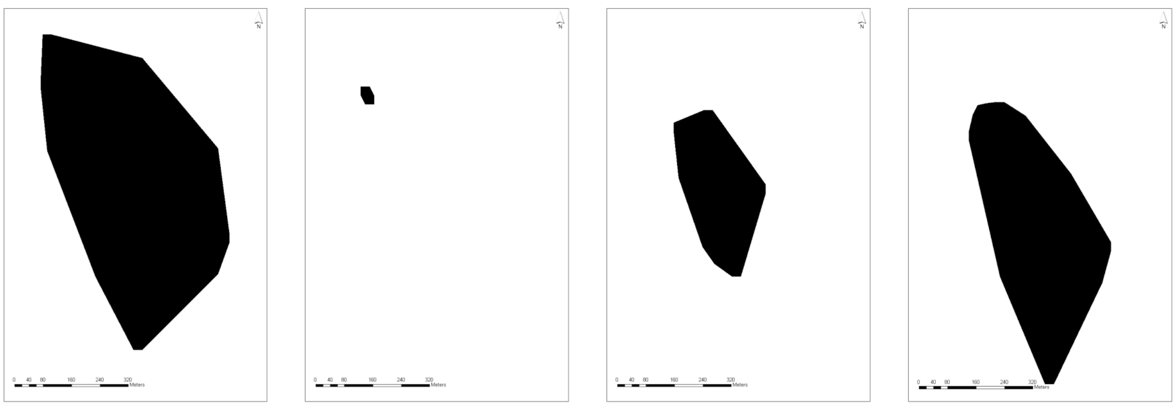


Figure 4.2 Contour map of Huangtucheng (HRP001).

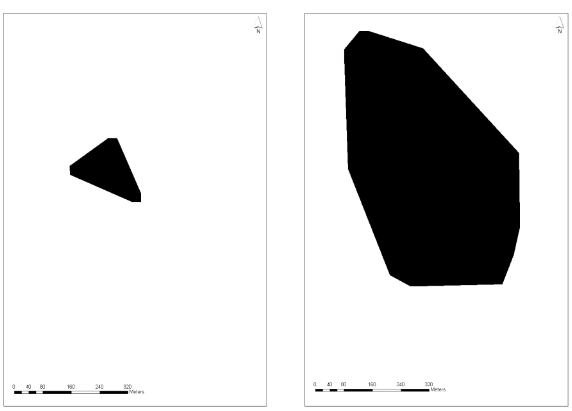
Figure 4.3 Adobes in mound 1 in the Huangtucheng site.



Phase I (E Yangshao) Phase II (M Yangshao) Phase III (L Yangshao) Phase IV (E Longshan)



Phase V (L Longshan) Phase VI (Erlitou) Phase VII (E Shang) Phase VIII–IX (L Shang/ Western Zhou)



Phase X–XI (Eastern Zhou) Phase XII (Qin and Han)

Figure 4.4 Site component changes from phase I (Early Yangshao period) to XII (Qin and Han).

Figure 4.5 The Taoyao site (HRP010) profile.

Figure 4.6 The Zhanglouyaochang site (HRP016) profile.

Figure 4.7 A view of the Dazhongzi site (HRP045).
Note: the photo was taken from north of the site.

CHAPTER 5

REGIONAL SETTLEMENT PATTERNS

As indicated by the site descriptions in Chapter 4, the Huangtucheng area has a substantial archaeological record. There are 76 sites in the survey area, covering a total of 569 ha. I consider this a minimum figure, as both the area covered by ancient occupation and the presently-visible site area have been reduced, to an unknown extent, by a combination of erosion, alluviation, plowing, looting, gardening, construction and other factors. In spite of these processes, the Huangtucheng survey does suggest that the surface above the ancient terrace edge at Luji has been stable since the Late Neolithic and that we have recovered a fair representation of the settlement patterns since that time. This chapter describes the phase-by-phase settlement patterns.

I divide settlements into tiers based on their sizes. Breaks of the tiers fall naturally within the data, although the lowest level of the tiers is arbitrary. Based on all the settlement size data in the survey, settlements in the survey area are categorized into two and three tiers. The lowest tier, or the third tier, is either below 2 ha or 1 ha varying with the time period. The first tier falls in the break of the largest group of sizes among the data, either above 5 ha or 10 ha depending on the time period. These settlement ranks are comparable to those used by Wright and Johnson (1975) in the Susiana Plain in Mesopotamia. Wright and Johnson (1975: Figure 2) used “natural breaks” in site size histograms to form size intervals of smaller than 3 ha, 3 to 7 ha, 8 to11 ha and larger than 12 ha for the middle Uruk period.

My survey shows that the Huangtucheng area has been occupied continuously since the Early Yangshao period (Table 5.1). Yang's (1981) work in neighboring Huangchuan County discovered Peiligang (Middle Neolithic) sites, although my survey did not recover any artifacts dating earlier than the Early Yangshao period. It is possible that there may be earlier, deeply buried strata in the Huangtucheng survey area.

In the Huangtucheng area, the first settlements appeared around 5000 B.C., development continued in the Late Neolithic times, fluoresced in the Bronze Age and after the Han dynasty reached almost the same settlement density as today. The earliest settlements were small sites on river terraces. By the Late Neolithic, one or two larger sites began to dominate, with relatively larger numbers of larger sites in the Late Yangshao and Late Longshan periods. In the transition from the Late Neolithic to the Early Bronze Age, the number of sites decreased; this suggests significant cultural, economic and political change during the transition, or may reflect a poor understanding of this transitional period. Settlement sizes and numbers grew in the subsequent Bronze Age, especially in the Late Shang and Zhou periods. Site counts and areas increased greatly, and previously unoccupied areas inland and at higher elevations began to be inhabited. By around 206 B.C., settlements dotted the entire survey area and utilized all types of landforms. Settlement size and density almost matched the modern settlement pattern, with ditches surrounding each village. After the Han dynasty, the settlement pattern was stable for nearly a millennium. In the 1960s, the Earth Movement initiated an abrupt population increase, and old residential areas were abandoned in favor of new construction nearby. New residential areas sometimes had surrounding ditches, but not always. Together, the old and new patterns supported a much larger population than previously.

5.1 The Neolithic

For this study, I divide the Neolithic into five phases: phase I/Early Yangshao (5000–4000 B.C.), phase II/Middle Yangshao (4000–3500 B.C.), phase III/Late Yangshao (3500–2900 B.C.), phase IV/Early Longshan (2900–2500 B.C.), and phase V/Late Longshan (2500–1900 B.C.). These phases are derived from well-dated chronological studies of pottery from the Central Plains. Some pottery types characterize multiple, over-lapping phases, so my chronology also includes transitional phases such as phase I–II, III–IV, etc.

By 5000 B.C., the first permanent settlements dotted the banks and terraces along the major rivers in the Huangtucheng survey area. In the Early Yangshao, some settlements exceeded 2.0 ha in size. Throughout the long Neolithic, people resided along the rivers, with settlements gradually becoming larger. In the Middle Yangshao, large sites developed, and total settlement area reached to a peak in the Late Yangshao period. Settlement size increased substantially in the Longshan period. We see rapid transformations in the Late Yangshao–Early Longshan transition, and again at the end of the Longshan period.

Phase I: The Early Yangshao Period (5000–4000 B.C.)

First settlements in the Huangtucheng area appeared by at least 5000 B.C. (Figure 5.1). This is consistent with a study that dated the earliest occupation along the upper Huai River at around 4900 B.C. (Henan Provincial Institute of Cultural Relics and Archaeology (HPICRA) et al. 1992:59). These settlements were also on the river terraces, both of large rivers—now canalized—and smaller watercourses.

Ten sites date to the Early Yangshao period, and settlement occupied a total of 14.2 ha (Table 5.2). Settlement sizes were variable, with the largest nearly 5 ha and the smallest only

0.2–0.3 ha. Sometimes sites were neighbors, only 500 m apart. The most distant settlements were only 12 km apart.

The Early Yangshao settlement pattern has two tiers: sites larger than 1 ha and sites smaller than 1 ha. The four first-tier settlements are evenly spaced, ranging from 5 to 8 km apart. Most of the sites only had cooking vessels and a few serving vessels; pieces were small and had low firing temperatures. Three larger sites, Zhaozhuang (HRP024), Lügangtou (HRP011), and Xiaozhongzi (HRP044), also had a few fragments of large vessels. Most Early Yangshao phase artifacts have the distinctive features of phase I ceramics: red pottery tempered with grass and ashes, and mostly plain. Fragments were small, and difficult to identify.

In contrast, the largest site, Huangtucheng (HRP001), occupies nearly 5 ha along a high river terrace with two artifact concentrations, each on a mound, with no Early Yangshao period artifacts in the intervening lower-elevation area. No settlements are within 4 km of Huangtucheng. We recovered 46 sherds diagnostic to the Early Yangshao period in 14 collection units across the Huangtucheng site, with the highest density atop the north mound. Overall, the Huangtucheng artifacts include more vessel types and a greater variety of decorations than the other Early Yangshao settlements. Vessel types include tripod vessels, large basins, bowls with a wide red band along the exterior of the rim, and decorated serving bowls with ears. Surface decorations varied by vessel type, and include pinched, engraved, and carved patterns. Based on rim diameters, some bowl sizes were standardized. We found large adobe chunks that are structural remains near the artifact concentrations, but no associated artifacts, so the structures can not be dated. From the site's size and variety of ceramic types, Huangtucheng was probably a large site in the Early Yangshao period.

Phase II: The Middle Yangshao Period (4000–3500 B.C.)

We found 15 sites dating to the Middle Yangshao period (Figure 5.2). All settlements are along riverbanks, including new settlements along the Wulong River, not far from the phase I settlements Shuaidong (HRP032), Liuzhuang (HRP037), and Dachaozhai (HRP068). The phase II settlement pattern has three tiers of settlements (Table 5.3). The first tier has two sites: Huangtucheng (HRP001) and Zhaozhuang (HRP024). During this period, Huangtucheng expanded to over 12 ha, and continued to have separate artifact concentrations on the two mounds. Zhaozhuang, however, was the largest phase II settlement, expanding dramatically from its phase I 1.7 ha to 17.6 ha in this phase, and eclipsing Huangtucheng in size. Second tier settlements ranged from 2–10 ha, and were at least 3 km apart along river terraces, suggesting they were independent occupations. Third tier sites are all smaller than 2 ha, and most are near larger, second tier settlements. None, however, are near either of the first-tier settlements.

Continuity varied for phase II sites. Liuzhai (HRP013) is a new settlement in the middle of the survey area; it is next to a small river and covers about 1.5 ha. Dazhongzi (HRP045), which covered 0.3 ha in phase I, had no typical phase II artifacts, although it did have some transitional late phase II to early phase III ceramics. This apparent abandonment of Dazhongzi may be for one of two reasons: 1) it is only 200–300 m from Xiaozhongzi (HRP044), and, since it has different artifacts, may have had a different function and status, or, 2) residents of Dazhongzi moved to Xiaozhongzi at the beginning of the period, contributing to that settlement's expansion and the abandonment of Dazhongzi.

The 357-phase II Middle Yangshao period sherds came from 106 collection units. Vessel styles and decorations from second- and third-tier settlements tend to be uniform, although those from Huangtucheng are markedly better in quality and are of vessel types that require more production steps (Feinman et al. 1981). While the sherds from the small (Tier 1) sites were small and eroded, Huangtucheng's ceramics were higher fired, from larger vessels, and represent more types of serving vessels. This strongly suggests that the Huangtucheng settlement had central functions, and at least some residents had access to better quality ceramics and thus had a higher socioeconomic status.

Middle Yangshao period settlement covered 49.8 ha, an increase from the 12.3 ha of the preceding Early Yangshao Period, indicating a gradual increase in settlement densities over a millennium. Site counts did not increase abruptly, many settlements that continued to be occupied became larger during this period, and Middle Yangshao peoples expanded their occupation along the rivers, and began to occupy inland areas.

As in the previous phase, we could not date any above-ground architecture to this period, although we did find red adobes on some sites. Along the middle Yangtze River, phase II/Middle Yangshao period kilns have been found, including at the Xiawanggang site (Henan Provincial Museum and the Yangtze River Planning Office 1989); no kilns in this survey area could be dated to this period.

Phase III: The Late Yangshao Period (3500–2900 B.C.)

During the Late Yangshao period the demographic trend toward increasing numbers of settlements and increasing size of settlements continued. Settlement clustering, which began in the previous period with some third-tier settlements located not far from second-tier settlements, became more pronounced. Indeed, this clustering can be considered a hallmark of this period in the Huangtucheng survey area (Figure 5.3). Four discrete clusters are along the Wulong, along a branch of the Lü River, along a contour line in the central survey area, and in the south. Areas between clusters lacked occupation, leaving a large proportion of the survey area unoccupied.

Interestingly, three clusters surrounded Huangtucheng to the north, west, and south, with the south cluster the closest, although still 2.5 km away. Twenty-three settlements date to this period, with new settlements established near settlements that had phase II occupation (Table 5.4). The largest settlements became even larger, and dominated the area.

Huangtucheng (HRP001), the largest site, produced 80% of the phase III artifacts. Huangtucheng expanded to 28 ha, and overtook Zhaozhuang (HRP024) to become once again the largest settlement in the survey area, although the two sites were by far the largest settlements in this phase. Some collection units have a very high density of phase III artifacts; for example, collection units C441 and C456 on the south side of Huangtucheng produced more than 50 sherds each. Phase III ceramics tend to be of high quality, and display a wide variety of vessel types and decorations, especially from the larger settlements. Vessel shapes include various tripod shapes, serving bowls, cups, and pedestal serving-stands. Small settlements had fewer types of tripod legs, bowl rims, and decorations in general. These phase III ceramics are similar to those of Qujialing and Shijiahe in the Jianghan Plains and Dahecun in the Central Plains (HPICRA et al. 1992:59), but display a distinctive regional style. We found no direct evidence for craft specialization at Huangtucheng, but speculate that the variety and high quality of the ceramics we did find suggest that this large site may well have had pottery-making specialists among its residents.

Zhaozhuang, in its strategic position controlling the lower Wulong, is the second largest settlement in the survey area, although at 18.5 ha, its size didnot increase much from phase II, when it covered 17.6 ha. Its small satellite settlement Kongyao (HRP025) disappeared; those residents may have moved to Zhaozhuang. Otherwise, the closest settlement was 4–5 km to the east or west.

Other than Zhaozhuang, we found nine phase III settlements along the banks of the Wulong River, branch of the Huai where there had been six in the previous period. The pattern is unexpectedly small, in that total settlement area only increased from 7 ha to 11.2 ha. Most sites remained at about the same size, although Xiaozhongzi (HRP044) became slightly smaller and settlement at Dachaozhai (HRP068) disappeared. Settlement along the north bank of the river increased, and people moved farther south to live along the lower stream at sites Xiaolizhuang (HRP040) and Xiaolizhuangbei (HRP046).

Similarly, settlements along the branch of the Lü River did not change much from the previous phase. Site area decreased slightly at Beiliuzhuang (HRP054), but it still was larger than its two neighbors, Zhangying (HRP048) and Weizhuang (HRP049). Together, these three settlements form a small settlement cluster, and Beiliuzhuang may have had some central functions for the cluster.

In addition to the cluster around Zhaozhuang, there is one in the southwestern survey area. Most of these settlements are on the banks of small rivers or on alluvial plains, and are not limited to the terraces of larger rivers, as is true of contemporaneous settlements elsewhere in the survey area. The largest settlement in this cluster is Liuzhai (HRP013), which covers 3.6 ha. Its closest neighbor is only 2 km to the west. We found five settlements aligned along the edge of what is today's flood zone, along a contour several meters above the terrain to the south. Indeed, modern villages are also dense along this same contour, and a large levee is immediately south of this line. I strongly believe that this line was the north edge of a flooded area, so that phase III and earlier sites may be buried under sediments deposited during repeated flood episodes that did not exceed this contour. Even today, most of the land south of and below this contour is planted with rice. Another possibility, however, is that these sites were along the bank of a river that does not exist any more; it would have paralleled the string of sites and the modern levee.

A third small cluster is south of Huangtucheng. This area had only a single site in phase II (Lügangtou HRP011), yet increased to three settlements in this phase. Interestingly, Lügangtou decreased slightly in area from 2.9 ha to 2.7 ha in this phase.

The Zhaozhuang settlement cluster has sites with all three size tiers. Zhaozhuang was the largest site, with neighboring settlements along nearby river branches. Within the Zhaozhuang cluster, settlements can be divided into two tiers, either larger or smaller than 2.0 ha. The larger settlements in this cluster are Dawangzhuang (HRP031), Xiaozhongzi (HRP044) and Beiliuzhuang (HRP054).

Huangtucheng is a prominent settlement with no neighboring sites nearer than 2 km. Huangtucheng is about 8 km from Zhaozhuang, provoking questions about their interactions. Did Huangtucheng dominate Zhaozhuang? From the available evidence, I think so. First, the occupation at Zhaozhuang is much smaller than Huangtucheng, with an area of 18.5 ha compared to Huangtucheng's 28 ha. Second, Huangtucheng's phase III ceramics are of better quality and in greater quantity than those of Zhaozhuang. Huangtucheng's phase III artifacts came from 191 collection units, which produced over 1339 phase III artifacts, while at Zhaozhuang we found 82 phase III sherds across 30 collection units. Third, Huangtucheng's artifacts came from the tops of the mounds suggestive of sub-surface architecture (not confirmed during this fieldwork), while Zhaozhuang's artifacts spread along a river terrace. Fourth, Huangtucheng's location between several large rivers suggests it may have controlled access and trade activities along all of them. In contrast, Zhaozhuang's control would have been limited to smaller and more marginal streams of the Wulong.

One striking feature of the Late Yangshao period in the nearby middle Yangtze River region is the change in residential structures, which became long houses, built in rows according to a planned pattern. Along the middle Han River, the largest branch of the Yangtze, researchers found long houses at sites such as Xiawanggang, Baligang, Zhujiatai and Diaolongbei (Henan Provincial Museum and the Yangtze River Planning Office 1989; Peking University 1998; Yangtze Team 1989; Hubei Team 1992). For example, Xiawanggang has a long house with 29 rooms, and a hearth in each room. The largest room is about 18.79 m^2; small ones are smaller than 10 m^2 (Henan Provincial Museum and the Yangtze River Planning Office 1989:165). At Xiawanggang, the long houses replaced round structures that were either subterranean or above-ground, and ranged from 15 to 50 m^2. In contrast, the earlier house form at Qinglongquan was square, with an interior hearth (Institute of Archaeology 1991). This shift to collective residential structures indicates an important change in social structure at the onset of the Late Yangshao period in the Han River.

Walled towns also appear during the Late Yangshao period in the middle Yangtze River and Yellow River regions. In the Jianghan plains, researchers found at least six Qujialing culture walled-towns larger than 10 ha, at contemporaneous with the Late Yangshao period. Walled towns also appear in the middle Yellow River region, although with different construction methods and at different scales. Xishan, for example, is a circular walled-town surrounded by a ditch, with more than 200 houses, a large hammered house structure, and a plaza in the town's 2.5 ha enclosed area (National Bureau 1999:13). Excavations revealed children buried under the house floors and human and animal sacrifices during ritual activities. Although the significance of the regional variation in the walled-towns is debated, these data strongly suggest a new sociopolitical system formed at the end of the Yangshao Period in the Yellow and Yangtze River regions. This is contemporaneous with the changes we record at Huangtucheng; its location, large size, and rich ceramics suggest it may have been a walled town during this phase, which would make it the first walled-town in the Huai river region.

In sum, settlement area expanded to 71.7 ha in the Late Yangshao period, in three tiers of settlements. Settlement density increased gradually to a relatively high density. Huangtucheng became the dominant settlement; controlling smaller settlements within a 10 km radius. Zhaozhuang is the second largest settlement, controlling at least ten settlements both up- and downstream, but especially downstream along the Wulong. The Late Yangshao period was a time of architectural development. As in nearby regions, Huangtucheng may have become a walled-town to protect residents from flooding and to show the heightened status of its residents. Also, concentration of adobe bricks suggests craft specialization.

Phase III–IV: The Late Yangshao to the Early Longshan Transition (ca. 2500 B.C.)

The hallmark of this transitional phase is increasing numbers of small settlements near previously occupied settlements. Ceramic styles also change, so that we find: 1) ceramics with transition characteristics—that is, the late phase of the Late Yangshao period and the early phase of the Early Longshan period; and, 2) ceramics that are typical of neither the Late Yangshao nor Early Longshan period. More important, this transition is characterized by changes in residential structures and social complexity in middle Yangtze and Yellow River regions. In the survey area, the transition is not abrupt, and is characterized by the appearance of new settlements, so that settlement density increased slightly in the survey area.

We attribute 22 settlements to this transitional phase, with a total settlement area of 36.4 ha (Table 5.5). Most settlements continued to be occupied from the previous phase. New settlements were generally small, ranging from 0.3–1 ha.

Settlement tiers show continuity with the previous phase. There are still three tiers and Huangtucheng is still the largest settlement at 12.1 ha. A few settlements are in the second tier and most are in the tier of smallest settlements (smaller than 2 ha); residential areas are not large in any of these sites.

Settlements still concentrate mostly on riverbanks and terraces, with only a few in inland areas (Figure 5.4). Most of the settlements are still along the Wulong, just as it was in preceding periods. There's an additional settlement along the Lü, with the appearance of Songwa (HRP053). The most remarkable change is the appearance of small satellite settlements within a 1.5–2 km radius around Huangtucheng, which were not there during the long Yangshao period.

Unfortunately, our chronology is not sufficiently fine-grained to reveal a more detailed understanding of the changes during the phase III–IV Transition. Given the significant socioeconomic changes that happened in regions north and south of this survey area, I believe the appearance of new, small residential settlements likewise indicates important changes in the Huangtucheng area.

Phase IV: The Early Longshan Period (2900–2500 B.C.)

The data show rapid change during this phase, and indicate possible sociopolitical changes. The total number of settlements increased, total settlement area decreased, and for the first time small settlements appear distant from watercourses (Figure 5.5). Most settlements continued to be adjacent to watercourses, however. Settlements are spatially clustered, and more sites are found within each cluster. Settlements still have three tiers, but in this period the tier of largest settlements have areas greater than 15 ha (Table 5.6). All settlements in the smallest tier cluster were near second-tier settlements and these clusters were all potentially dominated by Tier 1 sites.

Along with the decrease in the total settlement area from 71.7 ha to 65.6 ha in this phase, Huangtucheng remained the largest settlement in the survey area, yet decreased in area and was one-third of its area in the Late Yangshao period. Huangtucheng's major Early Longshan occupation concentrated on the mound-tops, but artifact density decreased markedly. We collected 377 sherds from 96 collection units, whereas in the Late Yangshao period we retrieved 1339 sherds from 191 collection units. The decrease in artifact density coupled with the increase in satellite sites strongly suggests a decrease in population at Huangtucheng in this period.

In contrast, the Zhaozhuang cluster shows overall continuity with the previous period. The number of satellite settlements increased slightly, thus increasing settlement density. Xiaozhongzi increased in area and became the second largest settlement in the cluster. The new settlements were generally small, ranging from 0.3–1 ha, and some of the small settlements were abandoned. Zhaozhuang decreased slightly in area, and the occupation focus shifted to the west side. In contrast with Huangtucheng, the artifact density at Zhaozhuang increased somewhat. Whereas in the previous Late Yangshao period, we found no sites within a 2 km distance of Zhaozhuang, in this period we found two small settlements. This signals either a general site density increase or a shift in the local settlement pattern.

The cluster along the lower Lü branch southwest of Zhaozhuang increased to five settlements. Beiliuzhuang (HRP054) is the largest, and it has four settlements within a 2 km radius.

The small settlement cluster west of Huangtucheng retained its overall pattern, although site count and areas both increased. Although its area decreased, Liuzhai (HRP013) remained the largest settlement in the cluster.

In the area between Huangtucheng and the Wulong, we found three small interior sites, averaging 3–4 km south of the river. Unfortunately survey conditions—limited visibility and poor preservation—made it impossible to accurately determine site areas.

The total Early Longshan period settlement area was 65.9 ha, a slight reduction from the previous period. Since settlement count increased, I suspect people moved out of some settlements that continued to be occupied, opening new areas for cultivation and establishing settlements near the new fields. Meanwhile, the largest settlement, Huangtucheng, decreased in area and artifact density, and the second largest settlement, Zhaozhuang remained approximately the same size, although increases in its ceramic density suggest increased population density.

Phase V: The Late Longshan Period (2500–1900 B.C.)

During the Late Longshan period, this area experienced a marked increase in the number, size and frequency of sites. The total residential area expanded to 103.4 ha, 40% more than during the Early Longshan period. Site density increased to a large extent, much more dense than its prior occupation, especially in areas near the Huangtucheng site.

We made 326 collection units on 43 sites that produced diagnostic Late Longshan artifacts. Most sites were still along river terraces or other locales near water, but an increasing number of new settlements were farther from watercourses. Settlements spread into more inland areas but no sites were found in the flooded area north of the Huai.

Settlement pattern changes around Huangtucheng were more dramatic. For the first time, smaller sites appeared within 3 km of the site, where no settlements had previously been. Indeed, the closest settlement was only 500 m from Huangtucheng. Huangtucheng itself regained its former size, and expanded south, farther than it had in the previous Yangshao periods. Total site area reached 30.1 ha (Table 5.7). Ceramic densities remained previous levels. Across the site, we collected 905 sherds in 157 collection units. This shows a significant increase from the Early Longshan period, which had only 382 sherds in 95 collection units.

We attribute 1631 sherds to this phase. Different sites have different quality ceramics. Huangtucheng has the richest variety, both in the numbers of types and their quality. Zhaozhuang also has a higher percentage of high-quality serving vessels, including *ding* tripods, *dou* pedestal serving-stands and cups etc. The proportion of ceramics resembling those of Shijiahe or Late Qujialing styles, from areas to the south, and Dawenkou style from the east decreased, but were still present. Most of the ceramics resemble those of the Central Plains. Ceramics from smaller settlements did not show much variation in style and quality.

Late Longshan period settlements are in four clusters, one on the west side near the Lü river and its branch, another along the Wulong, the third around the Liuzhai site in the middle of the survey area, and the fourth around the Huangtucheng site (Figure 5.6). The western cluster has eight settlements, with the largest at 3.9 ha (Weizhuang HRP049); smaller satellite settlements encircled larger sites, forming two tiers of settlements, those larger and smaller than 2 ha. The largest site in the Wulong cluster is Zhaozhuang, which is near the upstream end of the cluster and has two satellite settlements; some larger sites are downstream in this cluster. The second largest settlement in the Wulong cluster is 4.9 ha (Xiaozhongzi HRP 044), which has a close neighbor measuring 2.5 ha within 500 m, and small hamlets within 1 km. This cluster has three tiers of settlements, and Zhaozhuang controlled the upper river area. The Luizhai cluster has six settlements, with five smaller settlements around 4.6 ha Luizhai. The Huangtucheng cluster, which previously did not have satellite settlements surround, has four in this period; they range from 0.3–4.8 ha and are east and west of the 30.1 ha Huangtucheng site. Other settlements are within 5 km south of Huangtucheng, and have two tiers, splitting at 2 ha.

The Late Longshan period had at least three tiers of settlements. Huangtucheng expanded beyond its former maximum, and developed satellite settlements. As the largest settlement in this area, Huangtucheng and its satellites were much larger than and perhaps dominated or controlled other clusters in the survey area, with central place functions for the surrounding communities. Huangtucheng's second tier settlements are larger than 2 ha, but smaller than Huangtucheng. Most of the second tier settlements have nearby settlements smaller than 2 ha. Distances between the second tier settlements range from 1–5 km. Zhaozhuang, the second largest settlement in the survey area, maintained control (perhaps dominated in a political or economic sense) of the Wulong river area. It tops a three-tier settlement system. Still, Zhaozhuang and its cluster could have been controlled by the larger cluster dominated by Huangtucheng. Further investigation on the relationship between these two large sites is urgently needed.

In all, the Late Longshan period witnessed one of the most rapid developments since the Early Yangshao period. Site counts and areas increased, and site density increased accordingly. Settlements expanded and augmented the cluster pattern that had previously been established. Simultaneously, ceramic styles changed greatly, indicating changes in interregional interaction patterns. We need to compare contemporaneous settlement pattern changes linked to ceramic style shifts in neighboring areas (see Chapter 7). Environmental changes, for example alterations in river channel patterns, climate changes, and new flooding patterns, may have influenced these shifts. Ancient climate data and changes in the Huai River drainage need further examination.

5.2 The Bronze Age

The Bronze Age generally refers to three dynasties in Chinese historical records, that is, the Xia, Shang and Zhou dynasties. They originated in the Late Neolithic, and successively replaced each other; each established a centralized territorial state in China. Written records and rich archaeological data provide details on political, economic and social complexity in the state-level Shang and Zhou societies, while the Xia still remains legendary because of the lack of written records. The archaeologically-defined Erlitou polity is commonly regarded as a state-level society dating to the same period as the Xia (Liu and Xu 2007).

Archaeological research at Erlitou has revealed a palace, social status differences, and a four-tier settlement pattern around it, strongly suggesting a well-developed state-level society (Erlitou Team 2005; Lee 2004). Since this period is poorly known in other areas, my analysis of the Bronze Age in the Huangtucheng is similarly limited. I compare the ceramics and other artifacts we found with published data from neighboring areas.

Although bronze vessels were widely used by elites in the Bronze Age, ceramics are the dominant diagnostic artifacts found on the surface in this survey area. Previous research has focused on large-scale walled cities and elite burials; regional settlement pattern studies are still uncommon. Settlement pattern and population studies will certainly complement and enrich our understanding of societies in the Bronze Age.

Phase VI: The Erlitou Phase (1900–1600 B.C.)

The Erlitou phase ushered in tremendous changes. Settlement areas decreased greatly and some sites were abandoned. Some residents had to have emigrated out of the region, since almost all sites became much smaller, including large settlements like Huangtucheng and Zhaozhuang. In contrast to the high number and size of sites in the Late Longshan phase, this phase experienced a sudden change in its settlement pattern and had sparser occupation.

We found 12 Erlitou phase sites (Figure 5.7). The settlements were scattered along the rivers, with a few around Huangtucheng. We found no Erlitou phase settlements in the western survey area. Two clusters present in the previous phase totally disappeared during this phase, including the cluster along the tributary of the Lü and the cluster west of Huangtucheng. Along the tributary of the Lü, the cluster found in the Late Longshan dwindled into a single site (Weizhuang HRP049), and it had only a small occupation area. The Wulong cluster was greatly diminished, but survived in this phase. Zhaozhuang remained as the largest site in this cluster though its area shrank from 20.5 ha to 10.3 ha. The Huangtucheng cluster was also diminished, with Huangtucheng, at only 2.6 ha, remaining the largest settlement in a triadic cluster. Another site is 3 km away, and has a small occupation area of 0.7 ha. For the first time, Huangtucheng lost its regional prominence. The total occupation area for this phase is 23.7 ha, almost 80% less than the previous period.

The remaining settlements are still in three tiers: large sites with an area of over 5 ha; sites around 2 or over 2 ha and sites smaller than 1 ha (Table 5.8). Thus, the general pattern remained although the number of settlements decreased enormously. The separate regional clusters survived, although no single site dominated the region.

In the Central Plains, the Erlitou phase is characterized by pronounced social stratification, palatial architecture and complex craft specialization, as evidenced by excavation results from the Erlitou site in Yanshi, Henan (Erlitou Team 1984, 1986, 1992). They show Erlitou to be a well-developed city, with a complex arrangement of the palace, road system, and bronze and pottery workshops, along with burials that exhibit distinct social status differences. The extent of the Erlitou polity is unknown; if it extends across the Huangtucheng survey area, then the ruling center of the survey area is beyond the boundaries of this project area.

Although we did not locate architectural features similar to the Erlitou remains, the rapid abandonment of settlements relative to prior occupations strongly suggest a sudden social change in this area, regardless of causal factors. To a great extent, the ceramics we identified and collected did not match the typical styles in the Central Plains. Instead, they resemble more of those found in Eastern China such as the Yueshi culture.

In summary, this phase experienced the most sudden sociopolitical change since the Neolithic. Total site area decreased and site density dropped. Previous occupations across the survey area survived only in the Wulong River clusters and at some small settlements around Huangtucheng. The sparse occupation of the Erlitou phase, in contrast to the previous Longshan occupation, suggests a sudden, significant change in social and economic aspects from the Neolithic to the Bronze Age. Although site density decreased, the three-tier settlement pattern survived. Neighboring areas underwent increasing social complexity and stratification, and we need to examine further its influence in our survey area.

Phase VII–VIII: The Shang Dynasty (1600–1046 B.C.)

We dated 15 settlements with 69 collection units and an area of 30.2 ha to the Shang dynasty. Sites are scattered sparsely across the north and middle of the survey area (Figure 5.8). Some sites were still on river banks, but a few were farther inland away from large rivers.

Although site density was low, the sites still are organized into three small clusters. The clusters are much smaller than those dating to the Late Longshan period. One cluster is along the Wulong, and has four small sites. Surprisingly, Zhaozhuang, which was a large-sized site for the entire Neolithic times, declined in the Shang dynasty. One possible reason is that the Zhaozhuang ceramics are more concentrated in the Late Shang, which may indicate a gap in the general occupation.

One settlement cluster is in the middle of the survey area, and has three small sites. They are all small in area and the area within 2 km apart. Liuzhai (HRP013) is the largest site in this small cluster and its area is only 1 ha. The other two sites are even smaller. A few small, sparse sites are north, east, and west of this cluster.

Huangtucheng regained its position as the largest settlement in this period, and its area reached 19.8 ha. Clearly, there is a gap between the Late Longshan phase and Shang dynasty in Huangtucheng since the Erlitou occupation is only 6 ha. The population could have been greatly reduced then, since the area was so diminished. One of the most notable changes besides the increased area is the appearance of a satellite settlement to the west. Balidong (HRP061) is only 400 m west and at 1.4 ha; it is small compared to Huangtucheng. Two other sites, 2 km and 2.5 km south of Huangtucheng, are slightly more distant satellite settlements.

The sites have three tiers (Table 5.9). Huangtucheng is the single first-tier settlement. It's area, 19.8 ha, greatly surpassed the sum of all the other site areas dating to this phase. The second tier consists of sites with areas from 1 to 2 ha, and has only four settlements. Clearly, there is a large gap between Huangtucheng and the second tier settlements. The difference merits additional study. The third tier settlements, smaller than 1 ha, are relatively abundant, and are the majority of the sites dating to this period.

In general, Shang occupation is sparse and small in this area. This is consistent with data from the Zhumadian area in the upper Huai River region (Peking University and Zhumadian Municipal Office for the Preservation of Ancient Monuments 1998:7). Although the settlements still have three tiers, mid-sized sites are absent. Other than Huangtucheng, all other sites have areas less than 2 ha. The sudden reduction in the area of Zhaozhuang needs further investigation. Huangtucheng remains a central place for the surrounding sites in this area.

Phase VIII–IX: The Late Shang and Western Zhou Dynasty (~1400–771 B.C.)

The Late Shang and Western Zhou is a period in which bronze vessels were widely used in ritual activities and by the elites. The bronze vessels vary in types and styles and play important roles in political leadership and economic control in the transition from the Late Shang to the Early Western Zhou dynasty. Pottery vessels remained the major cooking, serving and storage vessels for utilitarian uses. Ceramic styles, however, are hard to distinguish between the Late Shang and the Early Western Zhou types. This is usually considered as a single transition period because of its continuity and the similarity of ceramic types and styles (HPICRA and Xinyang Cultural and Archaeological Institute 2003). We saw few sherds that clearly date to either the Late Shang or the Early Western Zhou; instead, we could only sort sherds to the longer, transitional period. For this reason, I discuss settlement patterns not as separate periods, but as a single period.

Late Shang and Western Zhou occupations reached another peak in settlement count and density, which contrasted to the sparse settlement earlier in the Bronze Age. People reoccupied previously abandoned places and even expanded to new areas that they not occupied before. Many small residential sites appeared. Some sites regained their previous area, and some grew even larger, while others lost their earlier dominance.

We found 37 sites with a total area of 102.1 ha (Figure 5.9). Site density is notably higher than in the previous Erlitou (phase VI) and Early Shang (phase VII) periods. Settlements spread across the survey area. The western portion, especially the area near the Lü River, was reoccupied and many small residential areas developed near each other, some as close as 500 m and some 3–4 km apart.

One of the most prominent changes in this phase is the shift in preferred site locations. Although some sites remained along riverbanks, some small sites appeared inland, at a distance from watercourses. Instead, people preferred higher-elevation locales, often on mound-like places. This preference is especially notable in those sites farther from water, such as the Wulou site (HRP002).

The most noticeable change in settlement area is that most of the settlements are small, varying from 0.3–3 ha (Table 5.10). A few previously large sites lost area from their Neolithic size, but still are larger than 4 ha. Habitation sites show gradually increasing scale and density. Huangtucheng dropped from 30 ha in the Late Longshan period to 17.5 ha in this phase, while small satellite sites were settled nearby. The Qianzhangweizi site (HRP005), east of Huangtucheng, became a large settlement. Zhaozhuang, previously another large settlement, became the largest site in this area; it had two small nearby satellite settlements. Not only did Zhaozhuang control areas along the Wulong River, it also exceeded Huangtucheng’s area. Large sites were scattered along the Wulong, but none were closer to Zhaozhuang than 3 km. Zhaozhuang may have been the central place for these settlements, supplying resources and providing decision-making in political affairs. This hypothesis is supported by the abundance of large quantities of higher-quality ceramics at Zhaozhuang.

The Huangtucheng settlement cluster in this phase deserves special attention. As in the Late Neolithic, Huangtucheng is the center of a group of settlements, some even fairly large (e.g., Qianzhangweizi, only 500 m distant). Huangtucheng’s decreasing area and the increasing number of small satellite settlements resemble the Late Longshan period pattern. It is intriguing that Huangtucheng itself occupied a smaller area but dominated a larger total settlement area than Zhaozhuang, which was a far larger settlement. Did Huangtucheng lose its central place status in the entire survey area? What hierarchical relationship did Huangtucheng and Zhaozhuang have? These questions are essential to our understanding of settlement pattern and settlement hierarchy of this area.

Phase VIII–IX settlements continue the three-tiered pattern noted for previous periods; they are: first-tier sites larger than 15 ha, second-tier sites varying from 2–10 ha and sites smaller than 2 ha. As in Neolithic times, the survey area hosts two large first-tier settlements. The most noticeable change, however, is the increasing number and size of second-tier settlements. Few sites are close to, or even larger than 5 ha. This tier of settlements comprises the large group of settlements that were missing in the Bronze Age. These second-tier settlements are surrounded by smaller settlements that average about 1 ha. We found 26 third-tier settlements dating to this phase.

In this phase, settlement counts gradually increase after the sharp transition in the Early Bronze Age. Occupations increase in some river-edge areas, and people reside in large, relatively closely spaced settlements. Sites still appear in clusters, with some closely spaced. Large sites and their satellites comprise two-tier settlement clusters. Huangtucheng and Zhaozhuang, both larger than 15 ha, become the first-tier sites in this period. Settlement spread beyond river terraces and banks to populate inland locales with higher elevations. Not surprisingly, there were few sites in the presently-flooded area north of the modern Huai River. Lügangtou, a Shang/Zhou site occupied since the Middle Neolithic, is one of the closest settlements to the Huai, at 1.5 km distant.

Phase X–XI: The Eastern Zhou Dynasty (770–221 B.C.)

The Eastern Zhou dynasty is composed of two phases: the Spring and Autumn period and the Warring States period. Historical records depict several small states and their capitals in the upper Huai River region. One of the small states had its capital at Qisi, a town 24 km southeast of the Huangtucheng site. Other neighboring areas also have walled-town sites. It is unclear which Eastern Zhou dynasty polity controlled this survey area.

Compared to the dense and extensive occupation of the Late Shang and Western Zhou dynasty, the Eastern Zhou dynasty underwent a decrease in settlement density and areas (Figure 5.10). We located 27 sites with a total occupation area of 17.2 ha. The settlements I discuss here include those dated to phase X and XI, but most of the sites were dated to the general phase X–XI since some ceramics are hard to distinguish. The average site size is less than 1 ha and even the largest site Zhaozhuang is only 2.4 ha (Table 5.11). The small settlement areas may reflect the small ceramic assemblage we can securely date to this phase, and the continuing use of visually identical utilitarian vessels from Western Zhou to Han periods. Most surface artifacts we found that date to this period are plain architectural materials, such as roof tiles and large grey bricks, with a few utilitarian vessel fragments. We only identified a few cooking and storage vessels, such as *li* tripods, pots and containers—an assemblage that is not nearly as rich and varied as those of the Western Zhou dynasty.

Habitation sites dot the survey area, although settlement areas and density decreased dramatically. People reoccupied previously occupied areas, including both riverbanks and in inland areas. Settlements are not spatially clustered to the extent they had been. This pattern may be the result of disruptions caused by frequent hostilities in the Warring States period.

Large sites that had been occupied since the Neolithic were abandoned in this period. This deserves special attention. Both Zhaozhuang and Huangtucheng lost size, and must have lost their dominance over at least some surrounding settlements.

The settlement hierarchy decreased to two levels: sites over 1 ha in area, and those smaller than that. The majority of sites are in the smaller tier. Only four sites are larger than 1 ha, including Huangtucheng and Zhaozhuang. The diminished site hierarchy indicates that the ruling center for this area is outside the survey area during this period.

During the Eastern Zhou dynasty, multiple, small sites dominated the entire survey area. Sites are found throughout the study area compared to the preceding period, but size frequency remained low. Large sites disappeared, and medium-sized site collapsed to become small sites, leaving a two-tiered settlement pattern, indicating the ruling center was outside the survey area. Several capitals of historical states, such as Jiang, Huang etc., in the upper Huai area are very close to the Huangtucheng area. Extending the surveyed area will help resolve this issue.

Phase XII: The Qin and the Han Dynasty (221 B.C.–A.D. 220)

A tremendous increase in settlement frequency and size of settlements occurred in the Qin and Han period (The Qin dynasty lasted a mere 16 years, and is commonly combined with the longer Han dynasty in archaeological chronologies). Site counts doubled from the previous period, and site density reached a climax. Sites increased in size, and settlements spread into more parts of the survey area. In the flooded area where no previous settlements had been established, we even found Han remains, which indicate climatic changes and shifts in the river flow.

Although settlements are found throughout the survey area, most sites were spatially clustered, especially in the western and central study area. Site counts are not uniform in each cluster, but generally are higher than in previous periods.

The most prominent changes in this phase happened along the Lü River and its branch, where large sites clustered (Figure 5.11). We found six large settlements, averaging 4–5 ha, on these river terraces that were fairly closely clustered. I suspect there may have been more Han habitation sites along these landforms, but modern occupations now obscure them, so that we could not identify earlier occupations. A few small Han settlements were located near the large sites, varying from 200 m to 1 km distant.

In contrast to the increased occupation along the Lü River and its branch, large residential Late Shang and Western Zhou sites along the Wulong disappeared. Instead, the surviving settlements became much smaller, with an average area of less than 1 ha. This pattern began in the Eastern Zhou dynasty, when large habitation settlements along the river disappeared. Total site areas for those along the Wulong River dropped to 17.7 ha for 11 sites, in contrast to 45.7 ha for 15 sites in the Late Shang and Western Zhou dynasty. Zhaozhuang remained as a large site in this period. Although at 11.1 ha, its area was diminished, it was still the largest site, and a central place for habitation sites along the Wulong. Other sites were small and site counts decreased from the end of the Western Zhou dynasty. This pattern could be related to changes in the Wulong River itself related to channel change and increasing flooding.

This period is characterized by having many small sites. We located 10 Han tombs in the survey area. We can reasonably assume that there were residential areas near these tombs or cemeteries, but during fieldwork we did not locate many nearby habitation sites. I hypothesize that these residential areas may be covered by modern occupations (and therefore their presence could not be ascertained) or buried under modern house foundations.

Huangtucheng remained the largest and most dominant settlement in the survey area during this period, with an area of 26.4 ha, although it is slightly smaller than its Late Longshan occupation (30.1 ha). The chief difference, however, is in the diminished number of satellite settlements compared to the Longshan period. To the west of Huangtucheng, there was a small cluster of settlements less than 4 km away, with small satellites around a larger site.

Sites dating to the Han dynasty period form a three-tier hierarchy: sites larger than 10 ha, sites larger than 2 ha and smaller than 10 ha, and sites smaller than 2 ha (Table 5.12). One of the most obvious changes is the increased count of second tier settlements. These large sites had been small in the previous period. Their density is rather high, suggesting the Han period had an increased population.

In sum, we found 46 settlements dating to this period, with a total residential area of 91.1 ha; we collected 868 sherds. I think additional residential areas are buried beneath modern occupations, so that these counts are too conservative, and the actual extent of the Han occupation was larger, probably close to the modern village density. These expansions in site area and site density are consistent with the general trend of changes in settlement patterns from the Eastern Zhou to the Han periods.

5.3 Historical periods after the Han (from the Liuchao to Qing Dynasties)

In conformation with standard regional survey methods, we collected sherds dating to these late historical periods and recorded those sites; however, the research questions of this project do not directly address the periods subsequent to the Qin and Han Dynasties. Little is known about the utilitarian pottery and porcelain styles of these periods because excavations have focused on large tombs and towns, meaning there is a good understanding of prestige goods and little understanding of typical residential assemblages. We collected artifacts, including pottery, terra-cotta and porcelain, and during analysis, we recorded their basic characteristics and styles. Undoubtedly, our fieldwork overlooked large quantities of plain pottery sherds and porcelains thus leaving a large number of historical sites unidentified. Later researchers must assume that our records for these sites are conservative, and do not represent the full extent of the occupation in these later periods. Any accurate and comprehensive understanding of these late historical periods of necessity will rely heavily on a refined chronology of utilitarian artifacts from this area. In addition, historical documents for this period do not have detailed, accurate records for this area. Typically, regional survey can complement historical documents and can provide detailed data on settlement pattern and population size.

Most of the historical sites in this area are multi-component occupations that were used continuously for many periods, or occupied for multiple periods. Few were single-component sites. One notable single-component settlement is a possible kiln site we found in a modern village. Taoyao (HRP010) had a huge quantity of pottery sherds, mostly unused and standardized in size and style. Most are bowl fragments, brownish grey and fired at high temperatures. One profile had adobe fragments, indicating a kiln was probably nearby. I expect that most of the modern villages in the survey area have been continuously occupied settlements since the Han dynasty.

We documented 62 sites dating to these late historical periods, and made 402 collection units and collected 1145 artifacts. These numbers are disproportionately low compared to the modern village densities. It was impossible to collect good samples of diagnostics dating to these historical periods. Fieldwork that produces finer ceramic chronologies will improve our understanding of utilitarian vessel styles and types used in these historical periods and therefore enable future researchers to refine settlement pattern studies.

Table 5.1 Summary of Settlement Data from the Huangtucheng Project Area by Period.

Phases (Periods)	Site number	Collection unit count	Area (ha)	Artifact count
I (E Yangshao)	10	37	14.2	117
II (M Yangshao)	15	106	49.8	357
III (LYangshao)	23	287	71.7	1663
IV (E Longshan)	32	213	65.6	1029
V (L Longshan)	43	326	103.4	1631
VI (Erlitou)	12	28	23.7	74
VII-VIII (Shang)	15	69	30.2	180
VIII-IX (L Shang/Western Zhou)	37	228	102.1	1923
X-XI (Eastern Zhou)	27	44	17.2	333
XII (Qin and Han)	46	218	91.1	868

Table 5.2 Phase I Settlement Area and Tier.

Site Number	Site Name	Area (ha)	Tier
HRP001	Huangtucheng	4.9	1
HRP011	Lügangtou	2.6	1
HRP044	Xiaozhongzi	1.9	1
HRP024	Zhaozhuang	1.7	1
HRP030	Yuchang	0.9	2
HRP054	Beiliuzhuang	0.9	2
HRP018	Lijing	0.5	2
HRP031	Dawangzhuang	0.3	2
HRP045	Dazhongzi	0.3	2
HRP047	Zhanggang	0.3	2
Total		14.2	

Note: Tier 1: site area > 1 ha; tier 2: site area < 1 ha

Table 5.3 Phase II Settlement Area and Tier.

Site Number	Site Name	Area (ha)	Tier
HRP024	Zhaozhuang	17.6	1
HRP001	Huangtucheng	12.0	1
HRP054	Beiliuzhuang	4.7	2
HRP011	Lügangtou	2.9	2
HRP047	Zhanggang	2.8	2
HRP044	Xiaozhongzi	2.6	2
HRP031	Dawangzhuang	2.2	2
HRP013	Liuzhai	1.5	3
HRP030	Yuchang	1.0	3
HRP018	Lijing	0.9	3
HRP037	Liuzhuang	0.6	3
HRP025	Kongyao	0.3	3
HRP032	Shuaidong	0.3	3

Site Number	Site Name	Area (ha)	Tier
HRP048	Zhangying	0.3	3
HRP068	Dachaozhai	0.3	3
Total		49.8	

Note: Tier 1: site area > 10 ha; tier 2: site area = 2–10 ha; tier 3: site area < 2 ha

Table 5.4 Phase III Settlement Area and Tier.

Site Number	Site Name	Area (ha)	Tier
HRP001	Huangtucheng	28.1	1
HRP024	Zhaozhuang	18.5	1
HRP013	Liuzhai	3.6	2
HRP011	Lügangtou	2.7	2
HRP031	Dawangzhuang	2.6	2
HRP054	Beiliuzhuang	2.5	2
HRP044	Xiaozhongzi	2.4	2
HRP030	Yuchang	1.9	3
HRP037	Liuzhuang	1.4	3
HRP018	Lijing	1.4	3
HRP047	Zhanggang	1.3	3
HRP040	Xiaolizhuang	1.1	3
HRP007	Lüdianzi	0.9	3
HRP046	Xiaolizhuangbei	0.9	3
HRP049	Weizhuang	0.6	3
HRP009	Miaoxi	0.3	3
HRP015	Luzhong	0.3	3
HRP017	Kongxiaozhuang	0.3	3
HRP020	Chenying	0.3	3
HRP032	Shuaidong	0.3	3
HRP038	Jinzhuang	0.3	3
HRP041	Qianwanglou	0.3	3
HRP048	Zhangying	0.3	3
Total		71.7	

Note: Tier 1: site area > 10 ha; tier 2: site area = 2–10 ha; tier 3: site area < 2 ha

Table 5.5 Phase III–IV Settlement Area and Tier.

Site Number	Site Name	Area (ha)	Tier
HRP001	Huangtucheng	12.1	1
HRP024	Zhaozhuang	7.5	1
HRP054	Beiliuzhuang	2.9	2
HRP037	Liuzhuang	2.2	2
HRP049	Weizhuang	2.0	2
HRP031	Dawangzhuang	1.9	3
HRP011	Lügangtou	1.5	3
HRP044	Xiaozhongzi	1.5	3
HRP015	Luzhong	0.8	3

Site Number	Site Name	Area (ha)	Tier
HRP007	Lüdianzi	0.4	3
HRP003	Chenweizi	0.3	3
HRP018	Lijin	0.3	3
HRP023	Yangshulin	0.3	3
HRP034	Shizhuang	0.3	3
HRP038	Jinzhuang	0.3	3
HRP040	Xiaolizhuang	0.3	3
HRP045	Dazhongzi	0.3	3
HRP048	Zhangying	0.3	3
HRP053	Songwa	0.3	3
HRP067	Sunzhuangbei	0.3	3
HRP076	Liuzhaibei	0.3	3
Total		36.4	

Note: Tier 1: site area > 5 ha; tier 2: site area = 2–5 ha; tier 3: site area < 2 ha

Table 5.6 Phase IV Settlement Area and Tier.

Site Number	Site Name	Area (ha)	Tier
HRP001	Huangtucheng	18.8	1
HRP024	Zhaozhuang	16.3	1
HRP044	Xiaozhongzi	4.2	2
HRP013	Liuzhai	3.3	2
HRP031	Dawangzhuang	2.5	2
HRP054	Beiliuzhuang	2.5	2
HRP011	Lügangtou	2.2	2
HRP047	Zhanggang	1.7	3
HRP040	Xiaolizhuang	1.6	3
HRP018	Lijing	1.4	3
HRP037	Liuzhuang	1.3	3
HRP045	Dazhongzi	1.3	3
HRP049	Weizhuang	1.3	3
HRP030	Yuchang	1.0	3
HRP003	Chenweizi	0.9	3
HRP017	Kongxiaozhuang	0.9	3
HRP014	Qianlou	0.6	3
HRP015	Luzhong	0.5	3
HRP020	Chenying	0.3	3
HRP023	Yangshulin	0.3	3
HRP025	Kongyao	0.3	3
HRP027	Yinweizibei	0.3	3
HRP032	Shuaidong	0.3	3
HRP036	Chenzhuang	0.3	3
HRP041	Qianwanglou	0.3	3
HRP046	Xiaolizhuangbei	0.3	3
HRP048	Zhangying	0.3	3
HRP055	Liuying	0.3	3
HRP057	Gaozhuangxi	0.3	3

Site Number	Site Name	Area (ha)	Tier
HRP070	Huzhai	0.3	3
Total		65.6	

Note: Tier 1: site area > 10 ha; tier 2: site area = 2–10 ha; tier 3: site area < 2 ha

Table 5.7 Phase V Settlement Area and Tier.

Site Number	Site Name	Area (ha)	Tier
HRP001	Huangtucheng	30.1	1
HRP024	Zhaozhung	20.5	1
HRP044	Xiaozhongzi	4.9	2
HRP061	Balidong	4.8	2
HRP013	Liuzhai	4.6	2
HRP049	Weizhuang	3.9	2
HRP011	Lügangtou	3.6	2
HRP031	Dawangzhuang	3.2	2
HRP054	Beiliuzhuang	3.1	2
HRP055	Liuying	2.9	2
HRP002	Wulou	2.8	2
HRP045	Dazhongzi	2.4	2
HRP040	Xiaolizhuang	1.9	3
HRP053	Songwa	1.8	3
HRP030	Yuchang	1.5	3
HRP007	Lüdianzi	0.9	3
HRP018	Lijing	0.9	3
HRP038	Jinzhuang	0.8	3
HRP057	Gaozhuangxi	0.8	3
HRP059	Waliuzhuangnan	0.7	3
HRP067	Sunzhuangbei	0.7	3
HRP037	Liuzhuang	0.6	3
HRP005	Qianzhangweizi	0.5	3
HRP047	Zhanggang	0.5	3
HRP008	Hongtangmiaoxi	0.4	3
HRP003	Chenweizi	0.3	3
HRP004	Bali	0.3	3
HRP015	Luzhong	0.3	3
HRP025	Kongyao	0.3	3
HRP027	Yinweizibei	0.3	3
HRP028	Yinweizinan	0.3	3
HRP032	Shuaidong	0.3	3
HRP036	Chenzhuang	0.3	3
HRP042	Xulou	0.3	3
HRP046	Xiaolizhuangbei	0.3	3
HRP048	Zhangying	0.3	3
HRP058	Waliuzhuangbei	0.3	2
HRP062	Maweizi	0.3	3
HRP063	Liupozhai	0.3	3

Site Number	Site Name	Area (ha)	Tier
HRP066	Yinzhuang	0.3	3
HRP072	Liuzhuang	0.3	3
HRP073	Renzhuang	0.3	3
HRP076	Liuzhaibei	0.3	3
Total		103.4	

Note: Tier 1: site area > 10 ha; tier 2: site area= 2–10 ha; tier 3: site area < 2 ha

Table 5.8 Phase VI Settlement Area and Tier.

Site Number	Site Name	Area(ha)	Tier
HRP024	Zhaozhuang	10.3	1
HRP001	Huangtucheng	6.0	1
HRP004	Bali	2.6	2
HRP031	Dawangzhuang	1.8	2
HRP007	Lüdianzi	0.7	3
HRP045	Dazhongzi	0.5	3
HRP030	Yuchang	0.3	3
HRP037	Liuzhuang	0.3	3
HRP038	Jinzhuang	0.3	3
HRP040	Xiaolizhuang	0.3	3
HRP049	Weizhuang	0.3	3
HRP068	Dachaozhai	0.3	3
Total		23.7	

Note: Tier 1: site area > 5 ha; tier 2: site area = 1–5 ha; tier 3: site area < 1 ha

Table 5.9 Phase VII–VIII Settlement Area and Tier.

Site Number	Site Name	Area (ha)	Tier
HRP001	Huangtucheng	19.8	1
HRP030	Yuchang	1.8	2
HRP061	Balidong	1.4	2
HRP045	Dazhongzi	1.3	2
HRP013	Liuzhai	1.0	2
HRP044	Xiaozhongzi	0.9	3
HRP015	Luzhong	0.8	3
HRP024	Zhaozhuang	0.7	3
HRP028	Yinweizinan	0.5	3
HRP006	Jinan	0.5	3
HRP003	Chenweizi	0.3	3
HRP014	Qiaolou	0.3	3
HRP019	Zhaoying	0.3	3
HRP031	Dawangzhuang	0.3	3
HRP070	Huzhai	0.3	3
Total		30.2	

Note: Tier 1: site area > 5 ha; tier 2: site area= 1–5 ha; tier 3: site area < 1 ha

Table 5.10 Phase VIII–IX Settlement Area and Tier.

Site Number	Site Name	Area(ha)	Tier
HRP024	Zhaozhuang	23.7	1
HRP001	Huangtucheng	17.5	1
HRP054	Beiliuzhuang	6.0	2
HRP044	Xiaozhongzi	4.8	2
HRP045	Dazhongzi	4.8	2
HRP002	Wulou	4.6	2
HRP011	Lügangtou	4.5	2
HRP055	Liuying	4.4	2
HRP061	Balidong	4.4	2
HRP013	Liuzhai	4.2	2
HRP060	Yangwafang	2.2	2
HRP040	Xiaolizhuang	1.9	3
HRP003	Chenweizi	1.6	3
HRP049	Weizhuang	1.6	3
HRP037	Liuzhuang	1.5	3
HRP023	Yangshulin	1.3	3
HRP047	Zhanggang	1.3	3
HRP038	Jinzhuang	1.2	3
HRP005	Qianzhangweizi	1.1	3
HRP046	Xiaolizhuangbei	1.1	3
HRP036	Chenzhuang	0.9	3
HRP004	Bali	0.8	3
HRP030	Yuchang	0.8	3
HRP075	Xueyingdong	0.8	3
HRP007	Lüdianzi	0.7	3
HRP031	Dawangzhuang	0.7	3
HRP032	Shuaidong	0.5	3
HRP041	Qianwanglou	0.5	3
HRP018	Lijing	0.3	3
HRP020	Chenying	0.3	3
HRP026	Sunzhuang	0.3	3
HRP035	Wangliuzhuang	0.3	3
HRP042	Xulou	0.3	3
HRP048	Zhangying	0.3	3
HRP056	Gaozhuangnan	0.3	3
HRP068	Dachaozhai	0.3	3
HRP072	Liuzhuang	0.3	3
Total		102.1	

Note: Tier 1: site area > 10 ha; tier 2: site area= 2–10 ha; tier 3: site area < 2 ha

Table 5.11 Phase X–XI Settlement Area and Tier.

Site Number	Site Name	Area(ha)	Tier
HRP024	Zhaozhuang	2.4	1
HRP001	Huangtucheng	2.0	1
HRP045	Dazhongzi	1.7	1
HRP054	Beiliuzhuang	1.5	1
HRP037	Liuzhuang	1.0	1
HRP030	Yuchang	0.9	2
HRP036	Chenzhuang	0.8	2
HRP040	Xiaolizhuang	0.7	2
HRP011	Lügangtou	0.6	2
HRP041	Qianwanglou	0.5	2
HRP055	Liuying	0.5	2
HRP019	Zhaoying	0.4	2
HRP048	Zhangying	0.4	2
HRP002	Wulou	0.3	2
HRP003	Chenweizi	0.3	2
HRP004	Bali	0.3	2
HRP006	Jinan	0.3	2
HRP013	Liuzhai	0.3	2
HRP023	Yangshulin	0.3	2
HRP026	Sunzhuang	0.3	2
HRP029	Fengzhuang	0.3	2
HRP032	Shuaidong	0.3	2
HRP035	Wangliuzhuang	0.3	2
HRP044	Xiaozhongzi	0.3	2
HRP047	Zhanggang	0.3	2
HRP061	Balidong	0.3	2
HRP069	Liulou	0.3	2
Total		17.2	

Note: Tier 1: site area > 1 ha; tier 2: site area < 1 ha

Table 5.12 Phase XII Settlement Area and Tier.

Site number	Site Name	Area(ha)	Tier
HRP001	Huangtucheng	26.4	1
HRP024	Zhaozhuang	11.1	1
HRP053	Songwa	9.1	2
HRP060	Yangwafang	6.7	2
HRP055	Liuying	4.9	2
HRP049	Weizhuang	4.5	2
HRP013	Liuzhai	4.3	2
HRP050	Chenxiaozhuang	4.3	2
HRP011	Lügangtou	3.5	2
HRP026	Sunzhuang	2.8	2
HRP009	Miaoxi	1.0	3

Site number	Site Name	Area(ha)	Tier
HRP054	Beiliuzhuang	1.0	3
HRP044	Xiaozhongzi	0.9	3
HRP045	Dazhongzi	0.9	3
HRP057	Gaozhuangxi	0.9	3
HRP075	Xueyingdong	0.7	3
HRP056	Gaozhuangnan	0.6	3
HRP008	Hongtangmiaoxi	0.4	3
HRP005	Qianzhangweizi	0.3	3
HRP012	Yaozhuang	0.3	3
HRP014	Qianlou	0.3	3
HRP015	Luzhong	0.3	3
HRP016	Zhanglouyaochang	0.3	3
HRP021	Dongzhuang	0.3	3
HRP022	Yangzhong	0.3	3
HRP025	Kongyao	0.3	3
HRP028	Yinweizinan	0.3	3
HRP029	Fengzhuang	0.3	3
HRP030	Yuchang	0.3	3
HRP032	Shuaidong	0.3	3
HRP033	Shuaidongnan	0.3	3
HRP036	Chenzhuang	0.3	3
HRP037	Liuzhuang	0.3	3
HRP039	Luciyuan	0.3	3
HRP047	Zhanggang	0.3	3
HRP051	Xueying	0.3	3
HRP052	Gaodazhai	0.3	3
HRP061	Balidong	0.3	3
HRP063	Liupozhai	0.3	3
HRP064	Liupozhaixi	0.3	3
HRP065	Wangxinzhuang	0.3	3
HRP066	Yinzhuang	0.3	3
HRP071	Tongzhuang	0.3	3
HRP072	Liuzhuang	0.3	3
HRP073	Renzhuang	0.3	3
HRP074	Chenxiaozhuangbei	0.3	3
Total		91.1	

Note: Tier 1: site area > 10ha; tier 2: 2 ha < site area < 10 ha; tier 3: site area < 2 ha

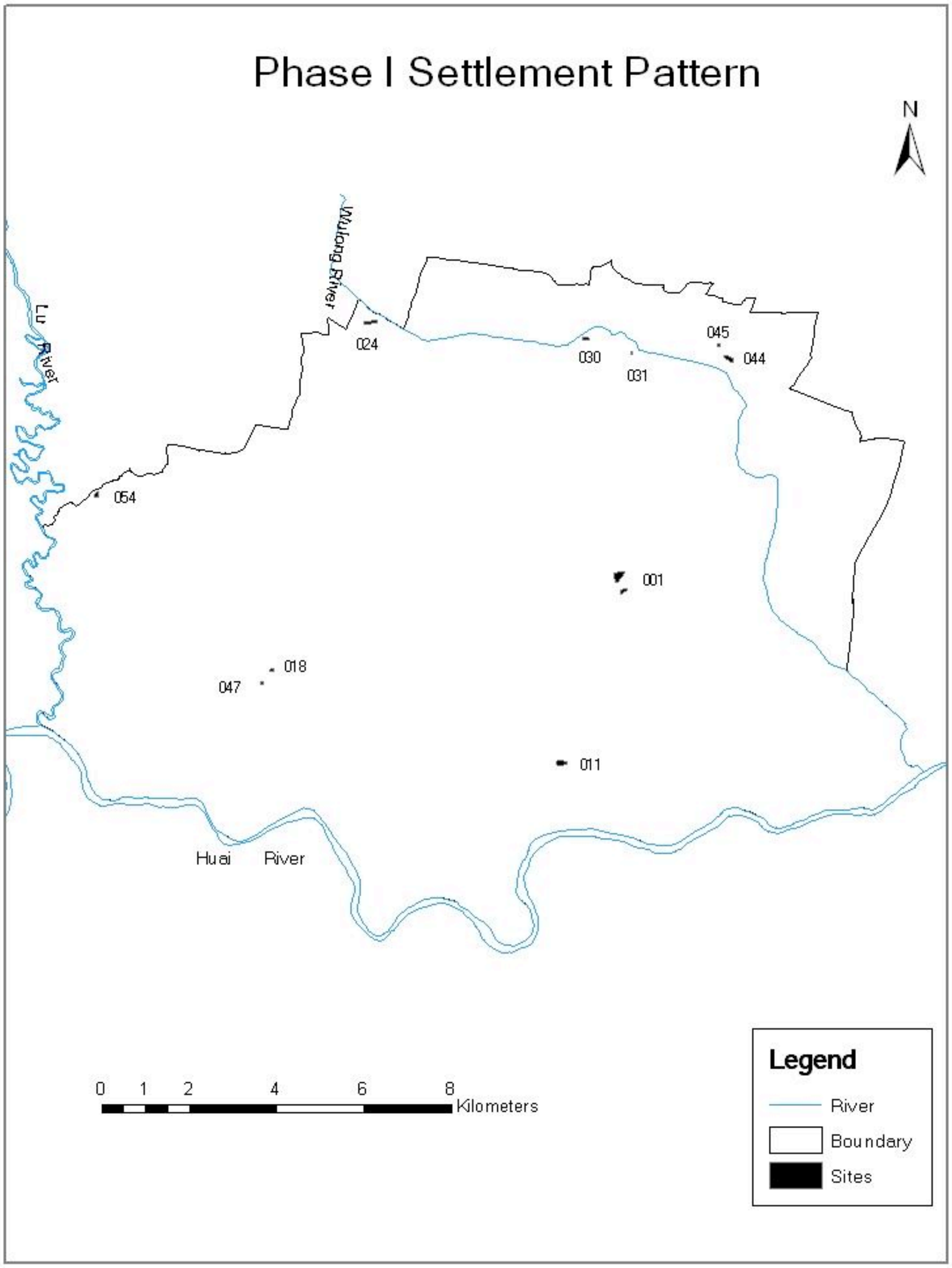


Figure 5.1 Phase I settlement pattern in the Huangtucheng area.

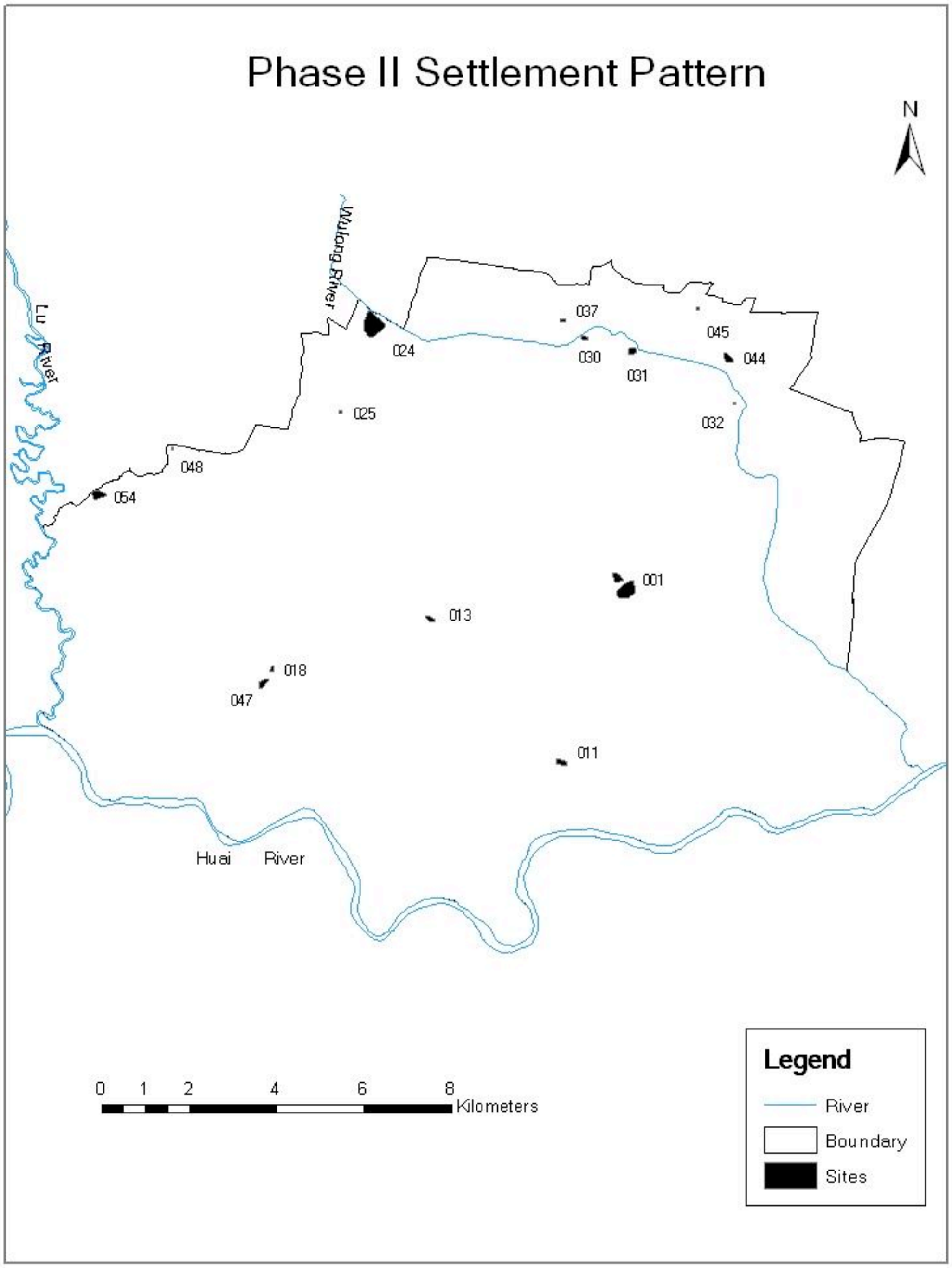


Figure 5.2 Phase II settlement pattern in the Huangtucheng area.

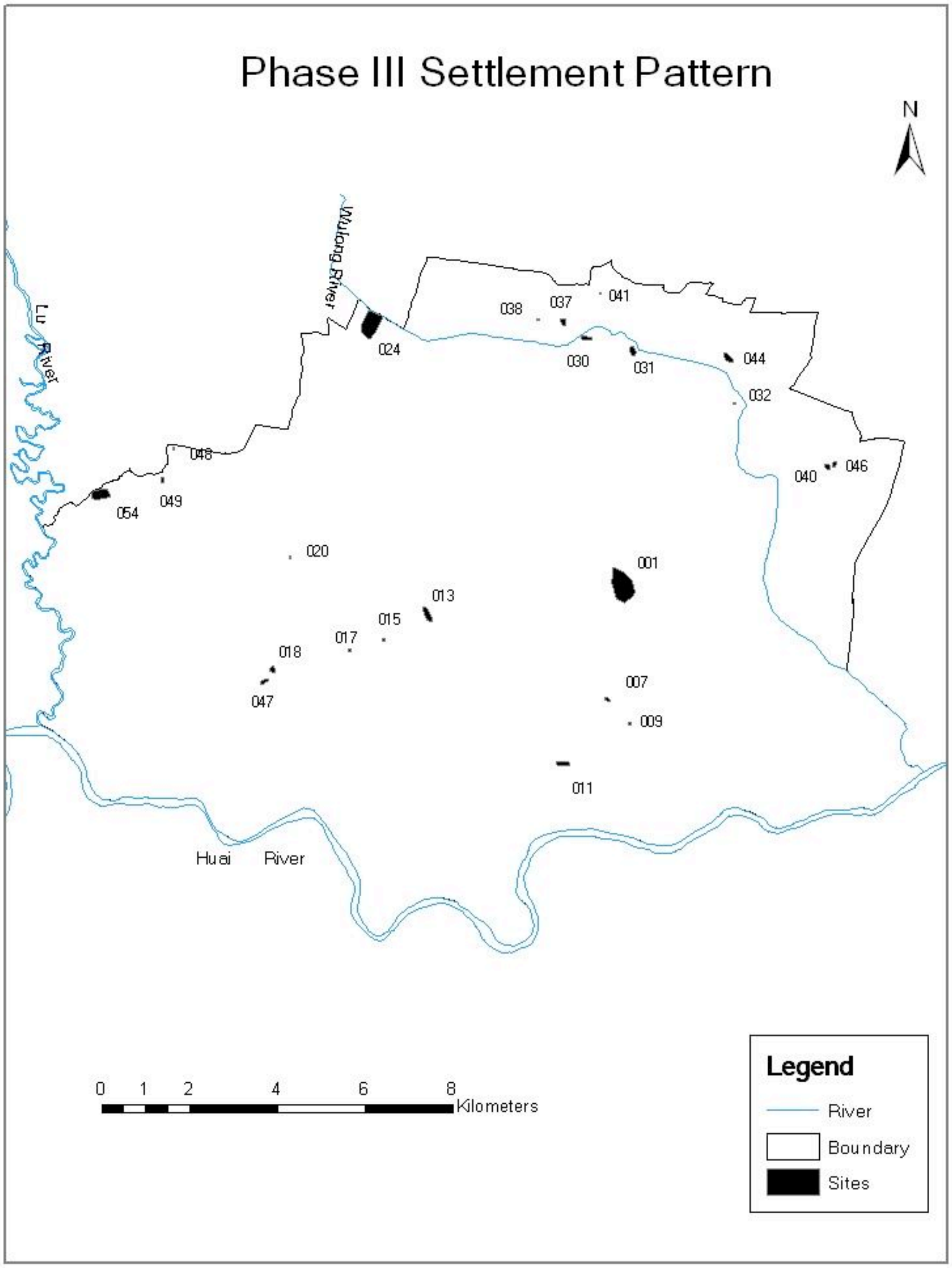


Figure 5.3 Phase III settlement pattern in the Huangtucheng area.

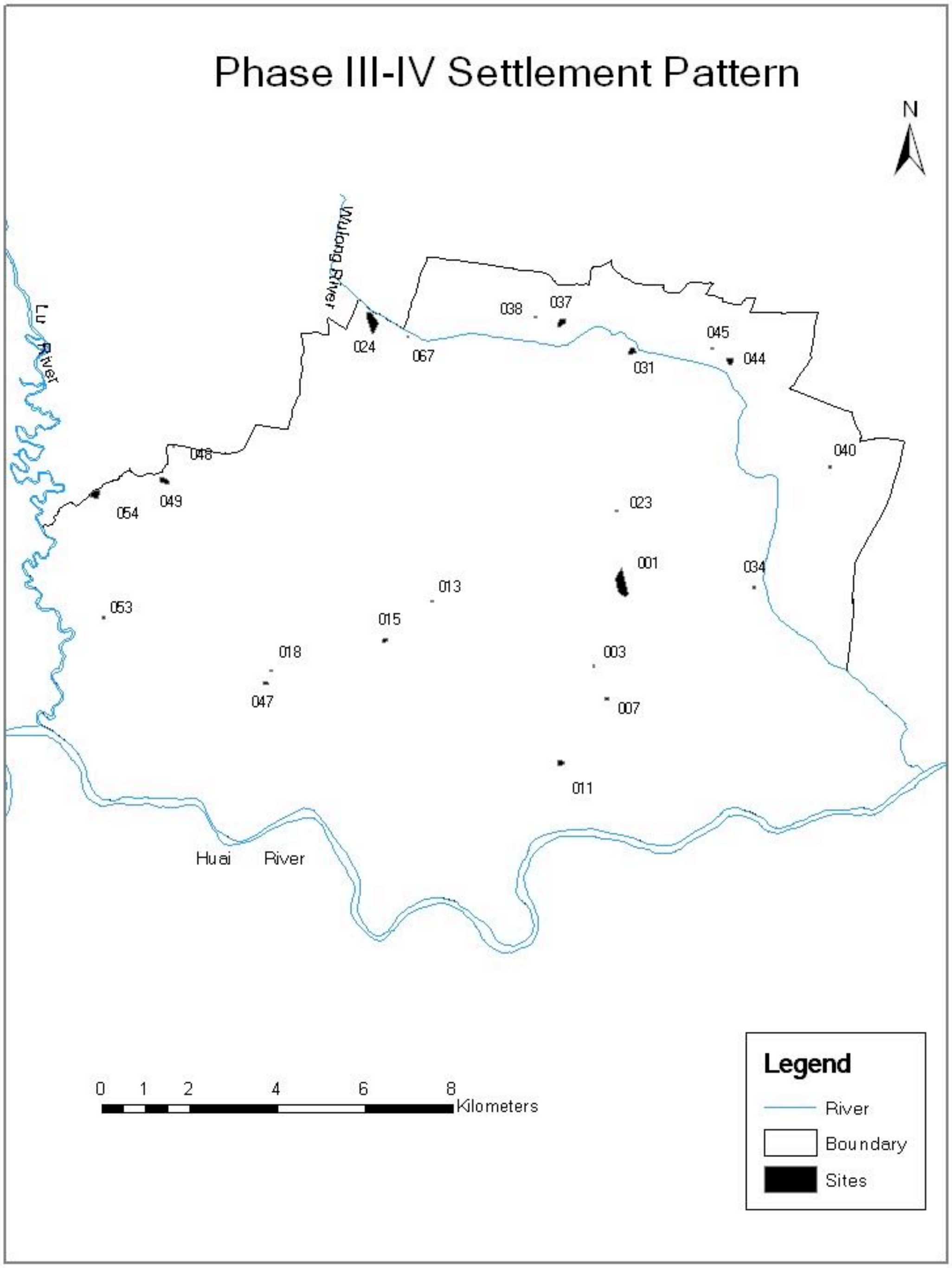


Figure 5.4 Phase III–IV settlement pattern in the Huangtucheng area.

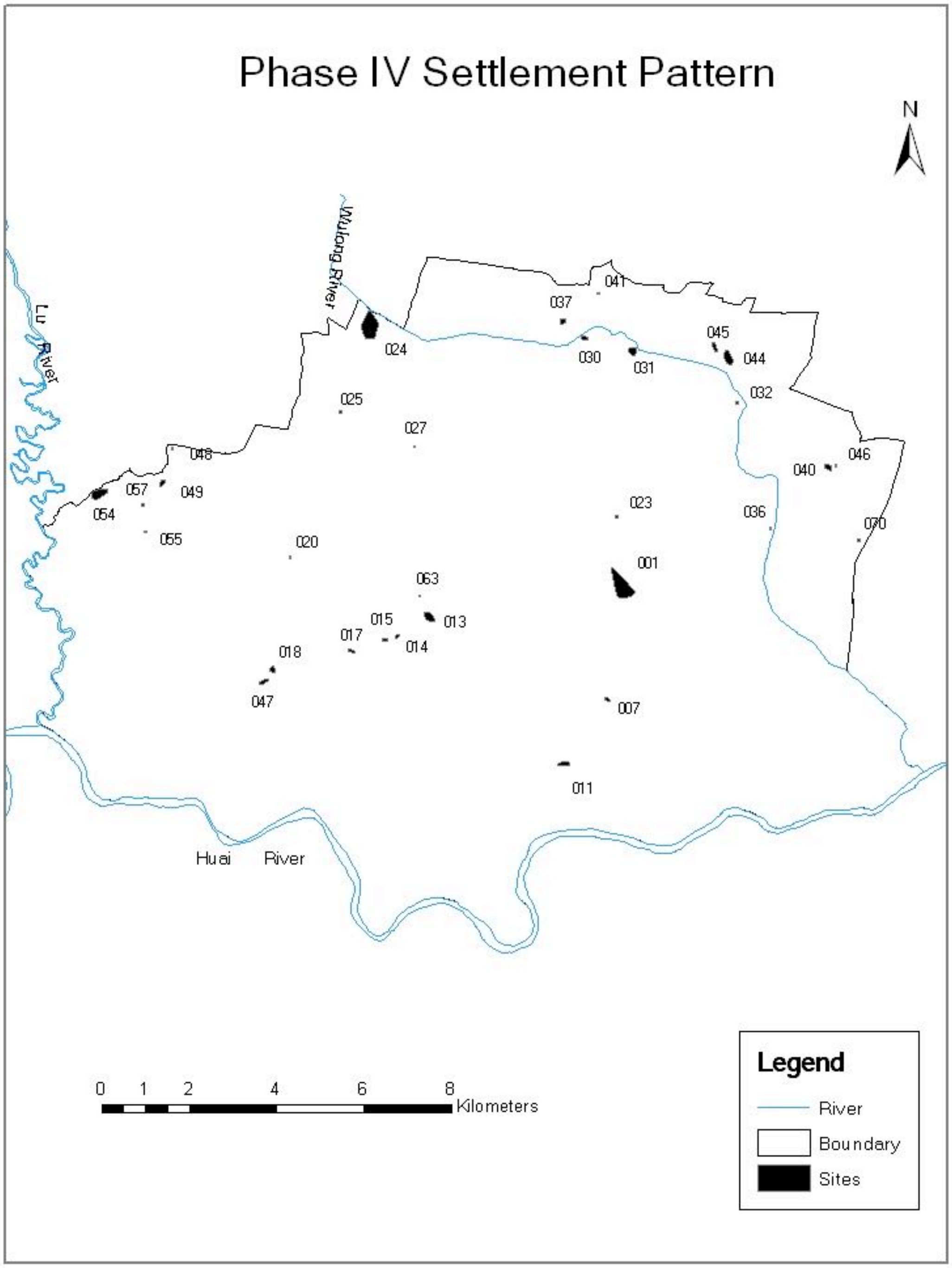


Figure 5.5 Phase IV settlement pattern in the Huangtucheng area.

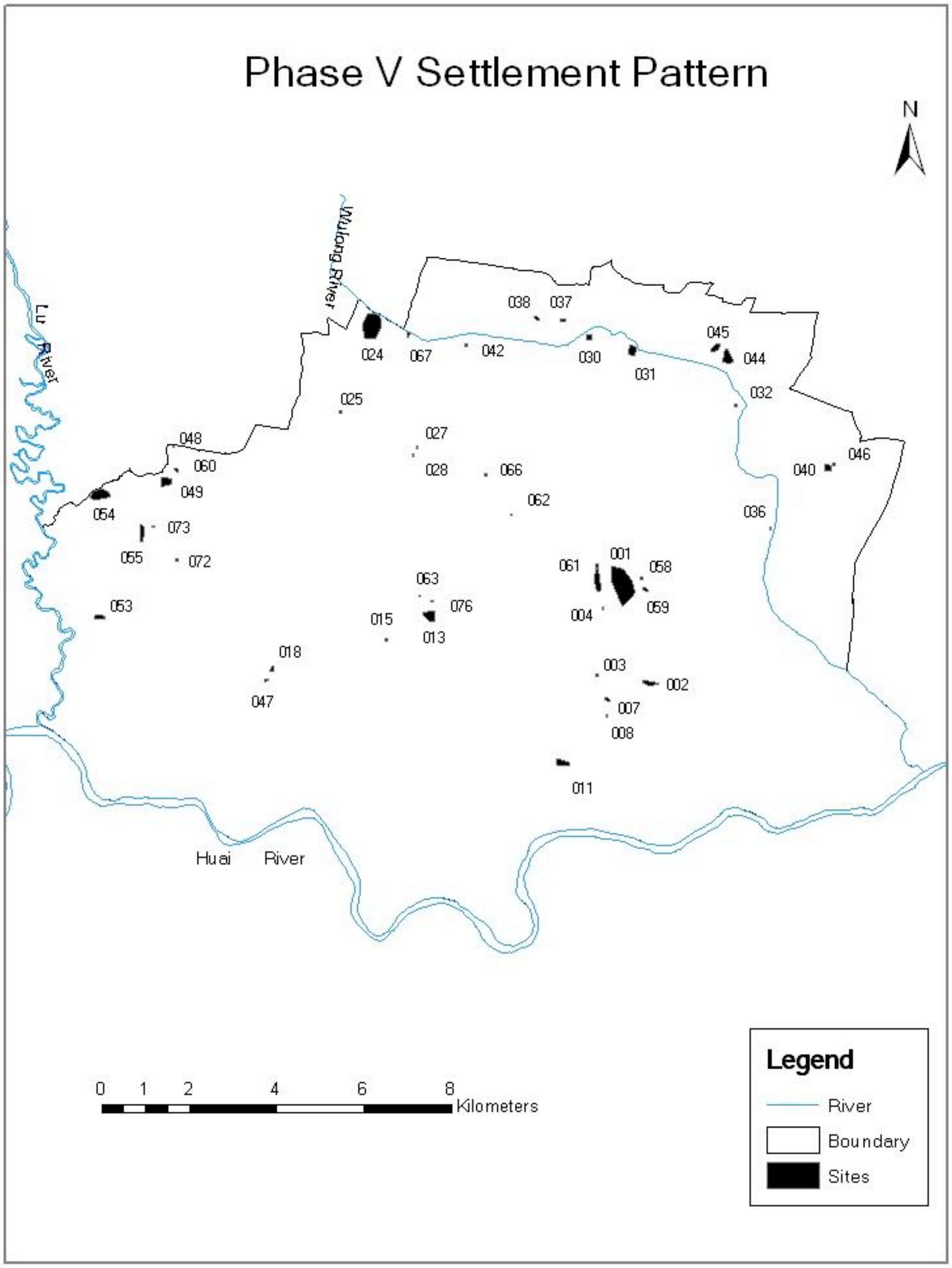


Figure 5.6 Phase V settlement pattern in the Huangtucheng area.

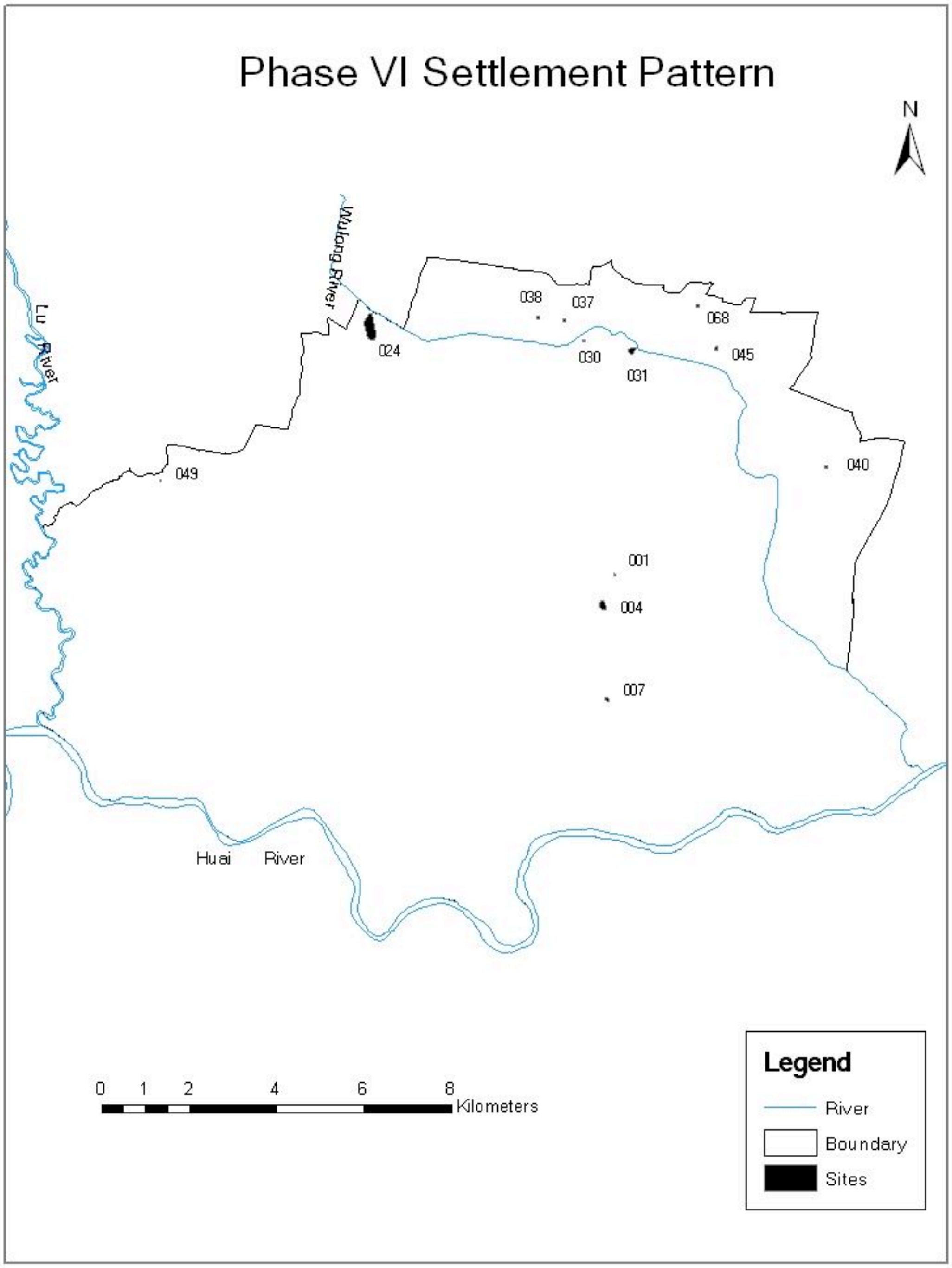


Figure 5.7 Phase VI settlement pattern in the Huangtucheng area.

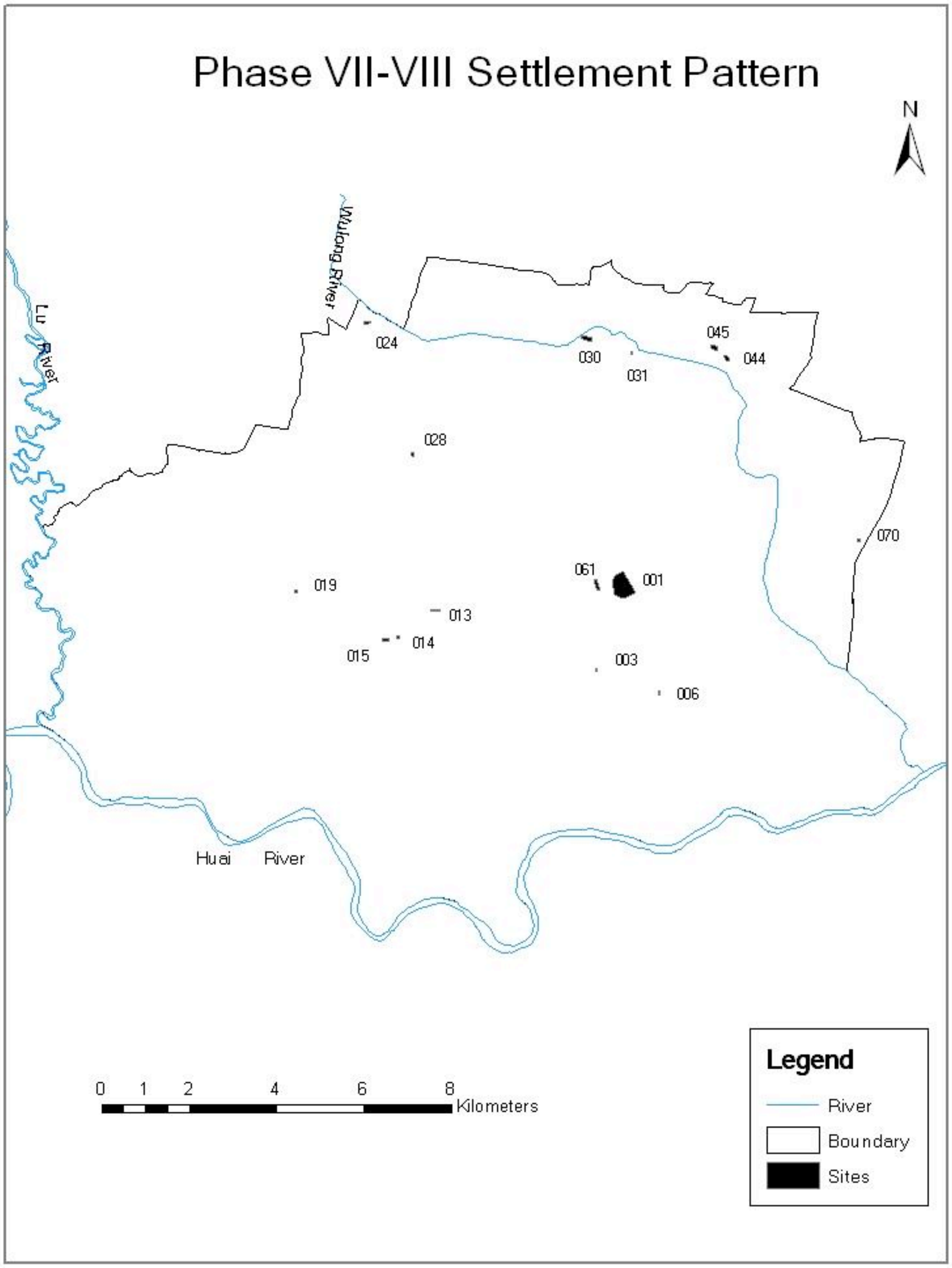


Figure 5.8 Phase VII–VIII settlement pattern in the Huangtucheng area.

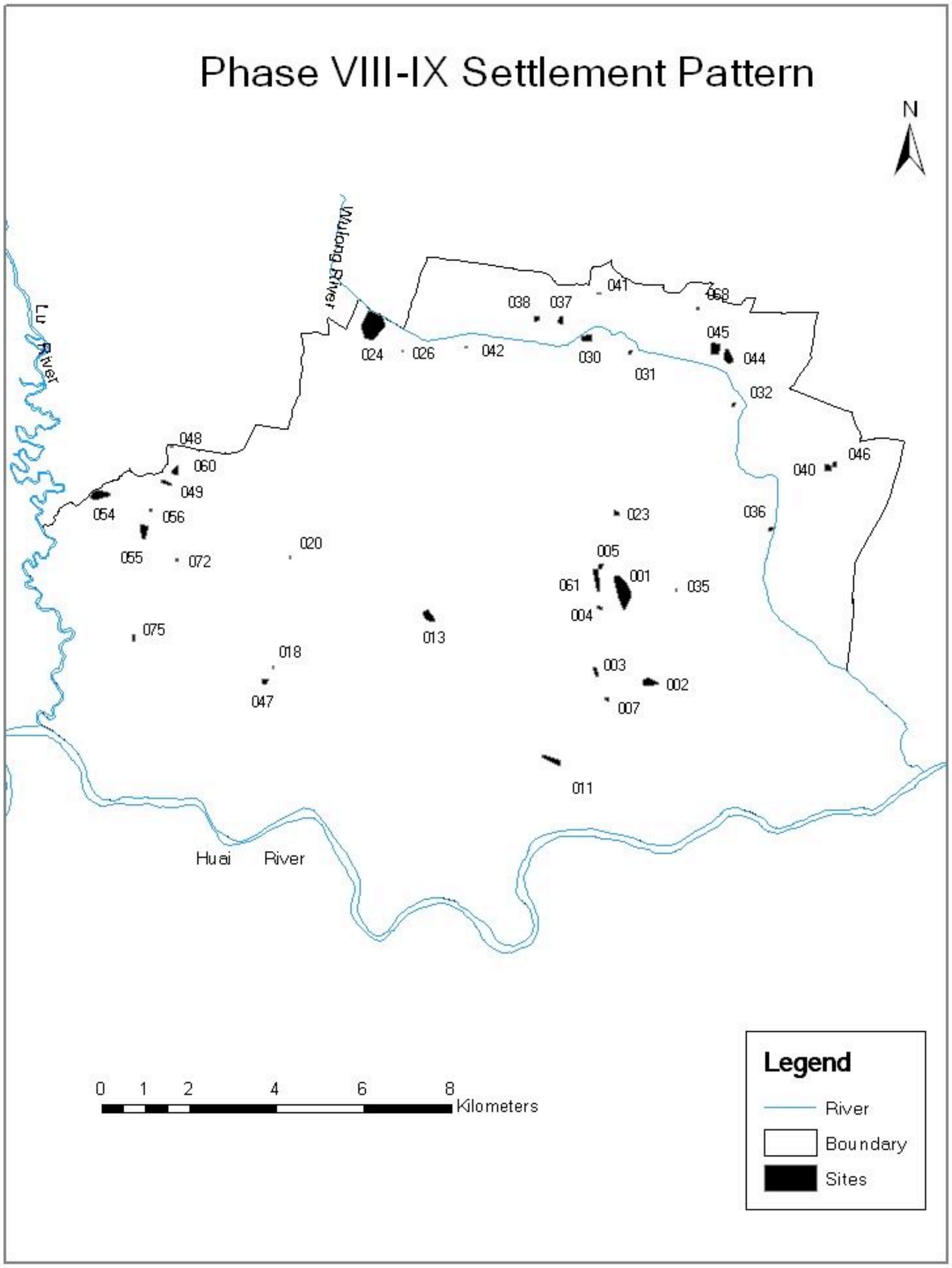


Figure 5.9 Phase VIII–IX settlement pattern in the Huangtucheng area.

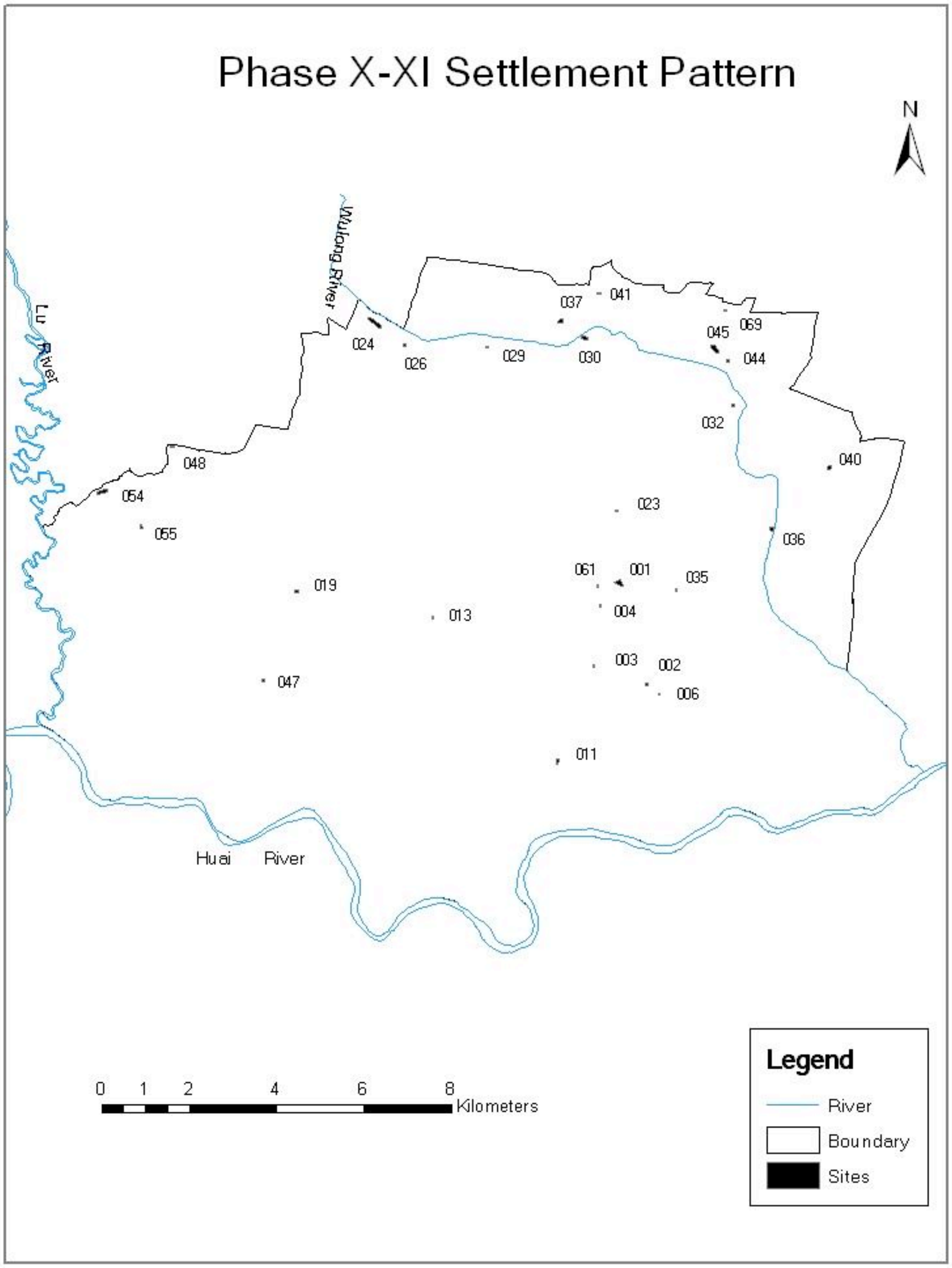


Figure 5.10 Phase X–XI settlement pattern in the Huangtucheng area.

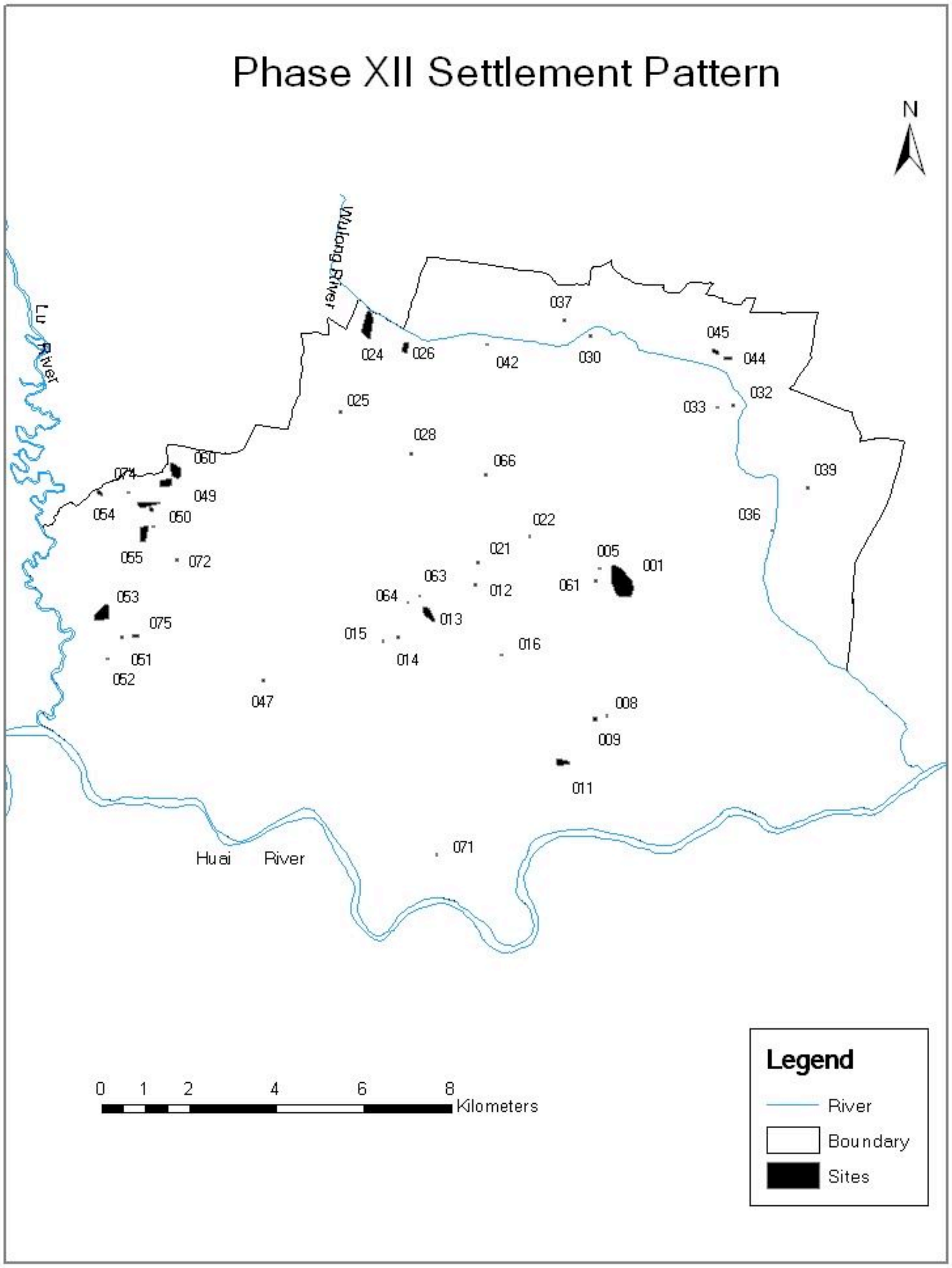


Figure 5.11 Phase XII settlement pattern in the Huangtucheng area.

CHAPTER 6

CONTINUITY AND CHANGES

The previous chapter 5 was an empirical, descriptive account of the Huangtucheng area. The Huangtucheng survey has produced settlement patterns for periods from the Yangshao to the late historical periods, or from 5000 B.C. to modern times. It shows both continuities and shifts in settlement patterns over 7000 years. In this chapter, I go a bit further in the direction of behavioral interpretation, recognizing that there are certain assumptions that I make that are not always as empirically grounded.

In this chapter, I focus on settlement systems inferred from data on settlement patterns. In the Huangtucheng area, settlements are categorized in tiers. These tiers formed a 2-level and 3-level settlement hierarchy in different time periods. Settlement hierarchy is one basis for discussing settlement functions. Settlements of the lowest tier are small villages or hamlets. The highest tier of settlements or the largest settlements are central places for this region, such as Huangtucheng and Zhaozhuang. I infer these central places as regional centers for the Huangtucheng area, providing political control of this area and service to the subordinate settlements. These regional centers have better quality of ceramics and usually surrounded by the second tier of settlements and the third tier of outlying settlements. Regional centers, like Huangtucheng have more population and better access to prestige goods.

A community as I define it here is a group of settlements, comprised of the second tier settlements and their outlying smaller settlements, in this case, the third tier settlements. In Chapter 5, I identified local clusters of settlements. Here I propose that these could be communities. In this chapter, I will be using some historical records and recent analyses about systems of central places and villages.

In the Huangtucheng area, small sedentary villages first appeared in this alluvial plain at around 5000 B.C., mainly along river terraces and watercourses. Site area and density increased during the Middle Yangshao period, and included large settlements as central places. In the Late Yangshao period, site counts and areas reached an unprecedented level. The Longshan period witnessed tremendous changes in settlement pattern and site density climaxed. In the transitional period from the Late Neolithic to the beginning of the Bronze Age, population and settlement densities were dramatically reduced. Site counts and densities did not regain their Neolithic maxima until the Late Shang and Western Zhou dynasty. Along with the changes in settlement patterns, preferred site locations also changed. In the Han dynasty, site density reached its highest levels, almost matching modern patterns.

6.1. Population Estimation

Population estimates are one of the most important and productive results of full-coverage archaeological surveys. Surveys in the Teotihuacán Valley revealed details of population change from the Formative through the Postclassic periods (Sanders, Parsons, and Santley 1979). Similar surveys in the Oaxaca Valley show population change for all periods; data provide important regional-scale evidence for the rise of the central site of Monte Albán in about 500 B.C. (Kowalewski et al. 1989).

Since the earliest survey projects in Mesopotamia and Mesoamerica, several approaches have been developed to estimate prehistoric populations (e.g., Adams 1965; Sanders, Parsons and Santley 1979; Blanton et al. 1982). These approaches are mainly based on variables such as residential architecture counts, settlement area, ceramic density, etc. There are relatively straightforward techniques for calculating population estimates across broad areas. However, since archaeologists cannot assume that the population has been stable for each archaeological period, the precision of the estimate depends on refined chronologies and other regional data.

To improve the accuracy of population estimates based on a count of settlements, Dewar (1991) proposed a model for assessing population for any part of the period. This method has been widely used in Mesopotamia, which has a long history of regional survey and a detailed chronology. Although it produces lower population estimates, the population counts are comparable for sub-regions across southern Mesopotamia, as Pollock (2001) and Wright (2001) have demonstrated.

Population indices are usually derived from well-excavated house data. Chinese archaeologists commonly use a count of households multiplied by an estimated per-house population count to get a rough idea of the resident population for an area. Empirically, such an estimate should be considered a minimum. Because it is derived from a very small sample, it does not constitute a total population, and therefore is not helpful for comparative analysis. Here is an example of this estimation method, made by Liu (2004:98) for Yuchisi in the Late Dawenkou period (2800–2500 B.C.). They excavated 41 rooms and estimated 4–6 people per room, getting an estimate of 160–240 for these residences. These 41 rooms are within a moat that encircles an area of about 5 ha. Thus, the calculated population is from160/5 ha to 240/5 ha, for a density of 32–48 persons/ha.

A few attempts to estimate populations at the regional scale have been made (e.g., CICARP 2003). The Chifeng project used well-excavated house data from Jiangzhai, Shaanxi Province, and applied the density of Jiangzhai occupation in the Yangshao period into the Chifeng area (CICARP 2003:162). They counted 63 small residences and five large structures in a Jiangzhai phase I (4840–4085 B.C.) residential zone within the moat (excluding the open plaza). Thus, the population is equal to 63 residences multiplied by 3–5 persons per residence, and totals 189–315 people. Counting the five large structures as residential, the population equals 68 residences multiplied by 3–5 persons per residence, and totals 201–340 people. Thus, the Jiangzhai phase I population was 189–340 people. Based on this range, population density would be 189–340 divided by 1.2 ha, or 158–283 persons per ha.

Obviously, there are huge differences on the population density in these two examples. Liu calculates the entire site area for the population density of Yuchisi, including any possible open plazas and other areas inside the moat. The Chifeng researchers only count the residential zone inside the Jiangzhai site. If we apply these two methods to the Huangtucheng area, it will produce quite different population estimates (Table 6.1).

For the Huangtucheng data, given the lack of excavation data to show room area and residential layouts, I use these two estimation methods: 1) based on Chinese excavation data, I assume house/habitation room densities at 10–20 rooms per hectare, and I assume five persons per room; and 2) from modern occupation in the Huangtucheng area, densities vary from 25 to 75 people per hectare (or dmax to dmin in Table 6.1). Final calculations for all periods are shown in Table 6.1. Thus, population increased tremendously in the Late Longshan period, to 5170–10,340 using the Chifeng method or to 2585–7755 using the Yuchisi method. Comparing these results to population density used in Liu's estimation of Yuchisi and the Chifeng project, my assumptions yield estimates that are in the middle range. If population density was high as 158–283 people/ ha in the Huangtucheng area, the population would have reached to over 10,000 people in the Late Yangshao period.

The assumption of 10–20 rooms per hectare is neither at the high nor the low extreme, and it is reasonable to use this index until better data are available. Thus I estimate that there was a population of 710–1420 people in the Early Yangshao period. These people lived in large villages and small hamlets. Population tripled in the Middle Yangshao period, reaching to around 2490–4980 people. Regional centers such as Huangtucheng might have one third of the entire population. This demographic trend continued and reached to a climax in the Late Yangshao period, the number of people living in the Huangtucheng area was around 3585–7170 people. Overall population in the Huangtucheng area decreased in the Early Longshan period. This slight decrease might be associated with sociopolitical changes in this area. Population reached to the peak in the Late Longshan period, the high end of population exceeded 10,000 people. At the transition to the Bronze Age, population decreased tremendously. And population density did not climb back to the Late Longshan level until the Late Shang and Western Zhou period.

These population estimates must be considered preliminary, and only provide an idea of relative change over time. The periods used in this analysis are rather long and vary in duration. I do not assume that population change was stable or unvaried during a millennium. A refined chronology will help improve population estimation, as would a more sophisticated model of population estimation.

6.2. Continuity

Major sites cluster along watercourses. Some were continuously occupied for the entire prehistoric and historical periods, even to the present. For instance, large sites such as Huangtucheng and Zhaozhuang have been occupied since the earliest time period until today. Some smaller sites situated on river terraces, such as HRP054, were also continuously occupied for most periods. Continuous use of a settlement suggests that ancient and modern peoples were making the same choices regarding proximity to agricultural resources and access to trade/transportation networks. The river-edge lands have agriculturally-rich soils and dependable water resources, allowing people to continue to practice sustainable agriculture since the Neolithic.

Settlements in the Huangtucheng area tend to be occupied during multiple periods, so that occupation was continuous for many generations; new sites tended to be established near these long-occupied settlements. Areas along large rivers such as the Wulong and the Lü and its tributary, site counts varied over time, but the areas were never totally abandoned. For example, along the Wulong four sedentary small villages (Zhaozhuang HRP024, Yuchang HRP030, Dawangzhuang HRP031 and Xiaozhongzi HRP044) appeared in the Early Yangshao period, and all four remained occupied into the Middle Yangshao period (Table 6.2). In fact, these sites retained settlement during the entire Neolithic. Only one or two sites were abandoned with populations shifting to neighboring areas beginning with the Shang dynasty. Most sites steadily increased in area over time, becoming larger communities after being established as small farming villages.

This tendency toward growth is especially pronounced among large settlements. These sites have more components than do the others, are always situated close to rivers, and near regional centers. Table 6.3 shows sites with more than six components ordered by decreasing maximum area; the number “12” signifies settlement in all of the 17 phases evaluated here. A few of the small sites were also along rivers, and their small size likely is partly due to modern disturbance.

Another way to describe this continuity is that site locations were stable through time. Although settlements expand in area and increase in density, the majority of sites remain near watercourses. Table 6.3 shows that all the large sites are located within 500 m of rivers or streams. In the Early Yangshao period, all sites are along rivers, especially large rivers and their tributaries. The percentage of sites within 2 km of rivers is high during the entire Neolithic. It drops a bit during the Late Shang and Western Zhou dynasty, when some settlements were established in higher-elevation non-riverine areas. After that, until the Han dynasty, many of the settlements were near watercourses.

The distance to large centers and their central functions was probably an important factor in choosing settlement location. The first and second tiers of sites, referred to, respectively, as regional centers and community centers (larger than 2 ha) occupied for multiple phases, are usually strategically chosen. Their distances from the nearest large, regional center—Huangtucheng or Zhaozhuang—range from 0.5–9 km (Table 6.3). The average distance is about 5 km, which means a round-trip could be made in the span of a single day. In the present Huangtucheng area, towns vary from 6–8 km apart. Markets in these towns are open on alternative days. Villagers in modern Maji sometimes go to Luji for marketing when the Maji market is closed, a walking distance of at least 5 km one way.

Generally, the Huangtucheng area is less densely occupied than neighboring areas in the upper and middle Huai River, Yangtze River and Yellow River regions. A reconnaissance survey in Zhijiang County, Hubei, about 400 km southwest of this survey area, found about 40 sites across 1310.4 km^2 (Zhang 2001:47). Of course, full-coverage survey in that area would likely reveal even more sites. In this area, reconnaissance survey found fewer than ten Neolithic sites across the whole of Huaibin County (1192 km^2). Even modern settlement density is much lower than on the south side of the Huai River and in Anhui province to the east. I suspect this lower density and sparser distribution has its roots in prehistory. We only identified ten sites dating to the Early Yangshao period, which lasted for a millennium, and their total occupation area (14.2 ha) is less than 7% of the total survey area.

During various periods, settlement spread and then contracted across the survey area. In general, sites do grow in area and count through time, and tend to be clustered. The clustered pattern formed in the Late Longshan period and consolidated in the early historical periods, such as the Late Shang and Western Zhou dynasty and the Han. The clusters with continuity were in the northern, middle, eastern, and western parts of the survey area. We found no identifiable pre-Han artifacts within 2–3 km north of the modern Huai River. The earliest remains in that area date to the Han dynasty. This area is now covered by flood deposits. The Huai River has a narrow channel with a large volume of water; during the summer floods, the water is much higher and spreads across a large area. Thus, earlier remains may be buried under flood deposits. Geomorphologic studies are needed to investigate this hypothesis.

Residence styles of the Huangtucheng area have been constant. The survey area is comparatively flat, and the water table is high, mostly 1–1.5 m below the surface. With frequent rains and river flooding, houses could be easily flooded, too. Over time, people have developed the *yanjushi* residential pattern, in which a group of residences are surrounded by artificial waterways, to deal with these conditions. Most modern villages employ the *yanjushi* pattern by first excavating ditches surrounding a flat area, piling the sediments in the center, and then building structures on this high ground. This layout has two major advantages: 1) water is convenient, and, 2) the ditches help control flooding and provide good defenses. We have no excavation data on pre-Han households from this area, so we do not know when this pattern was developed or introduced. However, both the layout of Huangtucheng and some Han residences suggest the *yanjushi* pattern was practiced in this area for millennia. Excavations at Qujialing culture sites show a similar pattern (He 1996), which support our hypothesis of the antiquity of this pattern. Only in the last half century, with the tremendous modern population growth, have people begun abandoning this residence pattern.

This area also displays significant ceramic continuity. Small-scale excavations at the Lishangwan and Leitaizi sites in the upper Huai River region indicate strong regional pottery styles (HPICRA and Xinyang Cultural and Archaeological Institute 2000, 2003). Regional styles are evident in the tempers, decorations, and vessel types/styles in the ceramic assemblages. For instance, in Lishangwan phase I, ceramically dated to the Late Yangshao and Early Qujialing periods, inclusions such as organic materials (grass or grass ashes), mica and sand are usually added into the paste. Most sherds are plain red pottery, with a few polychrome vessels. The ceramic assemblage has some vessels typical of the Jianghan Plains, such as tripod cooking vessels, footed vessels, pedestal serving-stands like *dou*, and spindle whorls with cross-like decorations. Some of the vessels typical of Early Qujialing assemblages from the Jianghan Plains, including *gui* tripod drinking vessels, cups, and polychrome bowls, are not found here. It is still unclear what the complete assemblage is from the upper Huai region since there has been so little excavation.

In sum, settlement patterns are continuous and stable in this area, in five principal ways. Most sites are continuously occupied. Preferred site locations are relatively consistent, clustered along the banks of major rivers and small streams, near water and rich agricultural soils. Although settlements gradually expand over time and experienced sharp transitions and abandonments, settlement density remained relatively low across the survey area. Sites dot the survey area. Furthermore, the pattern of residences surrounded by water (ditches or natural waterways), was a popular layout for a long time. The final aspect is the continuity of regional ceramic styles, which absorb elements and styles from neighboring areas. The Huangtucheng area has participated in trade networks and been influenced by nearby regions from the Early Yangshao period onward. Its local characteristics reflect its particular geographic location.

6.3 Changes over Time

Along with continuity of settlement patterns, the Huangtucheng area has also witnessed changes over time. Through time, settlements expanded, sharply transformed and consolidated at different periods, leading to the patterns we see today. These transitions and changes reflect sociopolitical and economic shifts in this area and provide important information on issues such as human-environmental relationships, social development and complexity.

Changes in settlement patterns are evident in site counts and densities, site distributions, artifact densities and distributions, and shifts in locational preferences. In general, site counts increased gradually from the onset of human occupation in this area, to climax at the end of the Neolithic. At the beginning of the Bronze Age is a sharp transition, which may be due to insufficient data on the Erlitou period, or may signal dramatic changes. The artifact collections show considerable variation through time, suggesting differential artifact distributions related to production and information exchange.

The most dramatic changes in site count and density occurred five times: the Late Yangshao, the Late Longshan, the Erlitou, the Late Shang and Western Zhou, and the Han periods. From the egalitarian, small farming villages in the Early Yangshao, settlements have steadily increased in count and density. In the Middle Yangshao, large communities formed, although their internal organization is unclear. In the Late Yangshao, large regional centers were formed and the settlement hierarchy suggests they began controlling resources and decision-making of nearby, smaller communities. At the end of the Neolithic in the Late Longshan period, spatially clustered settlements became more common. Site hierarchies became more apparent, with large regional centers, large community centers and small outlying villages forming the three levels of administrative units. Sites clustered in different parts of the survey area, except in flood-prone areas in the south. In the Erlitou period, site counts and density decreased dramatically. Large regional centers declined and were abandoned, and people retreated to reside on only a few river terraces. I suspect that the decrease of settlements is linked to population decrease and sudden sociopolitical change. At that time, the powerful Erlitou state developed in central Henan province, about 350 km distant. The Huangtucheng area was at the border of this state's territory, and it must have been greatly impacted by its powerful political economy. Researchers propose that in the Zhumadian area of the upper Huai region land capacity could not meet subsistence demands due to ecological shifts, causing the low density settlement pattern in the Late Erlitou and Early Shang periods (Peking University and Zhumadian Municipal Office for the Preservation of Ancient Monuments 1998:210). In the Shang dynasty, site density and counts slowly recovered, reaching new highs across unoccupied area. The survey area had been under the control of a small polity or split among several small polities, but from this period on the dominant central place may lie outside the study area. The role of Huangtucheng as the leading central place changed, although it remained a large settlement and prominent center. Regional centers dominating the survey area probably shifted to nearby state capitals, possibly Qisi city, the capital of the Jiang state. Population steadily increased in the Han dynasty, with its stable sociopolitical circumstances, and small and large communities were established across the survey area, including the flood-prone area to the south where we found no artifacts from earlier periods.

With regard to settlement patterns, I have discussed how low populations and settlement counts were across this area relative to the middle Yangtze and Yellow River region and other areas in the Huai River region. Across the Huangtucheng area, however, there were changes in distributions (Table 6.4; Figure 6.1).

I use nearest neighbor analysis to describe the distribution of settlement pattern in the Huangtucheng area. Nearest neighbor analysis is a distance-based analysis of a point pattern. It examines the distances between each point and calculates the distance from one point to its nearest neighbor (Clark and Evans 1954). These distances are compared to the expected values for a random selection of points to check if it is a complete random spatial pattern. If the mean nearest neighbor distance is greater than the expected mean distance, this pattern is considered dispersed. If the mean nearest-neighbor distance is smaller than the expected mean distance, this pattern is considered clustered (ESRI 2005:9). Z score provides the value of how observed pattern match the results and the statistical significance.

In the Early Yangshao period, settlements were sparsely distributed. The nearest neighbor calculation shows they were neither dispersed nor clustered. In the Late Yangshao, sites began to cluster spatially; the significance level of this clustered pattern is high, with a less than 1% chance that it is the result of random chance. Site clustering continued to increase through the Late Longshan, although the scale of the clusters varied. In the Early Bronze Age, especially the Erlitou and Shang dynasty periods, site distributions are quite dispersed. The clustered pattern did not return until the Late Shang and Western Zhou period. With the decline of large centers, settlements are more evenly distributed across the landscape, and widely spaced. In the Han dynasty period, the clustering pattern once again became pronounced, and the sites were closer together.

Artifact density and sherd counts from the collection units show similar changes. The largest ceramic collections date to the Late Yangshao, Late Longshan, Late Shang and Western Zhou and Han (Figure 6.2). In the Early Yangshao, we only collected over 100 sherds across ten settlements. In the Middle Yangshao, the count tripled, suggesting population growth and increasing site size. The 1663 Late Yangshao sherds strongly imply an expanded population and occupation area. Also, Late Yangshao sherds were fired at higher temperatures and not as easily broken as those of the earlier periods, so their higher counts are not attributable to durability. A more reasonable explanation lies in improvements to pottery-making technologies and methods, which in turn suggests increasing craft specialization and a wider use of formal kilns. A better developed trade network and market demands from increased population could also account for this phenomenon.

Eighty percent of ceramics dating to the Late Yangshao period (1339 of 1663) came from Huangtucheng. They are better quality and from more vessel types than any contemporaneous sites in the area. Blanton et al. (1993:82) studied ceramics in the Valley of Oaxaca, and concluded that elites in administrative centers had an access to a wider variety of ceramics than residents of non-administrative centers. In general, I infer that larger settlements with more central place functions will have more elites and a heightened demand for richer and exotic goods. The increased level of internal specialization and social differentiation signify an important sociopolitical change in the Late Yangshao period.

Of the Late Longshan collection, Huangtucheng still contributed a large portion, but only a total of 55%. The percentage decrease of pottery from Huangtucheng did not match the increasing size of that settlement, but is consistent with the increased number of Late Longshan sites. A sudden transition in Late Longshan to Erlitou is shown by the sharp decrease of typical

Erlitou sherds, which is consistent with patterns in neighboring areas, such as Luoshan County in the upper Huai River region (HPICRA and Xinyang Cultural and Archaeological Institute 2000, 2003). In the Late Shang and Western Zhou period, people used larger vessels, which means that they would make more fragments than small vessels when broken. Despite this factor, increases in sherd counts should relate to population increases, which should also be supported by increasing site counts and densities. Of course, variations in the duration of periods when those diagnostics were in use would also influence sherd counts (Varien and Mills 1997). Biases in collection strategies do not account for the significant differences in collection counts, since we collected all sherds visible on the surface for most sites, except a few systematic collections when we found extremely high artifact densities (exceeding 20 per period). Han dynasty sites also produced a large number of sherds, but not as many as the Late Shang and Western Zhou period. One possible explanation is that the Han ceramics are larger and thicker, usually in big pieces, which means their counts were proportionally lower.

Changes over time in preferred site locations are important. All Yangshao period sites are near watercourses, so this appears to be a dominant variable. Furthermore, these early sites continued to be occupied for 2000 years. Until the Late Longshan period, most sites remained near watercourses. In the Middle Bronze Age, things changed; settlements locations were also inland, with some sites 2 km or more from watercourses. Most sites were on mounded areas, or display a preference for higher elevations. This is similar to Western Zhou sites in the Rizhao area recorded by a full-coverage survey (Underhill et al. 2008:21). Historical records show that indigenous people of the Huai region attacked the central Western Zhou court. Notations on bronze vessels show the central Zhou collecting tributes from the Huai. For the central Western

Zhou court, conquest of the Huai is related to controlling copper materials in the middle Yangtze River region, since the upper and middle Huai lie between it and the copper sources.

In the imperial periods, settlements moved beyond the surface waterways, and spread farther inland. This is largely related to the development of agricultural technology. Oxen and iron tools were widespread by the Han dynasty. Farmers were able to open new lands by digging wells and excavating canals. Many stone sculptures from Han tombs show these new agricultural technologies, with farmers using plows pulled by oxen (China Agricultural Museum 1996). Han tombs from Zaozhuang, Shandong province, show iron farming tools including digging implements and wheels (Shi and Liu 2003). Large metallurgy sites are known from across Henan, such as Tieshenggou in Gong County and Xiadian in Linru County (Henan Provincial Bureau of Cultural Relics 1962; Ni 1960). More than 300 fragments of iron digging tools have been found at Xiadian. Large-scale canal projects are known from many locations across the imperial state, including the Dujiangyan project in Sichuan and Fengtang project in Shou County, Anhui (Wang 1974; Yin 1960). In fact, early in the Eastern Zhou period, a large-scale canal project "Qisibi" was established in Qisi, in modern Huaibin County. Shifts in settlement locations suggest the increasing ability of people to exploit new agricultural resources and expanded transportation networks.

In general, settlements in the Huangtucheng area underwent expansion, consolidation, collapse and reconsolidation over the distant past. These processes are shown by increases and decreases in site counts and densities, as well as artifact densities. Site counts are low in this area relative to nearby regions, but they vary over time. Sites disperse and cluster in different periods. Preferred site locations also vary. In contrast to the Neolithic, in the Bronze Age new agricultural tools and means of transport co-occurred with population increase and people began to occupy inland areas opening new agricultural lands. The relatively high elevations of Western Zhou sites could be partly to improve defensibility.

6.4 Settlement Hierarchy

Site area is an important indicator of settlement hierarchy. I used a standardized method for translating collection areas into component area, so measurement error should be consistent, except for a few uncontrollable factors, such as different site preservation conditions caused by human activities, erosion and coverage under alluvial soil. In the Huangtucheng area, modern agricultural activities such as plowing and irrigation canal building and industrial activities, such as building roads, houses and brick factories, cause the most severe disturbance to archaeological remains. These factors make it impossible to accurately estimate site area, so we use artifact distribution to estimate settlement area.

Regardless of measurement errors, site area differences do represent real variation in population density, settlement hierarchy and function. The sites vary in area both spatially and temporally, and indicate sociopolitical change across space and through time. Reading across Table 6.5 illuminates the settlement hierarchy during a given period, while a vertical scan shows how rank changes over time (Figure 6.3). By using standardized ranks across all periods, the data are comparable (Kowalewski 1990:47). I selected the size range of smaller than 1 ha as the smallest category, fully realizing that some sites in that category may well have been larger because they are too disturbed or obscured so that we could not determine the full extent of the site.

Table 6.5 shows changes over time. In the Early Yangshao period, the majority of the 10 sites are smaller than 1 ha, with 2 sites in the rank of 1–2 ha and 2 sites larger than 5 ha. Since the rank of 1–2 ha is not that significant to the relation of larger sites and smaller sites, we can instead put them into two categories: sites smaller than 2 ha and sites larger than 2 ha. Thus, eight sites are smaller than 2 ha, much more than the count of sites larger than 2 ha; however, the largest site area in phase I is only 2.5 ha. Site standard deviation is quite low for the Early Yangshao period, so it is reasonable to assume that most of the settlements are self-efficient small villages with no complex site hierarchy.

In the Middle Yangshao, the count of the smallest rank of sites remained the same, while the counts of larger sites increased, and includes sites greater than 10 ha (Figure 6.4). I interpret this as the formation of a three-tiered settlement hierarchy. Spatially, the small villages, less than 2 ha in area, clustered near medium-sized villages, which in turn are evenly distributed across the survey area. Settlements spreading across 10 ha appeared for the first time, which suggests central place activities might have become more varied and/or centralized, rather than being similar in each (smaller) settlement. In the Late Yangshao, the three-tier hierarchy became more obvious. The number of the smallest sites increased, as does the next rank. Together, the count of sites smaller than 2 ha almost tripled. Middle-sized villages and large towns became even larger, and had smaller, satellite settlements.

Huangtucheng spread to about 30 ha and obviously was the area's central place. The nearest settlement is 2.5 km distant. Huangtucheng's residents had access to better quality ceramics and more vessel types, based on the sites' richer assemblage. The site also produced a higher proportion of serving vessels, and vessels with decorations and animal motifs. We found exquisite stone artifacts and arrow heads only at Huangtucheng. Based on this material culture, I hypothesize that Huangtucheng had more higher-status residences than other contemporaneous communities in the survey area.

Small site counts continued to increase in the Early Longshan period, and more unoccupied areas were settled (Figure 6.5). We found 24 sites smaller than 2 ha. Site counts in the larger ranks remained constant, although the area of those larger settlements decreased. The rapid increase in small settlement count suggests population increases at the transition from the Yangshao to the Longshan period. Huangtucheng and Zhaozhuang remained the largest settlements, at the top of a three-tiered settlement hierarchy, and continued to be the central places for residents of the survey area.

In the Late Longshan, the settlement hierarchy became more pronounced within settlement clusters across the survey area (Figure 6.6). Each cluster has settlements of varying sizes. The most pronounced change is in the highly nucleated settlement surrounding Huangtucheng. From a singular community in the Early Longshan, Huangtucheng became surrounded by small and mid-sized communities. Huangtucheng's cluster itself has a three-tiered hierarchy that included a mid-sized village close to 5 ha in area and several settlements smaller than 1 ha. The Zhaozhuang cluster also has three tiers. The pronounced clustering of the Huangtucheng cluster suggests it increased control over those smaller settlements. The relationship between Huangtucheng and Zhaozhuang is intriguing because Zhaozhuang maintained control over the Wulong watercourse for thousands of years. Based on location and site plan, however, Huangtucheng seems to have had a more regionally prominent role than Zhaozhuang.

The Late Neolithic to the Early Bronze Age transition encompasses marked changes. The total site count decreased to less than 30% and the hierarchy became less pronounced. With the exception of Zhaozhuang, all settlements were smaller than 2 ha; Huangtucheng was apparently abandoned, although we did find Erlitou period remains 500 m away. During this period, state-level societies formed in other areas, such as the Erlitou polity in central Henan. A shift in occupation centers probably accounts for the abandonment of Huangtucheng. Simultaneously, the survey area was probably under the control of a center beyond its limits.

The Shang period is characterized by territorial states, controlling wide areas. Based on archaeological data, Xie (1995) estimates that the total territory of the Shang dynasty was around 1,000,000 km^2. The capital of the Shang dynasty was in northern Henan, although the capital changed several times, as recorded in the first universal history book *Shiji*. The Shang state controlled the entire middle and lower Yellow River basin. Recently, Shang-style bronze vessels have been found across modern Hubei, Hunan, Jiangxi and Sichuan provinces. Shang influence, if not territory, reached the southern Yangtze River region. Regional states, called *fangguo*, which were outside the Shang central polity, paid tribute and taxes to the Shang ruling class. The Huangtucheng area undoubtedly lies in the territory ruled by the Shang central government.

Shang period settlements are small compared to Late Neolithic settlements. We found only one site larger than 5 ha. This supports the idea that the central place that dominated this area was outside the survey area.

In the Late Shang and Western Zhou dynasty the state system perdured in the Central Plains. The central area dominated by the royal family was surrounded by small polities recorded as *fangguo*, or small states, in historical records. The subordinate states had their own political systems and military power, although the Shang controlled them. One leader in Zhou, later king of the Zhou dynasty, had 800 subordinate *zhuhou* (heads of lesser polities) whom he marshaled against the Shang, as recorded in historical books such as *Lüshichunqiu*.

Settlements remained sparse after the Erlitou. Huangtucheng and Zhaozhuang remained large towns, and they had satellite communities ranging in area from 0.3 to 5 ha. Probably, a community larger than Huangtucheng or Zhaozhuang and outside the survey area dominated these communities. Site hierarchy did not change much in the Late Western Zhou dynasty, although site count and density decreased.

Beginning in the Western Zhou dynasty, small states led by descendants of the Zhou royal family spread across the upper Huai River region. The states closest to this survey area include the Xi, the Huang, and the Jiang (Xinyang District History Office 1992). The Xi state was centered at Qinglongsi, 6 km southwest of the current capital of Xi County and 50 km west from Huangtucheng. Qisi, 13 km from the capital of Huaibin County, was the capital of the Jiang state, and is 24 km southeast of Huangtucheng. These Zhou states have an average diameter of about 30 km. Thus, this survey area should be dominated by one of these three small states, probably the Jiang.

The Eastern Zhou dynasty is a state-level political economy characterized by *fangguo*. The smaller polities paid tribute to the central government centered at Shaanxi and Henan. Direct control by the central government loosened by the end of the Spring and Autumn dynasty, when several states thrived in surrounding areas. They included Qi in Shandong, Chu in Hubei, Henan and Hunan. Eventually the central government lost control in the Warring States period. In 688 B.C. the Chu state conquered many small states, including Xi, Huang and Jiang in this region, consolidating their control. Warfare was recurrent at the end of the Eastern Zhou period, as suggested by the name Warring States.

Our survey area must have been under the control of one of these smaller states, probably the Jiang state at the beginning of the Eastern Zhou dynasty. Then, I suspect it was ruled by the Chu state soon after the Jiang was conquered. The large towns of Huangtucheng and Zhaozhuang diminished in this period. Otherwise, we only found small settlements in the survey area. The ruling center of this area should be the Jiang capital, whether it was controlled by the Jiang state or Chu state.

In the Qin and Han dynasty, a unified, centralized imperial system flourished. After a long period of hostilities, population began to increase and establish new settlements. With the introduction of intensified agricultural techniques and methods (e.g., metal tools and irrigation canals), village areas increased tremendously. Large villages became larger and the largest settlements also increased in area. We found many tombs and cemeteries across the entire survey area, also indicating population increase. The site hierarchy had three tiers, with 35 sites smaller than 2 ha, eight sites in the 2–10 ha range, and two sites larger than 10 ha.

The Han dynasty political system centered around the royal family at the capital, with local government at several levels: *jun*, district; *xian*, county; *xiang*, town and *cun*, village. This survey area was under the control of a county, either west in Xi County or southeast in Gushi County. Additional regional survey west of the Lü River, in Xi County, would clarify this regional hierarchy.

6.5 Craft specialization, Trade and Warfare

Several small-scale excavations have produced what data we have on non-survey ceramic assemblages from the Huangtucheng area. These data, in conjunction with data from this survey, together indicate basic characteristics of these assemblages. They combine local styles with influences from neighboring areas. Our overall understanding, however, is incomplete. New excavations and a refined chronology would benefit our understanding of the archaeology of this region.

Spotty excavation data suggest that early people of the Huangtucheng area participated in interregional exchange networks. In the Early Yangshao period, we found pots with distinctive bird-head attachments. Most sherds of this period were reddish-yellow, hand-made, low-temperature fired, and had coarse paste. Earlier reconnaissance surveys show similar styles to have been widespread in the upper Huai River region, including the Xinyang and the Zhumadian districts (HPICRA et al. 1992; Peking University 1998). Several excavations in the middle Huai River area, in modern Anhui province, have produced ceramics with similar styles, which are related to the Dawenkou style of Shandong (Anhui Provincial Institute of Cultural Relics and Archaeology 1985). The survey area, therefore, participated in the general Huai River system of ceramic production and interregional exchange by at least the Early Yangshao period. To date, similar styles have not been found in the middle Yangtze River region.

Interregional exchange became more pronounced at the Late Yangshao period. The exchange network expanded beyond the Huai River region. We recovered large quantities of sherds with styles similar to those of the Qujialing culture of the Jianghan Plains in the middle Yangtze River region. We found a pot-shaped tripod vessel with short legs that is a typical Early Qujialing cooking vessel, especially at Huangtucheng. This area and others in the upper Huai River region have also produced other typical Qujialing vessels, including round-bottomed pots, *dou* pedestal serving-stands, *bo* bowls, and *zeng* steamers. We didnot find many polychromes, only a few sherds with red-painted surfaces. We also found bowls with red-painted rims, like those common to the Yangshao culture in the middle Yellow River region. These data suggest frequent trade and interregional exchange with middle Yellow and Yangtze River regions in the Late Yangshao. This pattern could be the result of trade in ceramics, or the styles could have been emulated.

In the Longshan period, interregional exchange and trade in ceramics increased, as reflected by the striking assemblages of ceramics with mixed sources and styles. Late Qujialing elements are common, along with Central Plains styles and Shandong style egg-shell, thin-walled shiny wares. We cannot determine whether these were directly traded goods or if they represent emulation of styles from neighboring regions. It is certain, however, that residents of the survey area participated in an interaction area that extended to the Yellow River and Yangtze River regions. This trend continued through the Bronze Age, when the Huangtucheng area was dominated by a larger territorial state.

Increasing ceramic standardization is assumed to accompany increases in social complexity. Underhill (2002:253) predicts that the degree of standardization is greater in large centers than small villages, although her studies of Hougang residential contexts did not show that ceramic standardization increased during the Longshan period. To assess this, it is necessary to determine the degree and scale of ceramic standardization in the pottery of small sites and regional centers. Because of the paucity of rim sherds from the collections from small sites, this project doesnot have quantitative data on a scale sufficient to assess standardization. However, when the chronology is refined, the large collection from Huangtucheng may be sufficient for such a study.

Some craft specialization is evident as early as the Yangshao period, as indicated by certain vessel types and the use of kilns. We found large quantities of spindle whorls dating to the Late Yangshao (phase III). Small vessels, especially cups, show they were made with fast-wheel technology, indicating refinements in pottery-making methods. Adobes from some features also may relate to the use of certain kinds of kilns. In the neighboring Han River regions, pottery kilns were used as early as the Early Yangshao period in Xiawanggang (Henan Provincial Museum and the Yangtze River Planning Office 1989). However, because most of the collected objects are utilitarian items, it is difficult to assess the labor involved in the production process. Underhill (2002) argues that attached specialization did not develop after the emergence of states in northern China. From the sketchy data from this project, I conclude that ceramic types and variety increase with the growth of social complexity, but we need further research on ceramic production at a regional scale to assess degree, internal differentiation, and the nature of craft specialization.

Warfare has long been thought to have been a causal factor in state formation processes (e.g., Carneiro 1970), and debate continues (e.g., Earle 1997; Haas 1982; Johnson and Earle 1987; Redmond and Spencer 2006). Archaeologists study the causes and consequences of warfare, including social and ideological factors, using archaeological data from survey and excavations (e.g., Arkush and Allen 2006). Causal discussions mainly focus on external factors, such as environmental change and related resource stress, plus population pressure. Social and ideological aspects are more difficult to test in archaeological contexts, however. The role of warfare in state formation processes has been challenged recently and it is pointed out that chronic warfare fragment regions, and have no affect on political consolidation (Arkush and Allen 2006:5). Also, different societies, with varying individual histories in the scale and intensity of warfare (e.g., occasional raiding, planned conquest) and varying warfare technologies, will have various results, with warfare having a variable role in state formation processes. Recognition of the diversity in warfare in both prehistoric and historical contexts provides support for alternative interpretations of archaeological data.

Changes in settlement patterns, especially the presence/absence of defensible settlements, are one of the factors archaeologists use to assess levels of hostility and thus the threat of warfare. Redmond and Spencer (2006) have reconstructed Monte Albán’s warfare strategies linked to interregional expansion and consolidation immediately before and after state formation using settlement pattern data from the Rosario phase (700–500 B.C.) to Monte Albán II (100 B.C.–A.D. 200). They propose that the Monte Albán state attacked outlying polities to extract tribute rather than engaging with rival polities in the Valley of Oaxaca. However, to reconstruct warfare strategies and investigate the roles of raiding and warfare in China's past, we need more regional and macroregional settlement pattern data. Nevertheless, current data on settlement pattern change may show signs of warfare.

Defensive settlements are widespread in the Yangshao period (5000–2900 B.C.). Around 4800–4300 B.C., the Banpo settlement was surrounded by a moat, which is assumed to have been defensive. Similar small-scale defensible settlements were common in the Early Yangshao period. Walled enclosures, especially rammed-earth walls, which involve increased labor, have attracted more attention in discussions of state formation processes. Chinese archaeologists also agree that Longshan walled-towns in the Yellow River region relate to warfare (Qian 2001). Some intercommunity conflict and warfare was initiated prior to the widespread construction of walled towns in the Longshan Era (2900–1900 B.C.) in the Yellow River regions.

To examine the rise of Huangtucheng, I will briefly examine macroregional settlement pattern changes and walled town data. Over 60 Neolithic walled towns have been found in China. Most are concentrated in six areas: the middle and lower Yellow River regions; the upper, middle and Lower Yangtze River regions; and Inner Mongolia (Ren 1998). Since the Huangtucheng project is most closely associated with the middle and lower Yellow and Yangtze River regions, I focus this discussion on these four regions (Table 6.6), which had over 30 walled towns; most have been excavated and the data published. A few others are newly found and have yet to be excavated. The Neolithic walled towns date to three phases.

The earliest phase began in 4000 B.C., when Chengtoushan, a Daxi walled enclosure, appeared in the Liyang Plains in middle Yangtze River region; it is China's first walled town. The enclosed area is 7.6 ha, and it is surrounded by a moat. Chengtoushan includes roads, a pottery workshop, a ritual area, a rice field, and a cemetery, and elite residences are in the middle of the community. We should consider this an experimental phase for this new defensive strategy. Current data suggest that the wall may not have been defensive; instead it may be an expansion of an earlier plan where residences were surrounded by a moat. Still, this leaves the question of why people began to construct hammered walls and residences became more nucleated.

The second phase is from 3500–2500 B.C. Most walled towns are in the middle Yangtze River region, especially on the Jianghan Plains and in the piedmont between Dahong Mountain and the Jianghan Plains. Most of the walled towns were begun in the Qujialing period and continuously used in the Shijiahe period. In the latter period, the Shijiahe walled town reached a maximum area of 120 ha and had a pottery workshop (Shihe Archaeology Team 1990). Outside the wall were workshops for stone tools, jade, and copper. The stone workshop produced a *yue* (ritual axe), a symbolic military tool. These suggest highly specialized craft production possibly linked to a military ideology. Within 25 km of Shijiahe are other contemporaneous walled towns of various sizes, suggesting Shijiahe was a central place for an Early Longshan period (2900–2500 B.C.) polity.

A large Liangzhu walled town was recently found in the lower Yangtze River region (Liu 2007). This area is a center for jade carving, planned sacrificial mounds, and elite cemeteries. Recent findings have revealed walls at Mojiaoshan, enclosing 290 ha on a raised platform of pure yellow soil, with palatial architecture inside. Burials in elite tombs have included symbolic and ideological goods, such as *yue* and *cong* (finely carved squared cylinders often made of jade) that relate to supernatural and military power.

During this period there was only one walled town, Xishan, in the middle Yellow River region. It dates to 3300–2800 B.C. Excavators found several incomplete skeletons in trash pits, indicating either sacrifice or evidence of violence to residents or war captives. The appearance of this walled town suggests increased warfare at this time.

The third phase began around 2500 B.C., or during the Middle and Late Longshan period in the Central Plains terminology. This period has increased evidence of warfare and violence, such as scalping at Jiangou, in Hebei Province (Chen 2000). Walled towns were common in this period in the middle and lower Yellow River region. The walls were hammered, and square or rectangular in layout. In the middle Yellow River region, most of the walled towns are small, with the largest, Mengzhuang, measuring about 16 ha. Excavations at Mengzhuang have produced pottery pipes and copper items inside the town. An incomplete skeleton from a wall foundation suggests residents engaged in sacrificial rituals.

When the Early Taosi walled town was built, at ~2300 B.C., it signaled a jump in the area of walled towns; it measured 56 ha. In the Middle Taosi, about 2100 B.C., the town grew to 280 ha. In the Early phase, this walled town had controlled access to the palatial architecture, which is inferred from the presence of two bridge bases made of hammered soil. Pits with layers of incomplete skeletons signal violence. In the middle phase, the early walled town continued to be used, but elite and commoner residential areas expanded to the northeast. Researchers have found a granary area to the southeast and palatial areas to the northeast. A smaller walled town encompasses ritual and observatory architecture. Inside the wall, researchers have found copper objects and writing marks on pottery. The highly differentiated cemetery indicates social ranking.

Exotic materials and exquisite burial goods in some burials suggest they were high-status individuals. Together, these findings indicate that Taosi became a highly urbanized city in the Late Neolithic.

Walled towns in the lower Yellow River region are generally small; the largest is around 40 ha, and the small ones are commonly 3–3.8 ha. They cluster in certain areas and display a size hierarchy. No spectacular walled towns comparable to Taosi are known dating to this period in this region. Nevertheless, similar-sized settlements like Liangchengzhen and Yaowangcheng suggest highly differentiated Longshan period societies in Shandong.

Diachronic changes in settlement patterns of walled towns vary by region. Walled towns first appeared in the middle Yangtze River region, which is probably related to the development of the Qujialing–Shijiahe polities. Then, as a result of interaction and competition with polities to the south, settlements in the middle Yellow River region became more nucleated and incorporated walled precincts. Large walled towns are associated with early states or state-like polities, especially in the Longshan period. We need further survey and investigations in these regions to better understand the role of warfare and hostilities at the macro-regional level.

Data from the site of Huangtucheng illustrate some settlement pattern and state formation processes related to warfare. The settlement was extremely nucleated in the Late Yangshao period, and had no small settlements in its immediate buffer zone. Instead, people lived in the large community. This could be related to environmental changes, such as floods, which would have driven people to higher elevation locales such as Huangtucheng. Past pollen studies in another area in the upper Huai such as Yangzhuang suggest that more flooding was caused by warm and wet climate in the Late Longshan period. Fortification also could account for this pattern. Underhill (2002:34) suggests that the nucleated pattern of walled settlements and other demographic shifts during the Longshan period would have stimulated trade and production networks. In the Huangtucheng area, the earlier nucleated pattern shifted to a clustered pattern in the Early Longshan and became more pronounced in the Late Longshan, when there was a prominent settlement cluster at and around Huangtucheng. This pattern continued and expanded during the Late Shang and Western Zhou period.

I hypothesize that Huangtucheng became nucleated in the context of interregional interaction, while regional polities were reorganizing. After the retreat of the Miaodigou culture around 3500 B.C., regional polities thrived in various regions and reorganized themselves sociopolitically. This pattern of competition, expansion, and consolidation is clearly shown in the Huangtucheng area, and has been observed elsewhere in the world (Willey 1991). As the Qujialing–Shijiahe polities to the south expanded, they impacted this Huai River region. As part of the transition from the Late Yangshao to the Early Longshan, this region began to adopt walled-town enclosures, altered residential styles, and began emulating Qujialing–Shijiahe ceramic styles. Ceramics from this region also show influences from Shandong polities to the east, especially from the middle Huai River region. At the end of the Longshan era, powerful polities arose in the Central Plains, and the Huangtucheng area surrendered to them, and influences from the south and east subsided.

Table 6.1 Population Estimate using Four Density Indices.

Periods	Phase	Habitation area (ha)	10–20 rooms/ ha	dmin (25)–dmax (75)	Chifeng Index	Yuchisi Index
Qin and Han	XII	91.1	4555–9110	2278–6833	14,394–25,781	2915–4373
Eastern Zhou	X–XI	17.2	860–1720	430–1290	2718–4868	551–826
Late Shang and Western Zhou	VIII–IX	102.1	5150–10,210	2553–7658	16,132–28,894	3276–4901
Shang	VII–VIII	30.2	1510–3020	755–2265	4772–8547	966–1450
Erlitou	VI	23.7	1185–2370	593–1778	3745–6707	758–1138
Late Longshan	V	103.4	5170–10,340	2585–7755	16,337–29,262	3309–4963
Early Longshan	IV	65.6	3280–6560	1640–4920	10,365–18,565	2099–3149
Late Yangshao	III	71.7	3585–7170	1793–5378	11,329–20,291	2294–3442
Middle Yangshao	II	49.8	2490–4980	1245–3735	7868–14,093	1594–2390
Early Yangshao	I	14.2	710–1420	355–1065	2244–4019	454–682

Note: Chifeng index (CICARP 2003:162); Yuchisi Index (Liu 2004:98).

Table 6.2 Phases of Occupation of Wulong River Sites.

Sites	**I**	**II**	**III**	**IV**	**V**	**VI**	**VII-VIII**	**VIII-IX**	**X-XI**	**XII**
HRP024	x	x	x	x	x	x	x	x	x	x
HRP030	x	x	x	x	x	x	x	x	x	x
HRP031	x	x	x	x	x	x	x	x		
HRP044	x	x	x	x	x		x	x	x	x
HRP032		x	x	x	x			x	x	x
HRP037		x	x	x	x	x		x	x	x
HRP068		x	x			x		x		
HRP046			x	x	x			x		
HRP038			x		x	x		x		
HRP041			x	x				x	x	
HRP045				x	x	x	x	x	x	x
HRP040				x	x	x		x	x	
HRP036				x	x			x	x	x
HRP070				x			x			
HRP067					x					
HRP042					x			x		
HRP026								x	x	x
HRP029										x
HRP033									x	x
HRP039										x
HRP069									x	
HRP043										
Total site#	4	7	10	12	13	8	6	15	12	11

Note: x means the presence of occupation.

Table 6.3 Large Sites with Component Count (using only the first twelve phases), Distance to Rivers and Large Centers.

Site #	Maximum area (ha)	Component count	Distance to rivers	Distance to large centers
HRP001	30.1	12	<500 m	9 km to ZZ
HRP024	28.5	12	<500 m	9 km to HTC
HRP054	7.8	12	<500 m	8 km to ZZ, 12 km to HTC
HRP060	6.7	9	<500 m	6 km to ZZ
HRP044	4.9	12	<500 m	6 km to HTC, 8 km to ZZ
HRP045	4.8	12	<500 m	6 km to HTC, 8 km to ZZ
HRP013	4.6	11	<500 m	5 km to HTC
HRP011	4.5	12	<500 m	4 km to HTC
HRP049	4.5	8	<500 m	6 km to ZZ
HRP030	3.2	12	<500 m	5 km to ZZ, 6 km to HTC
HRP031	3.2	7	<500 m	5 km to HTC, 6 km to ZZ
HRP047	3.0	8	<500 m	9 km to HTC, 9 km to ZZ
HRP006	3.0	8	<500 m	2.5 km to HTC
HRP037	2.8	10	<500 m	4 km to ZZ
HRP026	2.8	9	<500 m	1.2 km to ZZ
HRP004	2.6	8	<1 km	500 m to HTC
HRP003	1.6	9	<500 m	2 km to HTC
HRP005	1.5	7	<1 km	800 m to HTC
HRP048	0.5	9	<500 m	8 km to ZZ, 10 km to HTC
HRP032	0.5	8	<500 m	5 km to HTC

Note: ZZ stands for Zhaozhuang (HRP024); HTC stands for Huangtucheng (HRP001).

Table 6.4 Nearest Neighbor Analysis of All Phases.

Period	Phase	O/E	Z score	Pattern	Sig. Level
E Yangshao	I	0.99	-0.001	random	n/a
M Yangshao	II	0.97	-0.197	random	n/a
L Yangshao	III	0.67	-3.307	clustered	0.01
E Longshan	IV	0.79	-2.52	clustered	0.05
L Longshan	V	0.6	-5.84	clustered	0.01
Erlitou	VI	1.17	1.1	dispersed	n/a
Shang	VII–VIII	1.35	2.6	dispersed	0.01
L Shang & Western Zhou	VIII–IX	0.81	-2.32	clustered	0.05
Eastern Zhou	X–XI	0.99	-0.05	random	n/a
Han	XII	0.79	-2.76	clustered	0.01

Note: O/E = Observed mean distance/ expected mean distance; Z score = standard deviations.

Table 6.5 Site Area Ranked over Time.

Phase	< 2 ha	2-10 ha	> 10 ha	Total
I	8	2		10
II	8	5	2	15
III	16	5	2	23
IV	24	5	2	31
V	31	10	2	43
VI	10	1	1	12
VII–VIII	14	0	1	15
VIII–IX	26	9	2	37
X–XI	26	1		27
XII	35	8	2	45

Table 6.6 Nelithic Walled Towns in the Huai, Middle and Lower Yangtze River and Yellow River Regions.

Period	Dates (B.C.)	Middle Yangtze	Area (ha)	Middle Yellow	Size (ha)	Huai	Size (ha)	Lower Yangtze	Area (ha)	Lower Yellow	Area (ha)
										Dinggong	10.8
										Bianxianwang	5.7
										Tianwang	15
										Diantu	25
Longshan Era										Youlou	2.5
										Jingyanggang	34
	1900			**Middle Taosi**	**280**					Huangguzhong	6
				Early Taosi	56					Wangjiazhuang	4
				Wangchenggang	1					Jiaochangpu	40
				Guchengzhai	17					Shangzhuang	3–3.8
				Mengzhuang	16					Lepingpu	3–3.8
				Haojiatai	3.3					Dawei	3–3.8
				Hougang	n/a					Wangji	3–3.8
	2500			Pingliangtai	3.4					Chengziyai	23
		Shijiahe	**120**			Huangtucheng	30.1	**Mojiaoshan**	**290**	Kangliu	3.5
	3000	Jijiaocheng	20			Huangtucheng?	28.1				
		Yinxiangcheng	12								
		Jimingcheng	20								
Yangshao Era		Zoumaling	7.8	Xishan	3						
		Menbanguan	22								
		Majiayuan	24								
		Xiaocheng	9.8								
	3500	Chenhe	n/a								
	4000	Chengtoushan	7.6								

Adapted from Ren Shinan (1998); Zhang Chi (2001).

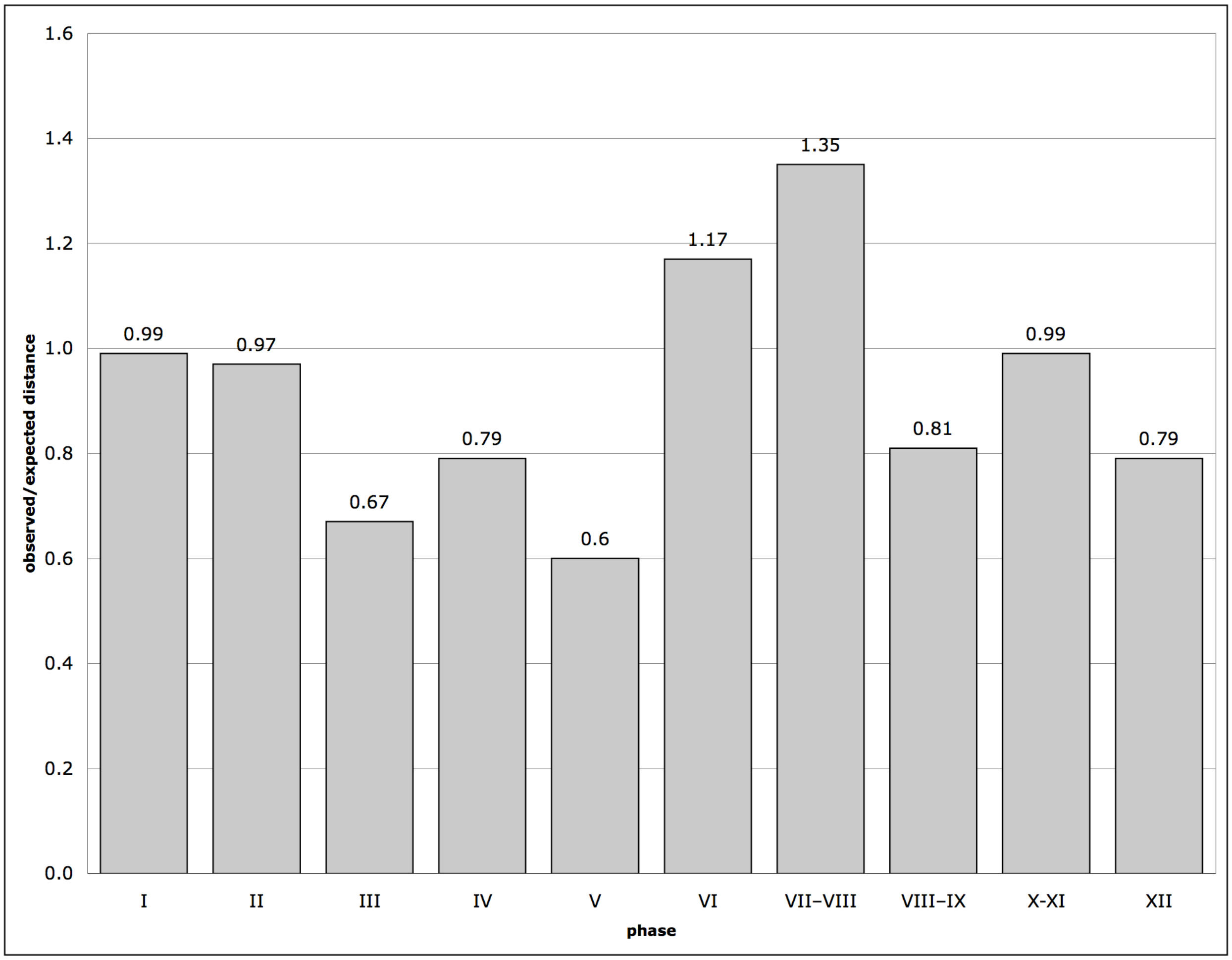


Figure 6.1 Observed mean distance versus expected mean distance of the nearest neighbors of settlements over time in the survey area.

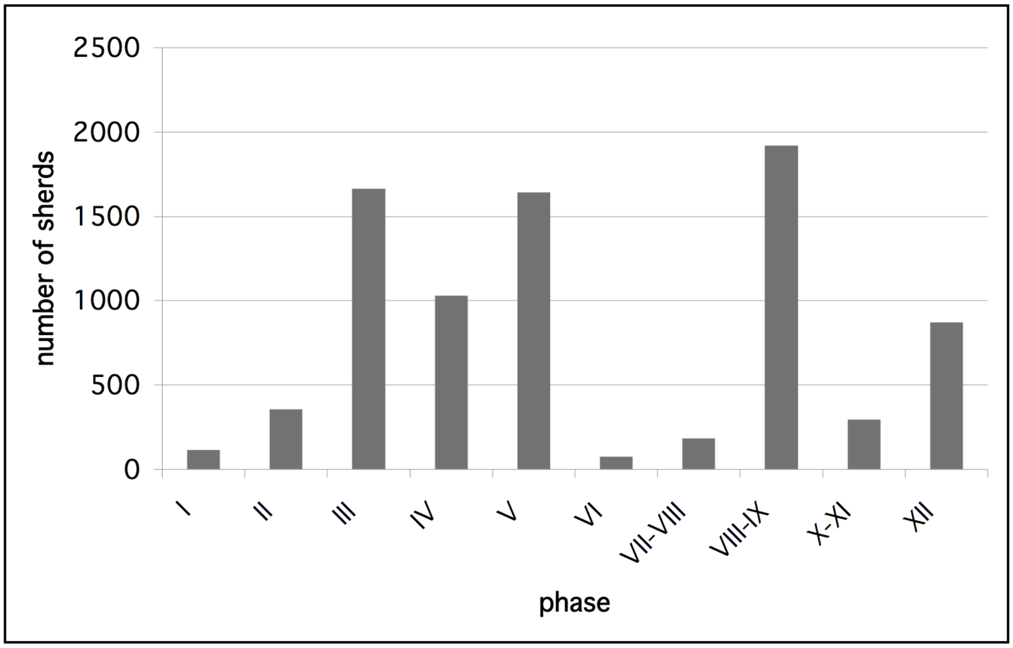


Figure 6.2 Artifact collection total counts per collection unit through time.

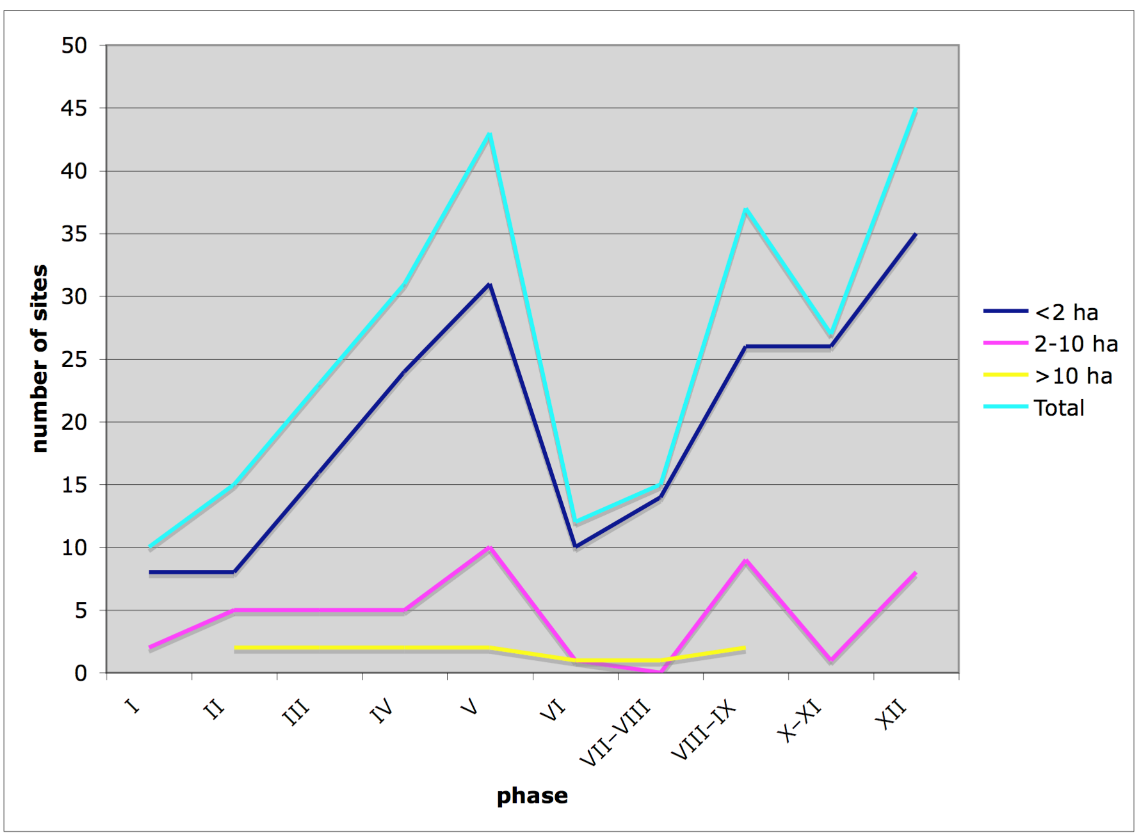


Figure 6.3 Comparison of site area ranks over time.

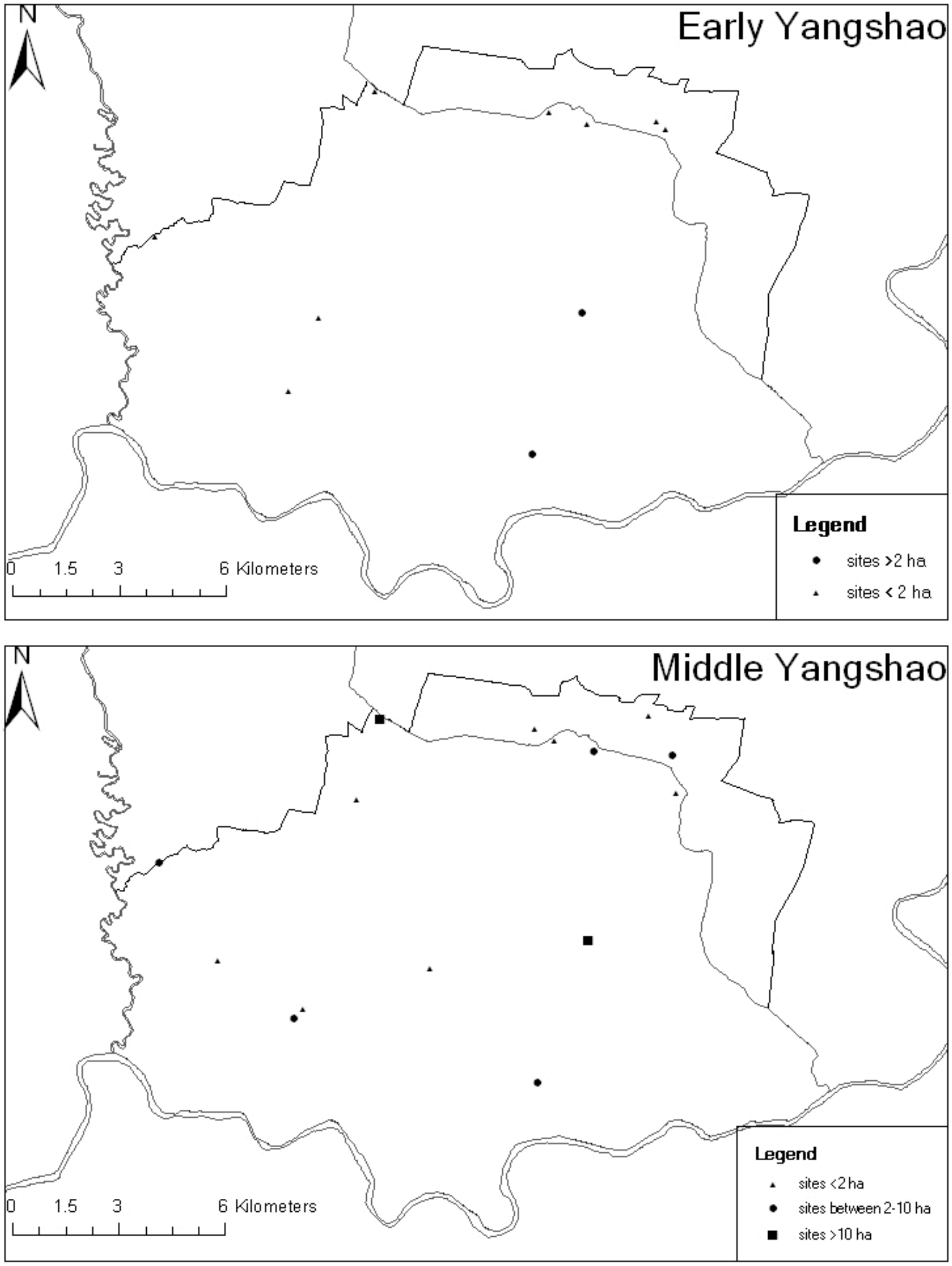


Figure 6.4 Site hierarchies in the Early and Middle Yangshao period.

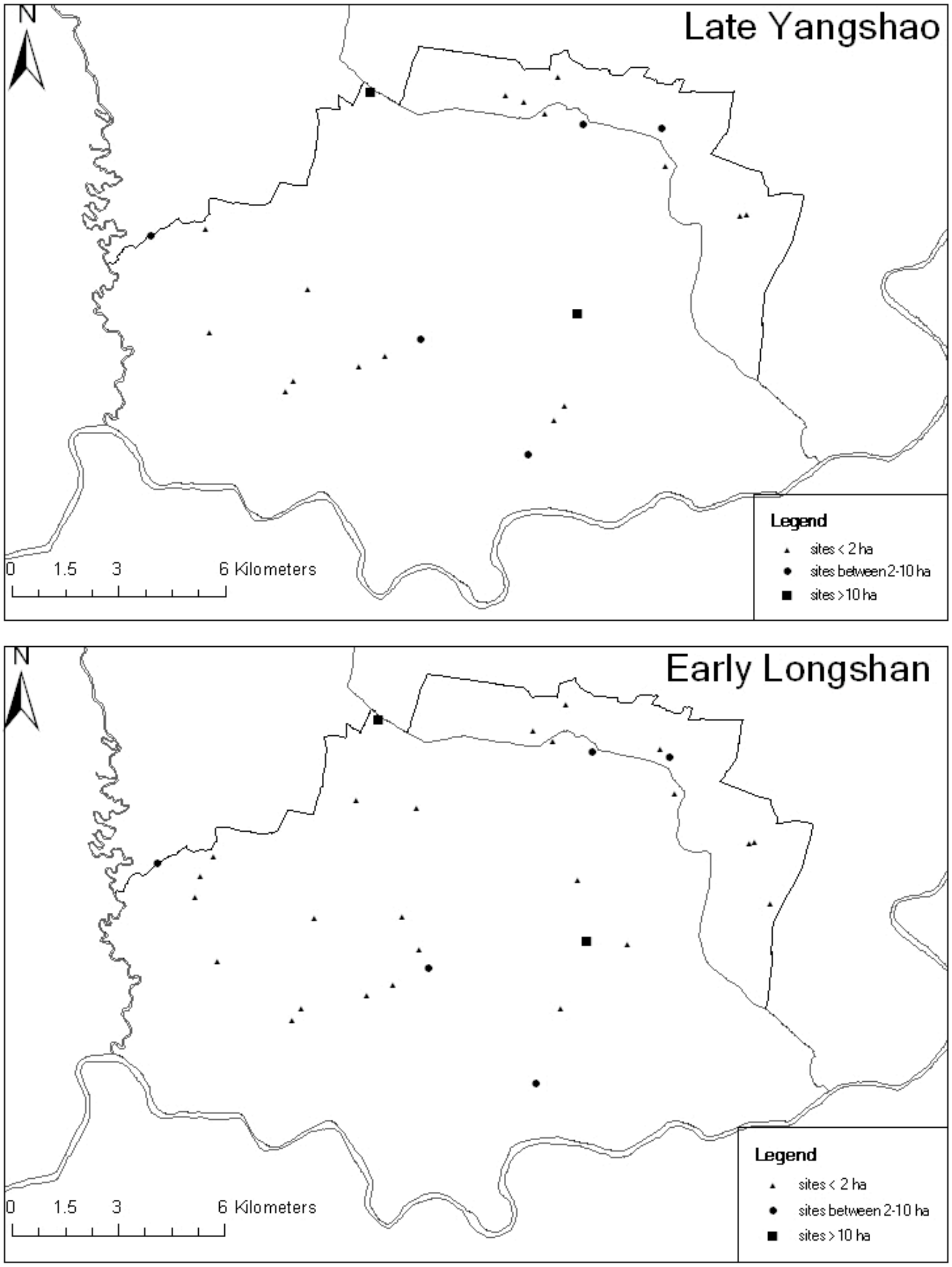


Figure 6.5 Site hierarchies in the Late Yangshao and Early Longshan period.

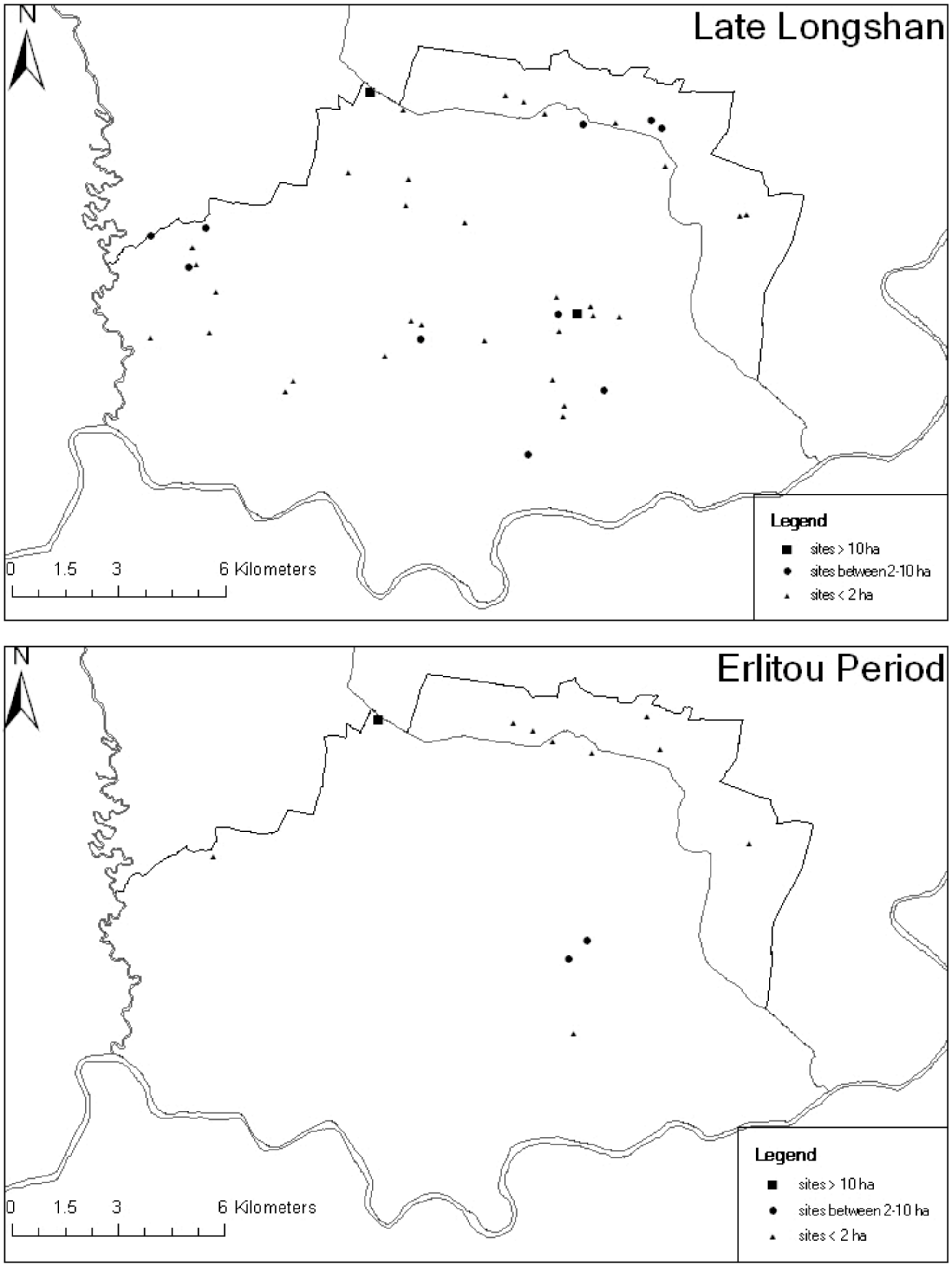


Figure 6.6 Site hierarchies in the Late Longshan and Erlitou period.

CHAPTER 7

CONCLUSIONS

The Huangtucheng survey had three main objectives: to describe settlement patterns of this area over time; to outline the development of this area from small villages to more complex middle-range societies to state-level societies; and to make further inferences about the changing political-economic role of this area in its macroregional relationship with neighboring areas to the North, South and East.

In the Huangtucheng area, diachronic settlement pattern changes are sometimes rapid and sometimes gradual, reflecting synchronic demographic and sociopolitical changes. These patterns need to be analyzed within a broader sociopolitical context and compared with changes and continuity in other regions. It is also by comparison that we may come to know the role of the Huangtucheng area as a core or periphery in the evolution of social complexity. Once we elucidate macroregional patterns, we can turn to the general question of the rise of social complexity in Huangtucheng and more generally what this may imply for the evolution of complexity in China.

Researchers have only begun to conduct regional archaeological surveys in China within the last two decades, but already they have produced rich data from central Henan Province, Shandong Province, and Inner Mongolia. I use these data for comparisons with the Huangtucheng area because they have been collected using similar methodologies. These comparisons are incomplete, however, because we have so little regional survey data from China. The most relevant and significant areas for comparison are those closest to the

Huangtucheng area, the Huai River region, and also the middle and lower Yellow and Yangtze River regions. The latter regions are important because the Huangtucheng area lies on the border between them. Using data from these regions allows analysis at a macroregional scale, and permits discussion of changes in sociopolitical complexity.

In this chapter, I begin with the Huai River region, including both published survey and excavation data. I emphasize the Neolithic through the onset of the Bronze Age, or the Erlitou period. Next, I examine parts of the middle and lower Yellow and Yangtze River regions, especially those nearest the Huai River region, including the Jianghan plains, the Central Plains, and the northern Anhui and Shandong Provinces. Then, I compare the Chinese data with those from other regions of the world at the same scale, mostly Mesopotamia and the Indus Valley, because those areas have had similar geography and archaeological survey projects, yielding the richest data and most complete literature. I broaden the discussion to examine the rise of sociopolitical complexity in the Huangtucheng region and China in general. Finally, I emphasize the significance of this regional survey project in the Huangtucheng area, and discuss pertinent questions for further research.

7.1 Comparisons with Settlement Pattern Studies in the Huai River Region

Settlement Pattern of the Immediate Surrounding Area

Little is known about settlement pattern within 100 km of Huangtucheng. Small-scale surveys and excavations have been conducted in Luoshan County (HPICRA et al. 1992, HPICRA and Xinyang Cultural and Archaeological Institute 2003). Excavations are usually small, such as 75 m^2 at Leitaizi and 100 m^2 at Lishangwan. The principal purpose of these excavations was to clarify the chronology. The Neolithic in southern Henan Province is divided into Middle (7000/6000–5000 B.C.) and Late (5000–2000 B.C.); no Early Neolithic remains have been found so far. Artifacts from these excavated sites, i.e. pottery styles, reveal close relationships to styles common on sites to the north, south, and east, but with greater similarity to the findings in the middle Huai River region.

Reconnaissance surveys in Henan Province provide basic data for nearby areas (National Bureau 1991). Only two Middle Neolithic Peiligang sites are known within 100 km of Huangtucheng. They are on branches of the Huai River, rather far upstream and not near each other. We found no Peiligang sites in the Huangtucheng project area. Reconnaissance survey data show that during the early phase of the Late Neolithic, Yangshao (5000–3500 B.C.) sites increased to 17. Most are still along the second terraces of the Huai River and its branches. No site area data are available.

At around 4100 B.C. the number of Qujialing sites increased to 52. The Qujialing area is on the Jianghan plains, and there was a cluster of sites on the north side of the Huai River. Settlement area varied during this period, and some large sites had smaller satellite settlements. Only a few Dawenkou sites, known from eastern China, have been found in this area. This area has the largest cluster of Qujialing sites in Henan, compared with the Central Plains.

At the end of the Neolithic, site counts increased dramatically. Nearly 200 sites are known within 100 km of Huangtucheng. Occupation clustered along major rivers. Longshan diagnostics are easily recognized, so this may be part of the reason for the large number of reported Longshan sites. A reconnaissance survey in Huaibin County found 19 Longshan sites, and Huangtucheng was the largest, at about 10 ha, and one of a small cluster of settlements. Several small sites were found within 5–10 km of Huangtucheng, with areas from 0.14–0.45 ha. This project shows these data were underestimates. We found small sites within 0.5–2 km and they were much larger than had been reported by the reconnaissance survey. The closest large settlement is Wanglou, about 10 km west of Huangtucheng. During this period, interactions with areas to the north became stronger than with those to the east and south.

Detailed settlement pattern data are also available for an area along a tributary of the Huai River, 50 km to the west (Figure 7.1). In 1991, surveyors found sites dating to the Neolithic through Zhou dynasty (221 B.C.) (HPICRA et al. 1992). They found 16 Yangshao period sites, with areas between 0.2 and 6.3 ha. Most sites are on terraces near the Huai River and its tributaries to the south. There are settlement clusters, and distances between sites in the clusters are less than 5 km.

In the Longshan period, site count increased to 17, with some early sites occupied continuously. The clustered pattern continued, but the pattern shifted from close to the Huai River to farther south. No Erlitou (phase VI in the Huangtucheng project) sites were found. Site counts for the Shang and Zhou dynasties decreased slightly to 12 and 13, respectively. In general, surveys indicate that the settlement pattern is dispersed, shows continuity with previous periods, and that settlements are mostly near rivers, but this impression may be flawed due to biases in traditional survey methods. The Huangtucheng project indicates that settlement patterns changed diachronically, and only sometimes were clustered, in contrast to the stable scheme shown by the reconnaissance surveys.

The Upper Huai River Region

There have been no full-coverage surveys in the upper Huai River region, but researchers have done a few reconnaissance surveys, all in the 1980s (National Bureau 1991), including an area of 14,974 km^2 in the Zhumadian prefecture. This project is about 150 km northwest of the Huangtucheng area (Figure 7.2). Several Neolithic and Early Bronze Age sites have been excavated, contributing data on that entire archaeological chronology.

In the 1990s, researchers began to focus on the human-environment relationship and recognized the importance of the Huai River region in the development of Chinese civilization. As part of this research initiative, excavations were conducted at Yangzhuang, in the Zhumadian district of Henan Province (Peking University and Zhumadian Municipal Office for the Preservation of Ancient Monuments 1998). The excavation revealed rich remains from Paleolithic periods through the Bronze Age, especially in the Erlitou period. To complement the archaeological data, researchers also recorded data on environmental changes, such as pollen, phytolith and mineral components. This evidence suggests a climate change in Neolithic times, from warm and wet in the Early Longshan period, to relatively colder and drier in the Late Longshan period, to warm and wet again in the Erlitou period (a climate similar to the present). Phytolith studies also suggest the predominant role of rice in Neolithic times and Early Bronze Age in the upper Huai River region.

No typical Early Neolithic sites have yet been reported, but pre-Peiligang occupations are known from Dagang, in Wuyang County about 60 km northwest of the Zhumadian area. Seven Middle Neolithic sites are reported, but none have been excavated. All are Peiligang sites, dating to 6000–5000 B.C.

Traditional reconnaissance survey in this area divides the Late Neolithic into Early, Middle, and Late phases. The Early phase corresponds to Early Yangshao, as it does in the Huangtucheng area (phase I). The Middle phase is the Qujialing, roughly equivalent to phase III and IV in the Huangtucheng area. The final phase is the Longshan, or phase V in the Huangtucheng chronology.

Twenty-five sites dating to ~5000 B.C. are reported for this area. Most are near rivers that are tributaries of the Huai, such as the Nü and the Nianjiang and its tributaries. Most sherds are plain and the ceramic assemblages are similar to those of the Huangtucheng area. Most sites have multiple components, and site areas have not been determined for this period.

Qujialing (~3500 B.C.) site counts increased markedly, totaling 53. Most are still on river terraces. Excavated sites include Danglou, Zhumadian and Sansuolou, Miyang (Henan Provincial Bureau of Cultural Relics 1965, Peking University and Zhumadian Municipal Office for the Preservation of Ancient Monuments 1996). Site areas are unpublished for most sites. A few single-component Qujialing sites are quite small, ranging from 1–2 ha. Danglou is about 4.5 ha overall but no Qujialing size data are available since that period was identified from excavations, and the excavated area measured only 34 m^2. The Danglou excavations reveal the similarity of ceramic styles with those of the upper and middle Huai River regions, and close ties to Qujialing sites in the Yangtze, Beiliu II in Linru and the Late Dawenkou in the Yellow River region (Peking University and Zhumadian Municipal Office for the Preservation of Ancient Monuments 1996:8).

By the Longshan, sites appeared in clusters and site counts increased greatly to 180. Most are still near rivers. Excavations indicate stylistic influences from Shijiahe in the Yangtze region, and Longshan from the Central Plains (Henan Provincial Bureau of Cultural Relics 1965:439). There are many single-component Longshan sites, and they appear in clusters. The largest is Hezhuang, measuring about 45 ha. Figure 7.3 shows that the Zhumadian Longshan site hierarchy has four tiers: sites smaller than 2 ha, sites larger than 2 ha and smaller than 10 ha, sites larger than 10 ha and smaller than 20 ha, and sites larger than 20 ha.

In the Erlitou period, site counts drop to a single site found by the reconnaissance survey. This should be considered a conservative count because excavations at some sites (e.g., Danglou) have found Erlitou ceramics that had not been reported during surface examinations (e.g., Peking

University and Zhumadian Municipal Office for the Preservation of Ancient Monuments 1996). Excavations at the ~4 ha Yangzhuang revealed rich Erlitou remains; the site has a circular surrounding moat. Evidence of sacrifices includes piles of sherds, complete vessels and animal bones sealed by a 5–10 cm layer of sterile pure yellow soil (Peking University and Zhumadian Municipal Office for the Preservation of Ancient Monuments 1998:97). Researchers also report finding architecture materials, a single item of red copper, and lacquer pieces painted with white and red pigments. Researchers suggest that latitude N33° is the southern border of the Erlitou polity of the Central Plains, and Yangzhuang is on that boundary.

As in the Huangtucheng area, the Shang site count is low. In contrast to the dense Longshan period occupation, the Shang site count drops to 46. The site count recovered in the Western Zhou period, and density increased. In the Eastern Zhou dynasty, this area has many walled towns, including the old capitals of the Cai state at Shangcai and Xincai, etc. Hezhuang has an iron workshop. In the Qin and Han dynasty, the counts of habitation and burial sites increased markedly, and included walled sites.

The general pattern for the Zhumadian area is similar to that of the Huangtucheng area, but the Huangtucheng project indicates greater diachronic variation in site counts. Our research shows traditional reconnaissance surveys underestimated Erlitou phase site counts in the upper Huai region, although site counts and density still were sparser than other phases. Other researchers argue that changes in ecological conditions in Yangzhuang, located between the northern subtropical and temperate zones, caused erosion and thus the gap in Early Bronze Age occupation (Peking University and Zhumadian Municipal Office for the Preservation of Ancient Monuments 1998: 208–210). Populations did not recover until the Western Zhou dynasty. I suspect that this could also be related to state consolidation, perhaps with warfare, since some places in the upper Huai River region were abandoned as others grew largely such as the Erlitou area in central Henan. In general, we would expect the Huangtucheng data to share similar trajectories of social complexity with the rest of the upper Huai River region.

The Middle Huai River Region

The Huai River is divided into upper and middle regions at the mouth of the Hong River tributary. The Huangtucheng project area is at the western edge of the Hong, and therefore can be considered in the transition area between the upper and middle Huai regions. There are a few studies in the middle Huai River region, but only a few well-excavated sites along with reconnaissance survey data provide useful data for this region. I focus on data from the northwestern Anhui province, since this area is directly adjacent to the Huangtucheng project area.

Reconnaissance survey in this region has focused on the Late Dawenkou period, dating to 2900–2500 B.C. (Anhui Team 1996). Surveying has located 61 Neolithic sites in northern Anhui, mostly Late Dawenkou and Longshan sites. Sites spatially cluster in three groups between the Huai River and the old channel of the Yellow River (Figure 7.4). Most are on terraces or on high mounded areas within 3 km of a river. We have site sizes and hierarchies for only two clusters. The northeast and middle clusters both have three-tiered hierarchies, including the cluster around Yuchisi. First-tier sites are usually larger than or about 10 ha, as is Yuchisi. Yuchisi is a well-excavated central place that has been studied over the last decade. Second-tier sites range from 2 to10 ha, and they number fewer than 10 sites. Third-tier sites are smaller than 2 ha. Remember that reconnaissance survey site areas likely are underestimated.

Excavations reveal that Late Dawenkou (~2600 B.C.) Yuchisi had 12 rows, a total of 39 houses surrounded by a moat that is 25–30 m wide and 4.5 m deep (Institute of Archaeology

2001). The moat has an oval shape and is ~235 m by ~220 m, surrounding an ~5 ha area. Researchers suggest that the moat had two main functions: 1) military protection, since Yuchisi is the central place for a group of small habitation sites; and, 2) flood prevention and as a reservoir (Institute of Archaeology 2001:17). Available data on the Huai River region suggest settlement on a mounded area surrounded by a moat is a common pattern for Neolithic sites. Modern villages also utilize this schema. I argue that the second reason, to control flooding and provide a ready source of water, is the principal reason Neolithic peoples chose this site plan.

Liu (2004:98) assumes an average of five people per room and estimates the population of Yuchisi as about 200 people. This is a conservative estimate since it is based only on the count of excavated houses. A density of 40 people per hectare (200 people/5 ha) is also low, as all houses are within an excavated area of less than 1 ha. We need a better population index for this site and region.

Ceramic assemblages found within the rooms and burials of Yuchisi resemble those found at typical Dawenkou sites in Shandong, especially in the combination of *gui* tripods, *zun* jars, cups and *dou* pedestal serving-stands, etc. One large jar has markings (sun, moon, mountain) similar to those found at Jühe, in Shandong. Therefore, researchers conclude that Yuchisi is a western subtype of the Dawenkou culture area. Artifacts from 192 burials, including those of children, reveal similarities with the Qujialing culture along the Yangtze River. The 102 child burials are all in large jars placed vertically in tombs, a burial custom widely used by Qujialing peoples. Tools such as spindle whorls are in styles consistent with artifacts found in the Jianghan Plains. Undoubtedly, Yuchisi peoples participated in trade and exchange networks with groups to both the west and east. They learned advanced pottery-making technologies from their neighbors to the east, although their ceramics are less refined than those from Shandong. On the other hand, residential architecture and burial customs are more similar to those of the middle Yangtze River region. This pattern is supported by the higher proportion of rice planting in the Late Dawenkou at Yuchisi (Institute of Archaeology 2001).

When compared with neighboring areas to the west and east in the upper and middle Huai River regions, Huangtucheng shows similarities: 1) a three-tier hierarchy beginning at least in the Early Longshan period (it began as early as the Middle Yangshao in the upper Huai and Huangtucheng areas, but we have no comparable middle Huai River data); 2) site clusters are composed of head towns, a single second-tier settlement, and several smaller satellite settlements; 3) the largest settlements are smaller than 50 ha; 4) settlements are surrounded by moats or ditches; and, 5) settlements have mixed ceramic assemblages showing influences from Qujialing and Shijiahe on the Yangtze and Dawenkou from Shandong in the Early Longshan, yet they are more similar to each other than to assemblages from neighboring regions.

Available data show the material culture of upper and middle Huai River peoples resemble to a great degree the material culture of middle Yangtze River peoples from the Late Yangshao through the Early Longshan period (3500–2500 B.C.). Especially notable are similarities in residential architecture (long rows of houses), rice cultivation (shown by production tools), craft production (similar spindle whorl styles), burial customs (especially of children), and settlement pattern (occupation of mound-like landforms near rivers or on river terraces and within a moat or ditch). During this transition period, Qujialing-Shijiahe polities expanded their influence to the north and directly influenced Huai River peoples. The Shijiahe polity was dominated by the 120-ha Shijiahe central place, and had spatially distributed smaller walled towns and large villages, suggesting a centralized, administrative hierarchy. The Huai River peoples not only adopted Qujialing-Shijiahe style ceramics, but also residential and settlement layouts, including walled-town plans. These commonalities could have been accomplished by contact in the form of exchange, trade, or even warfare. Influences were stronger on the upper Huai River region, which had many Qujialing-influenced sites in areas close to the Jianghan Plains, such as the Xinyang and Zhumadian areas.

7.2 Comparisons with Settlement Pattern Studies in Northern, Southern and Eastern Neighboring Areas

The Northern Neighboring Area (the Central Plains, Henan)

Researchers seeking to investigate the origins of the state in China have focused on the Central Plains in Henan Province, conducting both reconnaissance and full-coverage surveys. Using the reconnaissance data, researchers have constructed settlement hierarchies. Liu (1996, 2004) has reconstructed the settlement hierarchy for the entire Henan Province from the Middle Neolithic through the Erlitou period. Zhao (2001) focused on settlement patterns the Zhengzhou-Luoyang region at the western entrance to the Central Plains, including around the Erlitou site, a 300 ha settlement in 2000–1600 B.C. Full-coverage surveys have been conducted in the Yi-Luo River region and the areas surrounding Erlitou (Liu et al. 2002–2004; Erlitou Team 2005).

In the Middle Neolithic (7000/6000–5000 B.C.), the Central Plains settlements had a two-tier hierarchy. In the Zhengzhou-Luoyang region, the 35 Peiligang sites divide into two tiers: areas greater than 2 ha, and 2–6 ha (Zhao 2001:30). In the Late Neolithic or Yangshao period (5000–2900 B.C.), site counts increased to 800 in Henan (National Bureau 1991), with the largest at 30–45 ha.

In the Late Yangshao period (3500–2900 B.C.), rammed-earth walled enclosures (*cheng*) appeared. By the historic period, these early walled towns had become cities and central places. In the Neolithic, the walled plans have been interpreted as fortifications and for flood protection

(Ren 1998; Xie 2001). Xishan, 3 ha at 3300–2800 B.C., is the earliest walled town known on the Central plains (National Bureau 1999). By the Late Yangshao, the largest settlement was 80 ha, and there was a three-tier settlement hierarchy (3 ha walled town, large sites of 20–80 ha, and sites smaller than 20 ha). In the Epi-Neolithic or Longshan period (2900–1900 B.C.), there were more walled towns, and the largest, Mengzhuang, measured 16 ha.

Societies became more complex in the Late Longshan period (2500–1900 B.C.). Excavation in the Taosi site reveals a large walled town, palatial areas in Early and Middle Taosi phase (Shanxi Team and Linfen Cultural Bureau 2003; Shanxi Team et al. 2004). By 2300 B.C., the Taosi polity was one of the largest in China, dominating an area along the Taihang Mountains. Its largest city was around 280 ha by ~2100 B.C. and had satellite settlements, exotic and prestige goods obtained through tribute extraction and trade, and social hierarchies demonstrated by differential burial treatments.

Liu (2004:173) divided settlements in the Taosi area into three levels of hierarchy in both Early and Late Taosi phase. I disagree with her conservative division of settlement hierarchy into major center, minor centers and villages in the Taosi area. Even in Early Taosi phase, there should be more divisions among minor centers since their sizes vary from 24 to128 ha. Based on the sizes of these sites, there should be a four-tiered settlement hierarchy in the Taosi area by the Early and Middle Taosi phase.

Liu et al. (2002–2004) have detailed settlement patterns for an area comparable in size to the Huangtucheng survey in the Yi-Luo region. Site counts increase from five in the Peiligang period to 37 in the Yangshao period. The Late Yangshao had a two-tiered settlement hierarchy, dominated by a 20-ha site, with all other sites smaller than 10 ha. Population dropped at the transition to the Early Longshan, and increased again in the Late Longshan. The total site number of the Late Longshan is 171. The largest Longshan site reached 35 ha; medium sites ranged from 10–18 ha. Along with sites smaller than 10 ha, they formed a three-tier settlement hierarchy (Liu 2004:177).

In the Erlitou period (1900–1600 B.C.), the area of the largest site increased and settlement hierarchies deepened. The full-coverage survey in the Erlitou area suggested a four-level settlement hierarchy in that area (Erlitou Team 2005). Site counts increased from four in the Peiligang period to 105 in the Yangshao period, to 95 in the Longshan period, and to 125 in the Erlitou period. The largest Erlitou period site was around 300 ha, and the second largest was 80 ha (Erlitou Team 2005:34). Changes in the area of the largest site, the appearance of walled towns, and expanding settlement hierarchies in this part of the Central Plains in northern and western Henan suggest increasing integration and interaction among polities.

Over time, settlement patterns in the Central Plains changed greatly from the Yangshao through Erlitou periods. Settlement hierarchy deepened further in the Yangshao period (5000–2900 B.C.), and walled enclosures appeared in the Zhengzhou area. After a brief population decline in the Early Longshan period (2900–2500 B.C.), settlement density and walled enclosures became common in the Late Longshan period (2500–1900 B.C.). These walled enclosures were not large, no more than 20 ha. In the Late Longshan, settlement density and hierarchy, such as a four-tiered settlement hierarchy in the Taosi area, reached unprecedented levels sufficient to suggest state-level sociopolitical organization. In the Erlitou period, a powerhouse polity with a 300-ha capital and a large territory arose at the site of Erlitou, indicating a centralized territorial state with considerable specialization.

The Southern Neighboring Area (the Jianghan Plains)

To date, there has been no systematic survey on the Jianghan Plains, so we can only base our understanding of settlement patterns on reconnaissance data. Zhang (2003) has reconstructed basic settlement patterns for the middle and lower Yangtze River region.

For the Middle Neolithic, around 40 Chengbeixi sites (7000/6000–5000 B.C.), the earliest sedentary settlements, are known for the middle Yangtze River region. Site size data are limited, but the largest reported site, Bashidang, is around 3 ha. Bashidang was surrounded by a moat with an earthen wall around that. Most sites are smaller than 1 ha.

Site areas increased greatly in the Late Neolithic, known locally as the Daxi culture (5000–3500 B.C.) and part of the Qujialing culture (3500–2600 B.C.). Walled towns (e.g., Chengtoushan) first appeared at Daxi sites in the southern Jianghan Plains. Chengtoushan has an occupation area of 9 ha, is surrounded by a moat, and has an altar in the town. More walled towns appeared in the Qujialing, and areas vary from 10–20 ha. The settlement hierarchy may have had three tiers.

The largest walled town in the Jianghan Plains was 120 ha in the Epi-Neolithic, or Shijiahe culture (2600–2000 B.C.). Other walled towns are spaced hierarchically depending on their distance from the center (Zhang 1992); they indicate a four-tiered hierarchy. Zhang (1992) suggested that the Shijiahe polity controlled a large territory across modern Hubei and Hunan Provinces with its center in the Jianghan Plains (Figure 7.5). Zhang used a cultural historical approach, and may have overestimated the extent of the Shijiahe polity. Instead, this area might have had multiple polities with shared material culture. In the Erlitou period, the largest walled town was abandoned and site areas were much smaller than previously, but material culture styles more closely resembled those of the Central Plains.

For some areas in the middle Yangtze River region, we have more detailed settlement pattern data. In the Liyang Plains, for example, there was a three-tiered site hierarchy in the Daxi phase (Zhang 2003:47). Across an area of approximately 875 km^2, only two sites are larger than 4 ha. The six second-tier sites range from 1.8 to 4 ha, and 26 sites are smaller than 1.68 ha (Table 7.1). The distance between large sites is less than 20 km. In the Shijiahe period, site counts increased but the site hierarchy was stable; there were six first-tier sites, 18 second-tier sites, and an increase in third-tier sites to 152. Distances between large sites vary from 5 to 20 km. These data are from reconnaissance surveys, so site areas are probably conservative. Site locations tend to be near rivers, with many sites concentrated between tributaries. Medium-sized sites were surrounded by small sites, forming site clusters with other communities and head towns. During the Shijiahe period, the Shijiahe polity obviously had a four-tier settlement hierarchy and state-level sociopolitical organization. Residents of the Liyang Plains, 200 km southwest of Shijiahe, may have been directly controlled by the Shijiahe state.

Clearly, during the Epi-Neolithic period in the Jianghan Plains the settlement hierarchies were deepest and the walled towns were at their maximum; this suggests a powerful polity. The border area just north of the plains must have interacted with and been affected by this polity; this is supported by similarities in the ceramic assemblages.

In brief, research on the Jianghan Plains show settlement pattern changes from the Chenbeixi to Shijiahe periods (7000–2000 B.C.). Settlement hierarchy and sociopolitical complexity develop during the Daxi period (5000–3500 B.C.), along with the first walled town in prehistoric China, Chengtoushan. In the Longshan period (2900–1900 B.C.) or parts of the Qujialing and Shijiahe culture in this region, the settlement hierarchy increased to four tiers, with a 120-ha walled enclosure by 2600 B.C. Multiple hierarchically-arranged walled towns dispersed around this largest settlement indicate a state-level polity or multiple polities by the Late Longshan period (2500–1900 B.C.), if not earlier.

The Eastern Neighboring Area (Northwestern Anhui and Shandong)

Northwestern Anhui is the area immediately east of the border area. Eastern Shandong is discussed here since material styles from Shandong were widespread in the border area, especially in the eastern part.

No systematic studies have been conducted in northwestern Anhui, so settlement patterns are unclear, although new findings from Shuangdun, in Anhui Province, note the earliest writing marks and statues dated to 5300 B.C. (Chan 1993; Zuo and Yang 2005). Even the earliest periods should have had a settlement hierarchy. In the Late Neolithic, settlement areas increased. The 10-ha Lingjiatan site has an altar and tombs, and apparently was part of a two- or three-tiered settlement hierarchy (Zhang 2003:89). No walled towns have been found that date to this period. In the Epi-Neolithic, site areas decreased, and the settlement hierarchy seems less complex.

Shandong's Middle Neolithic settlement patterns are unclear. The 9.5 ha walled town of Dantu was founded in the Late Neolithic. Reconnaissance survey data suggests a two- or three-tiered settlement hierarchy (Luan 1997:1–68). A full-coverage survey conducted by a Sino-American team in southeastern Shandong (Underhill et al. 1998, 2002, 2008) found the earliest settlements date to the Beixin period, when two settlements smaller than 1 ha were in the piedmont (Underhill et al. 2008:4). Settlement counts and areas increased rapidly in the Late Dawenkou period (2900–2500 B.C.), and surveyors found 27 sites totaling 47.3 ha of occupation. In the Longshan period, settlement patterns changed dramatically. The largest site, 246.8 ha, Liangchengzhen, is a strongly nucleated settlement and walled town. In the Late

Longshan (2600–1900 B.C.), Yaowangcheng, 34 km south of Liangchengzhen, became the largest settlement in the Rizhao area at 367.5 ha. These two largest sites constitute the first tier of a four-tiered settlement hierarchy. Second-tier settlements range from 42.9 to 130.7 ha, third-tier settlements range from 10 to 32.6 ha, and the smallest sites are below 10 ha in area (Underhill et al. 2008:8). Surveyors found no Longshan walled towns in this area, and settlement hierarchy decreased abruptly in the Late Longshan and the Early Bronze Age.

Settlement patterns in neighboring areas to the east, especially southeastern Shandong, indicate state-level societies by the Late Longshan period (2600–1900 B.C.). Earlier settlement patterns, from the Houli (6500–5500 B.C.) and Beixin (5300–4100 B.C.) periods are unclear. Settlement hierarchy increased rapidly and walled enclosures appeared in the Late Dawenkou period (2900–2500 B.C). Settlement hierarchy and density climax in the Late Longshan (2600–1900 B.C.); four-tiered hierarchies and super-sized centers indicate state-level polities flourished. At the end of the Neolithic and in the Early Bronze Age, settlement counts decreased significantly.

As in other regions, settlement hierarchies and the periods with the largest walled towns varied diachronically. Areas east and south of the Huangtucheng area had four-tiered settlement hierarchies by the Early Longshan period (2900–2500 B.C.). Note that at the transition from the Neolithic to the Early Bronze Age, a four-tiered settlement hierarchy only is known from the Central Plains. Patterns in these neighboring areas seem to have influenced sociopolitical development in the upper Huai regions.

It is notable that changes in the Late Neolithic vary temporally and spatially (Table 7.2). The first four-tiered settlement hierarchies appear at slightly different times. On the Jianghan Plains, Qujialing-Shijiahe polities developed about 3500 B.C. and climaxed at 2600 B.C. during the Shijiahe period (2600–2000 B.C.). Shijiahe is the largest walled town at about 120 ha, and has distinct occupation and civic-ceremonial areas (burial and sacrificial) within the wall. Shijiahe is encircled by more than 20 settlements within an 80 km^2 area. Probably more than one polity was in the Jianghan Plains region, in the transitional piedmont area. Reconnaissance survey in Yingcheng, Hubei Province, has revealed a cluster of Shijiahe period settlements (Xiaogan Prefectural Museum 1989). Another large walled-town, found in Menbanwan, Yingcheng, Hubei Province, is around 100 ha. The second-tier walled town 18 km west of Menbanwan is around 25 ha. Third-tier settlements vary from 6 to 9 ha. The lowest administrative level is comprised of villages and hamlets smaller than 2 ha. Clearly, this piedmont area south of the Huai River had multiple polities from the Late Qujialing to Shijiahe period (3000–2500 B.C.). I suspect these polities were politically independent but culturally connected, which are supported by similarities in their material goods and burial customs.

In Eastern China, a four-tiered settlement hierarchy did not form until the Longshan period, at 2600 B.C., based on available data. Survey data indicates the largest Late Dawenkou period (3000–2600 B.C.) settlement was about 13.4 ha (Underhill et al. 2008:6). A larger or higher-ranked hierarchy may have existed outside the southeastern Shandong area as early as the Dawenkou period.

In the Central Plains in the Early Longshan period (2900–2500 B.C.), walled towns spread across the Yellow River region, but none were larger than 20 ha. No four-tiered settlement hierarchy was found in this period. But there was sociopolitical complexity, evidenced by differences in social status, careful city planning, and complex craft production (such as copper items found in walled towns). In the Late Longshan period (2500–1900 B.C.), a four-tiered settlement hierarchy, along with lines of evidence of social complexity such as palatial areas, architecture with function like observatory and sacrifice, road network and cemetery with great social status suggest a state-level society in the Taosi area by 2300 B.C..

Thus, important sociopolitical changes in residential architecture began in the Late Yangshao period, first in the Han River region, and then in the middle Huai River region, but we need more studies to enrich our understanding of house structure. Walled towns appeared in the Jianghan Plains and the middle Yellow River region, in part to control flooding and in part for defense. Advanced craft production technologies spread from the east into the Huai region, then to the Han and Central Plains, and climaxed in the Late Dawenkou period in the lower Yellow River region. Peer-polity competitions began in the Central Plains from at least the Late Yangshao to the Early Longshan period, when smaller polities were controlled by more corporate systems. The peer-polities shared ideology and ritual customs, including similar styles of ancestor worship. In the Early Longshan period, Qujialing-Shijiahe polities thrived by controlling water management, elite dominance of jade and craft production, and developed large populations. Around 2600 B.C. in southeastern Shandong, state-level societies with advanced craft production technologies appeared on the alluvial plains. By 2300 B.C., if not earlier, a large-sized state appeared in the Taihang Valley in northern China. The largest settlement had complicated palatial architecture, an elite residential area, and a ritual area including differentiated burials. South of the mountains, another large, centralized state appeared at Yanshi, Henan, somewhat later around 1600 B.C. This large-scale state controlled a large territory, and nearby polities declined and collapsed. Centralized states with large territories controlled by royal families, such as Shang and Zhou, succeeded these patterns.

State development had its origins in several regions in China including the Yangtze River, Huai River and Yellow River regions. Each had a particular history, and they developed for different reasons, in different forms, and had varying levels of complexity. The highly centralized and specialized, large territorial state at Erlitou is a mature state while the early states, at least from the Longshan period in regions such as the Jianghan Plains, the lower Yangtze River region and southeastern Shandong, have their own distinctive forms and characteristics. Small polities rose and fell in different periods, and eventually contributed to the formation of centralized administration in the Central Plains through interregional interactions, despite having various regionalized forms of trade, immigration, tribute, and warfare. More important, the Huai River region contributed to this process.

Simply put, settlement patterns in neighboring areas to the north, south, and east demonstrate different trajectories of state formation. Although varied in form and mechanism, polities in all three areas reached state-levels by the Late Longshan period (2500–1900 B.C.), if not earlier. As early as 4000 B.C., people participated in interregional interactions that were antecedent to state formation. The Huai region peoples may have been among the first who were strongly affected by those of other regions, as evidenced by shifts in house structures and settlement hierarchy. In later Neolithic periods, various neighboring regions influenced the Huai region, as evidenced by settlement pattern and artifact style changes. Hostilities among neighbors and their individual development paths provide the sociopolitical background for developments in the Huai River region, including the Huangtucheng area.

7.3 Comparisons with Settlement Pattern Studies in Southern Mesopotamia and the Indus Valley

Southern Mesopotamia encompasses a broad area of alluvial plains surrounding the confluence of the Tigris and Euphrates Rivers. In the fourth millennium B.C., pristine state-level societies arose in the Susiana Plain, in the Nippur-Abu area and in the Uruk-Warka area. Settlement pattern studies conducted across the alluvial lowlands in modern southern Iran and Iraq show well-developed four-tier settlement hierarchies in these areas.

Recent research suggests multiple cores or state-level societies arose in southern Mesopotamia, associated with the Uruk expansion (Algaze 2001; Pollock 2001). I focus this comparison on the alluvial plains of the Tigris and Euphrates Rivers, including the Nippur-Adab and Uruk areas, to take advantage of settlement pattern data. Scholars usually view this area as a single unit, but Pollock's reexamination of settlement patterns shows diachronic changes in political economy and demography. Since my research focuses on the state formation process, it is appropriate to examine changes from the Late Ubaid to Early Uruk periods. Unfortunately, settlement area data for Late Ubaid sites are limited; instead, I can only use basic settlement pattern information from the Uruk period.

Both Nippur-Adab and Uruk-Warka areas had a four-tiered settlement hierarchy in the Early and Middle Uruk (ca. 4150–3350 B.C.). Pollock (2001:187) divided all Early and Middle Uruk sites except 100 ha Uruk-Warka into three levels: those larger than 20 ha (large), 8–14 ha (medium) and those smaller than 8 ha, with Uruk-Warka the lone first-tier site. I also see these sites as having four tiers, and divide them into sites larger than 20 ha (including Uruk-Warka), 8–20 ha, 3–7 ha and those smaller than 3 ha. The first-tier sites are large central sites (cities, large towns) and the rest are towns, large community centers and villages respectively.

The Nippur-Adab area has 132 Early and Middle Uruk period sites, with a total occupation area of 373.3 ha (Table 7.3), and a four-tiered settlement hierarchy. The first tier has four sites, with the largest around 50 ha. The closest two large sites are 13 km apart and the farthest are about 50 km apart. These large settlements are at least 75 km north of Uruk-Warka, which is in the south. This supports the idea that these comprise two different administrative polities. Full-coverage survey in southeast Shandong shows the distance between the two largest settlements, which probably were central places for different polities, to have been about 34 km in the Longshan period (Underhill et al. 2008:11). Whatever the nature of the Nippur-Adab polity, it has a distinctive settlement pattern with large settlements all in the southern area, and varying densities of small sites clustering around each.

In the Uruk area, site counts and total areas are smaller than those of the Nippur-Adab area; it had 40 sites with a total occupation area of 198.8 ha. The largest site Uruk-Warka (100 ha) is in the southern part of the area near the Euphrates. The closest second-tier settlement is about 30 km away. This area also has a four-tiered settlement hierarchy.

In the Late Uruk period (ca. 3350–3100 B.C.), settlement patterns changed dramatically in the Nippur-Adab area. Site counts decreased in the northern area to 38, although most of the larger towns remained. The total settlement area was around 194.1 ha. In contrast, the Uruk area experienced a tremendous increase in site number and density. It had 89 sites with 516 ha of occupation area; the central site of Uruk-Warka became even larger, at 230 ha. The settlement hierarchy, however, continued to have four tiers.

From the Middle Uruk to Late Uruk period, settlement size and density changed dramatically in these two areas, and population changed markedly. After using Dewar's (1991) model to remove biases caused by long phases, Pollock (2001:216) reassessed the settlement count and occupied areas in these two regions and her revised figures are much more conservative than the original estimates. Adams (1981:69) assumed that the population density was 125 people/ha. By applying the adjusted occupation areas and Adams' population density, population can be estimated in different periods. For example, the total occupation area for the Nippur-Adab area in the Early and Middle Uruk is 88.4 ha; therefore, the estimated population is 11,050 people. For the Uruk area, the estimated population is 12,475 (99.8 ha x 125 people/ha).

Also using Dewar's model, Wright (2001:130) estimated population for different periods for the Susiana Plain. In Terminal Susa A period, the population was around 2150–4250 people with a density of 200 people/ha. In the Early Uruk, the population range was 6290–12,580. During the Middle Uruk, population increased rapidly to 8760–17,520, then decreased to 4560–9120 people in the Late Uruk. Clearly, the population in the Susiana Plain rapidly increased during the transition from the Terminal Susa A period to the Early Uruk period, which is when state-level polities formed.

Dramatic population increase is clearly an indicator of state formation processes in southern Mesopotamia. In all three polities—the Nippur-Adab area, Uruk and the Susiana Plain—population exceeded 10,000 people in the Early Uruk period. This is not to say that 10,000 is a requirement for state formation here or elsewhere, but that this is a correlation if not a cause in southern Mesopotamia.

Apparently, states emerged nearly simultaneously in the Early Uruk period in the south, accompanied by cultural interactions among the polities and exchanges of exotic goods and elite symbols. These polities were culturally linked yet politically independent (i.e., peer polities). Urbanization, demographics, immigration, trade networks and sociopolitical complexity increased through time across southern Mesopotamia, involving more territory in the process, and eventually extended into neighboring areas in the remote north.

Despite debate on the roles of cores and peripheries in the so-called Uruk expansion and early colonization, southern Mesopotamia as a whole displays gradual yet similar patterns of complexity during the state formation process. This process happened almost concurrently across the alluvial plains in the south.

Comparing the Mesopotamian patterns to those of the Huai River region, I see similarities in the geographies of the two regions. In addition, both have material cultures that display shared cultural characteristics across their regions. Settlement data from southern Mesopotamia provides a case study for direct comparison to the Huai River region, and to the process in China. By the Early Uruk period, both the Nippur-Adab and Uruk-Warka areas have four-tiered settlement hierarchies with the largest settlement between 50 and 100 ha, and a regional population exceeding 10,000 people. State-level polities, whether single or multiple politically autonomous but cultural similar polities, existed in southern Mesopotamia from at least about 4150 B.C. In the Late Uruk period, state-level societies remained although each region displayed different changes. The largest settlement was the same size in the Nippur-Adab area, but the Uruk area shows tremendous changes, jumping from a maximum single site area of 100 ha to 230 ha. The Early and Middle Uruk periods have settlement densities and largest settlement sizes similar to those of the Late Yangshao and Early Longshan periods in China. These data suggest that state-level societies may have arisen even earlier than the Late Longshan, as evidenced by four-tiered settlement hierarchies, the size of the largest settlements, and social stratification. This conclusion is speculative and further research and data are needed.

Comparison with the Indus Valley is somewhat difficult. The Indus civilization, or Mature Harappan (2500–1900 B.C.), is a general term used by specialists to refer to “a time of cities, developed social classes, craft and career specialists, writing and long-distance trade with Mesopotamia, Central Asia, and even the countries at the mouth of the Red Sea” (Possehl 2002:1). The Indus civilization spread across several geographic regions and landscapes, and include mountains, a plateau, and river plains. Settlement pattern studies utilize site data from across a broad area of one million square kilometers, and have yet to be used to model state formation processes. These rich data are mostly the result of surveys and long-term excavations. Possehl (1999:553-562) has reviewed the history of archaeological survey in the greater Indus area, and provides an appendix listing site data in *Indus Age: The Beginnings* (Possehl 1999). Even at this macroregional level, the settlement data for the transition from the Early Harappan (3200–2600 B.C.) to the Mature Harappan period is sufficient to show diachronic change, especially across the river plains.

Macroregionally, the Indus area experienced great variation in site counts, hierarchy and the size of the largest settlement (Table 7.4; Figure 7.6). The Early Harappan period has four contemporaneous regional phases—the Amri-Nal, the Kot Diji, the Damb Sadaat and the Sothi-Siswal. Site counts more than doubled from the Early Harappan (477) to the Mature Harappan (1052). Total occupation area nearly doubled from 281 ha to 537 ha. Consequently, the average site area doesn’t quite double, although the size of the largest settlement more than doubled. Changes in settlement hierarchy are less clear. Possehl’s (2002:48) histograms show three-tiered settlement patterns in both periods. In northern Sindh, on the river plains near the Indus River, the largest settlement grew from 40 ha to 100 ha, with a stable three-tiered settlement hierarchy in both periods. In the Sindhi phase, a four-tiered site hierarchy seems to be established. Since most of the sites are small, Possehl concludes that in the Mature Harrappan period "no one has successfully demonstrated that the settlements of these people can be rationalized into a three or four-tier system that is hierarchically arranged" (2002:63).

Possehl also argues that the Indus civilization was a "faceless sociocultural system" (2002:6), with no evidence of individual leaders, and no evidence for "a state bureaucracy" or "a state religion in the form of large temples." Thus, he concludes that there was no centralized and hierarchical archaic state in the Mature Harappan period. However, the sociopolitical system of the Mature Harappan was characterized by highly-urbanized centers, sociocultural complexity, settlement pattern changes (the abandonment of Early Harappan sites and possible population movement and migration with the increase of Mature Harappan sites occupying virgin soil), writing depicted on clay stamp seals, and technological achievements. This combination suggests that the Mature Harappan had well-developed sociocultural complexity. These data await model development and theory-building to refine our understanding of the Mature Harappan state.

I concur with Possehl's view that the Indus civilization had sociopolitical strategies that were more corporate than network. The absence of an elite class or associated monumental religious architecture makes the Indus civilization different from other complex and pristine sociocultural political systems, such as those in Mesopotamia, Egypt, and Early Bronze Age China.

I believe that the Mature Harappan resembles the Early Longshan of the Central Plains, with multiple developed cities and towns, highly specialized craft production, advanced drainage systems and community planning, and developed technology. Neither area has fancy tombs. Although the Mature Harappan displays diversity and heterogeneity in its sociopolitical system, the two regions do share some characteristics. These may be the examples of those early states displaying more corporate political strategies characteristics.

The Mature Harappan case shows that a distinctive elite class is not a requirement for the development of complex sociopolitical systems. Production and distribution of utilitarian goods does not have to be controlled by a particular group of powerful people. Market exchange may be generated at a smaller regional scale without involving substantial centralization. In contrast, ownership and display of exotic goods and the ability to hold feasts can propel and strengthen leadership strategies. It is still too early to draw complete pictures of the political economies in different regions of Late Neolithic China. Further regional studies focusing on these traits are obviously needed.

Excavations provide other lines of evidence for interpreting sociopolitical strategies in different areas in the Longshan period. Here I draw a few examples from the available data. Walled towns known in the Central Plains are mainly concentrated in central and northern Henan. Copper items were found inside walled towns such as Wangchenggang, Pingliangtai (HPICRA 1983, HPICRA et al. 1992). Excavations in Pingliangtai also showed that rows of houses were built on high platform and a drainage system was made of pottery pipes. Excavated tombs in the Central Plains showed variation in tomb size and number of burial goods, but no great distinguished differences existed in burial goods as those found in Taosi. Augured animal scapula, especially from pig, cow, goat and deer were very common in the Central Plains at the Longshan period. In the middle Yangtze River region, inside the largest walled town Shijiahe, pottery workshops and sacrificial areas were found. Over ten thousand red cups found inside the Shijiahe walled town suggest a ritual or feast area (Zhang 2003:148). More than 500 pieces of stone artifacts and five pieces of copper raw materials and products were found outside the walled towns in Luojiabailing (Hubei Provincial Institute of Cultural Relics and Archaeology and Institute of Archaeology. 1994). In the Lower Yangtze River region, fancy Neolithic tombs that were buried in mounded areas are unique. Large amount of portable prestige goods were buried in these fancy tombs. More than 1200 pieces of burial goods including pottery, jade, stone and lacquered goods were buried in a single tomb in Fanshan cemetery (Zhejiang Provincial Institute of Cultural Relics and Archaeology 1988). Among them, more than 90% are jade objects, including 21 pieces of Yue and Cong, objects symbolizing military and political power. The buried one should be elites with super power. These elite cemeteries were not alone, and they were next to altar and other large architecture in a cluster of sites centered at the Mojiaoshan site in current Zhejiang Province. These sites date to the Liangzhu culture (3250–2150 B.C.). The above shows only a small portion of their distinctive characteristics of political economies for the middle and lower Yangtze River region and the Central Plains in the Longshan period.

In summarizing the basic characteristics of sociopolitical strategies in the Longshan period based on the current data, I suggest that the Central Plains and the lower Yangtze River regions provide the two most distinctive examples of corporate and network strategies (Table 7.5). They differ in bureaucratic systems, public facilities, craft production, degree of personal wealth owned by elites, ritual systems and feasts, etc. The Central Plains exhibit a well-integrated bureaucratic system, with standardized houses, open access to public architecture, and public facilities such as water pipes and drainage systems in the Early Longshan period. Largest sizes of walled towns, and other major centers without wall enclosure Houses inside walled towns are not highly differentiated from those in large towns lacking walled enclosures are relatively of similar size, no more than 50 ha. No extremes of personalized wealth or exotic goods were displayed or controlled to legitimize power of the ruling class. On the other hand, the lower Yangtze River region displays another extreme. Personal wealth is owned and displayed in fancy tombs, using prestigious jade objects. A small group of specialized individuals controlled ideological and supernatural power. Craft production was focused on specialized jade objects rather than utilitarian goods. In other areas, such as the middle Yangtze River region in the Longshan period, we see elements of both political strategies. The middle Yangtze River region displays a well-integrated settlement hierarchy and large workshops for utilitarian goods. Jade production also was advanced, but not as specialized in portable prestige goods, such as those in the lower Yangtze River region. Differences in burial goods and tomb size existed, but were not as distinctive as in the lower Yangtze River region. For the Huai River region, we need more data to understand the political strategies employed during the Longshan period. The settlement pattern does display a distinctive hierarchical system. No large tombs or prestigious goods have been found. I suspect elements of both corporate and network political strategies were used in this area during the Longshan period; obviously we need more data to examine and verify this.

Clearly, Late Neolithic Chinese sociopolitical systems display considerable diversity. No single term can summarize all the characteristics of these polities or early states in the Longshan period. Various sociopolitical strategies, using different combinations of variables, have been used in various regions at different periods. The scale and degree of social complexity development varied as well. No single archaic state, city-state, or petty rural state term can fully describe the nature of sociopolitical systems in Late Neolithic China. Indeed, this diversity characterizes the richness of the Chinese archaeological data and its great potential to refining theoretical models, which in turn can contribute to our general understanding of state formation processes.

Thus, I combine systematic and historical data in a brief review of the process of sociopolitical complexity in Neolithic and Early Bronze Age China at two scales: a macroregional view and a regional view.

Macroregional view

During the development of social complexity in China since the Pre-Yangshao period, different variables played various roles. The earliest settled villagers began to apply new subsistence technologies. Rice fields at Bashilidang are dated as early as 7000 B.C., to the Pengtoushan culture. Settlement counts increased rapidly in the Daxi period in the middle Yangtze River region. When Daxi peoples came in contact with Miaodigou peoples (living near the junction of Shaanxi, Shanxi and Henan Provinces come together), they participated in a shared material culture using polychromes and a large iconographical system. The polychrome culture peaked when it spread northeast to Liaoning, east to Shandong, and across the middle Yangtze River region to the south.

By 3500 B.C., after the collapse of the Miaodigou expansion (Xiyin expansion in Yu's [2006] terminology), social development in all major areas, including the middle and lower Yellow River regions and middle and lower Yangtze River regions, reached a new level. Settlement density increased tremendously. Methods for making rammed walled enclosures spread. Also, multiple incomplete burials found in many regions indicate warfare increased (National Bureau 1999). These innovations and changes developed from interactions among earlier polities. The Miaodigou expansion shows the first evidence of territorial expansion and spreading ideology, although its political administration lagged behind its ability to conquer additional territory. The combination of territorial expansion without imposing political control causes an unsolvable problem. Eventually, Miaodigou lost in its competition with the Dawenkou from the east (Yu 2006:229). Later, almost all societies faced pressure to reorganize sociopolitically to overcome this new challenge. Family structure and residential architecture both changed, and storage pits were excavated inside houses. More important, walled enclosures were built to prevent flood and warfare. Long-distance trade subsided and technology emulation became more frequent.

To some degree, the Miaodigou expansion resembles the Uruk expansion in 4100 B.C., although it is uncertain it worked the same as the Uruk imperial system proposed by Algaze (1993). However, these two examples share one of the most common factors—that is, the use and emulation of similar styles of utilitarian goods.

Multiple competitive polities and societies characterized the Longshan period. Social complexity reached unprecedented levels. In the Middle to Late Longshan period around 2500 B.C., large polities arose in several areas, judging by data from regional surveys and excavations. The Shandong area had multiple state-level societies with a four-tiered settlement hierarchy and complicated craft production technologies. In the lower Yangtze River region, Liangzhu also reached this level, given its exquisite jade craft technology, and social differentiation as indicated by varied tomb treatment for elites and commoners. A small group of ritual practitioners held power. The middle Yangtze River region saw the rise of Qujialing-Shijiahe polity/polities, which had large craft workshops, large-scale walled town and a well-integrated settlement hierarchy. At the end of the Longshan period, the Taosi polity appeared in the Central Plains, with its super-sized city, exotic burial goods and deep social stratification shown in burials and dwellings. These polities display individualized political strategies, either corporate or network or both; they had trade and interaction among themselves, but none reached a macroregional level like the Miaodigou/Xiyin in the Yangshao period. Taosi declined at the end of the Longshan period, when the highly centralized and powerful polity centered at Erlitou arose in the Central Plains, and dominated a large territory that may include Taosi to the north and also other polities to the east and south.

The Bronze Age began after a long period of warfare and competition for raw material sources and territory, which partly accounts for the decrease in settlement density in many areas. As some polities, such as the Shang and the Zhou, expanded, all societies in prehistoric China underwent reorganization and unification. They employed various political strategies, including legitimizing supernatural ideology and institutionalizing policing power, controlling precious raw materials such as copper, and constructing control points, all of which strengthened the newly established centralized state system.

The Zhou royal family developed the *fenfeng* system as a political experiment. For a time, the central Zhou court and subordinate small states maintained peace. The balance broke when several large regional polities, such as the Qin, Chu and Zhao, arose at the end of the Spring and Autumn period. Competition and warfare ended when the super-military power and law system built by the Qin finally formed a unified imperial system. Political control across geographic boundaries was achieved through implementation of the jun–xian (jun—district/province, and xian—county) system, which was directed by the royal family and its ruling central government.

Regional view

The Huai River region has been an important area since the Neolithic. The earliest writing found in this area dates to 5300 B.C. The long ceramic tradition is apparent from the Yangshao period through the Early Bronze Age.

Data gathered by the Huangtucheng project are consistent with findings from across the upper and middle Huai River region. Settlements from before the Early Yangshao period were not found in the Huangtucheng area, probably due to alluvial deposits or erosion. Findings of Peiligang stone tools in the neighboring county, however, suggests the potential for early remains in this area. The uniformity of Yangshao ceramic assemblages from the upper Huai River region has indicated the strong material influences from the Central Plains. It is unclear whether these similarities resulted from direct contact or stylistic emulation. Settlements gradually increased in the Zhumadian and Luoshan areas to the west from 5000–3500 B.C. in a similarly stable way. Large-sized settlements appeared in the Late Yangshao period, such as Huangtucheng, Zhaozhuang and Leitaizi. The earliest large central settlements in the Huai River region date to the Late Yangshao, about 3500 B.C. The appearance of central places, along with a 3-tiered settlement hierarchy as well as its similarity to core areas to the North, South and East suggest that the Huangtucheng area may be a core area on its own at the Late Yangshao period.

In the Early Longshan period, settlement count increased but large centers shrank in size. This pattern became dominant in the Late Longshan period, with closely spaced and tiered settlements around large, central sites. Huangtucheng was surrounded by a two-tiered settlement hierarchy. Settlement pattern changes reflect regional population increases that exceeded 10,000 people. It matches the general pattern of the Huai River region and neighboring core areas. Walled enclosures became popular, as they did in the Yellow River region. All these lines of evidence suggest that the Huangtucheng area was a core at the Late Longshan period.

After thriving in the Late Longshan period, this area experienced a hiatus in the Erlitou period. Researchers working in the Zhumadian area hypothesize that the 33°N latitude line, which connects Zhumadian–Fuyang, was the southern boundary of the Erlitou polity.

Huangtucheng survey area is just outside this limit, which could partly explain its lack of typical Erlitou material. This area should be peripheral to the Erlitou and Shang in the Central Plains, and deserves more our attention to its own cultural traits.

This area, and the Huai River region in general, prospered during the Western Zhou. Historical records show that indigenous Huai people attacked the central Zhou court during contact. Although the Huai peoples were quite a threat to the central Zhou dynasty, it was peripheral to the core in the Central Plains. Eventually, the Zhou central court expanded its power across the Yangtze River region by controlling this area and establishing subordinate states in the survey area, such as the *Xi* and *Jiang* states.

Thus, by the Eastern Zhou dynasty, the Huai region, including the Huangtucheng area, was incorporated into a centralized imperial state system. The prosperous site and dense settlements of the Han period matched findings across the Huai River region as well as all other regions.

Settlement pattern changes in the Huangtucheng region reflect changes across the entire upper and middle Huai and even the neighboring areas to the North, South and East. The Huangtucheng area is the hub of the entire movement. During the Miaodigou expansion, this area was where the west (Miaodigou) met the east (Dawenkou), which explains why elements of both are found there, and where competition endured. It is intriguing, however, that our survey did not find much polychrome. I suspect that this area kept its strong regional characteristics and was not deeply affected by the Miaodigou expansion, while the eastern core had more influence on utilitarian goods, especially at the end of the Dawenkou period. The Huangtucheng area rapidly developed at the same time as all superpowers in the core areas developed into state-level societies. We do not currently have direct evidence to show that there are also similar state developments in this area; we need to record settlement pattern changes in a wider area to assess this process. It is certain, however, that residents of the Huangtucheng area interacted through these state polities via craft production and exchange.

The Huangtucheng region had rapid growth in the Late Neolithic times, from the Late Yangshao period to the Longshan period, and slowed down in the beginning of the Early Bronze Age. It grew from settled villages of small societies, to middle-range societies and eventually became part of territorial states at the Han dynasty. The Huangtucheng region might be a core area on its own at the Late Neolithic with rapid population growth, rise of the central places and a three level of settlement hierarchy as the other core areas and become periphery to the core area in the Central Plains in the Bronze Age. Interregional interactions with the middle and lower Yellow and Yangtze River regions also suggest that agents and structures in the Huangtucheng region could have adopted corporate and network strategies depending on its cultural ties with these neighboring areas during the development of social complexity.

By comparisons with the neighboring areas to the North, South and East as well as Mesopotamia and the Indus Valley, we can also reach to some general conclusions relating to the origins of the state. First, by deliberately putting the Huangtucheng area into the broader Chinese context, I suggest that at the same time, polities at different areas have apparently different forms, perhaps resembling more corporate or more network strategies. These areas are perhaps core or periphery, but they shift over time. Second, according to settlement pattern criteria used elsewhere in the world, I think that the state developed in China by at least the Late Longshan period, much earlier than the early historical dynasties. Third, though settlement patterns in the Huangtucheng area do not necessarily point to a Huangtucheng autonomous state, this region was undoubtedly an important part of a state and part of a core in the Late Neolithic. The

Huangtucheng area is also relevant to state origins because the Erlitou reorganization involves big growth of centers in some places and abandonment of others. The Huangtucheng area participated in part of the process.

7.4 Significance, Limits and Additional Research

Data collected by the Huangtucheng Regional Archaeological Survey Project illuminates our understanding of diachronic changes in settlement patterns, artifact types and styles, and the trajectory of sociopolitical complexity, including the establishment of the first villages, development of middle-range societies, and the formation of state-level polities at the regional scale. It shows interactions with the traditionally so-called core areas in the Central Plains and the Yangtze River. We know that the development of social complexity varied among societies. We cannot use a single template to assess the development of sociopolitical complexity in any given period; instead, we should examine these processes at the macroregional scale.

The Huai River region is at the transition between the sub-tropical and warm climate zones, and therefore has special geographic, climatic, floral, and faunal features. This ecological situation might affect the area's economy and cultural traditions. This project was limited to an area north of the Huai River, a zone of mostly alluvial plains between the floodplains of the Yellow and the Huai Rivers. Archaeological data show this area focused prehistorically on rice-agriculture (Peking University and Zhumadian Municipal Office for the Preservation of Ancient Monuments 1998). The people living here still rely on rice as a dietary staple. Millet has also been planted, and its proportion has varied. The suitability of both river valleys for rice cultivation underlies their similarities with respect to agricultural technologies, utilitarian goods, etc.

Previous studies have focused on examining direct influences from peoples of the middle Yangtze, the Central Plains, and Shandong regions on this area, mostly in terms of material culture, such as pottery. This one-way influence model is derived from the assumption that cores influence peripheries, which is a concept from world-systems analysis (e.g., Wallerstein 1974). Thus, sociopolitical complexity is thought to originate in core areas and disperse outward. Although the concept of the world system was developed for the modern world, it has been applied to prehistoric contexts. This model postulates that less-developed areas provide raw materials and resources, while the cores play greater roles in social development.

This research illuminates the process of social development for this part of the upper Huai River region over thousands of years. It also provides evidence for the shifting role of core/periphery for the Huangtucheng area. Over some periods, settlement patterns have been stable, while some transitional periods show rapid changes. The dispersed settlements of the Erlitou and Shang periods match patterns discovered elsewhere, including most areas in the Huai and Shandong regions. This area's settlement patterns and its special subsistence, economic, and political strategies offer much to neighboring regions.

Limitations

This settlement pattern study is limited in scale, providing only a restricted view of macroregional sociopolitical change. I do not propose any direct model for the development of social complexity in the Huai River region due to the scale of these findings. In addition, I made no systematic studies of the late historical periods, especially settlement patterns, because of the absence of a refined chronology or detailed artifact studies.

Additional research

Further research should address general assumptions that this transition area would have passively received influences from core areas. Instead, the Huangtucheng area should be seen as part of a politically independent region, at least over the long course of the Neolithic periods through the Early Bronze periods. Simultaneously, changes in this area also reflect its participation in a greater milieu, including the Yellow River, Yangtze River, and Central Plains regions.

To better understand sociopolitical processes in the Huai River region, we first need to improve our chronology. A refined chronology should be based mostly on the data from this region, rather than uncritically borrowing from neighboring areas and chronologies that are already established. With this refined chronology, we can vastly improve population estimates and hone settlement pattern analysis.

The second urgent research theme with respect to the Huai region is the discovery, evaluation and recording of raw material sources. We have found large quantities of Neolithic stone artifacts and tools. How did they arrive in this alluvial area? Did they come from upstream by riverine processes or via exchange? Further research can address this issue. We need clay studies to enhance ceramic analysis. Although we can visually analyze styles based on samples collected by this project, we don't know where the clays came from, and thus if the ceramics were produced locally to emulate styles from elsewhere. The upper Huai area has been found predominantly relied on rice in the Neolithic times, DNA test might help identify the development of rice cultivation in this area and find out sources for other related to rice agriculture, such as goat and millet. In short, material characterization and compositional analyses would help us understand craft specialization and interregional trade networks.

A third important issue for additional attention is geomorphologic research. Flooding has been a concern for people living along the Huai (and other major rivers) for thousands of years. Fluctuations in the river channel affect the settlement pattern. In this project area, nearly 40 km^2 are buried under flood-deposited sediments. Since we know that a preferred location for settlements was often near watercourses and on terraces, by mapping shifts in the river channel, we can better model zones of preferred landforms, some of which may be obscured at present.

Additional studies will expand our understanding at both macro and micro scales. Excavations will improve our knowledge of the specific chronology and illuminate aspects of sociopolitical and economic processes. Macroscale studies can put the Huai River region into a wider context and elucidate its contributions to other regions across China. This is an important yet overlooked area in our understanding of the Chinese past, and therefore I call for more attention to the Huai River region.

Table 7.1 Settlement Hierarchies in the Liyang Plains.

Tier	**Daxi Period (5000–3500 B.C.)**		**Shijiahe Period (2600–2000 B.C.)**	
Area (ha)	**Site count**	**Closest distance between large sites**	**Site count**	**Closest distance between large sites**
> 4	2	20 km	6	5 km
1.8–4	6		18	
<1.68	26		152	
Total	34		176	

Source: Zhang (2003).

Table 7.2 Summary of Settlement Hierarchies, Largest Site and Walled Towns in the Huai, Middle Yangtze, Middle Yellow and Lower Yellow River Regions.

			Huai		Middle Yangtze	Middle Yellow	Lower Yellow
Dates	**Period**	**U Huai**	**HTC**	**M Huai**	**Jianghan Plains**	**Central Plains**	**SE. Shandong**
1900-1500 B.C.	Erlitou	n/a	2	n/a	n/a	4, 300 ha, WT	2–3
2500-1900 B.C.	L Longshan	3, 45 ha	3, 30.1 ha, WT?	3	4, 120 ha, WT	3, 35 ha, WT	4, 367.5 ha
3000-2500 B.C.	E Longshan	n/a	3, 18.8 ha, WT?	n/a		3	2–3, 17.5 ha
3500-3000 B.C.	L Yangshao	n/a	3, 28.1 ha, WT?	n/a	3, WT	3, 80 ha, WT 3 ha	n/a
4000-3500 B.C.	M Yangshao	n/a	3	n/a	3, 3 ha, WT	2–3	n/a

Note: “4, 300 ha, WT,” for example, means 4-level settlement hierarchy, the largest settlement area is 300 ha, and the area has a Walled town.

Table 7.3 Summary of Nippur-Adab and Uruk-Warka sites by Number of Settlements, the Largest Settlements and Settlement Hierarchies at the Early, Middle and Late Uruk Periods.

Periods	**Nippur-Adab**			**Uruk-Warka**		
	Site count	**Largest settlement (ha)**	**Settlement hierarchy**	**Site count**	**Largest settlement (ha)**	**Settlement hierarchy**
Early and Middle Uruk	132	50	4	40	100	4
Late Uruk	38	50	4	89	230	4

Source: Adams (1981); Pollock (2001).

Table 7.4 Summary of Settlement Patterns in the Early Harappan and Mature Harappan.

	Site count	**Total area of sites (ha)**	**Average area (ha)**	**Largest site range**	**Site hierarchy**
Mature Harappan	1052*	537	7.25	50–100	4
Early Harappan	477	281	4.51	20–40	3

Adapted from Possehl (2002: table 2.15).
Number of sites in table 2.15 is 1019, here use the number 1052 described in the text of Possehl (2002:63).
Note: Site hierarchy information of the Early Harappan is for the Kot Diji phase, and the Sindhi phase for the Mature Harappan period. Details are seen in Possehl (2002:Figure 2.18 and Figure 2.19).

Table 7.5 Political Strategies used in the Central Plains and the Lower Yangtze River Region in the Longshan period.

Central Plains (Collective/Corporate strategy)	**Lower-Yangtze River Region (Personalized/Network strategy)**
• Well-developed bureaucracy	• Evidence of person-centered power, i.e. exquisite jade objects
• Open access to public architecture e.g. large open ritual/ceremonial spaces, council houses	• Not too many public utilities, e.g. walls, water control feature
• Less social stratification	• More social stratification
• Limited personal wealth, not too many fancy tombs	• More exotic, prestige portable goods, fancy tombs
• Craft specialization on utilitarian goods and technology (metallurgy) e.g. standardized, high-quality service vessels	• Craft production on highly specialized field, i.e. jade production, ordinary goods technology is not well-developed as the Central Plains, e.g. household pottery
• Knowledge-based e.g. authority built on leading large public projects, such as preventing flood	• Wealth-based, build power on the control of portable precious goods
• More stable system, houses are well-built and standardized	• Houses are not as well-built and standardized as the Central Plains
• Communal-type houses should be found inside walled-towns	• Less endure of long-term houses or site continuity over multiple generations (more dynamic system)
• Commoner-benefit ritual activity, focusing on predicting public affairs	• Elite-benefit symbolic systems, focusing on special access to supernatural power
• Public feast, more utilitarian goods found at open area	• Feasts emphasizing the show of prestigious goods, limited to certain people

Adapted from Feinman (2000: Table 12.3).

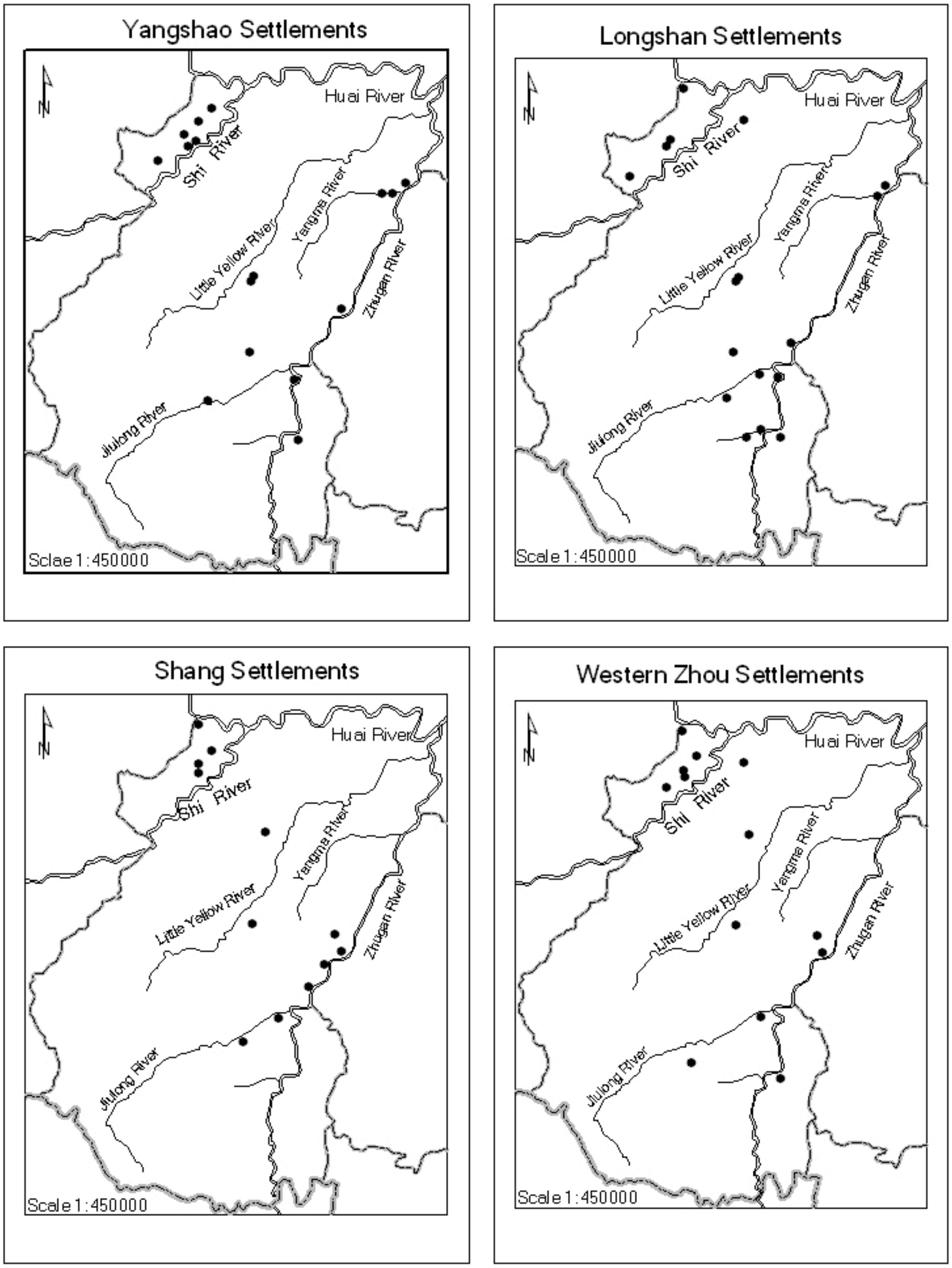


Figure 7.1 Luoshan County settlement pattern changes through time.
Adapted from Henan Provincial Institute of Archaeology and Culture Relics et al. (1992:Figure 1).

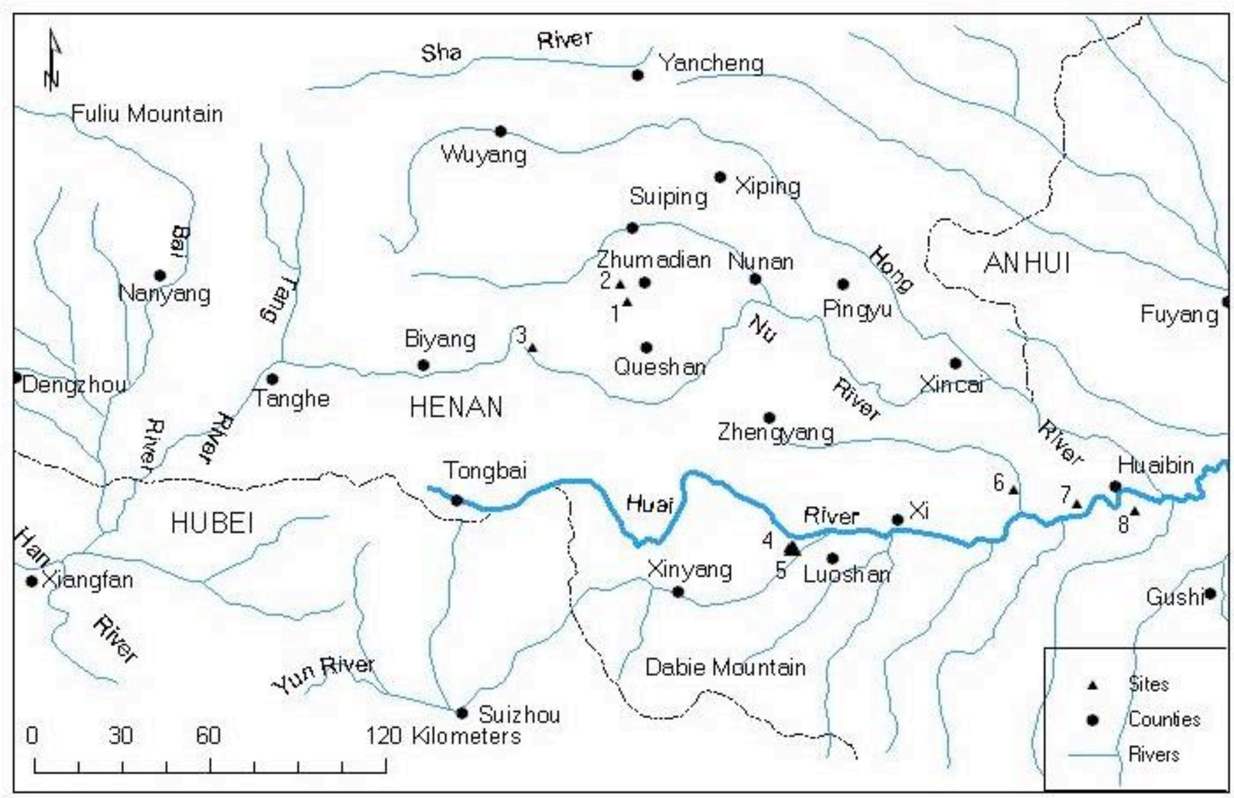


Figure 7.2 The Zhumadian area in the upper Huai River region.
Major sites mentioned in the text: 1. Yangzhuang 2. Danglou 3. Sansuolou 4. Leitaizi 5. Lishangwang 6. Wanglou 7. Huangtucheng 8. Qisi.

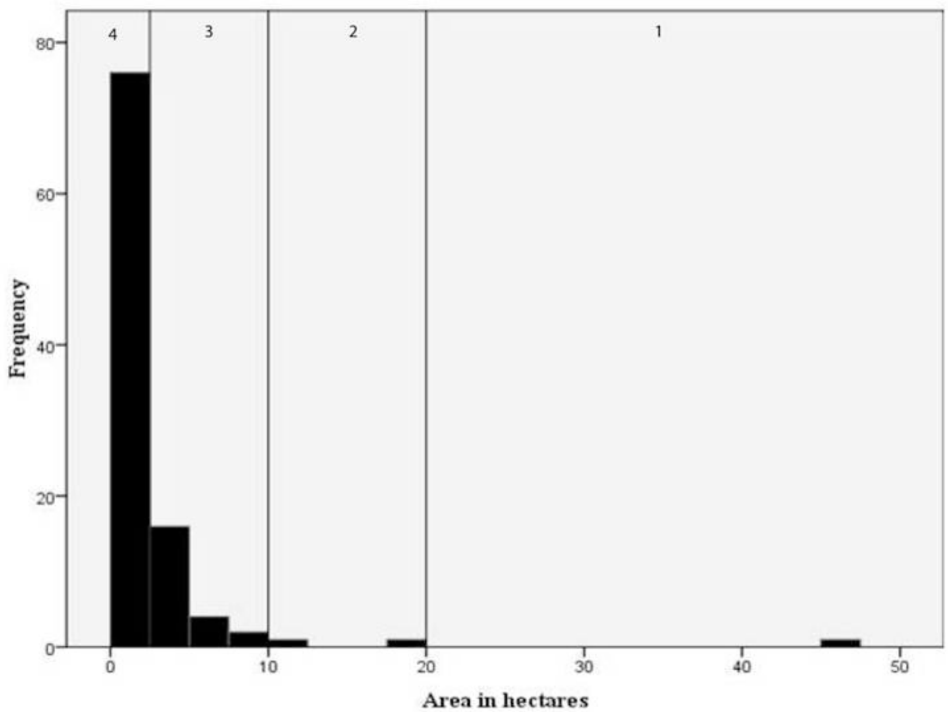


Figure 7.3 Histogram of single-component Longshan site area in the Zhumadian area, upper Huai.

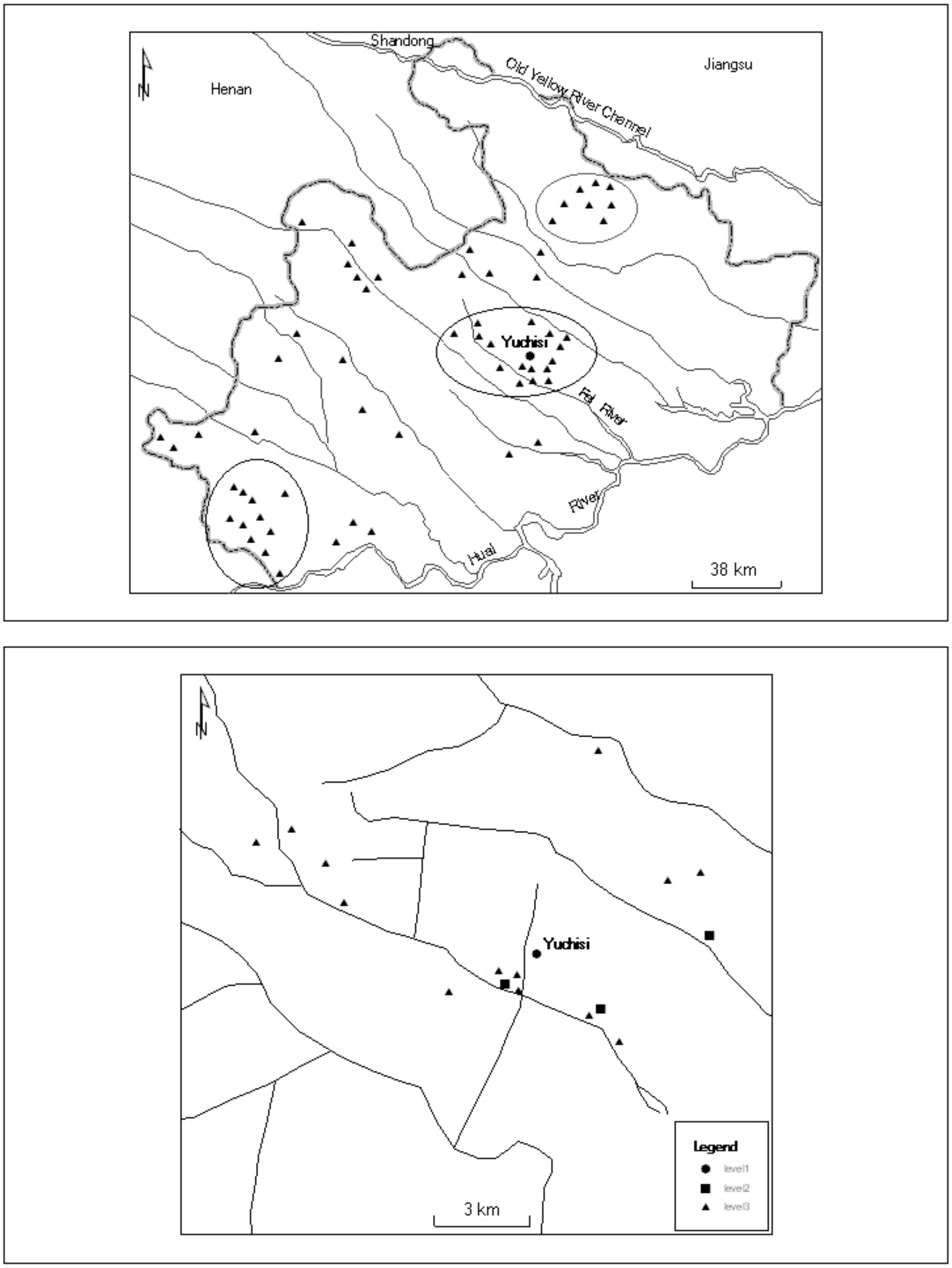


Figure 7.4 Settlement pattern in Northern Anhui and Yuchisi site cluster.
Adapted from Institute of Archaeology (2001:Figure 1) and Chinese Academy of Social Science Anhui Team (1996:Figure 2).

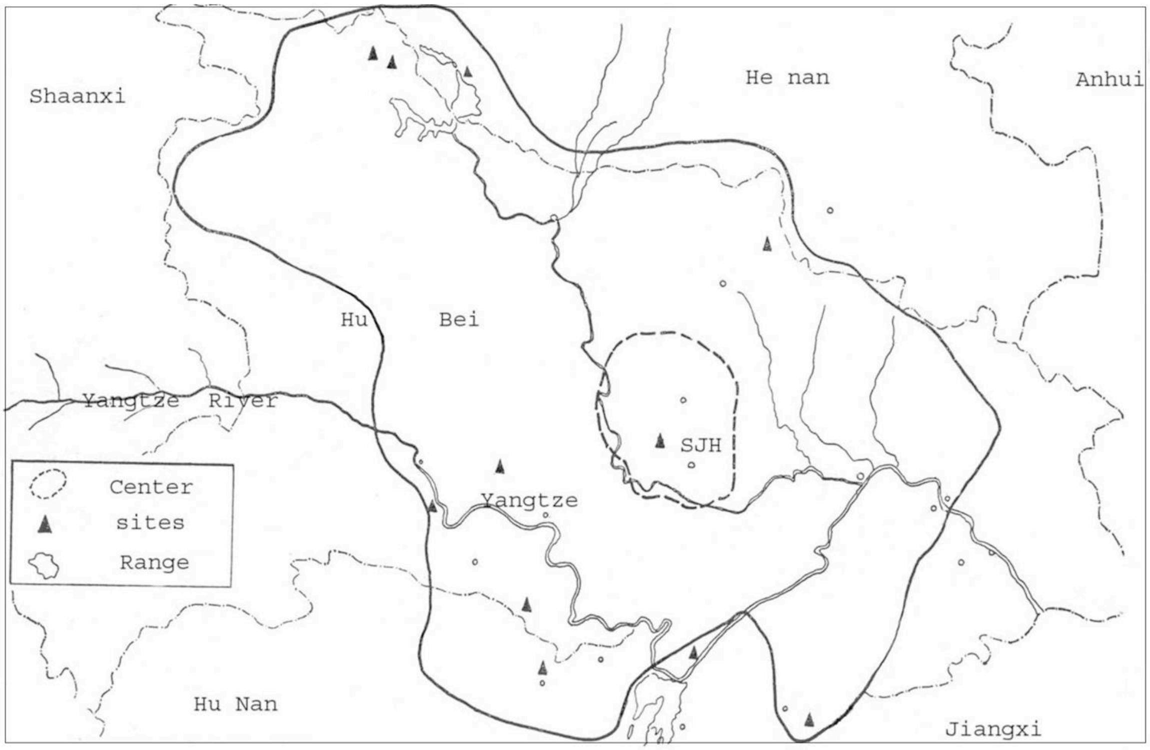


Figure 7.5 Estimated Shijiahe polity territory.
Source: Zhang (1992).

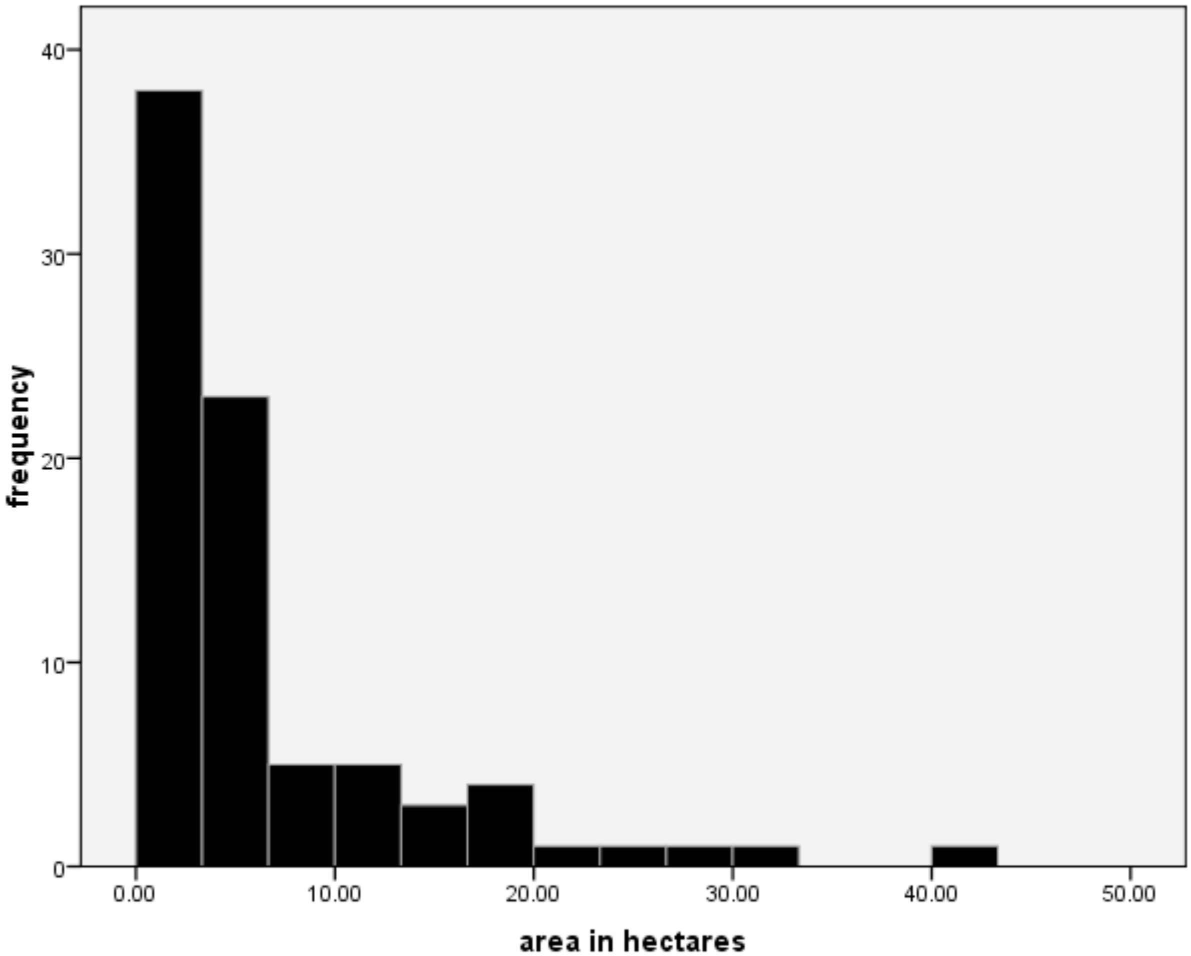


Figure 7.6 Histogram of Kot Diji phase sites, the Early Harappan period.

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APPENDICES

APPENDIX A.1 A LIST OF SITES

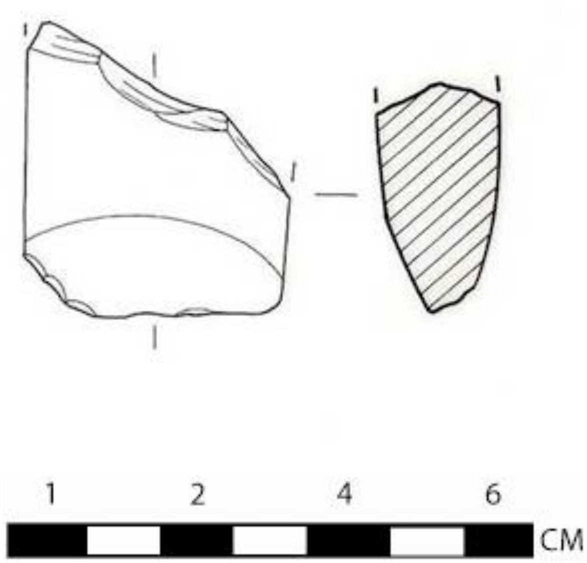
A total of 76 sites were found in the Huangtucheng survey. Detailed information of each site is listed, including site number, longititude, latitude, location and containing components or phases. Phase I-XVII means that this site was continuously occupied from phase I to phase XVII. Phase VIII–IX means a single phase here, that is, Late Shang and Western Zhou dynasty.

Site Number	Site Name	Longititude	Latitude	Village	Town	Components (phases)
HRP001	Huangtucheng	32°24′32.5″	115°15′27.6″	Liweizi	Maji	I-XVII
HRP002	Wulou	32°23′26.2″	115°15′51.0″	Wulou	Dengwan	V, VIII-X
HRP003	Chenweizi	32°23′32.8″	115°15′06.9″	Chenweizi	Dengwan	II-VI,VIII-XIV
HRP004	Bali	32°24′22.2″	115°15′09.7″	Liweizi	Maji	IV-X, XVII
HRP005	Qianzhangweizi	32°24′54.7″	115°15′09.9″	Liweizi	Maji	V-IX, XII
HRP006	Jinan	32°23′20.6″	115°16′01.9″	Jinan	Dengwan	IV-V, VI-XI, XVII
HRP007	Lüdianzi	32°23′14.2″	115°15′17.4″	Lüdianzi	Dengwan	III-VI, VIII-IX, XVII
HRP008	Hongtangmiao	32°23′03.4″	115°15′16.5″	Lüdianzi	Dengwan	V, XI-XII, XII, XVI
HRP009	Miaoxi	32°22′57.5″	115°15′36.2″	Lüdianzi	Dengwan	II,III, XII
HRP010	Taoyao	32°22′43.8″	115°15′10.6″	Lüdianzi	Dengwan	XIV
HRP011	Lügangtou	32°22′27.6″	115°14′39.2″	Lüdianzi	Dengwan	I-XIIII, XVI, XVII
HRP012	Yaozhuang	32°24′38.1″	115°13′19.5″	Lianhua	Luji	XII
HRP013	Liuzhai	32°24′16.4″	115°12′39.3″	Liudayuan	Luji	II-XII
HRP014	Qianlou	32°23′58.5″	115°12′13.2″	Qianlou	Luji	IV, VII-VIII, XII
HRP015	Luzhong	32°23′56.3″	115°12′0.8″	Luji middle school	Luji	III-V, VII-VIII, XII, XIII
HRP016	Zhanglouyaochang	32°23′46.4″	115°13′43.4″	Zhanglou	Luji	XII
HRP017	Kongxiaozhuang	32°23′47.8″	115°11′31.4″	Kongxiaozhuang	Luji	III-V
HRP018	Lijing	32°23′32.6″	115°10′24.6″	Zhanggang	Luji	I-V, VIII-IX, XVII
HRP019	Zhaoying	32°24′30.7″	115°10′43.4″	Zhaoying	Luji	VII-VIII, X-XI
HRP020	Chenying	32°24′56.3″	115°10′37.6″	Chenying	Luji	III, IV, VIII-IX
HRP021	Dongzhuang	32°24′54.9″	115°13′21.9″	Liweizi	Maji	XII
HRP022	Yangzhong	32°25′14.4″	115°14′06.4″	Liweizi	Maji	XII, XIII
HRP023	Yangshulin	32°25′34.4″	115°15′20.3″	Liweizi	Maji	III,IV, VIII-XI
HRP024	Zhaozhuang	32°27′49.2″	115°11′43.2″	Zhaozhuang	Xinli	I-XIII, XV
HRP025	Kongyao	32°26′44.0″	115°11′19.6″	Kongyao	Xinli	II, IV, V, XII, XIII
HRP026	Sunzhuang	32°27′35.2″	115°12′16.7″	Sunzhuang	Xinli	II-V, VIII-XII
HRP027	Yinweizibei	32°26′38.6″	115°12′24.8″	Yinyao	Xinli	IV-VI, X, XII-XVI
HRP028	Yinweizinan	32°26′13.2″	115°12′23.7″	Yinyao	Xinli	IV,V, VII-IX, XII, XIV-XV
HRP029	Fengzhuang	32°27′35.9″	115°13′26.4″	Fengzhuang	Xinli	IX-XIII
HRP030	Yuchang	32°27′41.0″	115°14′54.8″	Yuchang	Maji	I-XV
HRP031	Dawangzhuang	32°27′33.6″	115°15′35.4″	Dawangzhuang	Maji	I-IX
HRP032	Shuaidong	32°26′53.9″	115°17′04.4″	Shuaidong	Maji	II-V, VIII-X, XII, XVI
HRP033	Shuaidongnan	32°26′52.3″	115°16′48.9″	Shuaidong	Maji	XII, XV-XVI
HRP034	Shizhuang	32°24′37.9″	115°17′23.3″	Shizhuang	Maji	III-V
HRP035	Wangliuzhuang	32°24′36.4″	115°16′15.3″	Wangliuzhuang	Maji	VIII-XI
HRP036	Chenzhuang	32°25′23.3″	115°17′36.6″	Chenzhuang	Maji	IV, V, VIII-XI, XII
HRP037	Liuzhuang	32°27′55.2″	115°14′33.4″	Liuzhuang	Maji	II- XII
HRP038	Jinzhuang	32°27′55.1″	115°14′10.5″	Jinzhuang	Maji	III-VI, VIII-IX, XIII
HRP039	Luciyuan	32°25′53.5″	115°18′08.7″	Luciyuan	Taitou	XII
HRP040	Xioalizhuang	32°26′08.0″	115°18′26.6″	Xiaolizhuang	Taitou	III-XI
HRP041	Qianwanglou	32°28′15.2″	115°15′03.1″	Qianwanglou	Maji	II-V, VII-XI, XIV, XVI
HRP042	Xulou	32°27′35.4″	115°16′08.6″	Xulou	Maji	IV, V, VIII-IX, XI, XII
HRP043	Lizhuangbei	32°27′45.9″	115°16′32.4″	Lizhuang	Maji	IX
HRP044	Xiaozhongzi	32°27′28.1″	115°16′57.4″	Lizhuang	Maji	I-XII
HRP045	Dazhongzi	32°27′36.1″	115°16′48.7″	Lizhuang	Maji	I- XII
HRP046	Xiaolizhuangbei	32°26′11.6″	115°18′30.8″	Xiaolizhuang	Taitou	III-V, VIII-IX
HRP047	Zhanggang	32°23′22.6″	115°10′13.2″	Zhanggang	Luji	I-V, VIII-XIII
HRP048	Zhangying	32°26′15.1″	115°08′54.2″	Zhangying	Dongkong	II-V, VIII-XI
HRP049	Weizhuang	32°25′51.4″	115°08′50.6″	Weizhuang	Yangji	II-XIII, XV
HRP050	Chenxiaozhuang	32°25′33.7″	115°08′24.2″	Chenxiaozhuang	Dongkong	XII
HRP051	Xueying	32°23′54.7″	115°08′12.2″	Xueying	Luji	XII
HRP052	Gaodazhai	32°23′38.7″	115°07′59.5″	Gaodazhai	Luji	XII
HRP053	Songwa	32°24′14.1″	115°07′59.3″	Songwa	Luji	III-V, XII, XIII, XV, XVII
HRP054	Beiliuzhuang	32°25′41.5″	115°07′57.9″	Beiliuzhuang	Luji	I- XIII
HRP055	Liuying	32°25′17.6″	115°08′32.5″	Liuying	Luji	IV-V, VIII-XVI
HRP056	Gaozhuangnan	32°25′29.2″	115°08′36.6″	Gaozhuang	Luji	V-VI, VIII-IX, XII, XIII
HRP057	Gaozhuangxi	32°25′34.3″	115°08′26.2″	Gaozhuang	Luji	IV, XII, XIII
HRP058	Waliuzhuangbei	32°24′44.9″	115°15′44.4″	Liweizi	Maji	V
HRP059	Waliuzhuangnan	32°24′36.9″	115°15′47.4″	Liweizi	Maji	V, XIII-XV
HRP060	Yangwafang	32°26′00.3″	115°08′54.0″	Yangwafang	Luji	IV-VI, VIII-IX, XI-XIII, XV, XVI
HRP061	Balidong	32°24′50.0″	115°15′03.8″	Liweizi	Maji	V, VII-XVII
HRP062	Maweizi	32°24′12.5″	115°13′50.3″	Xuweizi	Maji	V
HRP063	Liupozhai	32°24′29.2″	115°12′31.3″	Liupozhai	Luji	IV, V, VIII-IX, XII
HRP064	Liupozhaixi	32°24′24.1″	115°12′21.2″	Liupozhai	Luji	VII, XII
HRP065	Wangxinzhuang	32°25′50.8″	115°12′12.5″	Wangxinzhuang	Luji	XI-XII
HRP066	Yinzhuang	32°25′59.6″	115°13′26.9″	Yinzhuang	Maji	V, XII
HRP067	Sunzhuangbei	32°27′43.1″	115°12′17.9″	Sunzhuang	Xinli	III-IV, V
HRP068	Dachaozhai	32°28′5.1″	115°16′31.8″	Dachaozhai	Maji	II, V, VI, VIII-IX, XVII
HRP069	Liulou	32°28′4.0″	115°16′54.2″	Liulou	Maji	V, X-XI
HRP070	Huzhai	32°25′15.5″	115°18′48.5″	Huzhai	Maji	IV, VII-VIII, XIII
HRP071	Tongzhuang	32°21′17.8″	115°12′49.9″	Houfanzhuang	Luji	XII
HRP072	Liuzhuang	32°24′52.5″	115°08′59.2″	Liuzhuang	Luji	V, VII-IX, XII
HRP073	Renzhuang	32°25′17.2″	115°08′37.7″	Renzhuang	Luji	V, XII
HRP074	Chenxiaozhuangbei	32°25′42.1″	115°08′15.9″	Chenxiaozhuang	Luji	V,VI, XII
HRP075	Xuyingdong	32°23′56.0″	115°08′22.7″	Xueying	Luji	IV,V, VIII-IX, XI-XII,XV
HRP076	Liuzhaibei	32°24′25.5″	115°12′42.6″	Liupozhai	Luji	III-V

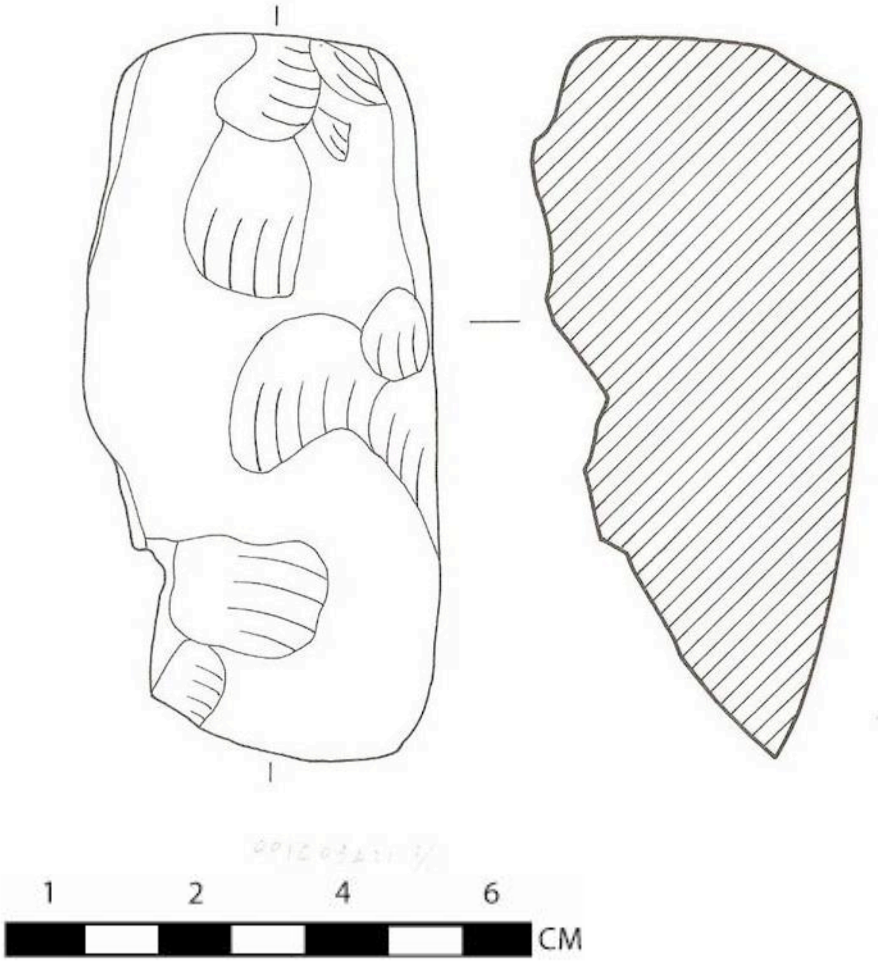
Figure A.1 A list of sites found in the Huangtucheng area.

APPENDIX B STONE ARTIFACTS

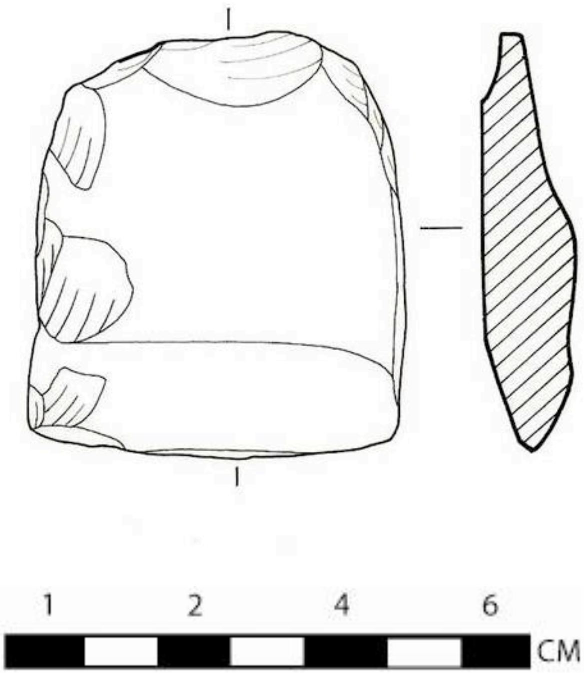
Due to the difficulty of dating and number of stone artifacts we collected, this survey did not give detailed studies on stone artifacts. In general, stone artifacts collected in this survey include several basic types: 1) stone axe (Figure A1-A3; 2) adze (Figure A4-A5; 3) chisel (Figure A6); 4) knife (Figure A7); 5) sickle (Figure A8); 6) arrow heads (Figure A9); 6) spindle whorl (Figure A10); 7) unidentified stone artifacts (Figure A11).



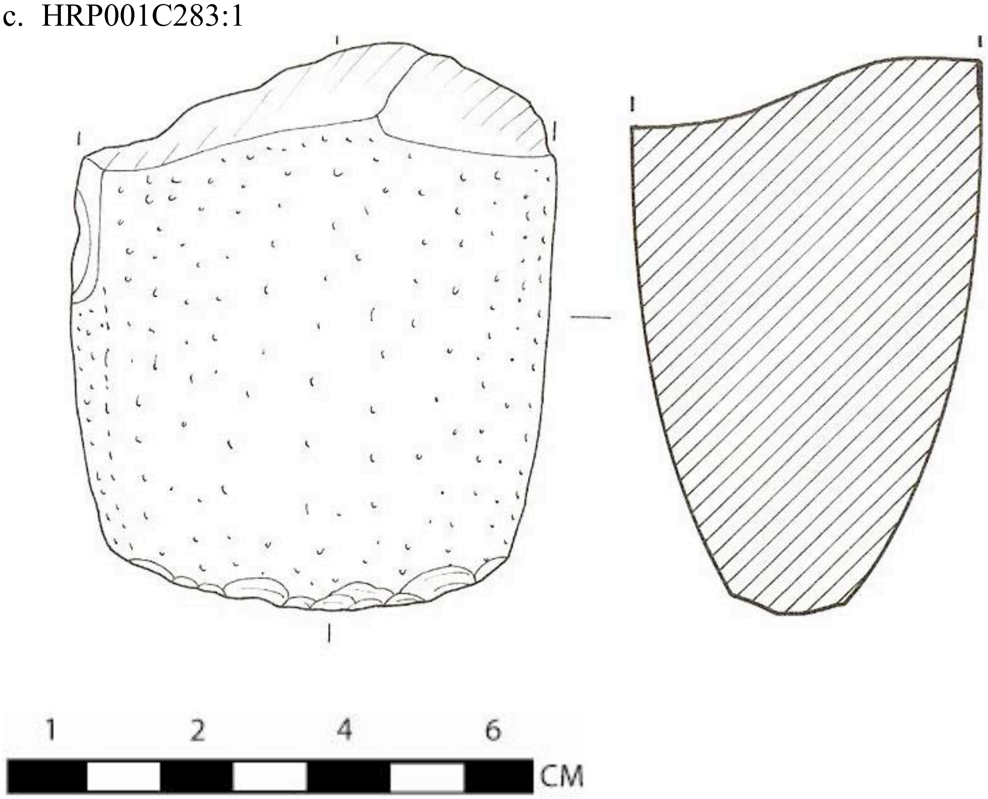
a. HRP001C276:7



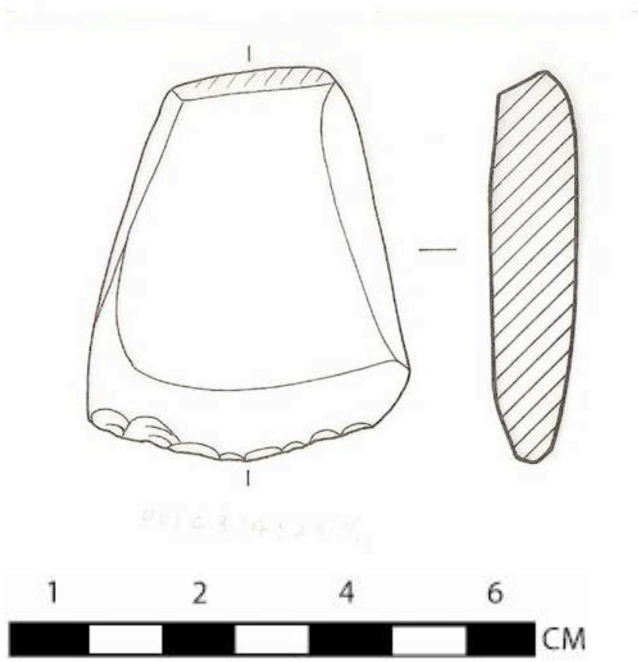
b. HRP001C032:1



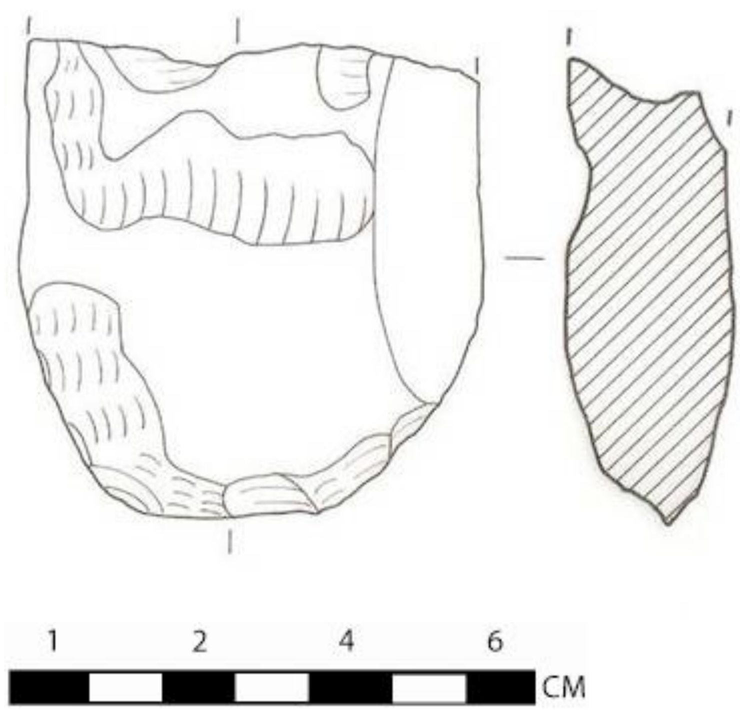
c. HRP001C283:1



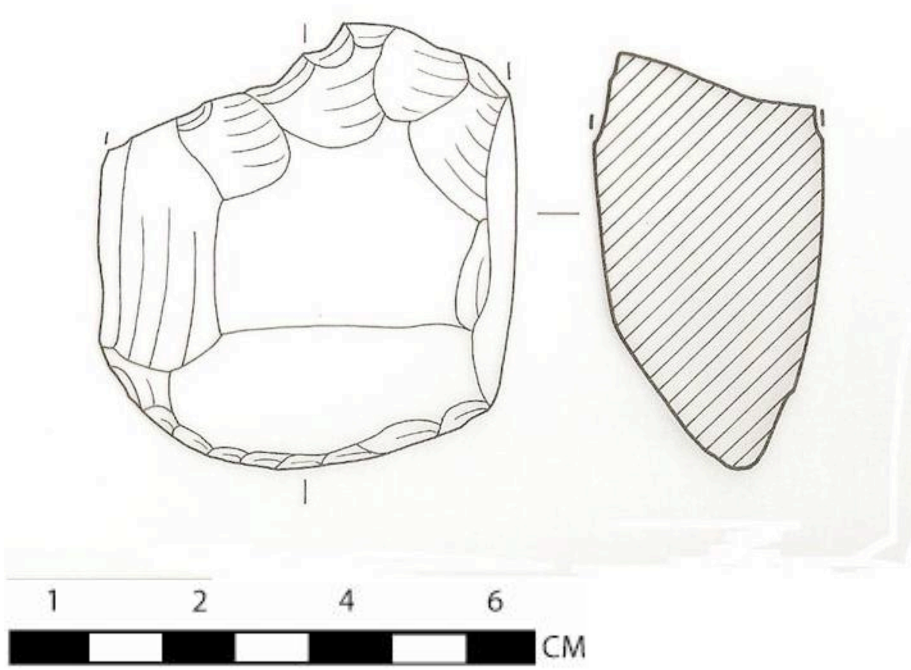
d. HRP001C296:13



e. HRP001C374:20

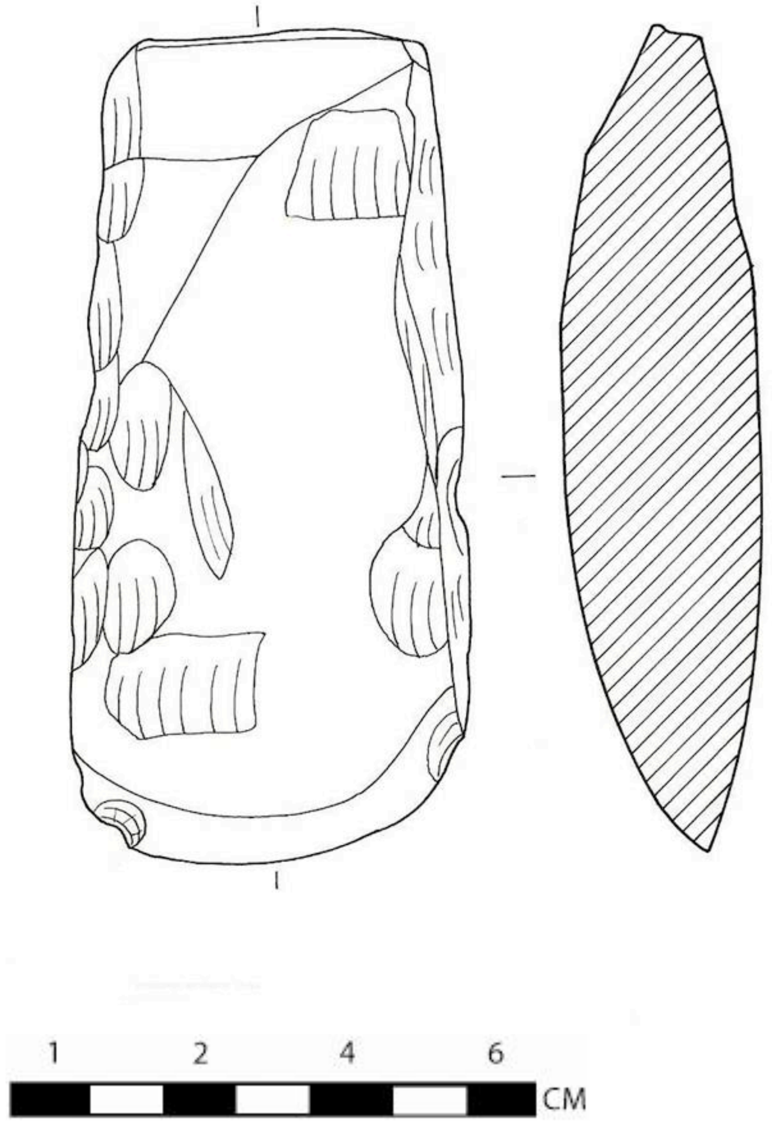


f. HRP001C386:25



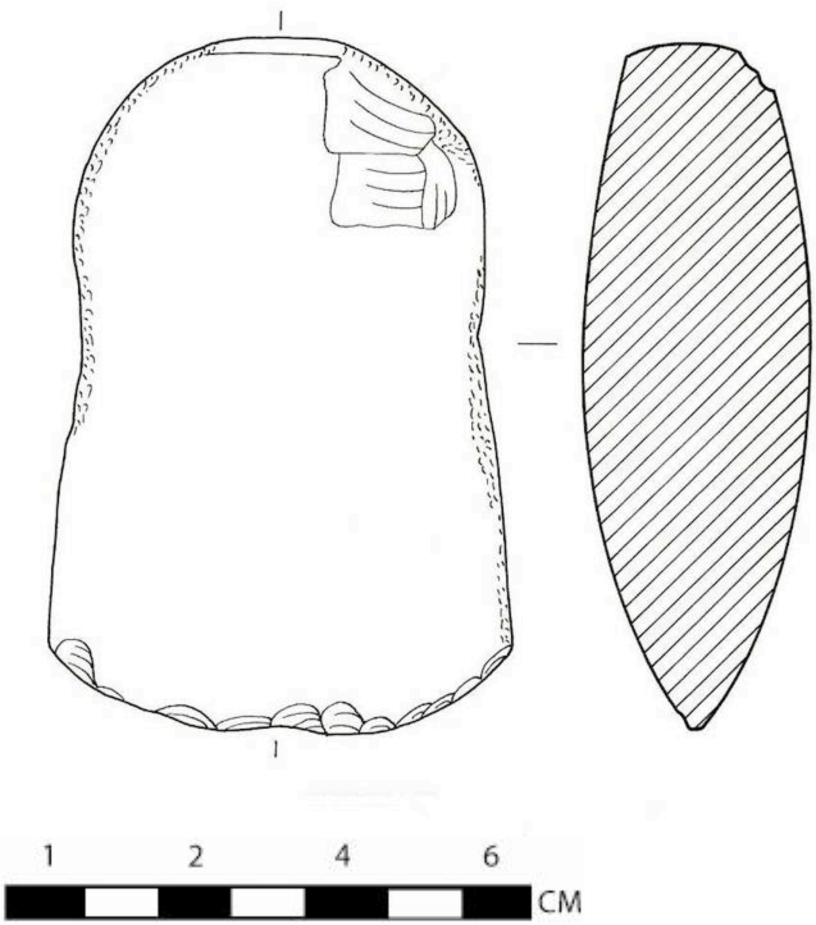
g. HRP001450:7

Figure B.1 Stone axes from the Huangtucheng site.



a.

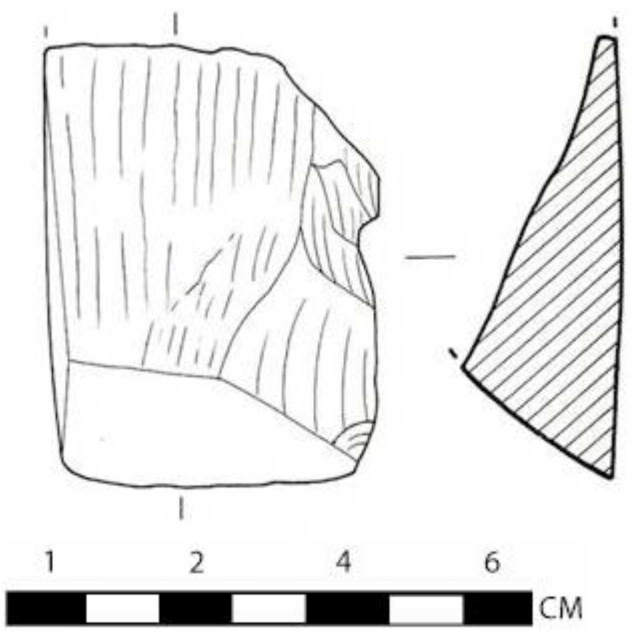
b.
Figure B.2 A stone axe from the Liuzhai site (HRP013C108:1).(a,b are the same artifact)



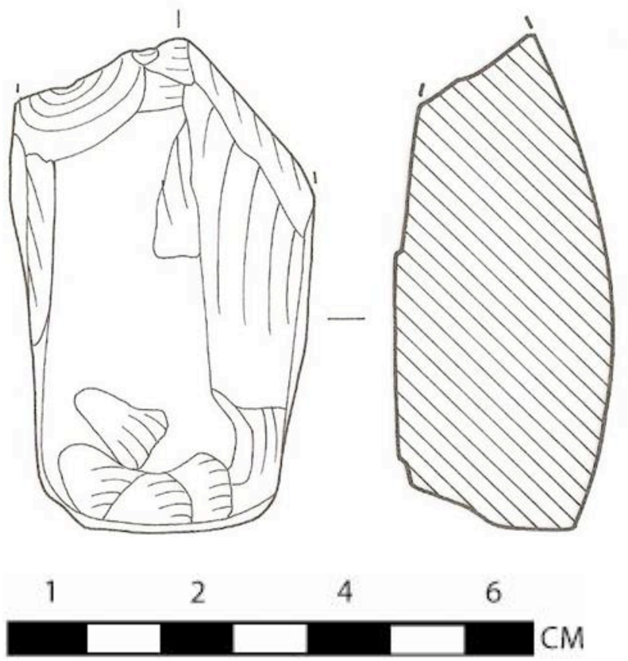
a.

b. front

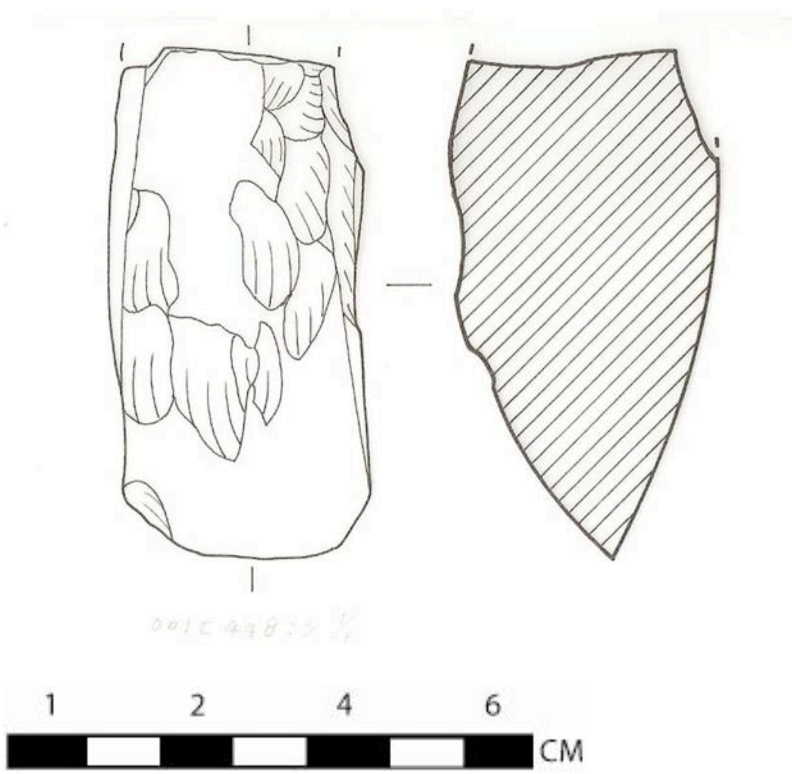
Figure B.3 A stone axe from the Yuchang site (HRP030C249:1)



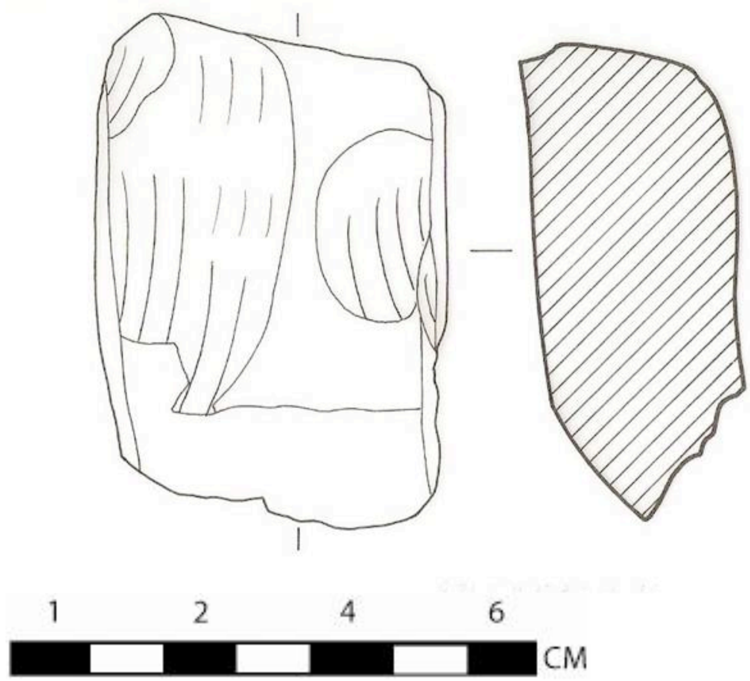
a. HRP001C383:15



b. HRP001C388:9

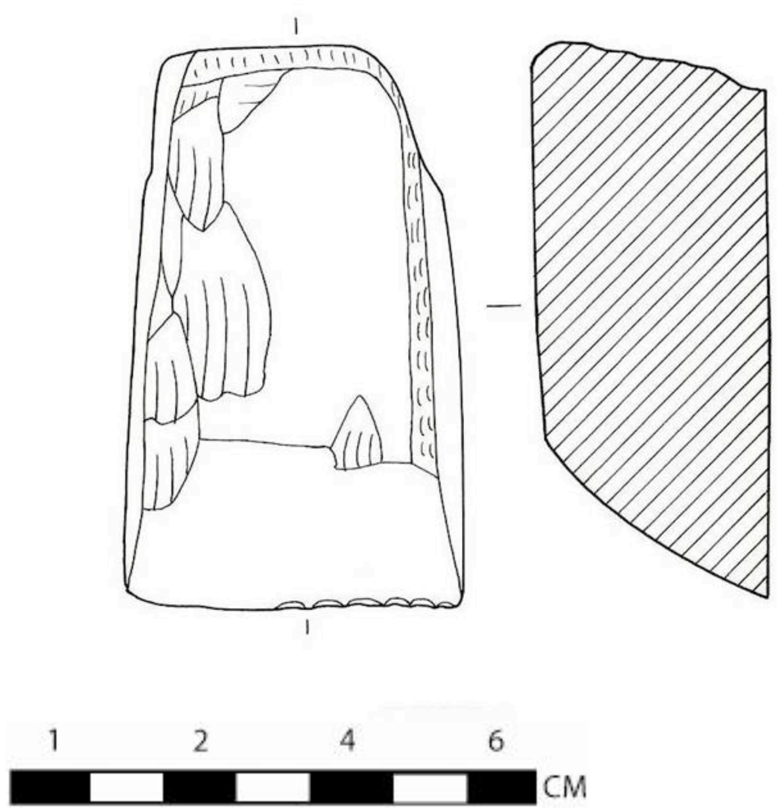


c. HRP001C448:5



d. HRP001C453:12

Figure B.4 Stone adzes from the Huangtucheng site.

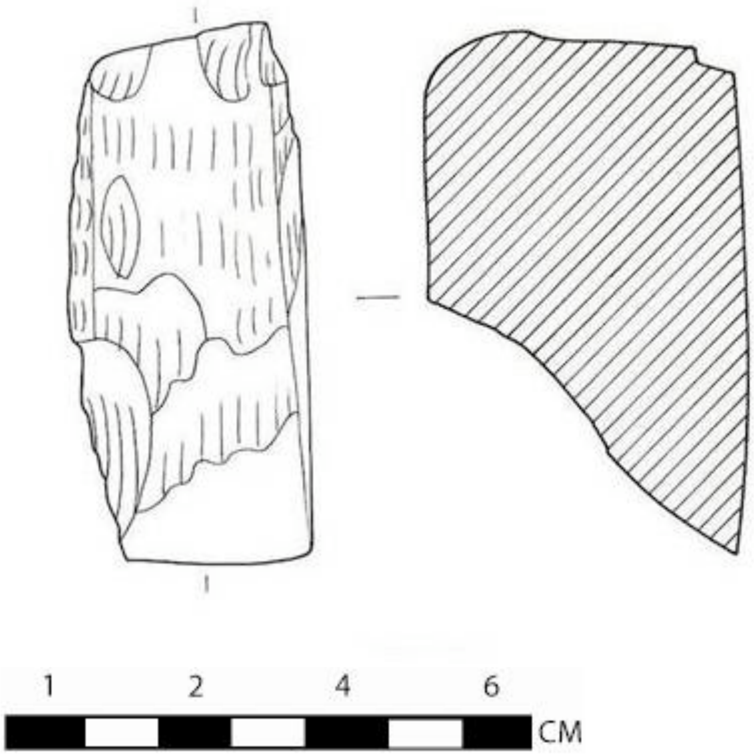


a.

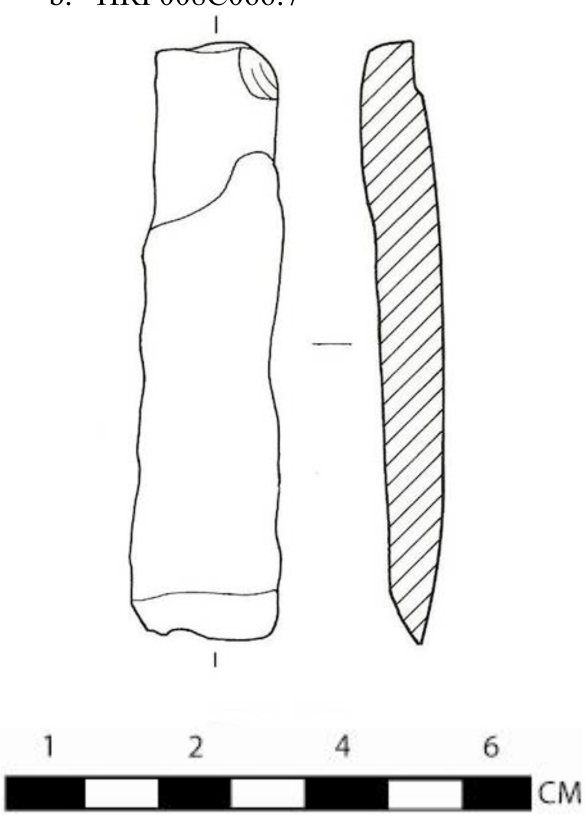
b.

Figure B.5 A stone adze from the Chenweizi site (HRP003C024:17).(a, b are the same artifact)

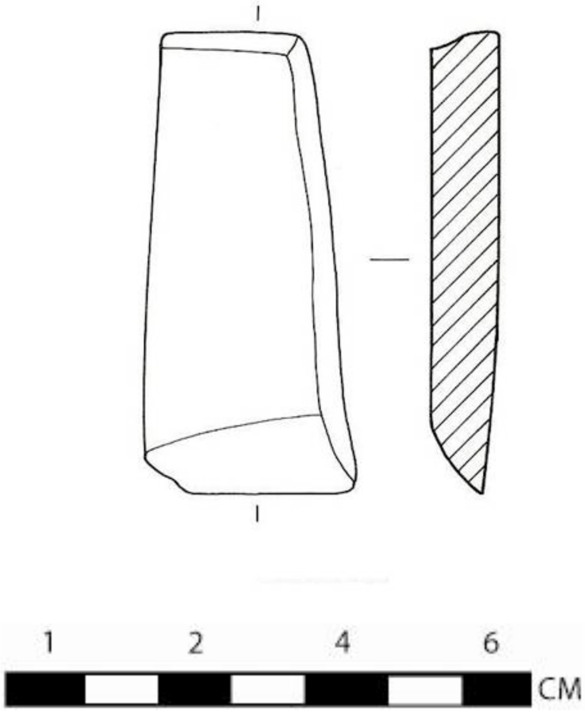
a. HRP001C209:1



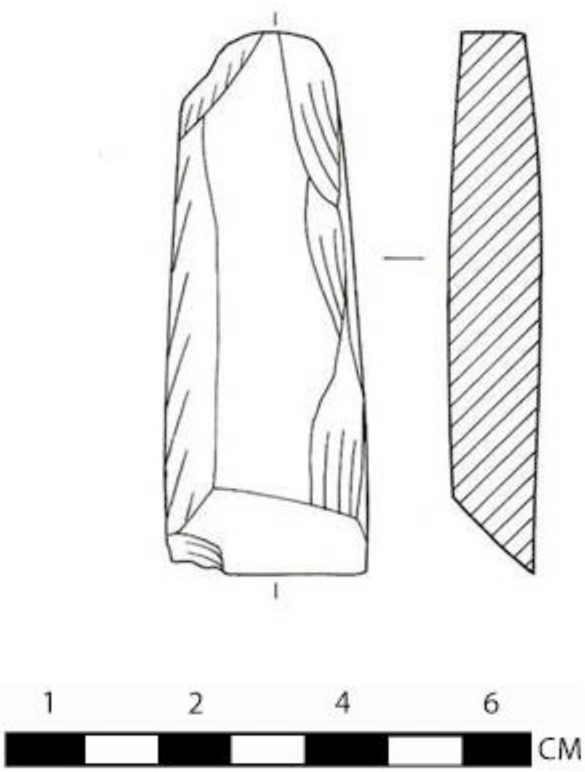
b. HRP008C066:7



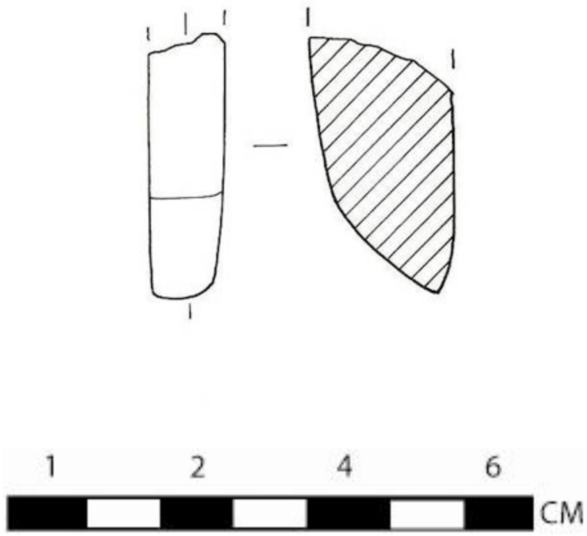
c. HRP024c151:12



d. HRP024C213:1



e. HRP028C194:9



f. HRP047C364:1

Figure B.6 Stone chisels from the survey area.

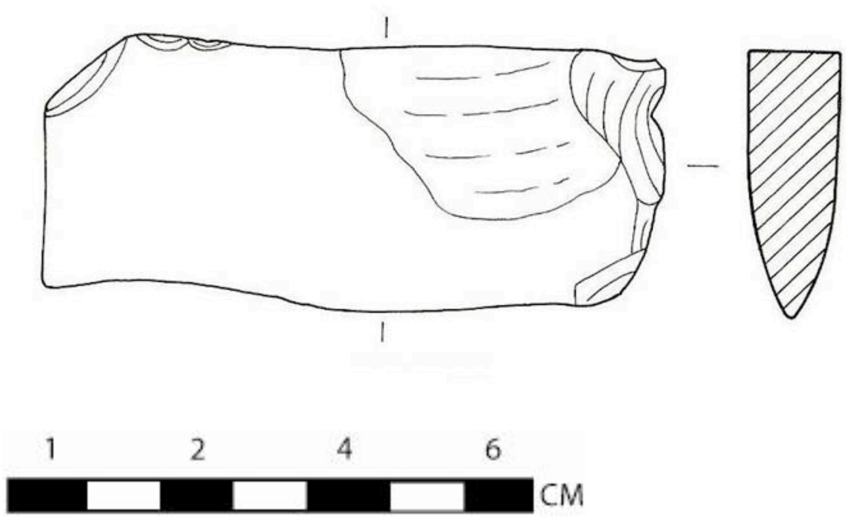
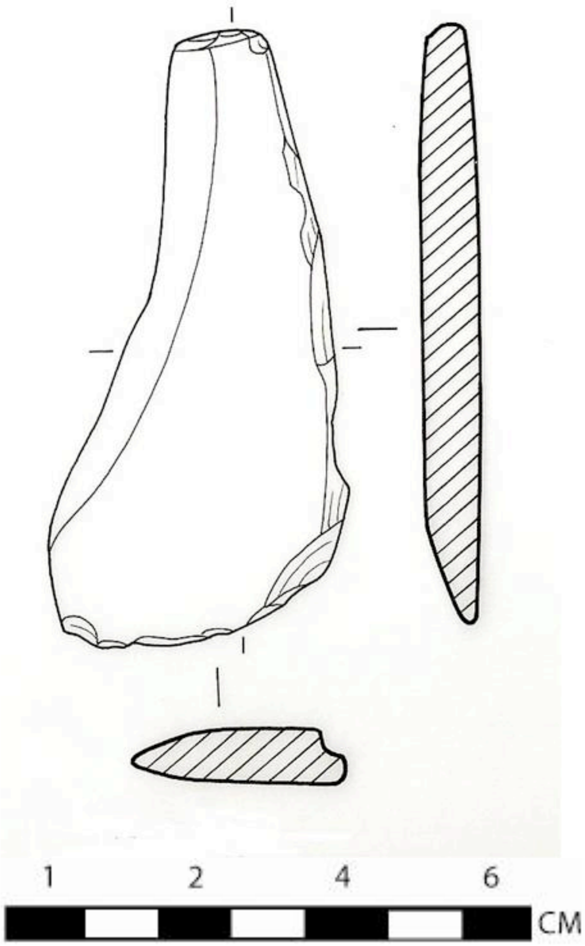
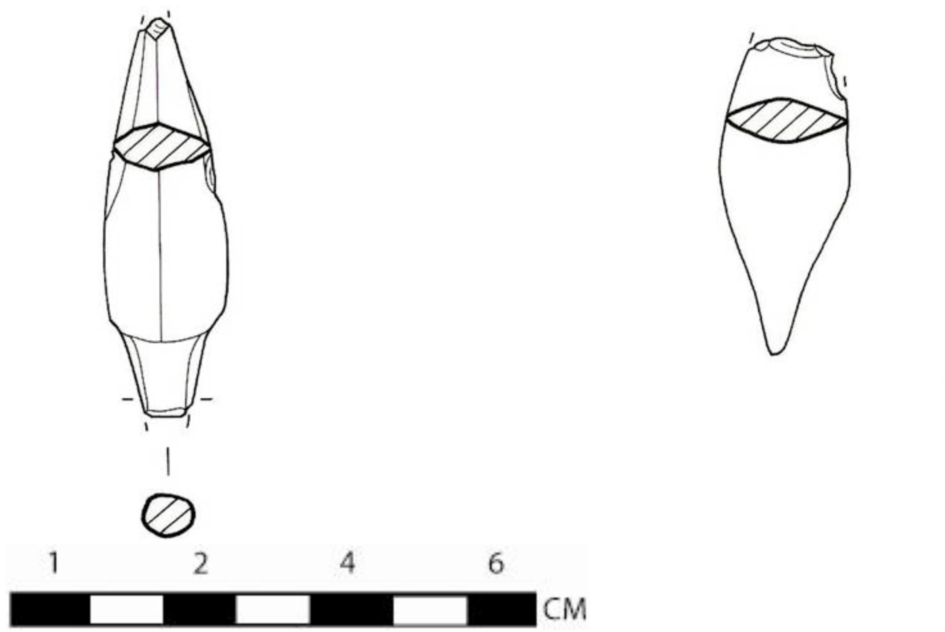


Figure B.7 A stone knife from the Lügangtou site (HRP011C077:42).



a.

Figure B.8 A stone sickle from the Huangtucheng site (HRP001C004:1). (a,b are the same artifact)



a. HRP001C388:7 b. HPR001C388:8

Figure B. 9 Stone arrowheads from the Huangtucheng site.

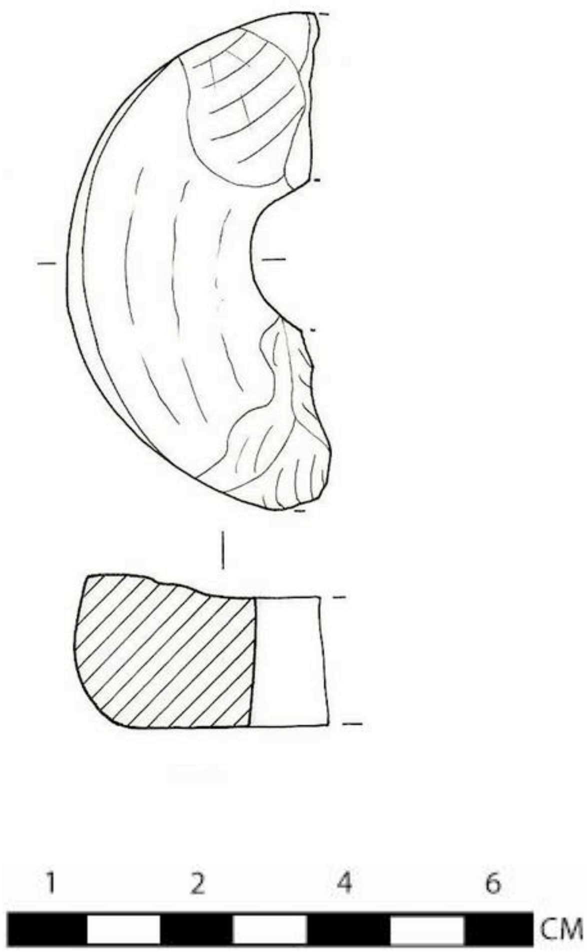
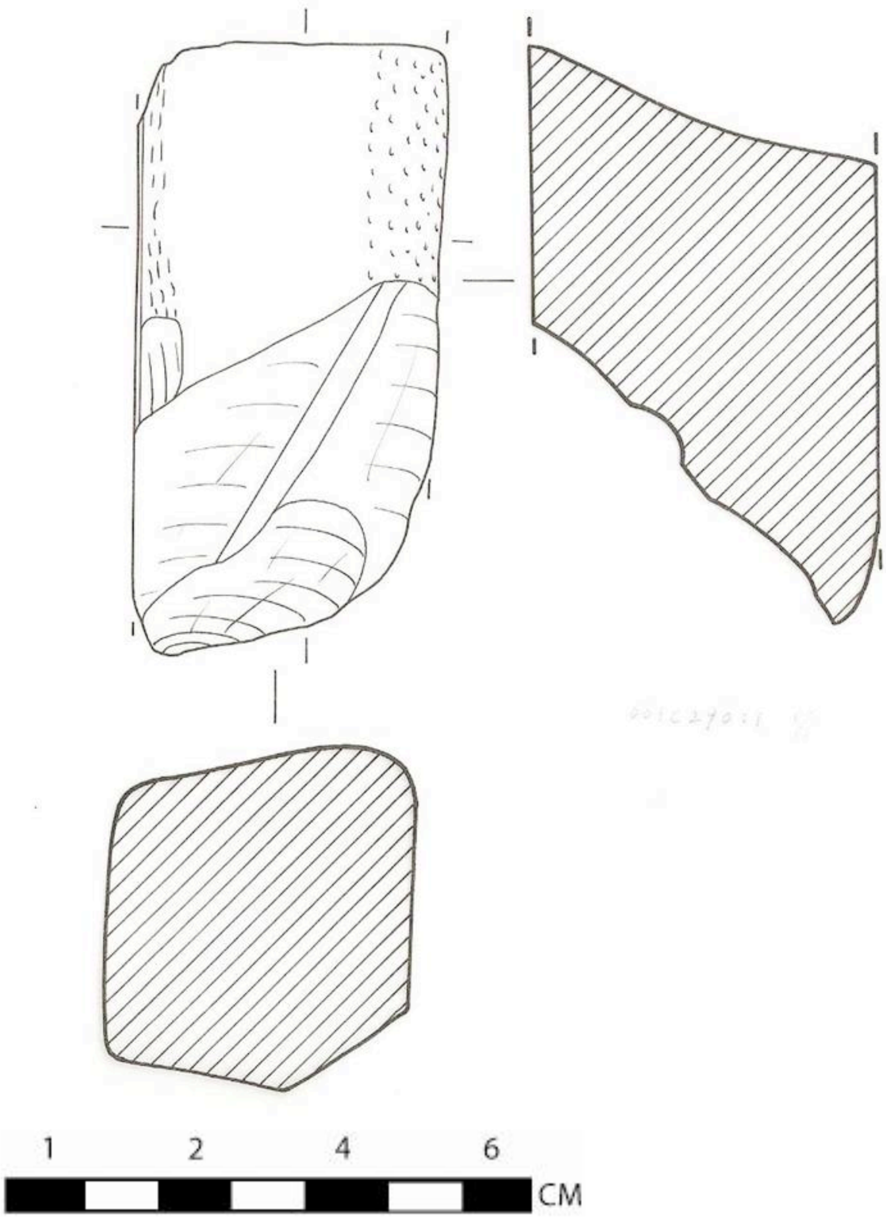
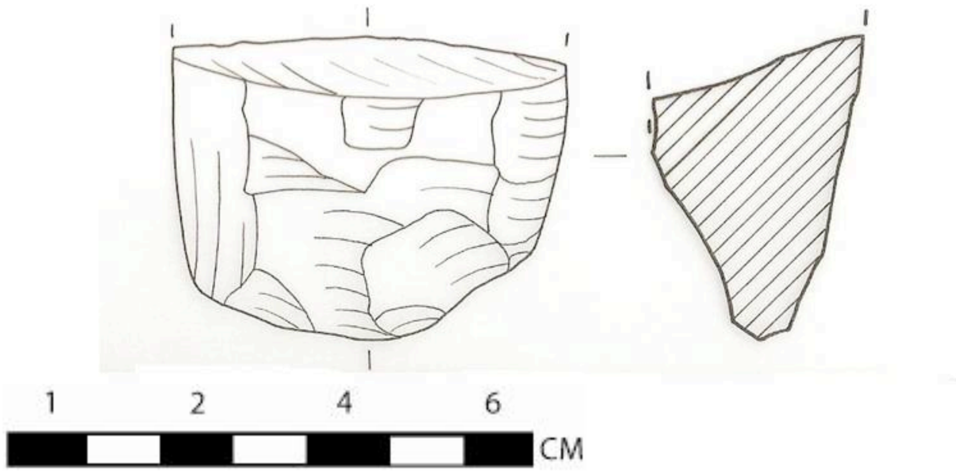


Figure B.10 A stone spindle whorl from the Zhanggang site (HRP047C359:1).



a. HRP001C290:1



b. HRP001C515:2

Figure B.11 Unidentified stone artifacts from the Huangtucheng site.

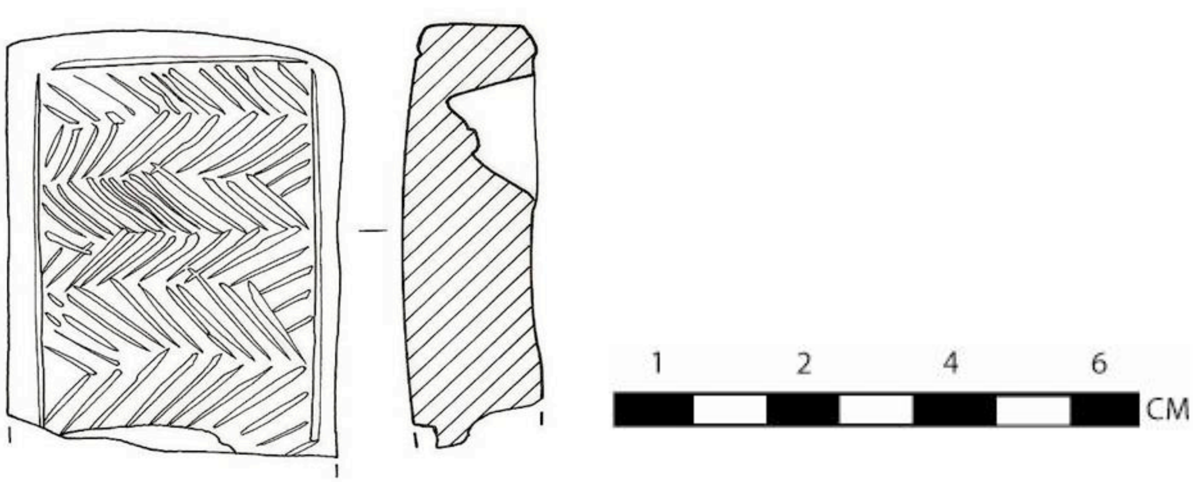
APPENDIX C. POTTERY TOOLS

Pottery tools found in this survey include: 1) base (Figure C.1); 2) spindle whorl (Figure B.2; 3) decoration pad (Figure C.3).

Figure C.1 A pottery base from the Xiaolizhuang site (HRP040C295:1).

Figure C.2 A spindle whorl from the Lügangtou site (HRP011C073:16).

a.



b.

c.

Figure C.3 A decoration pad from the Dawangzhuang site (HRP031C253:6).