Subsistence, environmental fluctuation and social change: A case study in south central Inner Mongolia

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According to the early Chinese textual accounts, the polities of the Central Plain beginning in the Zhou, colonized the territory north of the Wei River, through the Ordos Region under the Great Bend of the Yellow River and north to the borders of modern Mongolia. The historical model suggested that military expansion and cultural diffusion expanded the agricultural lifeway of the empire through population replacement, but the texts do not describe the local social and political environment into which these policies were imposed. Liangcheng County, in central Inner Mongolian Autonomous Region, is an excellent location to study the integration of populations into the Central Plain political system (500 BCE–200 CE). Archaeological survey provides the diachronic perspective that is necessary to examine the process of integration and to facilitate an understanding of how the intrusive social systems affected the indigenous social and political environment.

During the chaotic Warring States period, Central Plain bureaucrats co-opted the feudal manor system of the Western Zhou and created a system of compact villages that assisted administrative control and increased agricultural production. The data here suggest that it is the village system that is exported to Liangcheng. Although the traditional interpretation suggests population replacement, in Liangcheng a settlement system characterized by single family homesteads on land that is not productive for agriculture persists from the Neolithic to the Han Dynasty period. The combination of new farming villages introduced during the Warring States period and the persistence of dispersed homestead sites suggests a gradual process of acculturation to Central Plain social norms, not a wholesale replacement of population. Not until the Han Dynasty does a majority of the populace move into villages on the best agricultural lands.

The stability of the settlement pattern from the Neolithic into the Warring States period in similar locations that are not particularly advantageous for agriculture suggests that indigenous subsistence systems changed little until the Han Dynasty, implying that in Liangcheng, subsistence responded not to environmental fluctuation, but to social and political change.

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

PREFACE

Funding for this project was provided by a Doctoral Dissertation Improvement Grant from the National Science Foundation (#0219794), which funded the entirety of the 2002 field season and a Wenner-Gren Foundation for Anthropological Research Dissertation Fieldwork Grant (#13438) which funded all but a small portion of the 2004 season. Pre-fieldwork grants were provided by the Asian Studies Center (University of Pittsburgh) and the Department of Anthropology (University of Pittsburgh). Field work teams included Zhang Wenping, Han Longlong, and He Zhiyong (Inner Mongolian Institute of Cultural Relics and Archaeology), Zhao Mingxing, Wang Chunxue and Han Jinqiu (Jilin University), Zhao Bing, Zhang Zhonghe and Wang Zengjie (Liangcheng City Ministry of Culture) and Hao Liping (Wumeng Banner Museum of History). The slopes in Liangcheng were always steep, the food was not often good and the salary was never high, but these individuals worked diligently and conscientiously throughout. I thank them for their efforts.

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1. Introduction

The son of the ruling *Shanyu*, Maodun must have known of the intrigue at court. According to the 110th Chapter of the Documents of the Han (*Hanshu*), Maodun's father, Touman wanted to place his younger half brother on the throne of the Xiongnu Confederation. Touman even went so far as to send Maodun as a hostage to the neighboring, more powerful *Yuezhi* tribe and then attack them to bring about Maodun's execution. The plan failed when Maodun escaped and he was given a troop of men to train as a reward for his bravery.

The texts tell us that Maodun enforced discipline ruthlessly in his men, telling them that they must shoot whatever he shot with his whistling arrow immediately and that he would execute any that failed. To test their readiness, he shot his arrow at his favorite horse and then his favorite wife in turn, executing all those who would not discharge their arrows at his target. On the day he shot his father's favorite horse and all of his men shot the horse as well, Maodun knew his troops were ready. On a hunting expedition, he shot his father with the whistling arrow, his men responded in kind, killing the *Shanyu* Touman. Maodun then went on to kill his step-mother and all the other Xiongnu officials who would not take orders from him. Through similar intrigue and ruthlessly enforced discipline, Maodun and the Xiongnu rose to conquer the neighboring nomadic groups to the east and to the west, and within a generation "All who lived by drawing the bow were united into one family…" By 209 BCE the stage had been set for the conflict between the agricultural Han, ruled by the Son of Heaven and the nomadic, pastoral Xiongnu, ruled by the *Shanyu* who took power through regicide (Sima and Watson 1993: 134-141).

These descriptions, paraphrased and greatly simplified from the received texts above, are the basis for the dichotomy of the "steppe and the sown" which has so affected the archaeology and history of the border regions between the Xiongnu Confederation, who controlled the steppe and the Han Dynasty, which ruled China from c. 200 BCE to c. 200 CE. There is a large corpus of historical literature that relates to the period of Chinese History from

the Late Zhou to the Han Dynasty period (c. 771 BCE– c. 200 CE) including the *Zuo Zhuan* (The Commentary of Mr. Zuo), the *Shiji* (The Book of History), and the *Han Shu* (Documents of the Former Han). These histories paint historical events on a grand scale, weaving a parable of good governance and conveying the manner in which the rulers dealt well, or poorly with the important events and issues of the day (Watson 1993: xvii).

The texts allow us an understanding of events across north China from the 10th Century BCE forward, informing us of the rise of the Zhou over the Shang and the establishment of a feudal system of government with ruler-appointed family members to oversee the separate states (*guo*). The texts also report that over the generations relations among these states were strained and conflict arose both between the states and within the states. One of these border states was the Jin, which broke into three separate states as part of a succession dispute in 475 BCE. One of these splinter states was the Zhao state, far to the north, a state that had to both fight wars to the south and protect the northern border. The Zhao was the last state in the north to challenge the Qin for supremacy at the end of the Warring States period, losing a decisive battle with the Qin in 262 BCE (Hsü 1999; Lewis 1999: 640).

Although the texts are important to gain an understanding of the pressure faced by these states, both from internal conflicts within the Warring States period political sphere and from raiding parties to the north, archaeology has become so focused on the names, places and events related by the received texts that too little attention has been paid to many of the most basic attributes of past peoples who lived between the Han and the Xiongnu during this formative period of the Chinese Empire. Asking questions about subsistence and social change during the last centuries of the Zhou Dynasty that lead to the establishment of first the Qin and then the Han Dynasties does not require a rejection of the received texts, but not asking questions about subsistence and social organization will hinder the understanding of the scope, pace, and processes of social and subsistence change that occurred between the Neolithic and the Iron Age in north China. There is no reason not to accept that the Xiongnu and the Han

were the players in the Great Game for control over Inner Asia and the eastern extension of the Silk Road, but this acceptance does not inform us to as the social processes that allowed first the Zhao and then the Han to consolidate their positions across the section of Chinese border north and east of the Ordos region. It is the method of consolidation on the southern side of the border region and in south central Inner Mongolia specifically, that is the focus of this dissertation.

South central Inner Mongolia is part of the "Northern Zone" (Linduff 1997), a region sometimes referred to in Chinese archaeological publications as the Great Wall Region (*Changcheng Didai*). This zone stretches from the coast of the East China Sea, to the forests of Liaoning Province, south and west along the Ming Dynasty period Great Wall towards the Great Bend in the Yellow River, and into the Ordos region the Bend defines (Figure 1). This area, defined roughly by the course of the Han and Ming Dynasty Great Walls, has long been considered a "Zone of Interaction" between the steppe and the sown (*nongyou jiaodaiqu*). However, the nature of that interaction has never been clear.

Because the time depth of the texts is not great, especially in reference to events on the eventual borders between the Han and the Xiongnu, issues of subsistence, social organization and how these might change through time cannot be adequately dealt with through historical data alone. This is true even though subsistence strategy and settlement pattern are the attributes most often used to describe the steppe-sown dichotomy. The Xiongnu are described as, "moving about in search of water and pasture and have no walled cities or fixed dwellings nor do they engage in any kind of agriculture" (Sima and Watson 1993: 129). This passage has been interpreted by modern scholars to mean that the Xiongnu are pastoral nomads. However, this does not inform us as to how this subsistence strategy came about, or how prevalent this lifeway was through the Northern Zone. The accepted view is that environmental change brings about the adaptation of pastoral subsistence strategies before the dawning of the historical

period in the Northern Zone, an hypothesis that has not been well explored in the archaeological record (Di Cosmo 2002; Han 2003; Tian 1991, 2000; Wang and Feng 1991).

On the political side the texts have also lead to questions of interpretation. The texts inform us that the Ordos region was captured by Meng Tian of the Qin between 221 and 210 BCE, lost in the civil war that ended the Qin Dynasty and reclaimed by the Han. But the texts do not inform us as to what this means for the residents of these border regions before, during or after the events take place. Many of the events on the national level (wars, treaties, agreements on trade) had a direct effect on the peoples of the border region and these effects can be studied through the pattern of habitation remains in a region. Historical and archaeological analyses are often made at different scales, but this does not necessarily bring these different scales of analysis into direct conflict. Hypotheses made at larger scales can often be tested against their archaeological correlates at smaller ones.

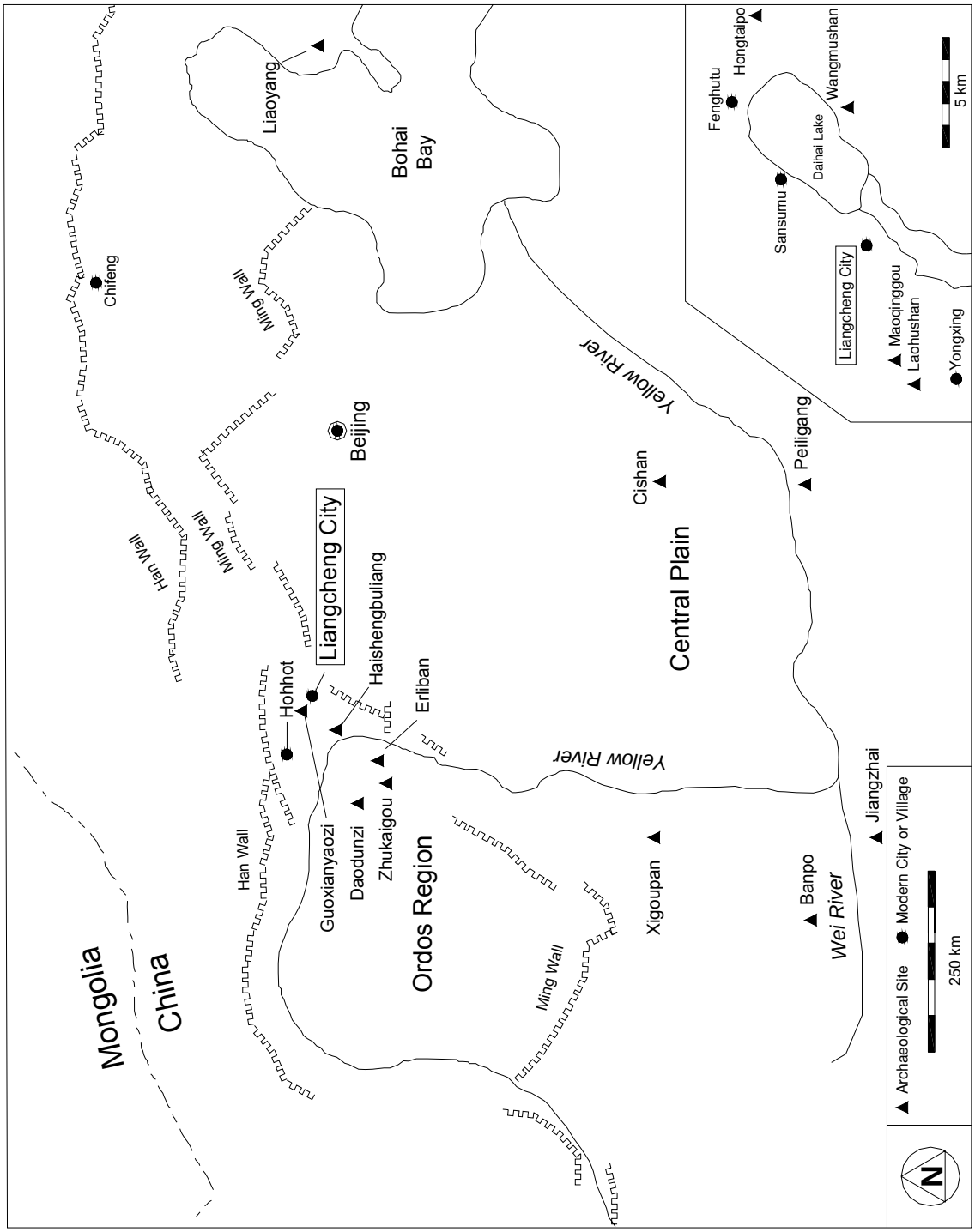


Figure 1. Map of north China with an inset of the Daihai lake region. The Northern Zone, including the Ordos Region, is roughly delimited by the Han and Ming Dynasty Great Walls.

1.1. Analysis at the supra-regional scale

The dichotomy between the steppe (horse riding, pastoralist, mobile and foreign) and the sown (agriculturalist, sedentary and Chinese) has not been constructed from the archaeological data of this region, but the steppe-sown dichotomy has been imposed on the data because of the interpretation of the received texts. The transfer of this binary opposition from the texts has had an effect on the scale of analysis, with both historians and archaeologists analyzing data across tens of thousands of square kilometers, far above the scale at which changes in subsistence strategy and development of communities are thought to operate, sometimes obscuring processes occurring at the local level (Section 1.1.1). These larger scale analyses have been used in the interpretation of data from individual cemeteries or single habitation sites, with certain remains related to historical peoples based on artifact style. Once this connection has been made, historical documentation is used to posit a subsistence strategy (Section 1.1.2).

1.1.1. Historical analysis of the Northern Zone

Historians utilize the received texts to explain events at the largest spatial scale. Most of these studies have two actors: those in power on the Central Plain (in the Pre-Qin/Han period this unitary force is less clear than in the Han Dynasty) and those in power on the steppe (the Xiongnu or another earlier "horse riding people" (*beidi*) who vie for power across north China and Central Asia). These works reinforce the differences between those who practice agriculture and those who may be pastoralists and go beyond the mere description of events to seek the underlying reasons behind the conflict that rages across the Northern Zone throughout the historical period (Barfield 1989; Jagchid and Symons 1989; Lattimore 1962). Is the conflict based on the inability of the steppe zone to produce subsistence resources, as suggested by Jagchid and Symons (1989)? Or is the nature of the Xiongnu political economy, which required plunder of the south to fund the activities of the state, responsible for the conflict? Political organization, not subsistence shortfall is the explanation favored by Barfield, who posits that relations between the steppe and the Central Plain were responsible for the rise of steppe

polities like the Xiongnu and that the political stability of the steppe polities was dependent on raiding across the border. These raids caused the Han to sign a series of unequal treaties with the Xiongnu (called the Heqin Alliances, the first of which was signed in 198 BCE), which allowed the Xiongnu *Shanyu* to provide rare, valuable foreign goods to his subordinates (Barfield 1991: 45-48; 2001; Yu 1990). Without these payments across the frontier, according to Barfield, the internal economics of the steppe would not be able to fund the activities of the state (Barfield 2001).

The internal mechanisms by which these subsistence and political changes operated across the Northern Zone is not clear. For example, how might the peoples of the Northern Zone and beyond have adopted a subsistence strategy that required inputs from the outside, especially because grains are difficult to transport over land? This hypothesis has testable correlates at a smaller scale as it posits that there was not sufficient farming within the Xiongnu polity. Archaeological investigations by Honeychurch in northern Mongolia (2004) and Miniev in Buryatia (Linduff 1997: 87), suggests that the Xiongnu did possess sites that produced agricultural foodstuffs and close scrutiny of the subsidies provided by the Han (as listed in the received texts) do not appear to have been large enough to feed the general Xiongnu population (Barfield 1991: 47).

In the political sphere, Barfield's argument would seem to necessitate a dearth of the building blocks of social complexity within the Xiongnu territory in the areas north of the Northern Zone and into southern Siberia before the rise of the Han. Without a strong Han state to provide subsidies (either directly or through raiding), the Xiongnu *Shanyu* would be unable to raise the revenue necessary from his mobile, pastoralist subjects to fund the state (His theory also assumes that the Xiongnu had no sedentary agricultural component, which is an argument in need of further testing.). Honeychurch's work in northern Mongolia does show the internal development of social complexity, suggesting that although the Xiongnu may have relied on luxury goods procured from raiding to fund some of the political activities of the center, internal

political processes also contributed (Honeychurch 2004; Honeychurch and Amartuvshin 2006). These supra-regional hypotheses made from the texts have regional archaeological correlates that can, and should, be tested at a regional scale.

1.1.2. Extending the texts with archaeological remains

Historians, art historians and archaeologists have attempted to further expand the historical literature by connecting individual historical peoples to archaeological cultures (e.g. Di Cosmo 1999; Qiao 2004; So and Bunker 1995). However, the extensions of the texts are then only as accurate as the connections between the historical peoples and the archaeological assemblages. The complexity of making these connections increases when the received texts use the same proper names to refer to historical "peoples" (*minzu*, an ethnic moniker) and to the names of polities. This practice was common when referring to the horse riding peoples of the north (Psarras 1995). To cite just one example, the Maoqinggou cemetery, in the Liangcheng region under study here (Figure 1, Inset), is thought by some, including the excavators, to be the remains of the Xiongnu (Di Cosmo 2002; Tian and Guo 1986; Yang 2001). Others consider the cemetery to pertain to another group (Lin 1999; Qiao 2004). But whether "Xiongnu" refers to members of a polity, an ethnic group or a subsistence strategy is unclear. Psarras' reasoning is perhaps most representative of the issues that are conflated in these discussions.

> Maoqinggou, for example, although sometimes attributed to the Xiongnu, clearly belongs to a non-Xiongnu sedentary culture. Although there is no basis for positing Xiongnu assimilation at any date, Xiongnu influence is evident. The material of Maoqinggou includes small bronze appliqué ornaments, buckles, and the occasional ornamental plaque, all of which are forms associated with nomadism (Psarras 1995: 106-107).

This paragraph, includes ideas of ethnic identity, political membership and subsistence strategy, all based in the analysis of artifact style. Similar, if not as clearly stated connections between artifact assemblages, historical peoples and subsistence strategies are made by others as well (Di Cosmo 2002; Lin 1999; Qiao 2004). This line of inquiry is mired in definitional tangles that will not be solved with more mortuary data, better stylistic typologies, or better chronologies,

because the connection between ethnicity, artifact style and subsistence strategy is tenuous at best. Ethnographies have shown that subsistence is fluid, not static (Glatzer 1982), which would break the bonds between ethnicities and subsistence that are the basis of much of the physical anthropological (biometric) studies of mortuary remains (e.g. Pan (1986) biometric study of the Maoqinggou cemetery). In addition, the connection between drying environments and specialized pastoralism, oft repeated in the archaeological literature, is also brought into question by modern ethnography showing that mixed, not specialized, subsistence strategies are most advantageous during periods of localized drought (Cambell 1984). Chemical analysis of bones, not further analysis of artifact style, will help solidify links between tomb style, artifact style and subsistence strategy or refute these links entirely (e.g. Cai and Jiu 1985; Pechenka et al. 2002). Placing mortuary and site scale data in its regional context and connecting burials to habitation data will also aid in the understanding of how subsistence practices, as seen in past land use, change through time.

Just as regional and site level analyses have brought the accepted knowledge of the northern side of the steppe-sown dichotomy into question, the southern portion of the steppe-sown model from the historical texts requires the same model-testing at the regional scale. If the characterization of the Xiongnu as politically and agriculturally dependent nomads has proven too simplistic, what about the southern side of the Han Dynasty Great Wall? Might not the view of the Han as unitary independent agriculturalists prove to be too simplistic as well? Little is known about the groups on the southern side of the Han Dynasty Great Wall before these regions are integrated into the polities of the Central Plain and this dearth of knowledge hinders our ability to understand what, if any, changes occur once border areas are integrated.

1.1.3. Building up from the regional perspective: New anthropological context and new connective tissues in the study of history

A regional scale study of an area south of the Han Dynasty Great Wall during the formative Warring States and Han Dynasty periods is needed. This scale would place the known sites in context, allow testing of supra-regional scale hypotheses and recover data that is

directly relevant to the ancient lifeways of the people in the Northern Zone. Regional settlement pattern study produces data at the appropriate scale and of the appropriate type, habitation not mortuary remains.

This dissertation is a regional settlement pattern study that focuses on the local sequence of development in the Liangcheng region of Inner Mongolia, PRC, from the Laohushan period (2900 BCE) to the end of the Han period (c. 200 CE) (Figure 1). This sequence includes the development of communities in the Neolithic Laohushan period, their collapse in the Bronze Age (c. 2000 BCE) and the integration of this region into polities of the Central Plain (c. 600 BCE). By making the changing settlement system in Liangcheng a diachronic case study this dissertation will examine basic questions about changes in subsistence strategy and the connections between these changes and the development of communities or past environmental fluctuations: Does the pattern of land use suggest changes in subsistence strategies through time? When do these changes occur and do they correspond with changes in community structures or environmental fluctuations? These basic questions have not been asked of the archaeological record at the local scale in south central Inner Mongolia, and this has affected the interpretation of the available site level data as it has been applied to regional questions. In addition, by grounding the study in a regional context instead of asking questions bound by the received texts, the questions asked of the data change. Instead of asking about the origin of the Xiongnu across the Northern Zone (Lin 1999; Qiao 2004), this study asks questions about the lifeways of the inhabitants of the Liangcheng region through time, regardless of their connection to the received texts, during each of the chronological periods defined archaeologically (see Section 1.6).

1.2. South central Inner Mongolia: The regional context

Archaeological survey provides the diachronic data necessary to examine the integration of south central Inner Mongolia into the polities of the Warring States and Han Dynasty from a

local perspective. The received texts and archaeological data from outside the survey region provide an understanding of geo-political events occurring across China, from the Central Plain to the Great Mongolian Steppe, that provide background for the events documented locally.

Historians and archaeologists have long known that, during the Zhou Dynasty (1046–226 BCE), the Central Plain political sphere expands into the territories that are now part of the Inner Mongolian Autonomous Region. The mechanism that allowed this expansion has gone unexplored, or has been categorized under the rubric of “sinification”. A diachronic view is necessary to understand the process of expansion at the local level. What changes might integration involve? Was the population predominately agricultural before the Warring States period or do we see the settlement of nomads on the landscape? If agriculture predominated, did integration bring about changes in the agricultural system, or did integration leave the already extant settlement system unchanged? Although the results of this dissertation have historical significance, the goal is to learn more about the subsistence practices and political structure of the Liangcheng Region before and after integration into the Central Plain political sphere that began during the Warring States period and continued into the Han Dynasty. This is an inquiry best begun by analyzing the archaeological data using sound middle range theory and ethnographic analogy.

1.3. The survey region

The survey region, Liangcheng County in western Inner Mongolia, is located approximately 50 km south and east of Hohhot and 70 km east of the Yellow River (Figure 1). Liangcheng County presently averages 430 mm of rainfall annually and has an average temperature of 4-6°C (Nei Menggu 1987: 5). This rainfall, which arrives overwhelmingly in the summer months, does provide enough rainfall for non-irrigation agriculture to be successful. However, the concentrated distribution of this rainfall has a strong effect on agricultural productivity and land use (Section 1.5).

The entire survey includes 307.8 sq km of Liangcheng County, which was divided into two survey zones, the Yongxing Basin survey tract and the Sansumu survey tract (Figure 2). The Yongxing Basin survey tract was chosen to include as much topographic variation as possible. This survey tract extends from the northern Tributary of the Gongbeihe Reservoir, at approximately 1200 masl, north through two upland plateaus to an elevation of 2150 masl. In the modern period the basin itself is dominated by agriculture. If the expansion of agriculture in the Warring States and Han periods leads to a reduction in the land available for herding, as suggested by those who view the two subsistence strategies as incompatible, the upland plateaus might have been places where herders settled so that they would have maximum access to pasture (Cribb 1991; Finkelstein 1995). If economic or even subsistence integration was desirable (or necessary) the mountains between these plateaus would constitute a barrier to this interaction, meaning that plateau residents would need to choose open land over easy contact with peoples on the Yongxing Basin.

The Sansumu survey tract is a roughly rectangular 12 km by 8 km slope that rises gradually from the shore of Daihai Lake to the base of the first mountain ridge. (The survey includes all of the land to the top of this first ridge.) The soil in this zone, especially near the lake shore itself, is thicker and more productive than the Yongxing Basin. The gullies are not as deep and therefore more of the landscape can be easily watered utilizing rainfall runoff. Fields in close proximity to the lake also have a higher water table than the Yongxing Basin.

The pre- and very early dynastic periods in Liangcheng County can be divided archaeologically into five chronological periods (Table 1). Although the archaeology of this region before this survey was centered on the analysis of archaeological cultures, which strictly speaking is different from the establishment of a chronology, the past stratigraphic excavations in this and the surrounding regions will allow the ceramic collections to be divided into chronological periods (Nei Menggu 2000; Nei Menggu and Beijing 2003; Nei Menggu and Riben

2001a). There are several chronological gaps in this sequence that are examined in their chronological sequence.

Table 1. Chronology used in this settlement pattern study.

Period	Dates
Yangshao period	4700–2900 BCE
Laohushan period	2900–2100 BCE
Zhukaigou period	2100–1500 BCE
Warring States period	500–200 BCE
Han Dynasty period	200 BCE–200 CE

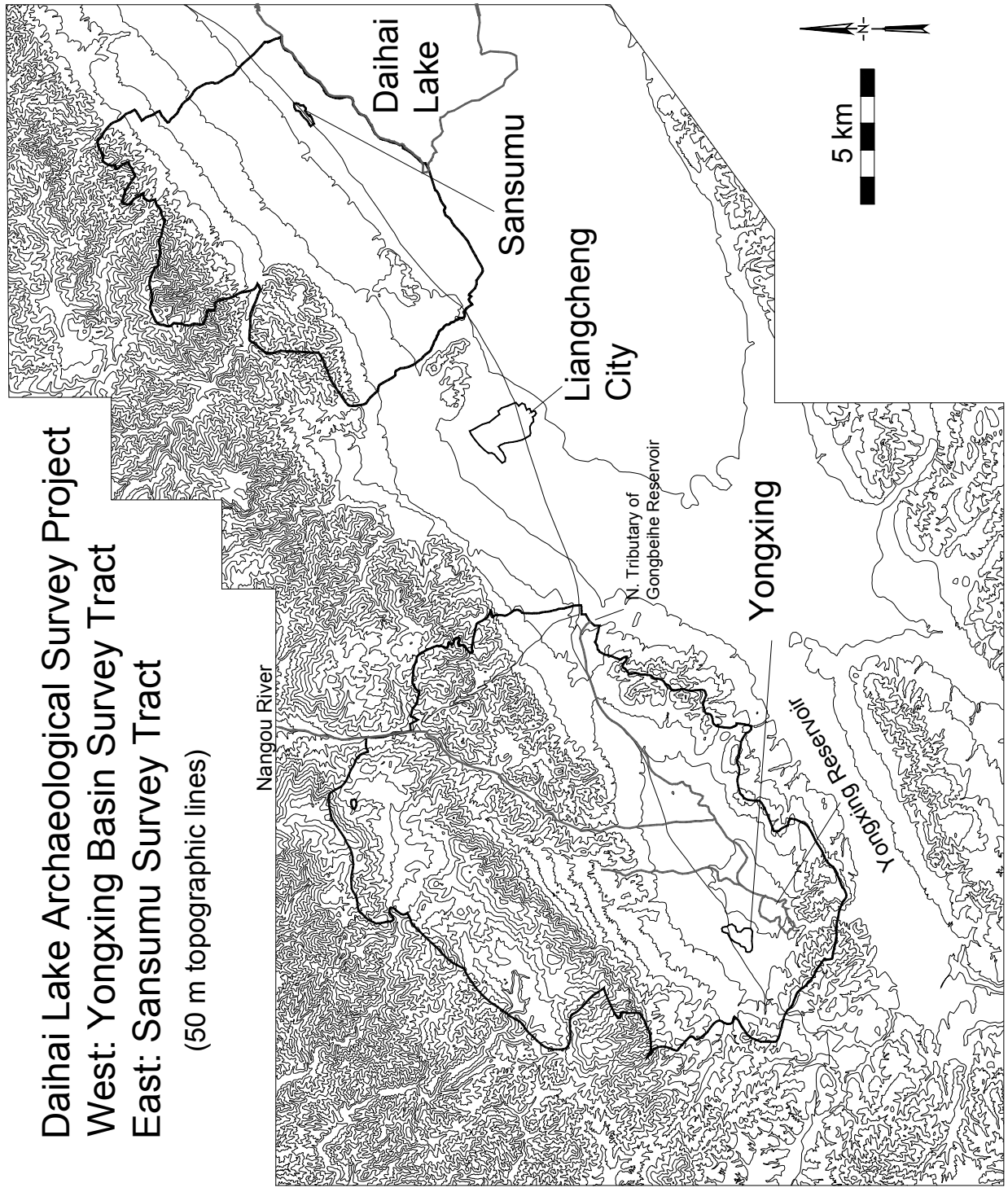


Figure 2. Liangcheng county survey map, showing both survey zones.

1.4. The pushes and pulls of community formation

One of the goals of this settlement pattern study is to examine changes in societal complexity and the interaction among groups of people who inhabit the Liangcheng landscape through time. Changes in social complexity operate at the scale of the community, making the understanding of community formation a fruitful avenue of archaeological inquiry (Peterson and Drennan 2005). The development of communities has not been much emphasized in archaeology and especially in the historical archaeology of China, where social forms are thought best explored through historical documentation.

It has often been assumed that, from the Neolithic period onwards, rural China has been dominated by the farming village (Barnes 1999; Chang 1986; Yan 2000; Zhang 2005). When Gina Barnes (1999) begins her chapter on the Yangshao period with the subtitle, “The Beginnings of Village Life”, specialists concede that this represents the state of accepted knowledge in the field, even if it is a concept that is not well tested. Although data from the Yiluo River valley survey largely supports the conclusion that Yangshao period populations did organize themselves into villages (Chen et al. 2003), the fact remains that the social ramifications of this kind of social organization are largely unexplored (e.g. Peterson and Drennan 2005). Unpacking the implications of village life will aid in the interpretation of the survey data from Liangcheng, especially during the periods when strong community organization is lacking.

There are social and economic forces that bring people together into communities. We join into communities so that we can find mates, celebrate feasts and bury the dead among other things. Although participating in social activities is an important part of being a community member, none of these social interactions are daily occurrences. Living in close proximity to neighbors also facilitates economic interactions. These might include trade for foodstuffs to obtain more palatable foods or to shield against subsistence shortfalls. The secondary products

from domesticated animals are often greater than can be used by a single family unit, and this encourages trade among neighbors as well. At the village level, trading handicrafts of one kind for another undoubtedly occurs well beneath the threshold that might be considered craft specialization. All of these daily, small scale economic interactions would serve to reinforce the social connections that are employed only at certain necessary moments of the ritual calendar.

Also included in our understanding of interactions within communities is the expectation that communities with larger populations also have the potential for a larger number of interactions (Peterson and Drennan 2005: 6). As society becomes more complex, these interactions increase in number and variety. An excellent example of a complex society where residents join into small local communities is modern, rural China. Villages in modern, rural China are places where all of the economic and social interactions described above occur regularly. In addition, the village is also the place where the central government interacts with the farming population. The one child policy, lessons on the use of chemical fertilizer and the payment of utility bills are all managed at the village level. Each village has its own head and party secretary, who interact with bureaucrats at the county level (and above). A system of individual households would provide both physical and organizational challenges to the management of the populace by the central government, therefore individual homesteading is discouraged. A very small number of individual households live outside this village system and these households, which occupy marginal land, are grouped into a neighboring village for administrative purposes.

There are economic costs to community membership. Although living in close proximity to one's neighbors allows for resources to be shared, it also assures that many people compete for the same natural resources. Large communities stress their local environment to an extent that an individual household would not and therefore large populations require larger catchments to meet subsistence needs. In modern China a larger catchment has the practical effect of increasing the distance between residences and fields. The time spent commuting to

cultivate fields is the daily economic cost of village membership. As the area farmed by a village expands (by deforestation, reclamation, or terrace building), the cost of daily travel to these increasingly distant fields may eventually come to outweigh the benefits of village membership, resulting in the establishment of new habitation sites (or new villages) closer to the fields exploited for agriculture. The threshold at which communities bud off, creating new communities is culturally bounded. At different times, we would expect different pulls and pushes to produce a different residential calculus and different size communities. Archaeologically, an understanding of the calculus that created the community structure can be derived by studying the settlement pattern and the community structure it represents.

To cite just one example, if political instability grips the landscape and crop theft were a habitual problem, long distances between houses and fields would become less palatable. In the modern period, where the only human threat to crops is the occasional surveying archaeologist and the pulls of village membership are strong, long distances are traveled daily to fields without over-stressing the bonds of village membership. The economic costs and benefits of community membership change through time, creating the different social and economic structures reflected in changing settlement patterns seen archaeologically in the Liangcheng Region.

1.5. A land classification system based on modern settlement

The two survey zones require different land classification systems. In the Yongxing Basin, the availability of rainfall runoff from the mountains is highly variable. Because the rainfall is highly concentrated, the availability of rainfall runoff is important for agriculture.

Daily rainfall data from the weather station at the Liangcheng County Seat in 1960, 1970, 1980, 1990 and 2000 show that an average of 29.4% of yearly rainfall in Liangcheng falls on the three rainiest days each year (unpublished data, Liangcheng County Department of Weather Statistics). The average rainfall for those same five years was 329 mm, sufficient to

support non-irrigation agriculture. However, the concentrated nature of the rainfall increases the value of fields which can be irrigated with rainfall. In the Yongxing Basin, where the gullies in a large portion of the survey area are deeply downcut, the lower availability of rainwater has an effect on agricultural productivity, especially in the years that rainfall is scarce. In the Sansumu survey tract, the gentle slope of the lake basin and a lack of long, deeply downcut gullies allows rainfall runoff to be utilized more widely across the survey zone. Because the variation in the rainfall availability in the Sansumu survey tract is small, soil quality becomes more important in differentiating between zones of agricultural production.

In the Sansumu survey tract, Daihai Lake, which has a smaller area now than in the past, has affected soil quality (Table 12). Fields near the modern lake shore are more fertile than fields farther towards the mountains. These soils have not been subject to erosion and fields very close to the lake not only received more runoff through time, but were once repositories of lake sediment as well. The lake also affects the depth of the water table, further increasing the value of lands near the lake. In general, the land in the Sansumu survey tract is more fertile than the Yongxing Basin survey tract and the differences between the land classifications in the Sansumu survey tract are more subtle; both of these characteristics can be seen when the land classification developed below is compared to modern settlement.

1.5.1. Land classification in the Yongxing Basin survey tract

Today in the Yongxing Basin survey tract, there are five major categories of land with different implications for agricultural productivity (Figure 3). Two of these categories lie on the lowland plains and are labeled irrigable and non-irrigable plains in Figure 3. In general, this land is very productive for agriculture because the soils are deep and fertile, the landscape is level and easy to cultivate, and erosion is negligible. Today, these lands are completely dominated by agriculture, some of it irrigated in the recent past.

The rainfall pattern described above increases the agricultural productivity of areas of the Yongxing Basin adjacent to shallow gullies or streams which allow rainfall runoff from the

mountains to be easily directed into fields. The areas of the Yongxing Basin survey tract west of the Nanhe River are more productive than lands east of this river (Figure 3). The northern tributary of the Gongbeihe Reservoir does flow east of the Nanhe River, but it has cut deeply into its channel. The downcutting of the river has caused the erosional gullies to downcut as well. The topographic maps differentiate gullies that have downcut the surface, and therefore direct water far below the surface of the landscape where it cannot be utilized for irrigation, and gullies that are shallow, and therefore are more easily exploited for irrigation. These two kinds of gully are mapped in Figure 3 with thick lines indicating the deeper gullies and thinner lines indicating the shallow gullies. These gullies are used to divide the lowland plains in the Yongxing Basin into two categories: lands that would be irrigable with water redirected from shallow gullies (irrigable plains), and lands that would not be irrigable in this fashion (non-irrigable plains). The soils are thicker and more productive on the plains than in any other land class in the survey region, but the difficulty in exploiting rain water in the non-irrigable plains affects the productivity ranking of the non-irrigable land. Of the five land categories utilized in this analysis, the irrigable plains rank highest in productivity and the non-irrigable plains rank third.

The plateau region (which is essentially a high valley floor) has undergone many of the same geological processes as the Yongxing Basin. Two plateaus are included in the Yongxing Basin survey tract. The Sanqing Plateau is at an elevation of approximately 1700 masl and the Dongshihao Plateau is at an elevation of approximately 1800 masl. These areas, especially the Dongshihao Plateau, are colder and wetter than the Yongxing Basin. The slopes overlooking these plateaus were extensively terraced in the modern period, allowing planting along the ridge lines. The topography funnels rainfall onto the plateaus, which are dominated by a 10 to 20 m wide strip of grassland in the very center of the valley along the principal stream, and by raised fields along the edges of the basins. The two great disadvantages of these plateaus are inconvenient roads and a shorter growing season. The roads are poor, in part, because this

region is too cold to produce the region's main cash crop, corn. Only cold adapted crops like potatoes and *yanmai* are grown on the plateau, and the export of these crops has not warranted an investment in better roads. In the past, the export of crops and the isolation of this region may or may not have been a factor in the location of settlement. In terms of agricultural productivity, the plateaus rank second, behind the irrigable plains.

The fourth ranked soil productivity zone in the Yongxing Basin survey tract is the slopes, which is the land classification that receives the most immediate rainfall runoff from the mountains, and the first of the water from the spring thaw. Although the slopes are well positioned to take advantage of summer rains, the soils are thinner and slightly sandier. Topographically, slopes are more prone to erosion and are less likely to absorb water. Terracing completed during the modern period has made this land more productive by increasing the amount of water absorbed by the soils and reducing the likelihood that seeds would be washed away by spring rains. Although terracing has increased the productivity of these lands somewhat, they are still not as productive as the two classes of land on the lowland plains or the highland plateaus.

Above the slopes are the bases of one of the two mountain ridges that traverse the two survey zones, the highest rising over 2100 masl. The mountains themselves are too steep to farm, and thus rank fifth in productivity out of the five zones. In the past these mountains must have been an excellent source of timber. The mountains have been overgrazed in the modern period, and although herding animals in the mountains has been made illegal as part of soil conservation and reforestation projects, herding is still quite common in the mountains.

1.5.2. Land classification in the Sansumu survey tract

The Sansumu survey tract does not possess the topographic variation of the Yongxing Basin survey tract. The Sansumu survey did not extend to the upland plateaus beyond the first mountain ridge and therefore only four productivity zones are outlined here (Figure 3). The most productive land is the area immediately adjacent to the lake. The water table is higher here and

the soil quality is good as well. This land is labeled Sansumu soil class one in Figure 3 and is farmed very intensely in the modern period. There is a secondary category of land on the lake basin that is not farmed so intensively. This agricultural productivity class is labeled Sansumu soil class two. The dividing line between the first and second soil classes, the two most productive categories of land in the Sansumu survey tract, was drawn by tracing the elevation at which the lowest fallow lands could be seen in the satellite image. The next most productive category of land is the slopes, followed by the mountains. Both have the same attributes as the slopes and the mountains in the Yongxing Basin survey tract.

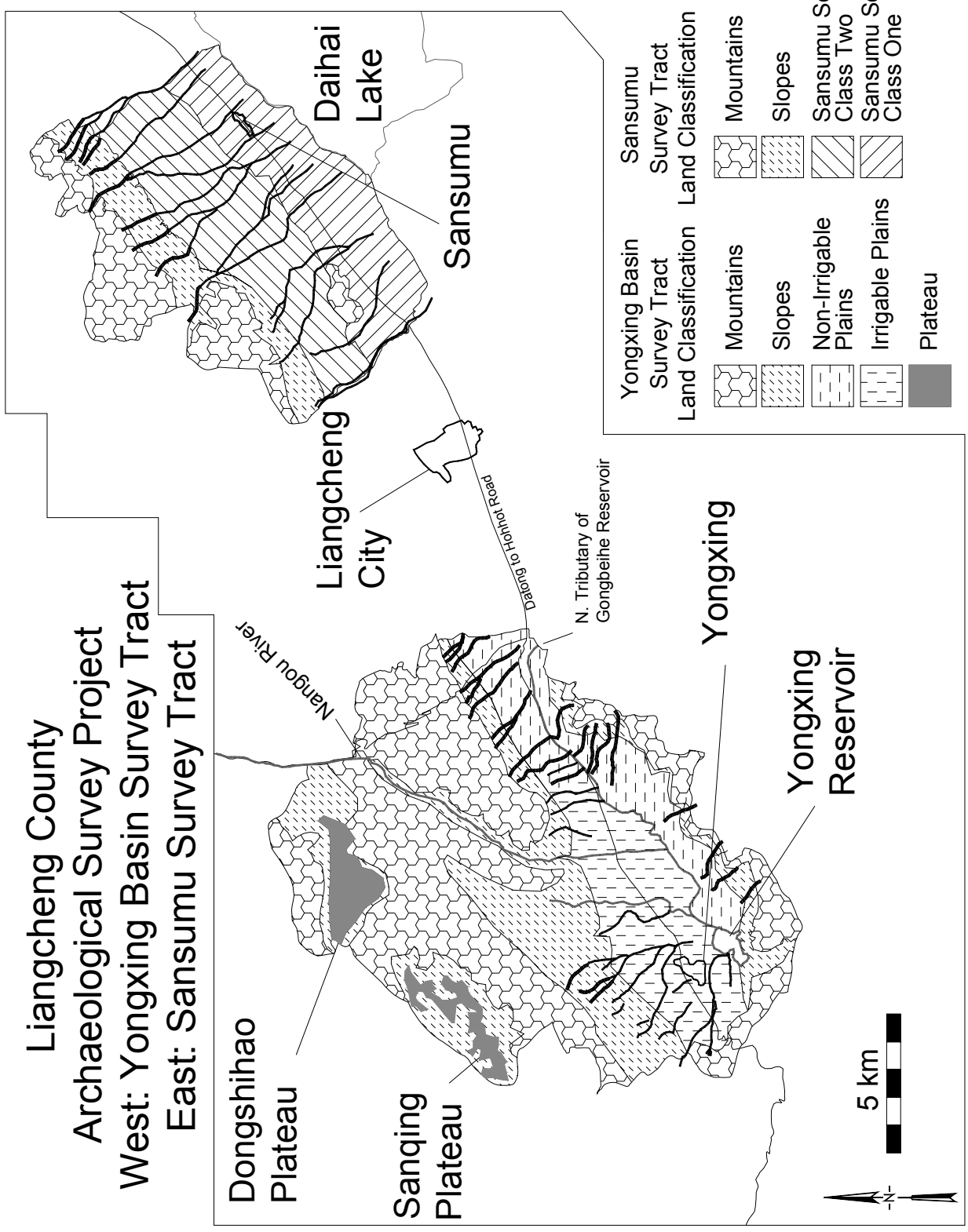


Figure 3. Agricultural productivity land classification in the Sansumu and Yongxing Basin survey tracts.

1.5.3. Evaluation of the land classification system

This system of land classification can be tested by comparing it to the modern population distribution. The Chinese village system allows the central government to manage efficiently the populace, but the village system in Liangcheng is also meant to maximize agricultural production. Modern census data show that only 2.3% of the modern village population are not farmers and this characteristic of modern village life will aid in the understanding of the Liangcheng landscape (Bureau of Statistics 2000). The land classification is based on knowledge gained from walking the landscape and conversations with farmers met during survey. The modern population distribution will provide an evaluation of the observations made here. The expectation is that a settlement pattern that seeks to maximize agricultural production will place a majority of the population on the best agricultural land, therefore a land classification that can correctly predict the modern residence pattern will have identified the zones with the best agricultural land.

Table 2 shows the area of each land classification in the Yongxing Basin and Sansumu survey tracts and shows the percentage of each land classification that is settled. (Because modern census data is not available at the village level, settlement area will be used as a proxy for population.) As Table 2 shows, there is a perfect rank order relationship between the percentage of the zone occupied with modern population and agricultural productivity rank (Sansumu survey tract r_s= 1.0, p= 0.05; Yongxing Basin survey tract r_s= 1.0, p= 0.01). This strong correlation allows confidence that the productivity rankings provide a useful characterization of agricultural potential.

Table 2. Area of the land classifications in the Sansumu and Yongxing Basin survey tracts and percentage of area occupied within each class.

Sansumu Survey tract				
	Soil Class One	Soil Class Two	Slopes	Mountains
Productivity rank	1	2	3	4
Area of land classification	32.2 km^2	35.9 km^2	16.1 km^2	22.4 km^2
Percentage of class occupied	6.2%	4.2%	3.5%	0.2%
Population Rank	1	2	3	4

Yongxing Basin survey tract					
	Irrigable Plains	Plateau	Non-irrigable Plains	Slopes	Mountains
Productivity rank	1	2	3	4	5
Area of land classification	35.5 km^2	Dongshihao 4.9 km^2 Sanqing 3.5 km^2	20.9 km^2	53.6 km^2	81.9 km^2
Percentage of class occupied	5.9%	4.5%	3.2%	0.8%	0.2%
Population rank	1	2	3	4	5

1.6. Plan for the work

The dissertation begins with an explanation of the surface survey methodology utilized in the field as well as an examination of the biases that may have been introduced into the data because of that methodology (Chapter 2). To allow for a better understanding of the social structures in all periods, Chapter 3 undertakes a study of the demographic history of the Liangcheng region. The relative density index developed in this chapter is utilized in the analysis of local scale (and larger) human communities, and settlement hierarchies that develop in these communities at different scales (Drennan and Peterson 2004; Peterson and Drennan 2005). Traditional settlement pattern study allows comparisons between small scale, low density remains and large scale dense remains, for example, but absolute population estimates allow the more intuitive comparison of a community of less than one hundred people to a community of several thousand. These population estimates are also used to compare past population distributions to the agricultural productivity land classification (Section 1.5), allowing analysis of the commitment to agriculture made in each period.

The first recorded human occupation in this region occurs during the Yangshao period (4700–2900 BCE) (Nei Menggu and Beijing 2003). No evidence of occupation dating to this period was recovered by the surveys here and this period is dealt with only briefly in the text (Chapter 4).

The Laohushan period (2900–2100 BCE), represents the earliest remains recovered by the survey (Chapter 5). The sites from this period are not large, the largest single site being just over 7 ha, but these sites do tend to cluster, especially in the area of the Maoqinggou corridor in the Yongxing Basin survey tract. The extent of community organization will be examined via density plots (Peterson and Drennan 2005) and the commitment to agriculture will be explored through a comparison of land use during the Laohushan period and the modern period.

Chapter 6 examines habitation in the Zhukaigou period (2100–1500 BCE). This period shows both a demographic crash and a complete disbanding of the Laohushan period social system. Although there is a precipitous dip in population during this period, the land use pattern is roughly similar to land use during the Laohushan period. These two settlement patterns show populations settling on a horizontal band on the landscape where the slopes meet the mountains. This is a pattern that holds for the entire period from 2900–1500 BCE and also meshes with what little is known about the Yangshao period settlement pattern from the unsystematic surveys that occurred in the 1980's (Chapter 4).

Populations increase quickly when this region is first integrated into the Central Plain political sphere during the Warring States period (600–200 BCE), and a two part settlement pattern is seen to develop between the horizontal zone occupied since the Neolithic period and the shore of the lake (Chapter 7). This pattern consists of two different kinds of settlements, one kind that, both in location as well as in size and spacing, is reminiscent of the modern settlement pattern, and another kind which is suggestive of dispersed homesteads, especially across the broad horizontal band occupied since the Neolithic that covers the largest portion of the two survey regions.

This dichotomy persists in the Han Dynasty period (Chapter 8) but the ratio of occupations on the slopes to occupations on the best agricultural lands changes to favor occupations on the best agricultural lands for the first time. These communities on the best agricultural lands show the farming village pattern that was first seen in this region on the shore of the lake during the Warring States period. This farming village pattern houses most of the population in the survey region for the first time during the Han period. These villages would have produced important agricultural surpluses near the border regions where soldiers were stationed.

This dissertation will show that since the Neolithic this region showed a different mix of subsistence strategies than the Central Plain, and that the changes in subsistence patterns in

Liangcheng occur not during periods of known environmental fluctuation, but during periods when changes in social complexity are seen in the settlement pattern data. South central Inner Mongolia does not adopt agriculture to the same extent as the Central Plain during the Longshan period that is contemporaneous with the Laohushan period in Liangcheng, and it shows resistance to the farming village pattern during the Warring States period.

Even during the periods in which the region is most tightly bound to the Central Plain, the Han Dynasty, this region appears to have had a broad mix of subsistence strategies. In addition, with its diachronic perspective, this dissertation shows that, during the Warring States period, the unit of assimilation to cultural norms was the farming village. This social structure was both foreign to the region before integration and likely brought with it new social norms from the Central Plain as well.

2. Methodology

The chosen methodology for this settlement pattern study was a full coverage, pedestrian surface survey. The survey methodology utilized here was modified slightly from the methodology employed in the Chifeng Basin settlement pattern study to better characterize the sparse nature of the Liangcheng archaeological record (Drennan et al. 2003b). Teams of three or four people systematically walked the landscape with a survey interval not in excess of 25 m. Whenever a single not obviously modern artifact was found by any member of the survey team, the survey stopped and searched for more artifacts in an area that ideally did not exceed one hectare. These collections are the basic unit of the survey, the collection unit.

Collection units (called “collections” throughout) are areas, ideally no larger than one hectare, that represent places where traces of past human activity (usually ceramics) were found. Two different collection strategies were employed, depending on a subjective assessment of the density of remains across a collection area made by teams in the field. One collection strategy, called systematic collections, was utilized in collection units where the density of sherds was at least four or five sherds in a 3 m diameter circle. If this density was reached, then two workers traced a rough 3 m diameter circle and all of the sherds in the circle were collected. If 20 sherds were not found in the first circle, then another circle was drawn until either 4 circles were drawn or 20 sherds were recovered. Teams were instructed to select areas where the sherd density within the circles would be representative of the collection area as a whole. If ceramic density was lower than this threshold, then non-systematic grab-bag, or general collections were taken across the site. Our goal was to gather a sample of approximately 20 sherds from each general collection unit as well, but because of the low density of sherds across the survey region, only 12.2% of collections included 15 or more sherds. (By comparison, in the Chifeng region, 42.7% of collections had 15 or more sherds.)

The area of each collection unit was drawn on the survey maps, which were satellite imagery printed at a scale of 1:10,000 and laminated to keep out the elements. In 2002, to

compensate for the low resolution of the satellite imagery that was available for the region within the survey budget (15 m resolution, false color composite Aster imagery), topographic information from 1:50,000 scale maps was added to the imagery before printing. In 2004, topographic maps were not available when the imagery was printed, but monochromatic SPOT imagery was purchased (10 m pixel resolution). Field crews utilized GPS units during both seasons to aid in the interpretation of the imagery in the field.

Two seasons of survey took place in Liangcheng, from June to August, 2002 and May to July, 2004. Surface visibility was almost universally excellent in 2004. We began our survey just as fields were being plowed, and crops never caused problems for survey crews. In 2002, the late start of the survey meant that surface visibility was not as good as in 2004, but since the survey progressed roughly from south to north, by the time that the valley floors had tall crops that limited visibility and mobility, survey teams had begun working in the mountains and the plateau floors. On the plateaus, potatoes and y*anmai* predominated; neither crop hindered visibility to a significant extent. Corn and wheat, which are both much more problematic for survey, do not grow at these higher elevations.

The possible bias introduced to the survey data from surface visibility is analyzed in more detail in the demography chapter (Section 3.2). Two additional issues will be addressed here: (1) Whether sparse surface scatters should be seen as a portion of the settlement pattern to be included in the analysis, or considered the result of modern processes and removed from the analysis (Section 2.1); (2) An explanation of the basic unit of analysis in this study, the meaningful human community (Section 2.2).

The Chifeng survey methodology was utilized here because the Liangcheng region shares land use, geological and archaeological attributes that made pedestrian surface survey appropriate. Like the Chifeng Basin, much of the Liangcheng region is a river basin with surrounding mountains. Both the valley floors and the slopes leading up to the mountains are overwhelmingly under plow, bringing ceramics to the surface and clearing away surface

vegetation. In areas where farming is not presently practiced, sheep and goats have kept the vegetation to a minimum and more labor intensive methodologies like shovel probes were not judged to be necessary.

The archaeological record of Liangcheng also shares several important attributes with the Chifeng region that made the methods used here appropriate to characterize the past settlement patterns of this region. Most important among these was the compact nature of "sites" in the Liangcheng region. Although sites are not used in this dissertation to represent human communities (see below), "sites", as discussed in common archaeological parlance, meaning discrete clusters of ceramics and other indicators of past human activity surrounded by areas with little or no evidence for past human activities, do exist on the Liangcheng landscape. It is the size and density of these discrete clusters that this settlement pattern study seeks to characterize. The density of archaeological remains in Liangcheng, like the archaeological remains in Chifeng, can be characterized by large regions with very little evidence of human activity interspersed with clearly recognizable clusters of artifacts. These shared characteristics, which made the Chifeng survey and collection methodology appropriate for the Liangcheng region with some slight modification.

Modification was required because the archaeological record in Liangcheng is generally less dense than the Chifeng Basin. Few sites were known archaeologically before the beginning of the survey and these sites were smaller than those known in the Chifeng Basin. There has also been much discussion in the archaeological literature of past habitation in Liangcheng by mobile pastoralists (Di Cosmo 2002; Tian and Guo 1986). Much of this discussion is based either on historical references or interpretations of the Maoqinggou cemetery, not on settlement archaeology. Because mobile peoples were thought to once occupy this region, the survey interval was reduced to approximate the width of two pastoral tents and their surrounding activity areas, using the modern Mongolian Steppe settlement pattern as a guide. This width is approximately 20–25 meters. In addition, since mobile peoples are thought to leave few remains

on the landscape, a lower threshold for making a collection was used than in the Chifeng settlement pattern study (Drennan et al. 2003b: 127).

In the Liangcheng survey whenever a single sherd was found, teams would stop and search the landscape for other evidence of past habitation (usually ceramics). Once the survey teams had stopped and searched for other evidence of habitation, even if no other ceramics were found, the ceramic was still bagged and the location of the find marked on the survey maps. In all but 7.3% of the cases, more sherds were found once the survey teams had stopped walking, making stopping the survey to look for more sherds seem a reasonable methodological decision. These small surface scatters were collected because once the teams had spent time looking for more sherds, the time taken to bag and record the sherds seemed trivial. These sherds could always be removed if they were found to unduly affect the analysis, but once a sherd was discarded, it was irreparably removed from further analysis. In addition, as the threshold for what constitutes a site continues to be discussed in the archaeological literature, the analysis of sparse scatters is important.

2.1. Sparse surface scatters and sparse habitation

Of the 4,566 collections made during the survey, only 333 collections had only one sherd (7.3%) and 1,122 collections had three sherds or less (24.6%). Collections of three sherds or less constituted a small proportion of total analyzed sherds (2,353 out of 28,924, 8.1%), and total collected area (217.8 ha out of 1650.8 ha of occupation, 13.2%). Together these two proportions exerted a small, but not insignificant effect on the demographic index used to look at the correlation of population to agricultural land classification and the analysis of communities, which was also based on the demographic index (Chapter 3).

Before these sparse collections are included in the analysis, their relationship to the rest of the settlement pattern needs to be ascertained. If these collections are seen to be aberrations that result from the fertilizing of fields with soil from other locations, as some have argued, then

perhaps they should be removed from the analysis all together (Daihai 2006). The collection of single sherds is unusual for projects of this scale and therefore it is important to ascertain their value as data. Does the overall pattern of sparse collections suggest that they were the result of past habitation or of field fertilizing?

If these sherds were not the result of agricultural fertilizer, then the sparse collections should approximate the pattern seen in the more dense collections and the proportion of collections with very sparse collections should be different for each period, showing the differing proportion of small, possibly ephemeral occupations in each period. The pattern of sparse collections do show the same general distribution as the rest of the settlement pattern (Figure 4). The comparison of the single sherd, two sherd and three sherd collections and the rest of the settlement pattern shows that the patterns were very similar and it was not the case that single sherd collections were found only in areas where agriculture in the modern era is most intense. These results do not support the fertilizing hypothesis.

The comparison of the proportion of collections in each individual period also shows that particular periods have either especially high or especially low proportions of collections with 3 or fewer sherds (Figure 5). If the small, ephemeral populations were the result of modern processes, we might expect that all periods would have been affected equally. The overall proportion of collections with 3 or fewer sherds in all periods is 24.0%. There were several periods that have percentages far below this average, and those differences were significant: Both the Han and the Liao periods had lower proportions of sparse collections (with higher than 99% confidence). The lower proportion of the Laohushan period also has high confidence between (95% and 99%). Even among the periods with lower than average proportions (the Liao Dynasty, the Han Dynasty, and the Warring States periods) the differences are also highly significant, suggesting that the differences were the result of the different settlement patterns, not modern processes.

2.1.1. A different hypothesis of soil movement

Discussions with the coauthors while preparing preliminary survey results (Zhang Wenping, Wei Jian) produced the following approach to the empirical evaluation of the impact of fertilizer on survey results. Two sources are hypothesized for field dressing, either the walls or beds of gullies and rivers. Gulley walls are popular places to find new soils for use as fertilizer because an exposed face makes for easy soil extraction. All the farmer needs to do is loosen the soil from the top of the wall and gravity pulls the soil down the face for collection at the bottom. (I have seen younger farmers ride their shovels down the face of a gully, this may be part of the attraction of this method.) If there is an archaeological site eroding from this gully, then the sherds will be transported from the gully wall to the fields. Beds are especially popular after the rain, when they contain fresh soil. Accepted wisdom dictates that sherds eroded from archaeological sites find their way onto river beds and then these sherds are deposited into fields. These specific vectors of sherd transport can be tested with GIS analysis.

If the transport of soil from gullies or rivers was the cause of very small, sparse scatters, then the periods with the largest proportion of dense collections (in this analysis ≥4 sherds) within a 50 meter buffer of the gullies would also be the periods with the greatest proportion of sparse collections (3 sherds or less) in areas where farming takes place (sparse collections from the mountain land classification are not included in this proportion since agriculture, and therefore fertilizing, is not practiced in this zone.). In both survey areas, a rank order correlation coefficient shows that the proportion of dense collections near the gullies or rivers in a period is a poor predictor of the proportion of sparse collections recovered by the survey for that period (Yongxing Basin survey tract r_s= 0.100, $p>0.2$; Sansumu survey tract r_s= 0.257, $p>0.2$).

These analyses do not disallow that such soil movement occurred. It does, however, suggest that soil transport and field dressing were not the major causes of sparse surface scatters and that these sparse scatters are to a large extent part of the settlement patterns of their perspective periods. In addition, the existence of sparse collections in areas where farming

does not take place, as well as the location of two single sherd Laohushan collections on the Dongshihao plateau, where no dense Laohushan collections were located, also provides evidence that these sparse scatters are largely the result of ancient, not modern activities.

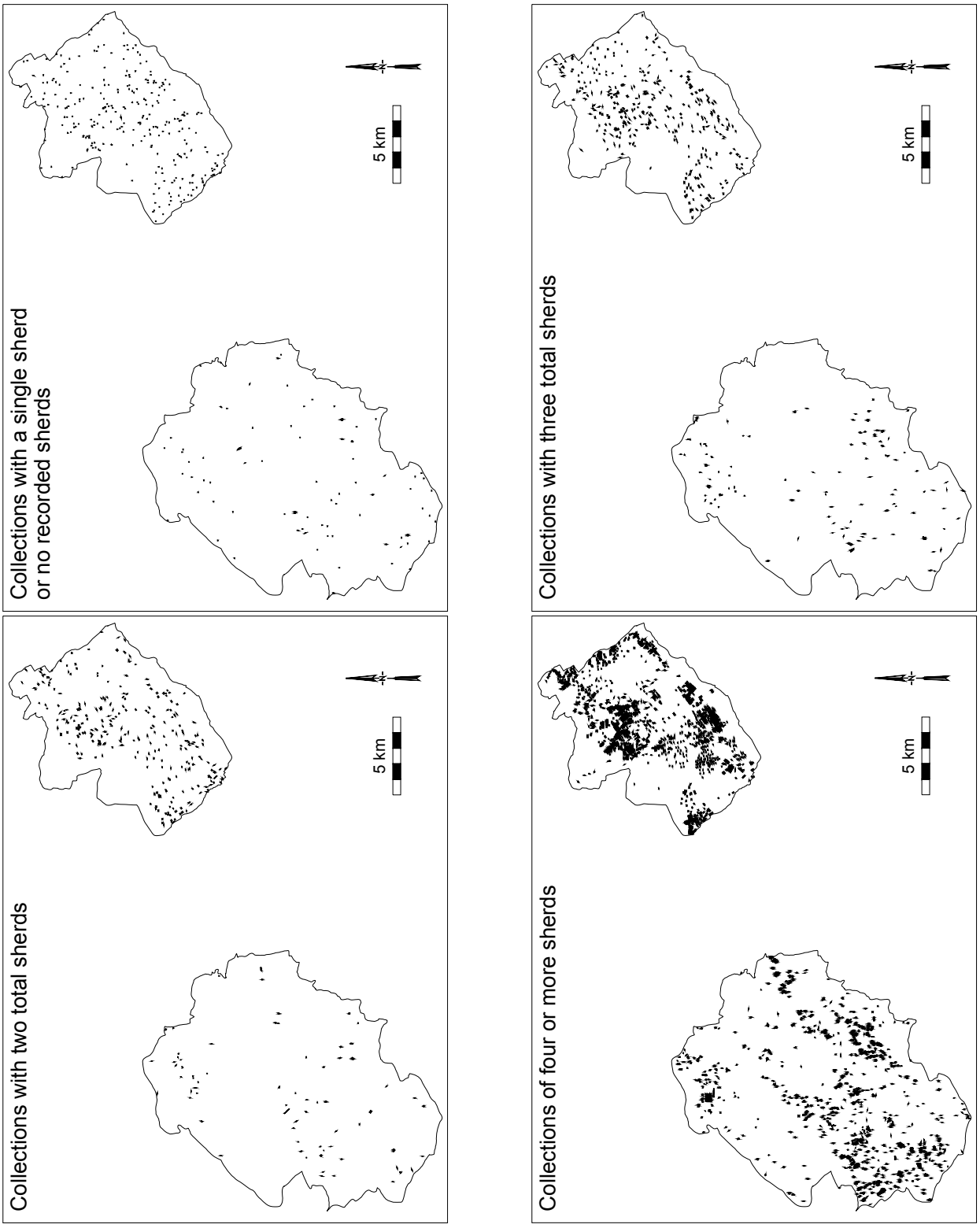


Figure 4. Top left: Collections with zero and one sherd, Bottom left: Two total sherds (from any period), Top right: Three total sherds and Bottom right: Four or more total sherds.

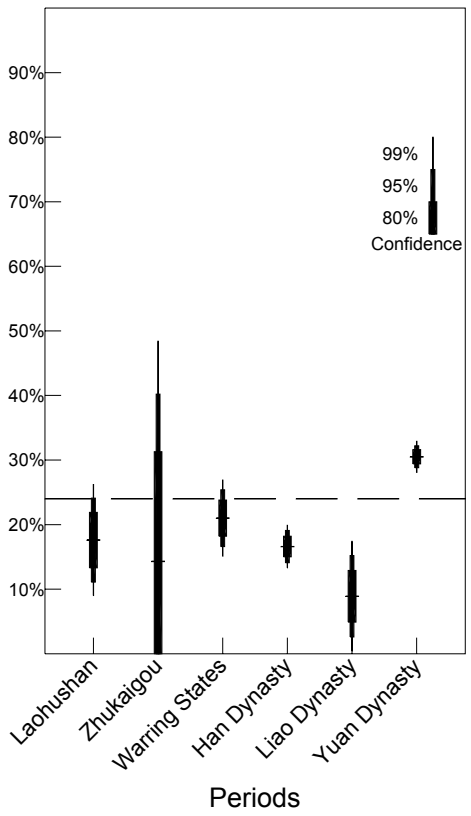


Figure 5. Bullet graph of the proportion of collections dating to each period that have less than 4 sherds. The dashed line shows the overall proportion of all collections (24.0%).

Table 3. Proportion of dense collections within the 50 m river/gulley buffer and proportions of sparse collections across the survey area, by period.

Yongxing Basin survey tract				
Period	≥4 Sherd Collections within Buffer	Rank	≤3 Sherd Collections Outside of Mountain Land Class	Rank
Laohushan period	11.3%	3	13.2%	2
Zhukaigou period	N/A		N/A	
Warring States period	13.6%	2	8.5%	4
Han Dynasty period	5.8%	5	3.8%	5
Liao Dynasty period	20.0%	1	10.0%	3
Yuan Dynasty period	9.9%	4	16.7%	1

Sansumu survey tract				
Period	≥4 Sherd Collections within Buffer	Rank	≤3 Sherd Collections Outside of Mountain Land Class	Rank
Laohushan period	19.2%	1	14.1%	5
Zhukaigou period	0.0%	6	14.2%	4
Warring States period	10.4%	3	22.2%	3
Han Dynasty period	17.9%	2	50.4%	1
Liao Dynasty period	4.3%	5	8.6%	6
Yuan Dynasty period	9.4%	4	32.7%	2

2.2. Unit of analysis

The site has been much maligned as a unit of analysis. One group of archaeologists, lead by Dunnell and Dancey, have argued for a "siteless survey approach" as a replacement for the concept of the site (Dunnell 1992; 1983). Their chosen methodology would map the location of every artifact on the landscape. Instead of 4,566 units of analysis called collections here (see below) there would have been 28,924 units of analysis for the Liangcheng survey; each of the sherds would have had its own individual lot number and location. "Sites" would have been created during the analysis phase from the "…*construction* of interpretable artifact aggregates…" (Dunnell 1992: 35)

Rather than constructing sites based on the distribution of individual artifacts, this analysis follows more closely the methodology taken by the Basin of Mexico survey, which constructed sites based on the distribution of artifacts across fields (Sanders et al. 1979: 20-30). Rather than use fields, in this analysis sites are created from the smallest unit of analysis in the survey, the collection unit (Drennan et al. 2003b), an approach that has been referred to as equally siteless, if on a different scale (Peterson and Drennan 2005: 21-22).

2.2.1. Collections and meaningful human communities

When the term "site" is used in this analysis, it refers to a group of collection units with internal gaps of as much as 100 m. Data on site size, defined in this way, are included in this analysis for comparison to other surveys, but sites are not used as the unit of analysis in this data set. As commented on by Peterson and Drennan (2005), larger, more populous occupations are likely to have more interaction pull than small occupations with small populations. This is the very basis for Central Place Theory. However, assigning collections to sites based on the single static standard of distance alone does not take the stronger social pull of more populated communities into account. Therefore, the method outlined by Peterson and Drennan (2005) is used here to delineate small local communities as meaningful units of human interaction based on the size and density of remains left on the landscape.

The difference between sites derived from a static 100 m standard and a more fluid threshold based on the spatial extent and density of remains becomes especially apparent when just over 100 m spacing is found between large sites. Surely this spacing is not as meaningful as 100 m spacing between two individual collections, each representing a single household. An important part of understanding a settlement pattern includes understanding the way human communities interact with one another. Using communities as a basis of the analysis instead of sites allows for better understanding of the construction of larger scale communities from local scale community units and their hierarchy as well (Drennan and Peterson 2004). Two sites of almost equal size separated by 105 m at the top of a settlement hierarchy will produce a radically different result when plotted on rank size graph than if those two sites are combined into a single center. The identification of communities as opposed to sites is used throughout to trace the history of community interaction in Liangcheng through time.

The analysis of communities, as well as estimates of past land use, are all dependent on the accurate characterization of the density of remains across the entire landscape. Full coverage pedestrian surface survey was the most effective method to obtain this data, which until now has not been available for the Liangcheng region. From the survey maps, which include the spatial extent and density of remains, datable to different periods based on analysis of ceramic assemblages, a relative demographic index was calculated and then correlated to absolute estimates of population from excavated sites (Chapter 3).

3. The demographic history of the Liangcheng region

Population indices have long been the focus of archaeological investigation, and comparison of the populations of different regions (or sub regions) is an essential component of anthropological inquiry (Drennan et al. 2003a; Hassan 1981). Survey provides data on the spatial extent and density of archaeological remains across the landscape, which are widely recognized to be the soundest basis for making regional population estimates (Drennan et al. 2003a; Sanders et al. 1979: 183-216). A relative demographic index has been developed by Drennan et al. (2003a) for the Chifeng region. This chapter utilizes this index as a starting point and utilizes archaeological data from inside and outside the Liangcheng region from several different periods to convert this relative demographic index into raw population estimates.

3.1. Calculation of the relative population index

Drennan et al. (2003a) developed a relative index of population that has the following attributes. The index: (1) utilizes the total area of occupation instead of the number of sites to avoid the "over counting" of small sites in comparison to larger sites; (2) utilizes artifact density to differentiate between sites that were occupied for longer or shorter periods, or at higher or lower concentrations.

As outlined in the methodology chapter above (Chapter 2), teams made a subjective assessment of the density of remains across a collection area in the field and made systematic collections when the density was high enough to support this collection strategy. The relative demographic index utilizes the density of remains in the 3 m diameter circles made during systematic collections as a sample reflecting the density of remains across the entirety of the systematic collection.

Collecting a representative sample from the surface of a collection that can be characterized by both low density and uneven distribution of ceramics is very difficult. Unfortunately, the distribution of sherds across low density collections can be described in

exactly this way. Where the density of sherds was not high enough to support the systematic collection methodology (four or five sherds could be found in a three meter diameter circle placed anywhere across the site), the general collection strategy was used. These are essentially grab bag collections that reflect the ratio of remains of different periods on the surface by sampling around 20 sherds from the one ha collection. Because the density of remains across such an uneven, clustered distribution is so difficult to quantify, a density of 0.25 sherds/m^2 is assigned to general collections (Drennan et al. 2003a). In collections with remains datable to more than one period, the ratio of remains between periods is utilized to apportion the relative index between periods (Drennan et al. 2003a: 157).

For example, Table 4 contains the collection data from the Laohushan site. Twenty-seven sherds were collected from the single 3 m diameter circle in lot 02B325. The sherd density across the collection is 3.82 sherds/m^2 and this density is taken to represent the sherd density across the area of the collection. For collection 02B325 the sherd density (3.82 sherds/m^2) is multiplied by the area (0.28 ha), for an index of 1.07. Higher scores in this index reflect either high sherd densities across somewhat smaller collection areas, as we see here, or lower sherd densities across a larger collection area. A sherd density of 1.07 sherd/m^2 across a collection with an area of 1.0 ha would produce the same index score of 1.07 (Drennan et al. 2003a: 158).

Table 4. Survey collections at the Laohushan site.

Systematic Collections

Collection Number	Area (ha)	Total Ceramics	3 m Diameter Circles	Area m^2	Density Sherds/m^2	Relative Demographic Index
02B325	0.28	27	1	7.065	3.82	1.10

General Collections

Collection Number	Area (ha)	Total Ceramics	Laohushan Ceramics	Non LHS Ceramics	Density sherds/ m^2	Relative Demographic Index
02B324	0.35	6	6	0	0.25	0.09
02B326	0.22	6	6	0	0.25	0.06
02B327	0.91	8	8	0	0.25	0.23
02B328	0.82	48	45	3 (Yuan)	0.25	0.19
02B329	0.64	12	12	0	0.25	0.16
02B330	0.07	31	27	3 (Yuan) 1 (Han)	0.25	0.15
02B331	0.11	6	6	0	0.25	0.028
			General collection total			0.903
			Systematic collection 02B325			1.10
			Total contribution of the Laohushan site to the demographic index for the Laohushan period			2.00

Although the calculation of a sherd density allows for the comparison of remains within a period, diachronic change in population requires the comparison of periods of different lengths. The demographic index developed for the Chifeng region adjusts for differences in period length by dividing the sherd density index by the number of centuries in a period (Drennan et al. 2003a: 157). It is clear that longer term occupations create deeper deposits but it is not yet clear whether deeper deposits produce higher surface densities, or is the relationship between the depth of sites and their surface densities clear. Dividing the sherd density index by the number of centuries assumes a linear relationship between the number of centuries and the density of sherds on the surface of a site. For example, if ten people living on the surface of a site left behind enough trash in one century so that the density of sherds on the modern surface is 1 sherd/m^2/ha, then we expect that the deeper site left behind by five people living for two centuries would leave the same density of remains on the surface.

The comparison of surface densities between the Warring States and Han Dynasty period does not support the assumption of a linear relationship between time and sherd densities. The surface densities for the Warring States and Han Dynasty periods include the same range of densities even though the Warring States period was approximately half the length of the Han Dynasty period (Figure 6). In addition, examination of excavated habitation remains does not suggest the average density of habitation changed appreciably between these 2 periods (see below). Therefore, what is referred to as the "Density-Area Index" in the Chifeng Monograph (Drennan et al. 2003a: 178) will be referred to as the Relative Demographic Index here.

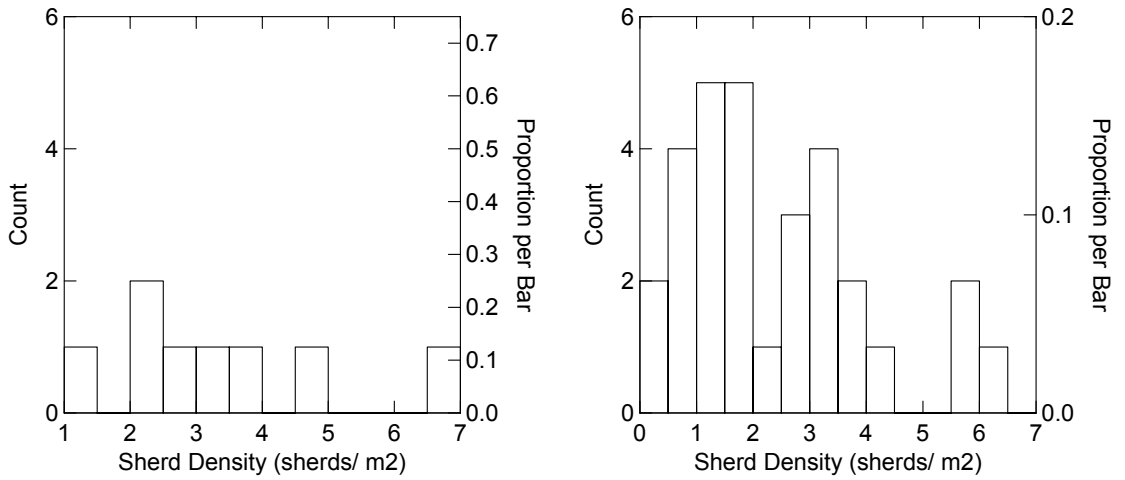


Figure 6. Sherd densities for systematic collections for the Warring States (Left) and Han Dynasty (Right) periods.

The Relative Demographic Index can now be calculated for each of the collection areas across the two survey zones and the totals compared between periods (Figure 7). The Relative Demographic Index shows that the survey region saw its first significant influx of population in the Laohushan period, followed by demographic decline in the Zhukaigou period. After what is presently considered to have been an occupational hiatus in the region, Liangcheng was integrated into the large polities of the Central Plain region during the Warring States period and saw further population growth during the Han Dynasty period. After a period of population decline during the poorly understood period between the end of the Han Dynasty period and the beginning of the Liao Dynasty period, a similar pattern was seen as the region was once again integrated into larger polities from outside the survey area. This later integration was characterized by more gradual population growth during the Liao Dynasty period and a considerably higher spike during the Yuan Dynasty period.

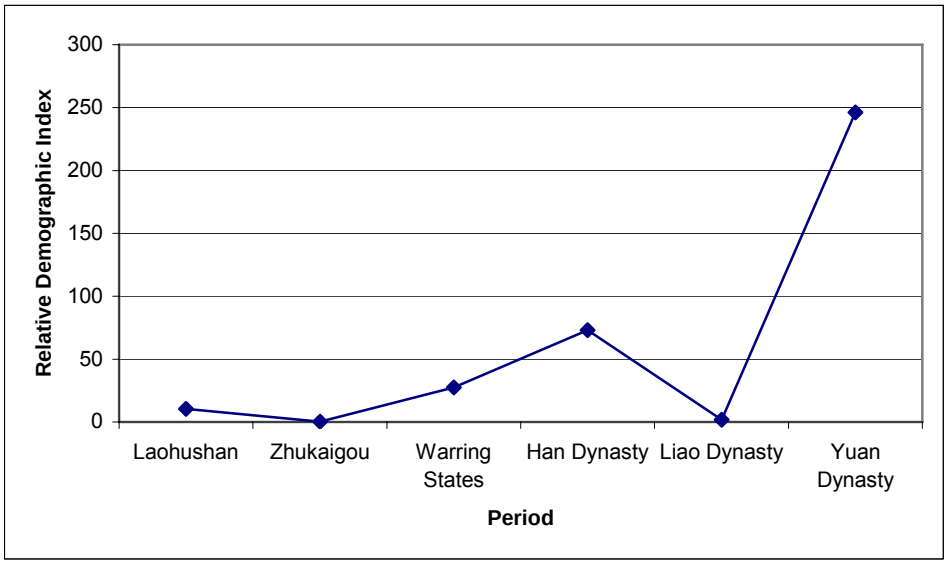


Figure 7. Relative demographic index scores by period.

3.2. Possible sources of bias in the demographic index

The use of a relative demographic index that relies on surface remains requires that the survey collections accurately reflect the density of garbage left as well as the ratio of remains of different periods on the surface. Two possible sources of bias are examined here, surface visibility and the differential visibility of Yuan Dynasty period porcelains.

3.2.1. Surface visibility

Surface visibility does have some effect on surface collecting. The concern is that the effects of surface visibility could be so pervasive that our results measure changes in surface visibility across the landscape instead of changes in density of surface remains. Teams in the field made a subjective classification of the visibility of artifacts during survey (Low, Middle, High) that can be used to test for this source of bias. A rank order correlation coefficient illustrates what portion of the variation in the number of ceramics collected during survey can be explained by surface visibility. The relationship between artifact visibility and the number of artifacts collected is quite significant due to the large number of collections, but of very little strength (r_s= 0.012, p< 0.0005). Differences in surface visibility had little affect on the number of sherds found during survey.

3.2.2. Differential visibility between porcelains and grey ware

The use of the relative demographic index requires another assumption that deserves special attention: that all kinds of ceramics were collected in equal proportions to their actual presence on the surface. Although workers were instructed that the first sherds encountered during survey were the ones to be collected (as opposed to preferentially collecting early period sherds), it is still difficult to compensate methodologically for the high contrast white color of the Liao and Yuan porcelains. Porcelains are simply visible from farther away than the grey ceramic wares of the earlier periods. Because the Chifeng survey did not collect these porcelains in large quantities, the effect of porcelain visibility on the sherd density measurement has not been tested.

One way to examine this possible bias is to examine the ratio of ceramics between periods in systematic collections, where we can be confident that sherds of all types were collected, and general collections, where the issue of contrast is likely to cause the most concern. Porcelains were analyzed separately for the Yuan period only. (Liao porcelains and grey ware, which were comparatively rare, were not differentiated during analysis.) Only Yuan porcelains to greyware ratios will be used here.

If the percentage of Yuan sherds found during systematic and general collections is compared, we find that Yuan ceramics (both grey ware and porcelains) make up 43.7% of the total number of all ceramics collected in systematic collections and 70.2% of all ceramics in general collections. Examining the ratio of grey ware to porcelains in Yuan collections shows that the systematic collections are dominated by grey ware (498/186 or 2.7/1) but that the ratio is almost even in general collections (9792/9187 or a ratio of 1.1/1). Porcelains appear to be over represented in general collections. There are other explanations for this kind of bias, including the probable relationship between dense sites representing long term occupation and storage vessels made of grey ware, but the first task is to ascertain the effect of this apparent bias on the relative population index. If the difference is small, it need not cause much concern.

The possible effects of over counting porcelains is pervasive. Of the 3574 general collections made during the survey, 821 have at least one Yuan Dynasty period porcelain. Over counting has the potential to affect not only 466 collections that contain only Yuan porcelains but also the proportions of the relative demographic index assigned to different periods in the 231 collections that have at least one Yuan Porcelain as part of a larger collection of sherds from other periods.

However, any adjustment made for the effects of porcelain visibility must take into account how the differences in “detectability” of porcelains over grey ware affect the success rate of finding artifacts on the surface (Banning 2002: 40-54). This relationship between increased detectability and increased success rate of finding sites, will not be linear (Banning

2002: 56-62). Some single sherd sites would have been discovered regardless of the differences in contrast because a variety of factors combine to place a single piece of porcelain in a survey transect. In other collections, the ratio of Yuan sherds to sherds of other periods would have been lower because multiple porcelain sherds would not have otherwise been found, increasing the relative population index of other periods.

Any attempt to model the effect of contrast on the "detectability" of porcelains will certainly contain a large error range, especially because any model we hypothesize will be largely theoretical until tested, and the large error range that is inherent in any adjustment of the demographic index for differential visibility in porcelains must be contrasted to the effect that porcelains might have had on the index. Of the 466 collections that contain only Yuan porcelains, 200 are single sherd collections that contribute little to the index because their areas are so small (0.04 ha each). These 200 collections make a total contribution to the relative demographic index of 2.0 or 0.8% of the relative population index score for the Yuan Dynasty. If we were to utilize the ratio of grey ware to porcelains from the systematic collections (1.7/1), to reduce the number of porcelains in general collections to the same ratio, Yuan sherds would still be 62% of the total number of sherds collected using the general collection methodology. Although there does seem to be some bias towards porcelains, this bias does not affect the overall Yuan dominance of the demographic index.

It is now clear that the Yuan Dynasty period will dominate the relative demographic index regardless of the over counting of porcelains, but we should also examine the effect of Yuan Dynasty period porcelains on the relative demographic indices of other periods. If all the Yuan Dynasty period porcelains were removed from the general collections, the population index would be increased for other periods by up to 13.6% (Table 5).

Table 5. Change in the relative demographic index for other periods if Yuan Dynasty period porcelains were completely removed.

Period	Demographic Index	Demographic Index without Yuan Porcelains	Percent Change
Laohushan period	10.30	11.70	13.6%
Zhukaigou period	0.31	0.31	0.0%
Warring States period	27.32	27.79	1.7%
Han Dynasty period	72.74	77.19	5.8%
Liao Dynasty period	1.76	1.85	4.9%

The percentages in Table 5 are considerably larger than any adjustment that might need to be made to the index; they represent a recalculation of the index based on the complete removal of Yuan Porcelains, not an adjustment for over counting. Therefore, the effect of over counting porcelain on the demographic index is very likely smaller than the error range for any adjustment. Not adjusting the index for porcelain visibility is the course of action that will introduce the smallest error.

3.3. Converting the relative demographic index into an absolute population estimate

The relative demographic index can now be converted to allow each unit of the index to represent a number of people. Ideally this would be accomplished by using a series of sites excavated after they had been systematically surface collected, allowing the index to be anchored to demographic estimates at the site level. A few points in each period where survey data and excavated data can be connected would allow for better estimates. This work has not been completed to date, so the conversion used here will be based on a comparison of survey data to Neolithic sites excavated in Liangcheng before the survey took place. Population estimates for the Warring States and Han Dynasty periods will be made by comparing survey data and excavation data from outside the Liangcheng area.

3.3.1. Population estimates for the Laohushan period

The site of Laohushan was excavated in the 1980's and was collected during the Yongxing Basin survey. This site has an area 9.2 ha and has 70 excavated households with an average house size of 9 m^2 (Figure 8). Because house sizes are very small at the site, a constant of 2–3 people/house is used to estimate the population at Laohushan, a total of between 140 and 280 people(2003a: 162).

There is a reasonable correspondence between the Laohushan excavation and its subsequent collection (Figure 8). Although the match is far from perfect, the walls of the site were not visible on the satellite images used as survey maps. The survey maps carried by field teams were produced so that the 100 m scale at the bottom of Figure 8 was 1cm in length (a scale of 1:10,000). With the available equipment it is unreasonable to expect accuracy better than ±50 m from the placement of survey collections, or approximately 1 cm on a 1:10,000 map. Although a site map was not drawn during the survey, according to the notes taken, collection 02B330 was placed on the pottery kilns just outside the walls. This would very likely mean that collections 02B325 and 02B324 would have been placed directly adjacent to the excavation squares (which were never back filled and are still easy to find). When looking at the concordance between the excavation and the survey, collections 02B324 to 02B329 should be shifted east approximately 25 m, within the tolerances that might be expected from analysis at this scale.

Laohushan was cored before it was excavated and the areas that produced deep deposits were chosen for stratigraphic investigation (personal communication, Guo Zhizhong, 1999). Although there is some worry that collection 02B325, which produced the highest concentration of sherds at the site during the survey, could be the remains of the excavation backdirt pile, the eastern portion of the site also produced the densest house remains during excavation. In addition, although this is the collection with the highest density of Laohushan period remains in the survey, it is not the only systematic collection made on a Laohushan

period site during the survey; 02B325 has the highest density because it is the only Laohushan period systematic collection that contains only Laohushan sherds.

The relative demographic index is converted to an estimate of absolute population by equating the Laohushan index score of 2.0 to 140 or 280 people by utilizing a constant of 70.0 or 140.0 respectively. Using these constants produces an initial population estimate for the Laohushan period of 721 to 1442 people. This initial estimate of Laohushan population can be improved by using data from sites already excavated from the Liangcheng region.

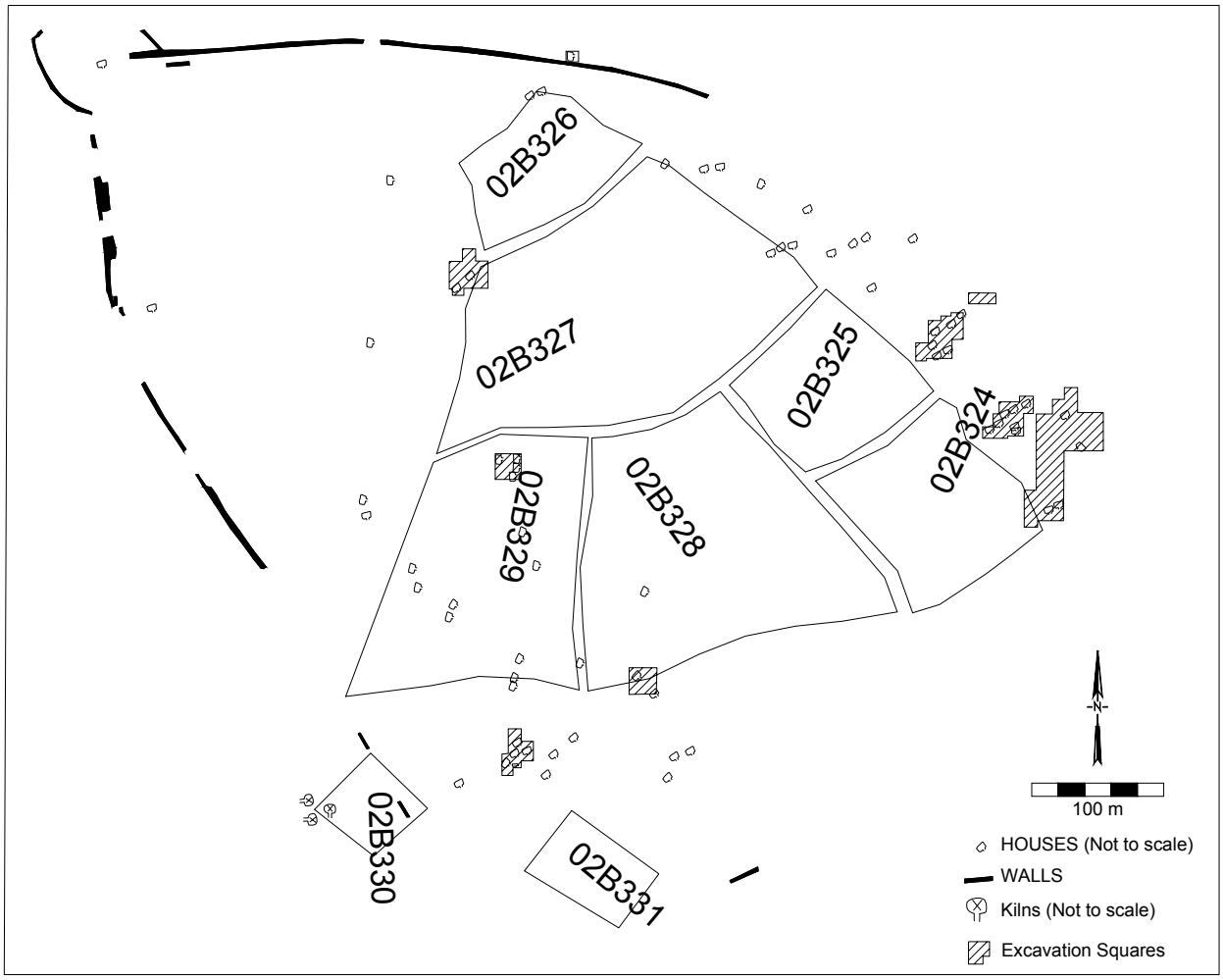


Figure 8. Top: Collections areas superimposed on the Laohushan site map. Bottom: The same figure rendered near the scale of the survey maps used by field teams (See Text).

3.3.2. Adjusting the estimated population for the Laohushan period using excavated data – The sites of Xibaiyu and Yuanzigou

Xibaiyu is one of the Laohushan period sites in the region that has been badly damaged by erosion. Xibaiyu is approximately the same size as the Laohushan site, with a walled area of 9.2 ha. Because there is a large gulley that transects the site, there is a considerable difference between the area collected (1.6 ha) and the known area inside the stone walls of the site. The houses that have been excavated appear to be much the same size as those at Laohushan, less than 10 m^2. The poor condition of the site makes attributes like house density difficult to ascertain, but the densest remains at Xibaiyu appear to be about half as dense as those at the Laohushan site. Because the site sizes are similar, the population at Xibaiyu should not be much less than half that of the Laohushan site. However, because the area of the site that produced sherds was so small, Xibaiyu is only given 0.42 in the Relative Demographic Index, this score should be elevated to one half of the Laohushan site (a relative demographic index score of 1.00).

The Yuanzigou site extends more than 500 meters along a bluff overlooking the Yuanzigou River, due north of Yaozicun village. Of all of the excavated Laohushan period sites in this region, this one is the largest and least damaged by erosion. However, Yuanzigou is the best known site in the region and is both well marked and on a good road between local tourist attractions and Liangcheng City. All of these attributes have led to the over collection of this site by archaeologists and tourists alike. This site was visited once as part of the 2004 survey, and twice again by the author during 2004. No ceramics were found. A demographic estimate for this site will have to be added to the population of the Laohushan period.

The remains found along the bluff by the excavators in the 1980's can be divided into three separate clusters. The site report states that each of the three slopes is approximately 10 ha in size, but this is inaccurate (Nei Menggu 2000: 10). The site map is reproduced in Figure 9. If the entire site, including the area of the gullies, were occupied in the past, then the area would

be approximately 7.5 ha. The densely occupied 4.7 ha portion of the site has 132 houses (Table 6).

Table 6. House densities at the Yuanzigou site.

Excavation Section	Approximate Area	Houses	Density
One	0.90 ha	40	44.4 houses/ha
Two	0.75 ha	45	60.0 houses/ha
Three	1.30 ha	47	36.1 houses/ha

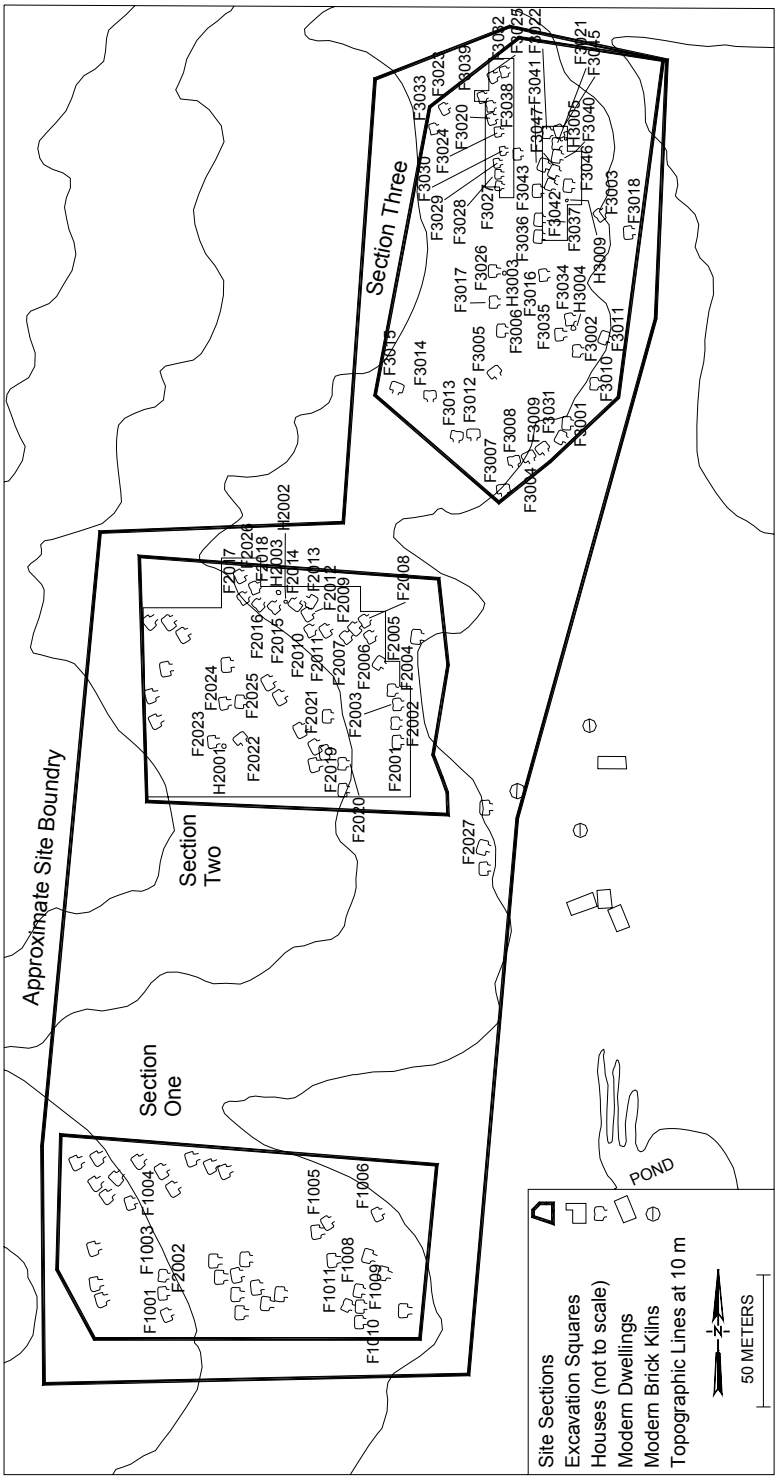


Figure 9. Yuanzigou site map (Redrawn from Nei Menggu 2000: 11).

Of all of the Laohushan period sites that produced surface collections during the survey, the Laohushan site had the highest density of excavated remains, approximately 40 houses/ha. This is roughly equivalent to the lowest excavated house densities at the Yuanzigou site. The greatest source of error in archaeological demographic estimates at the site level is contemporaneity; unless two houses intrude on each other there is little way to exclude houses from a count that were occupied at the same time. Because the houses at Yuanzigou are so tightly packed across the site, it raises the concern that contemporaneity issues are worse at this site than at other excavated Laohushan sites. The population here will be calculated by utilizing the relative demographic index from the Laohushan site (2.0 or 0.64 per ha), over the entirety of the excavated area of Yuanzigou itself (4.7 ha), for a total demographic index score of 3.0 and an absolute population of between 210 and 421 people.

The entire Laohushan period has a total relative population index score of 14.3. Using the constant derived from the excavation of the Laohushan Site, the population of the Laohushan period is estimated to be between 1004 and 2009 people.

3.3.3. Applying the relative demographic index to the Han Dynasty and Warring States periods

The conversion of the relative demographic index to absolute population estimates depends upon the relationship between the amount of trash passed down to us in the archaeological record and the number of people these amounts of trash represent. To implement this idea, the density of remains made during survey are correlated to already excavated examples allowing the conversion of the relative demographic index to an absolute population estimate (Drennan et al. 2003a; Sanders et al. 1979). There are several arguments to be made against using the same constants for more than one period (Drennan et al. 2003a: 164). If the average number of ceramics used per person increased between the Neolithic and the Iron Age, for example, then we would over estimate population in later periods (by using a constant derived from the Neolithic site of Laohushan). Conversely, if the cooking pots during the Iron Age were metal, then many fewer ceramics would have been broken during cooking,

possibly pushing our index lower because of increased consumption of ceramic cooking vessels in the Neolithic.

All of the potential problems are not technological. If the social organization changed between periods, people might find it socially necessary to live closer or farther away from their neighbors. Because of the way social distance is reflected in the settlement patterns of different periods, we might find that the number of houses per ha in an “average” village would change through time.

3.3.3.1. Warring States and Han Dynasty period village sites

The Warring States and Han Dynasty period remains are not clustered in the same way as the Neolithic remains. A very large percentage of the Neolithic materials recovered by the Yongxing Basin and Sansumu survey tracts can be characterized by rather dense sites like Laohushan and Yuanzigou. The Warring States and Han Dynasty period sites known in other regions cannot be characterized in this manner, requiring a different conversion from the relative demographic index to absolute population estimates.

A Han Dynasty village site was excavated north of Liaoyang City, Liaoning Province (Figure 1) (Dongbei 1957). This site is a collection of several homesteads and a cemetery spread across a square kilometer. Although the size of each individual house is not given in the report, each homestead has an area of approximately 30 m x 20 m and contains its own animal pen and a ceramic lined well. The houses are semi-subterranean. Although the photos of the site do not include scales, the houses are circular and appear not to be as deep as their Neolithic counterparts. Other Warring States period houses fit this general profile.

A Warring States village site has been excavated at the Erliban Site in the Junge’er Banner, Inner Mongolian Autonomous Region (Figure 1) (Nei Menggu 1994, 1997). Although the remains recovered there are not as complete as those at the Han Dynasty site of Liaoyang, this site has two different kinds of houses that point out a major difficulty with identifying

vernacular architecture in the Warring States and Han Dynasty periods. The Erliban site has both semi-subterranean and surface house remains, a pattern that is repeated elsewhere, causing problems for the estimation of house densities at other sites.

At many sites from the Warring States through the Han Dynasty periods, there seems to be a mismatch between the number of subterranean non-house remains (pits and wells) and the number of houses reported. For example, at Erliban there were 42 storage pits discovered but only four houses. The Lutaigang site, Henan Province, has a single circular, semi-subterranean Spring and Autumn period house (2.4 m diameter) and 14 pits. The Duangang Site, about 10 km east of Lutaigang, contains the remains of 5 wells and over fifty pits but no houses (Zhengzhou and Kaifeng 2000: 242). Lastly, at the Keshengzhuang loci excavated as part of the excavations at the Western Zhou capital at Fengxi, multiple bone hairpins and other items of personal adornment were excavated with stone, and bone tools as well as 26 wells in an area with no house remains (Zhongguo 1962: 27). When the mix of house remains at Erliban and Luoyang West Suburb are considered together with the more robust remains found in larger sites (see below), it seems likely that this is a period when housing developed from a stage where semi-subterranean houses were the norm, to a stage where a mix of surface housing as well as housing with stamped earth walls became more common, especially in larger settlements. What the archaeological record lacks is systematic investigation of surface houses without stamped earth foundations; the lack of a more complete set of domestic remains will cause our conversion to underestimate population to a certain extent.

From what is available in the archaeological record at more modest sized sites, we suspect that house sizes did not become considerably larger in the Bronze and Iron Ages. Houses around 10 m^2 were still quite common, like the semi-subterranean house included in the report at Erliban (2.8 m x 2.9 m). The density of houses at the Liaoyang and Erliban sites vary widely. If the two contemporaneous Warring States period houses at Erliban are examined, they are found as part of 375 m^2 of excavation or approximately 50 houses/ha. The Liaoyang

excavations produced 7 houses as part of 1.3 ha of remains or 5.4 houses/ha. (For comparison, the densest remains at the Neolithic Yuanzigou site above were 60.0 houses/ha.) The comparison of dense and sparse distributions of houses to settlement pattern data of different sherd densities will allow the calculation of a conversion factor.

3.3.3.2. Warring States and Han Dynasty period walled settlements

The remains of the Lower Capital of the Yan State (Yanxiadu), in modern Henan Province, is a well excavated example of a walled site dating to the Warring States period (Hebei 1996). This site is an order of magnitude larger than anything recovered in Liangcheng (6.5 km x 5 km). The large scale of the site itself, as well as the impressive nature of the fortification around the site, immediately calls to mind cities like Han Chang'an, which is characterized by wide, planned streets which served to divide the city into districts. Some of the houses at Yanxiadu meet these expectations. In the northeast corner of the Eastern Walled city, in a district called Xiaopingtai, is a group of four houses (Hebei 1996:30). The floors of these houses are on the surface, but the house floors themselves are built on substantial stamped earth foundations. Three of the four houses have been completely excavated and are modest in size (5 m x 3.8 m). All four houses share an east-west wall with the neighboring structure and therefore all three houses are in an area of 21 m x 6 m or 40 m^2/house (250 houses/ha). However, these dwellings are not the norm at this site. The other house remains at the site are circular or rectangular semi-subterranean houses that are reminiscent of their Neolithic predecessors and the smaller sites discussed above.

An example of a cluster of these semi-subterranean houses at Yanxiadu is found at the Eastern quadrant of the Number 6 Dongshencun Section. At this site twenty semi-subterranean houses were recovered in two broad excavation areas. The remains were divided into three different periods: Middle Western Zhou period (75 m^2/house), Late Western Zhou period (150 m^2/house and 144 m^2/house for the two areas) and Spring and Autumn period (120 m^2/house)

(Hebei 1996: 449). The average density of houses in these two areas fall between 133 houses/ha and 66 houses/ha.

The problem of missing house remains continues at Yanxiadu. There are several hundred thousand roofing tiles recorded at the site, but very few houses. The large numbers of pits and wells found at the site were almost certainly used by people living near them, but the house remains, if any, were not recognized by excavators. The remains of surface houses would likely resemble those seen at the Wuyangtai Village section of the Yanxiadu site. Here, excavators recorded 35 m^2 of "living surface" (*zhumian*) but no other house structures at this depositional level.

3.3.3.3. Correlating the excavated house densities to the relative demographic index

The varying house densities found at Warring States through Han Dynasty period village sites are listed in Table 7.

Table 7. Sites and house densities for Western Zhou through Han Dynasty sites.

Site/ Period	Density (houses/ha)
Liaoyang Han Dynasty period	5.4 houses/ha
Erliban Warring States period	50 houses/ha
Yanxiadu: Xiaopingtai Late Warring States period	205 houses/ha
Yanxiadu: Section No. 6 Dongshencun Middle Western Zhou period	133 houses/ha
Yanxiadu: Section No. 6 Dongshencun Late Western Zhou period (two sections)	66 houses/ha 69 houses/ha
Yanxiadu: Section No. 6 Dongshencun Spring and Autumn period	83 houses/ha
Laohushan (for comparison) Densest area of the Neolithic site	40.0 houses/ha (excavation) 7.6 houses/ha (entire site)

Of the sites listed above, only Liaoyang is an actual village in its entirety, with all of the architecture necessary (wells, animal pens) to carry out an agricultural existence. The Xiaopingtai section of the Yanxiadu Site suffers from a very small excavation area. The question for this type of architecture is not, “How dense are the remains inside the building?” (This is essentially a four unit apartment block.), but “How many buildings there are in a hectare?” This single building has not been fully excavated, so we cannot know the density of this house type across the site. This collection of houses is an outlier at its own site and is likely not the kind of residential architecture we have in Liangcheng. This data point will be removed from the analysis, leaving four other data points, three from Yanxiadu and another from the Erliban site with a range of 50 houses/ha to 133 houses/ha.

A comparison with the Laohushan site aids in the understanding of the range of densities contained in Table 7. At Laohushan the densest excavated house remains from the site yield a density of houses/ha comparable to Erliban, while the total density of known house remains inside the wall is 7.6 houses/ha, much closer to the density at the Liaoyang site. These

two data points are not as far apart as they initially seem; the Liaoyang data includes areas of the site that are not “house” in the same way that the area within the wall at Laohushan includes a large section of the site that is not dominated by houses. When remains from the survey are examined, the same range of data is found, likely representing collections taken directly on top of houses (and their associated middens) to collections taken further from the center of the site.

3.3.3.4. Quantifying survey collections: Sherd density

As cited above, the density of sherds in general collections is hard to measure accurately, and these collections are therefore given the somewhat arbitrary density of 0.25 sherds/m^2. The raw densities for Han Dynasty systematic collections are in Figure 6. The densities cluster at under 2 sherds/m^2, between 2 sherds/m^2 and 4.5 sherds/m^2 and a third between 5.5 and 6.5 sherds/m^2. The Warring States period systematic collections show two different densities, the seven systematic collections below 5 sherds/m^2 and the single collection above 6.5 sherds/m^2 (Figure 6). The sherd densities in these two periods share a range of densities that, when compared to excavated data, will allow the calculation of a conversion factor between the relative demographic index and absolute population.

I have argued above that the very highest density excavation areas represent high concentrations of occupation. Because all sites are not circles, and certainly not all sites have their highest density housing in their geographic centers, we should not expect the “middle” of the site to necessarily be the exact center; but if systematic collections are to be seen as representing the surface remains of higher density excavation data, they should appear as part of larger clusters of collections, not off by themselves. In a large site, this would mean that the density of sherds in collections would be higher near the middle of the site where presumably either houses were more dense or people rebuilt houses over the life of the site.

The Yongxing Basin survey tract shows many fewer collections than the Sansumu survey tract. We should therefore expect a larger number of low density collection areas

representing low density occupations. The areas that do show higher density occupations should be parts of larger clusters of collections. This is overwhelmingly the case with the Han Dynasty period data; many of the systematic collections are on the valley floors, or on the fertile slopes near the village of Maoqinggou (Figure 10). The systematic collections on the slopes are part of the only high density collections we see in the Yongxing Basin for this period (on the western slopes). The darker grey collections near the eastern border of the Yongxing Basin survey are outliers in that they are more isolated than other collections with high density remains.

Han Dynasty period data for the Sansumu survey tract meet the expectations of our model even more securely (Figure 11). The largest cluster on the shore of Daihai Lake is a mix of systematic collections (the two darker shades of grey and black), which we interpret as the remains of high concentrations of occupation (Figure 12). The northern slopes are overwhelmingly light grey general collections.

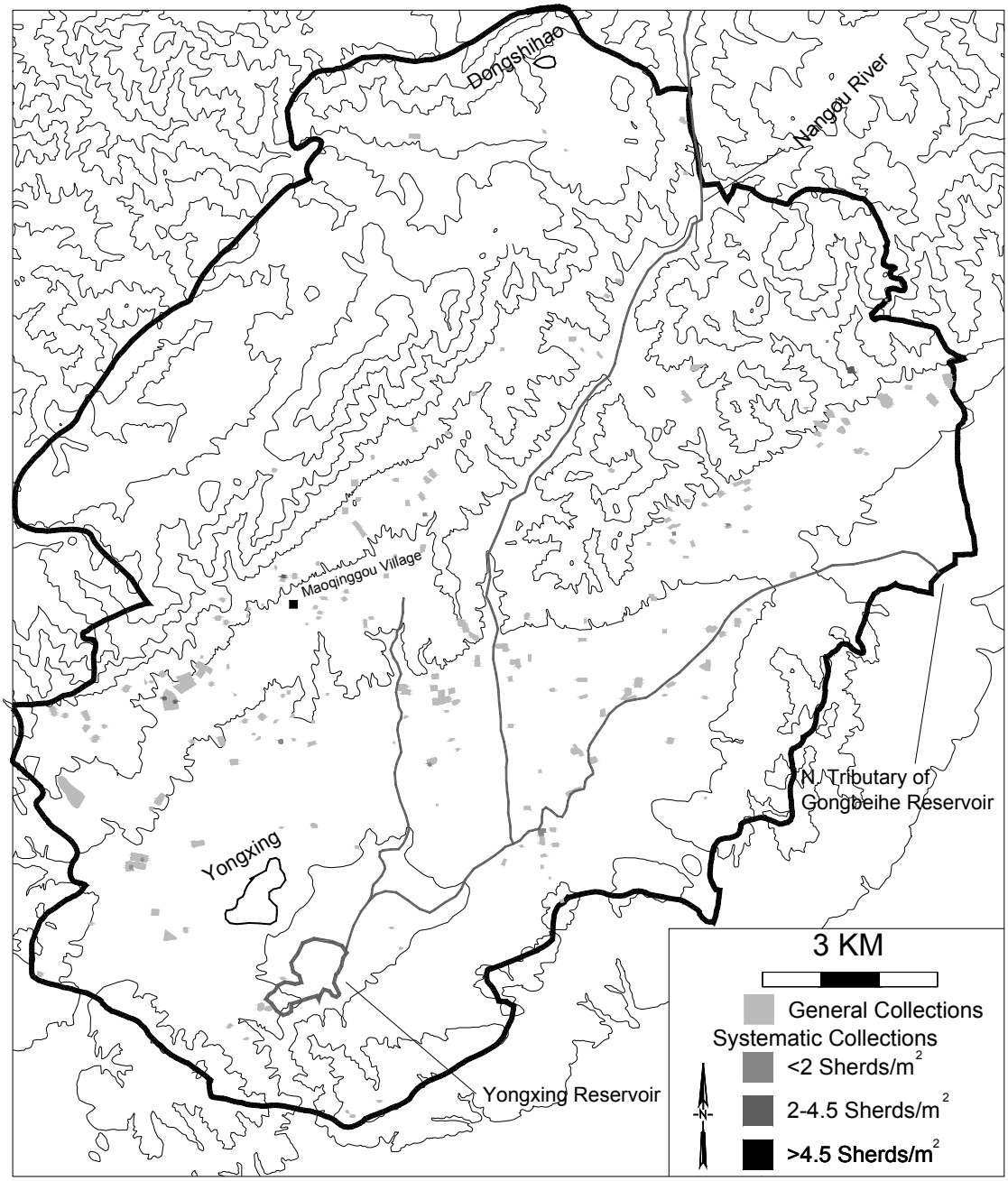


Figure 10. Yongxing Basin survey tract with Han Dynasty period density polygons (100 m contour interval).

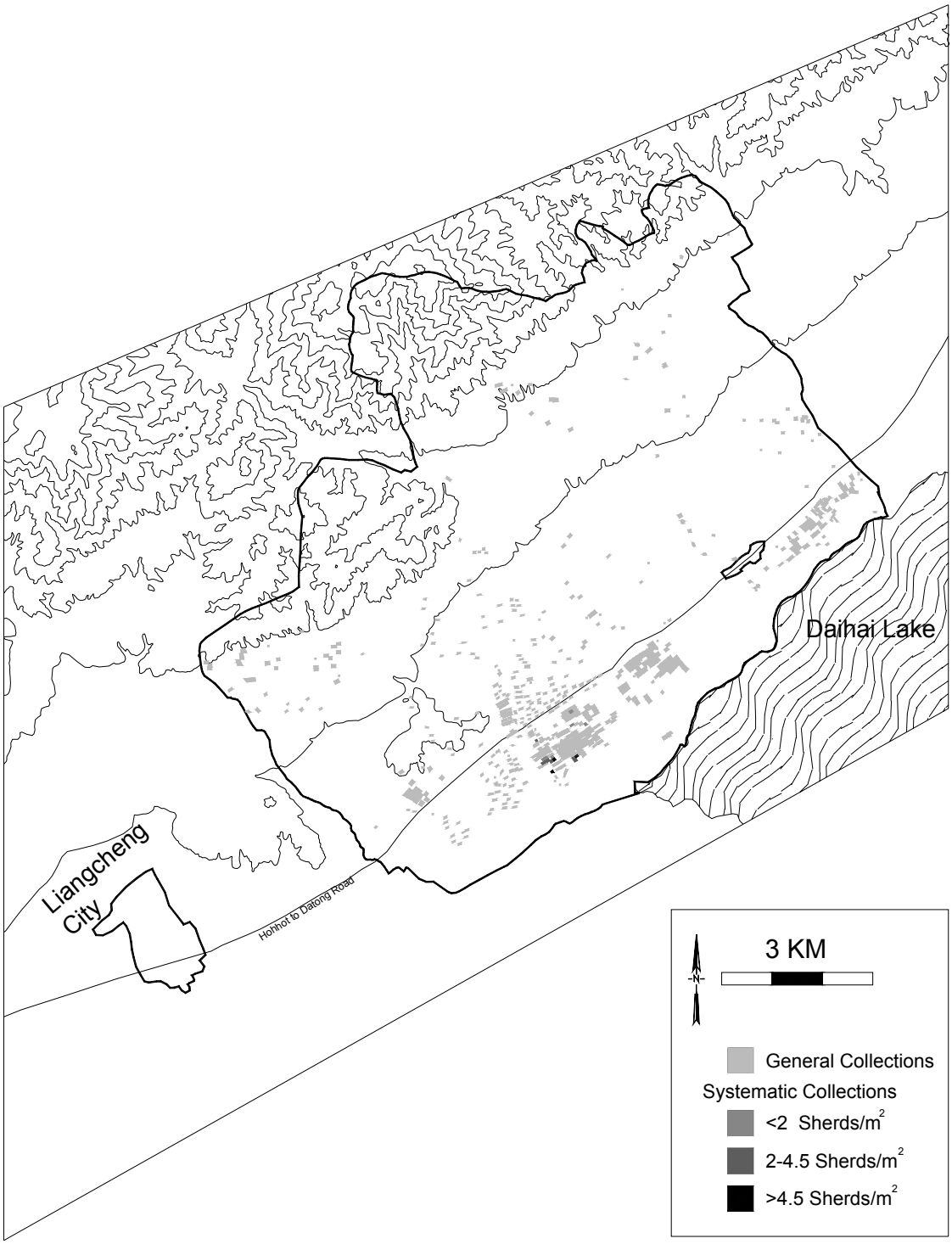


Figure 11. Sansumu survey tract with Han Dynasty period density polygons (100 m contour interval).

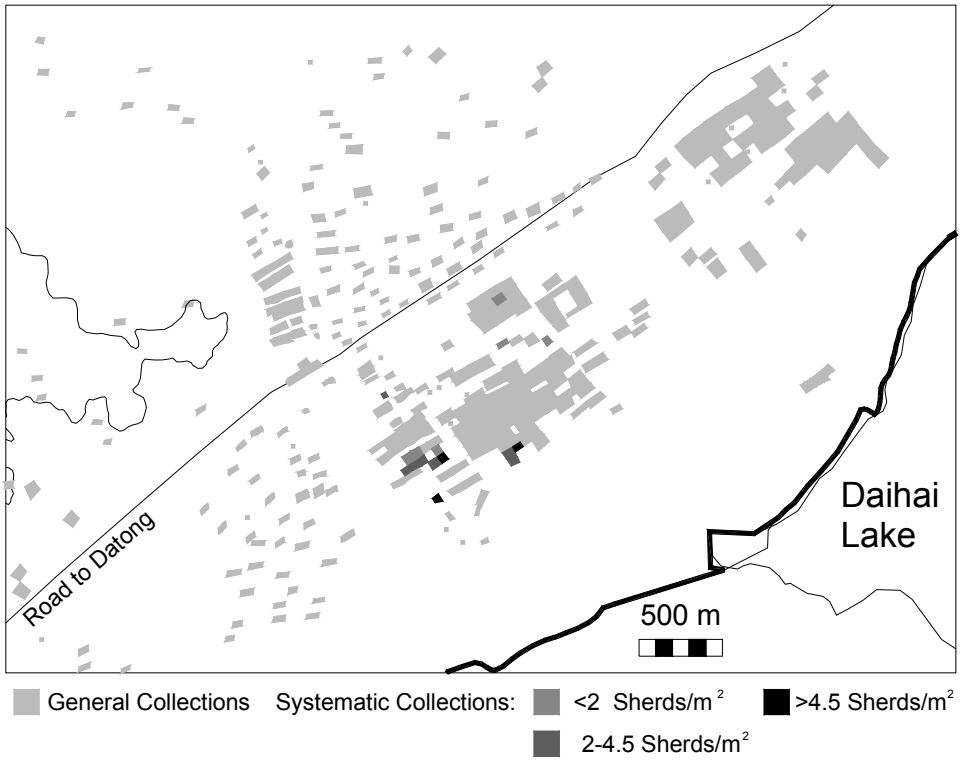


Figure 12. The high density Han Dynasty period cluster on the shore of Daihai Lake (50 m contour interval).

The Warring States period Yongxing Basin data has very little of the clustering we are interested in classifying here (Figure 13). The highest density systematic collection was found in the southwest quadrant of the survey, on the slopes. Figure 14 shows that this collection is part of a loose cluster of collections, adjacent to the other systematic collections in the Yongxing Basin survey tract.

The Warring States period Sansumu survey tract shows an interesting pattern (Figure 15). Like the Han Dynasty period data on the shore of Daihai Lake, the lake shore cluster is divided into two parts, and systematic collections were found only in the western cluster. Five of the other six systematic collections for this period were found within 1.9 km of each other, on the eastern slopes, in an area that during the Han Dynasty period does not show this density of occupation (Figure 16).

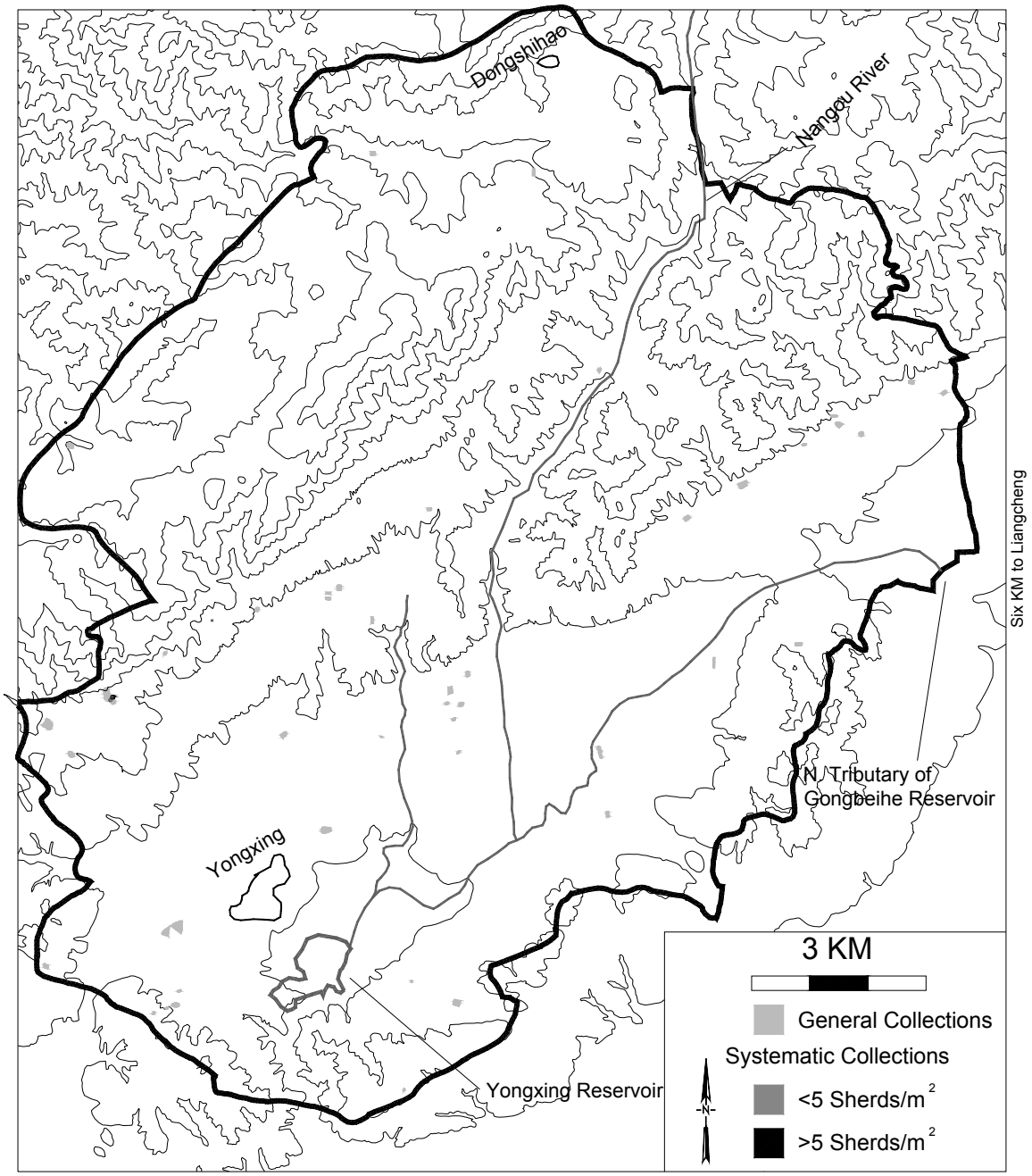


Figure 13. Yongxing Basin survey tract with Warring States period density polygons (100 m contour interval).

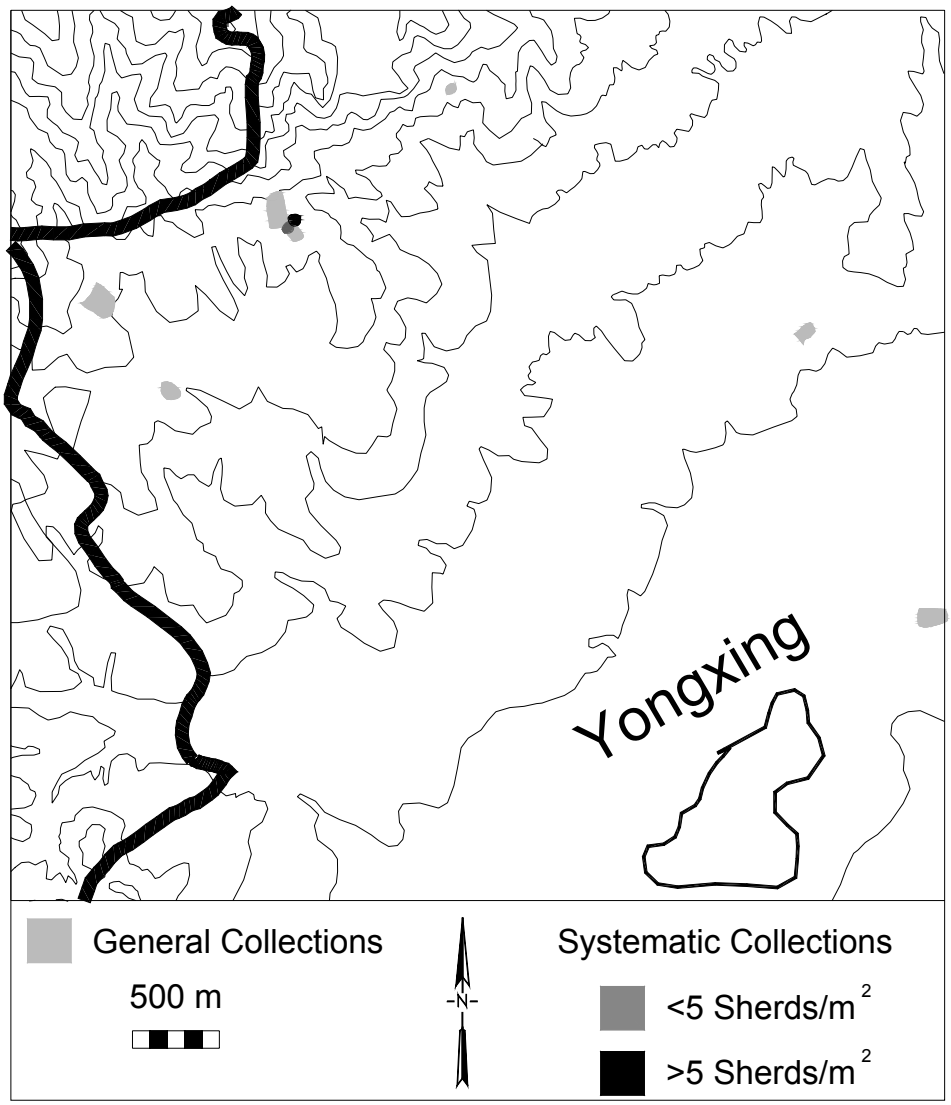


Figure 14. High density Warring States period collections from the Yongxing Basin survey tract (50 m contour interval).

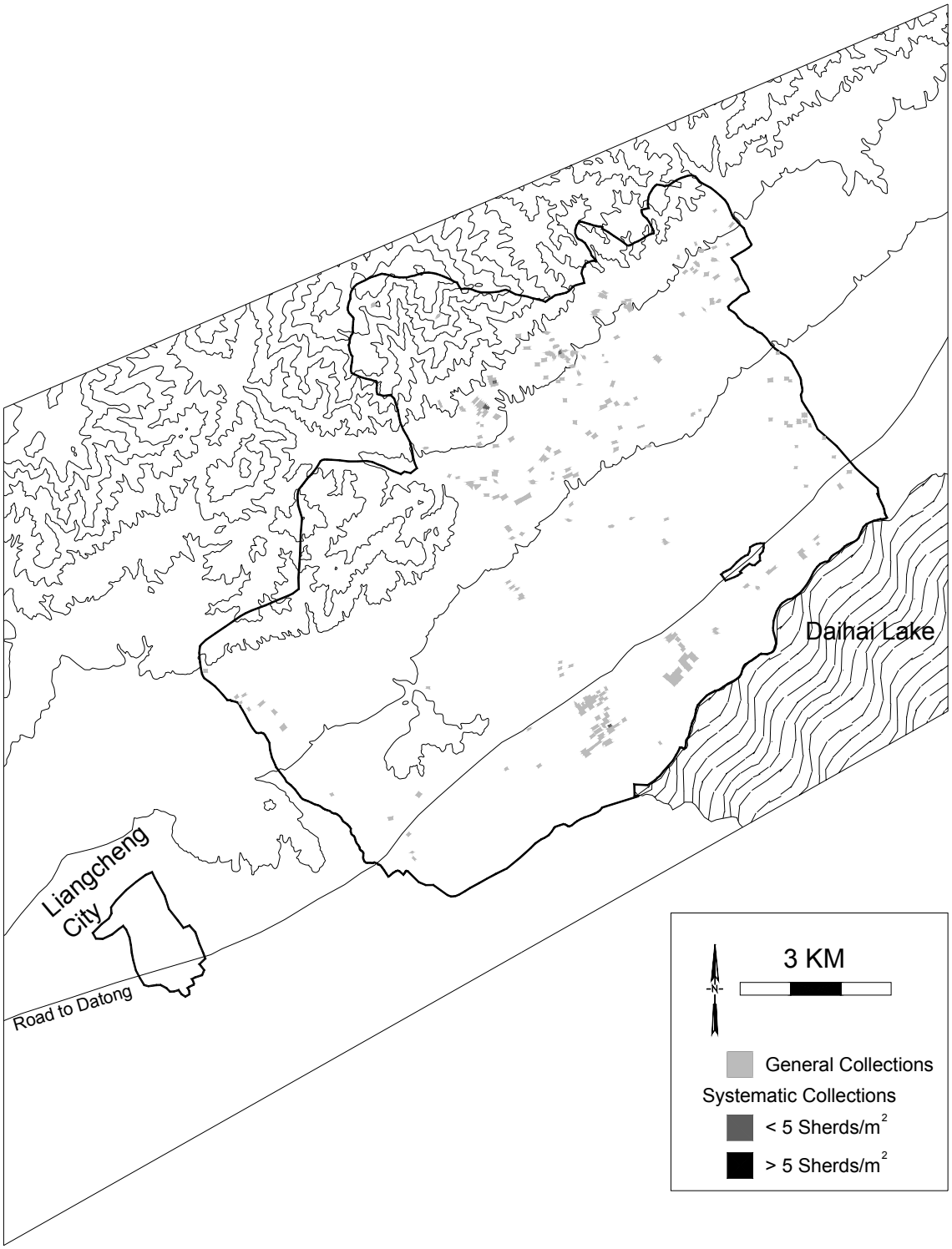


Figure 15. Sansumu survey tract Warring States period density polygons (100 m contour interval).

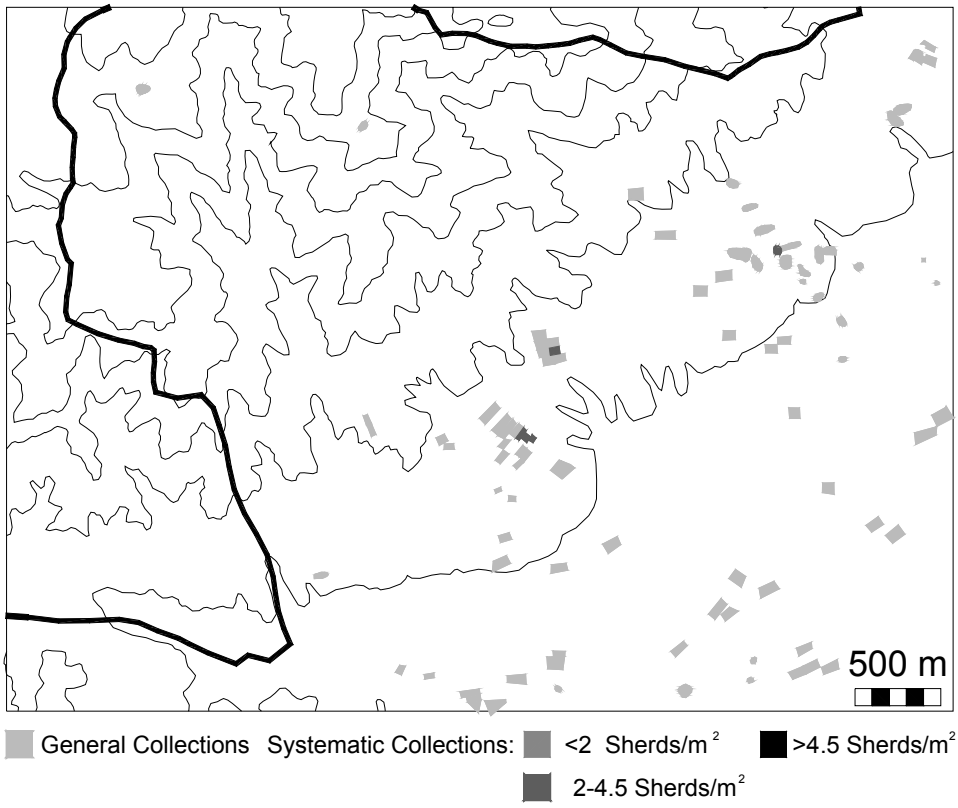


Figure 16. High density cluster of Warring States period collections in northern portion of Sansumu survey tract (50 m contour interval).

3.3.4. Applying the excavated house densities to the density information from the survey

The systematic collections are shown above to delineate areas where higher densities of population were located in the past. Although the locations of high population were different in the Warring States and Han Dynasty periods, these areas were in the middle of clusters of lower density remains and cover a very similar range of densities. The excavated data and the survey data both support the conclusion that the density of houses across low to medium size sites like those seen in Liangcheng did not change between periods. Population changed because the occupied area increased, or the areas of dense population increased in size, but the range of population densities found in the occupied areas themselves did not. Therefore, the range of excavated and survey data above will be used to arrive at a single conversion factor for both the Warring States and Han Dynasty periods.

The first step in converting the relative demographic index to an estimate of absolute population is to connect the densities from survey to the excavated densities of house remains. Table 8 contains the correlations between the excavated and the survey data. The general collections appear to exhibit a sparse distribution across the landscape that should be interpreted as homesteads. The one excavated example of a homestead site available for comparison is the very low density site of Liaoyang (5.4 houses/ha).

The systematic collections present more complicated issues. Although the survey data shows that the systematic collections are high density regions in the middle of lower density remains, to make absolute population estimates a connection must be postulated between the systematic collections and remains at Yanxiadu and Erliban. Rather than quibble about which individual excavation produced data the most like higher density remains in Liangcheng (a difficult question to answer without any excavated examples from the Liangcheng region), an average of the medium house densities at the sites of Yanxiadu and Erliban will be utilized in developing a conversion factor between the relative demographic index and an estimate of absolute population.

Table 8. Correlations between excavated sites and survey data.

Period/Site	Density (houses/ha)	Associated Density for Survey Data
Liaoyang	5.4 houses/ha	General Collections
Erliban	An average of 67 houses/ha	Systematic Collections
Yanxiadu: Section No. 6 Dongshencun		
Yanxiadu: Section No. 6 Dongshencun		

The next step is the actual calculation of the conversion. The area of the collection is multiplied by the appropriate house density to arrive at an estimated population for that collection. This population is then divided by the relative population index for that collection to create a conversion factor. For example the general collection 04A075 has an area of 0.84 ha. At the density of 5.4 houses/ha and between 4 and 6 people/ family the estimated population is between 18.2 and 27.3 people. The relative demographic index for this collection is 0.211. The conversion factor is (18.2 or 27.3 divided by 0.211) 86.3–129.4.

The results of the conversion are in Table 9. The Warring States period conversion factor was calculated without collection 02B266, which is an outlier for the Warring States period systematic collections and lowers the conversion factor below the range of the other calculations. Averaging the conversion factors for the general and systematic collections for the two periods provides a conversion of 120.4–179.3.

Table 9. Calculation of the conversion factor for the relative demographic index.

Excavated Density (Houses/ha)	Period	Average Population per Collection Unit	Average Relative Population Index Score per Collection Unit	Conversion Factor
General Collections				
Liaoyang	Warring States	8.7–13.0	0.063	138.0–206.3
5.4 houses/ha	Han	9.2–13.9	0.065	141.5–213.8
Systematic Collections				
Yanxiadu and Erliban	Warring States	52.7–75.5	0.587	89.8–128.7
67 houses/ha	Han	76.1–114.1	0.678	112.4–168.3

3.4. Final absolute population estimates

The final population estimates for the Laohushan period through the Han Dynasty period are in Figure 17. The Zhukaigou estimate uses the multiplier from the Laohushan period. The population for the three small Zhukaigou period sites discovered by the survey will be quite small regardless of the exact method used. If the conversion factor for the Neolithic site of Laohushan had been used as a conversion factor instead of the conversion factor derived from the excavated data used here, the Warring States and Han Dynasty period populations would have had a different range. The Warring States period would have seen its population drop from an estimate of 3061–4559 to a much lower estimate of 1926–3852. The Han Dynasty period would have seen similar drops from 8801–13106 to 5117–10233.

It is not clear how much of a difference would be seen utilizing excavation data from the Han Dynasty and Warring States periods to estimate the population for the Yuan Dynasty as opposed to Yuan data. Calibrating the index based on Yuan excavation data would be preferable in any case, so no estimation of absolute population will be made here. A comparison of the relative demographic index between periods leaves no doubt that the population increased dramatically in the Yuan Dynasty period.

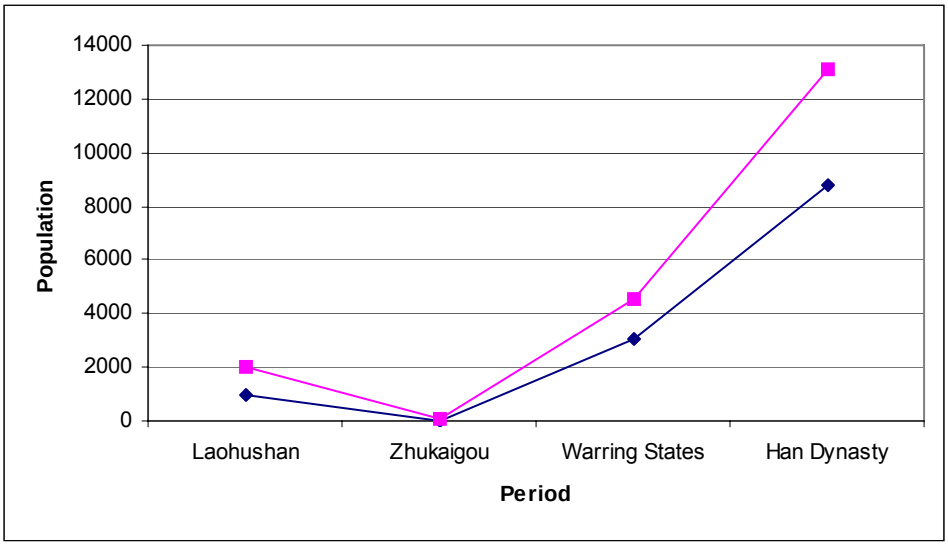


Figure 17. Final absolute population estimates (upper and lower) from the Laohushan to Han Dynasty periods.

4. Initial occupation and previous work in the Liangcheng region: The Yangshao period (4700–2900 BCE)

Archaeological investigation in the Liangcheng region began in the early 1980's. In the late 1980's and again in the late 1990's the Inner Mongolian Institute of Archaeology and Cultural Relics completed a large scale unsystematic survey of the Liangcheng Region (called the Cultural Relics Survey here). The earliest known occupation recovered by that survey dates to the middle Neolithic, Early Yangshao period (4700–2900 BCE). Test excavations occurred at many of the sites recovered by the Cultural Relics Survey (Nei Menggu and Riben 2001a). No remains from this period were recovered by the Sansumu or Yongxing Basin surveys (Figure 18).

Because the Cultural Relics Survey was not full coverage, community organization of the Yangshao and later periods cannot be compared. A single large site (Dongdan, 70 ha) was reported by the Cultural Relics Survey, suggesting the development of a primate site hierarchy. No test excavations have been published from Dongdan, but the data from the other excavated sites show very similar house sizes and household assemblages both within and between sites. These data do not suggest that a social hierarchy was developing during this period.

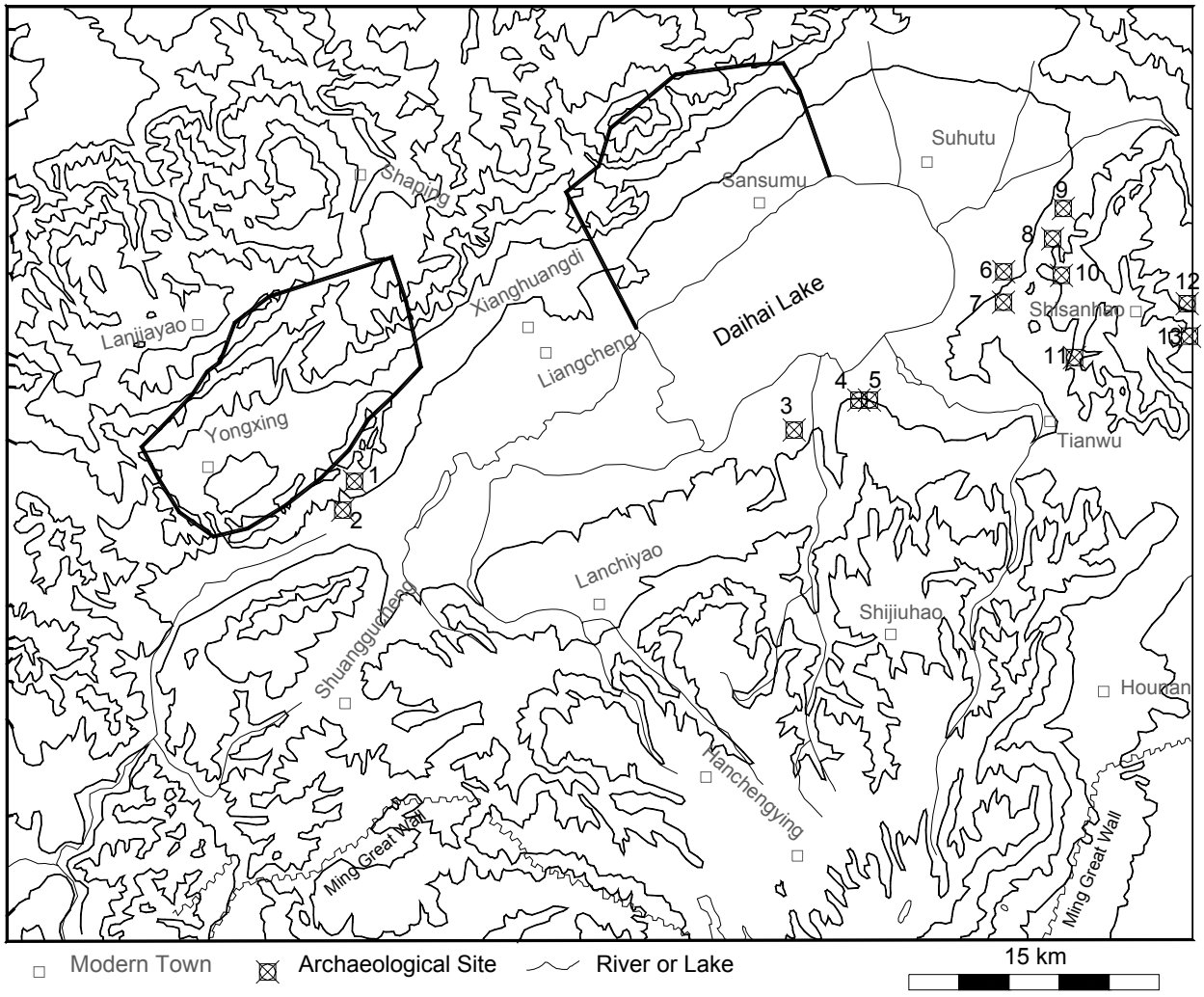


Figure 18. Topographic map with location of Yangshao period sites in the Liangcheng region and approximate boundaries of the Yongxing Basin and Sansumu survey tracts (100 m contour interval) (Redrawn and corrected from Nei Menggu and Beijing 2003: 6).

The labeled sites are: (1) Shashitan (2) Lanmayao (3) Shizishan (4) Lower, Middle and Upper Wangmushan (5) Shihushan I and II (6) Dapo (7) Dongtan (8) Upper and Lower Hongtaipo (9) Huangtupo (10) Pingdingshan (11) Yanwanggou (12) Wulongshan (13) Dongqihao

5. The formation of local communities: The Laohushan period (2900–2200 BCE)

The earliest remains recovered in the Yongxing and Sansumu survey tracts date to the Laohushan Period (2900–2200 BCE). The survey located eight sites between 3 and 7.5 ha and a much larger number of homestead sites, most less than 1 ha in size. Four of these larger sites have walls that are still visible on the landscape. These large sites are among the Laohushan sites already named by the Cultural Relics Survey (Nei Menggu 2000). These names will continue to be used here. Sites of all sizes are found on the south facing slopes of each survey zone and are grouped into distinct clusters with a large proportion of the landscape completely uninhabited (Figure 19, Figure 20). This settlement pattern suggests that the social and economic forces that pull people into communities are stronger than the centripetal forces pulling people away.

The settlement pattern seen here suggests a subsistence strategy that differs from the subsistence systems developing on the Central Plain during the contemporaneous Longshan Period. On the Central Plain, beginning with the Yangshao Period, subsistence systems are thought to be dominated by the exploitation of domesticated plants and animals (Liu 2004; Yan 2000; Zhang 2005). However, the extent to which excavations at large sites on the Central Plain can be seen to inform us to the subsistence practices seen elsewhere in North China is a matter of scholarly debate (Crawford 2006). A comparison of the Laohushan period settlement pattern seen here with the settlement pattern of the modern period suggests a broad mix of subsistence resources are being exploited.

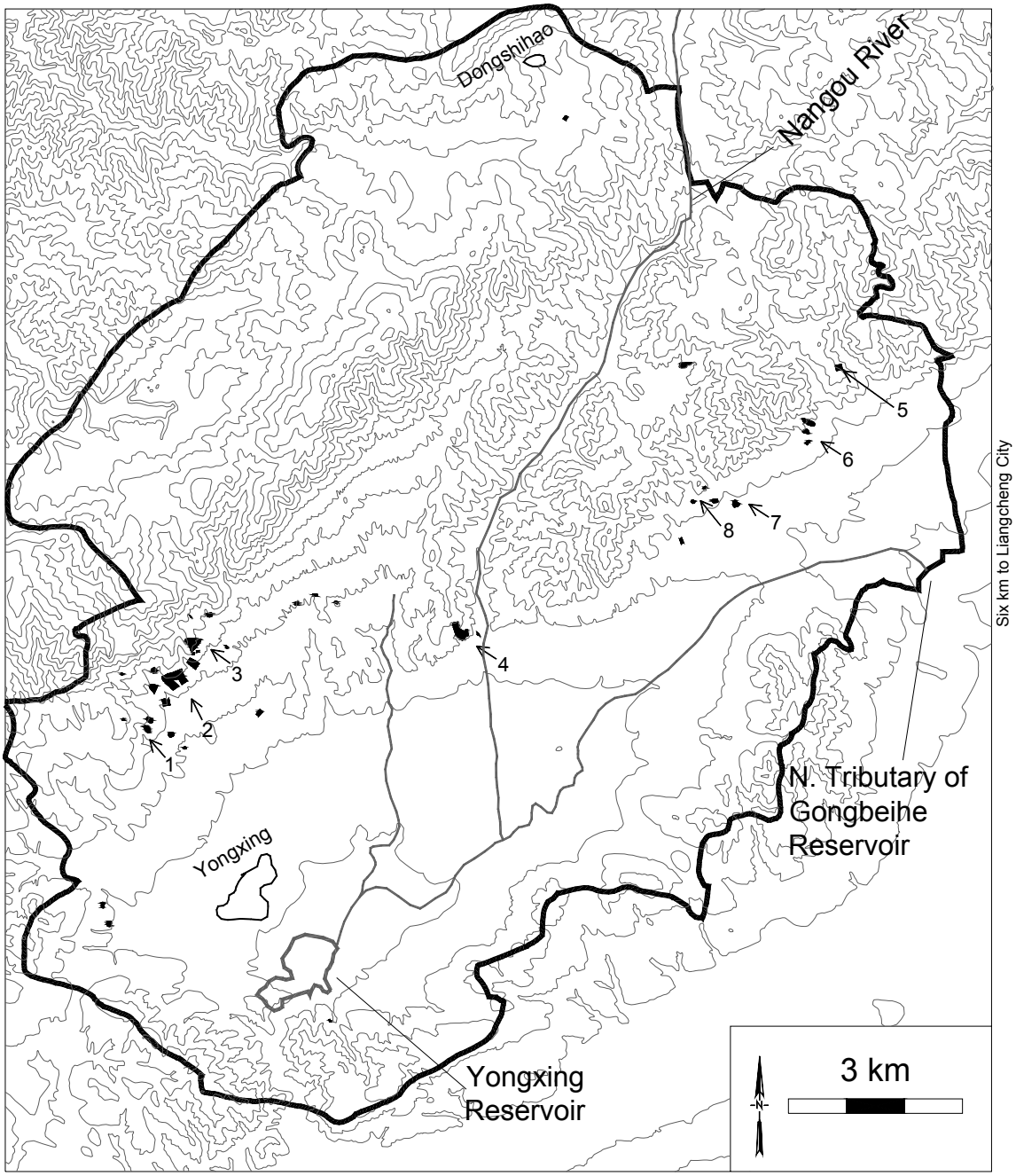


Figure 19. Laohushan period collections in the Yongxing Basin survey tract. Sites mentioned in this chapter are: (1) Xibaiyu, (2) Mianpo, (3) Laohushan, (4) Bancheng, (5) Site 600, (6) Site 248, (7) Site 128 and (8) Site 138 (50 m contour interval).

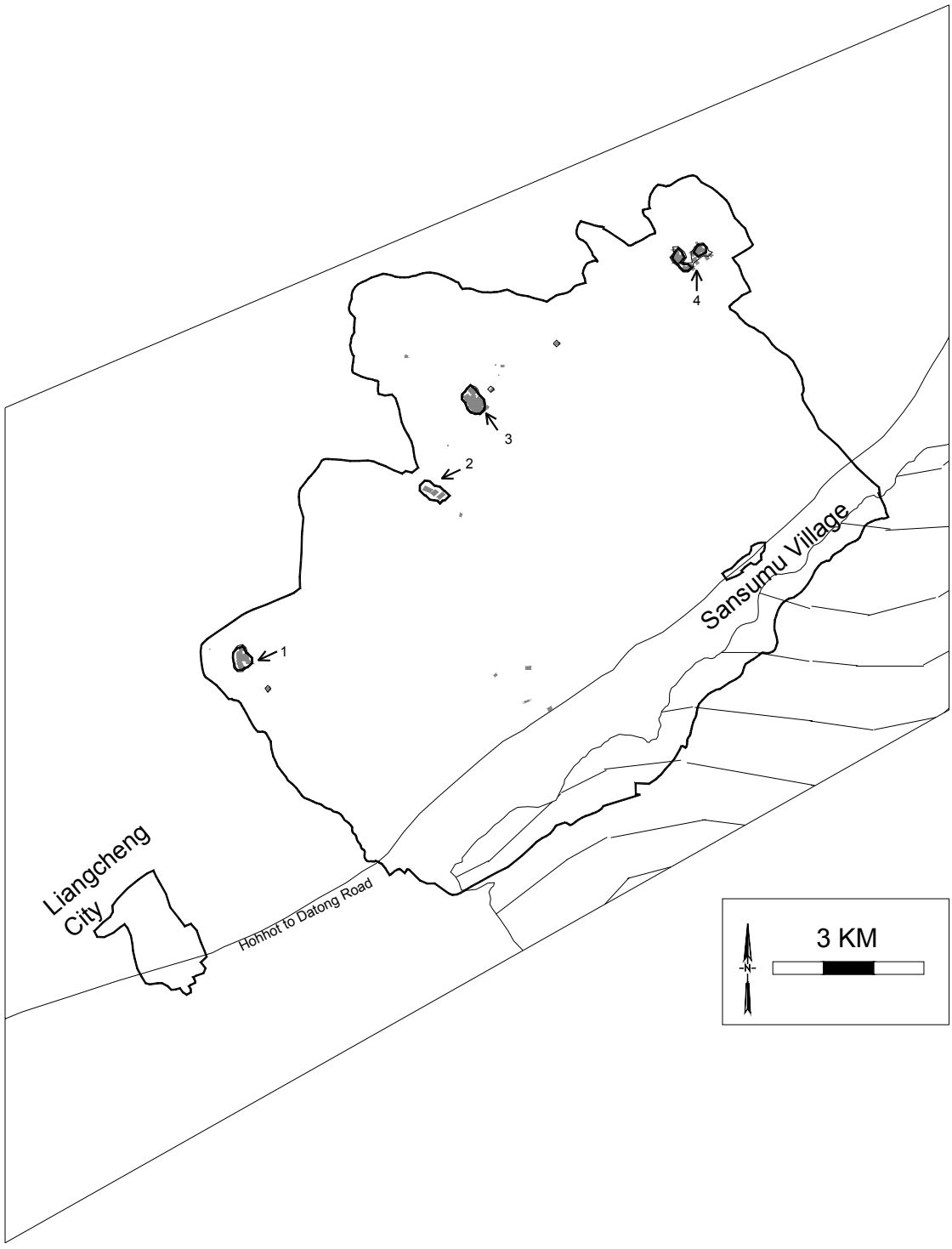


Figure 20. Laohushan period collections from the Sansumu survey tract (50 m contour interval). Sites mentioned in this chapter are: (1) Baiposhan, (2) Yuanzigou, (3) Hetongyao and (4) Damiao. The hatched area delineates Daihai Lake at 3000 BCE.

5.1. Identifying communities in the Laohushan period

5.1.1. Local level communities

Peterson and Drennan have developed a technique of identifying communities utilizing density plots of population (2005). They suggest that local scale communities can be identified in plots with minimally or completely unsmoothed surfaces (2005: 10). The contour plots of the Laohushan period population density at the minimally smoothed inverse power of four are in Figure 21. These plots show a series of sharp peaks that group collections into local communities; the height of the peak is proportional to the population of the community.

Many local communities, some including only a single collection, can be identified in the Yongxing Basin survey tract. Each local level community is delineated by a thick contour line in Figure 22 and the communities that include more than one collection are labeled. The largest of these communities was the Laohushan Cluster, it stretched from the site of Xibaiyu to the Laohushan site, a distance of just over two km. Although all of the inhabitants of this community were likely not in daily contact with one another, the residents of the different sub-local community clusters were likely in daily contact with members of other sub-local communities.

The populations among the communities differ sharply (Table 10). The Laohushan Cluster had a population an order of magnitude larger than the other local communities in the Yongxing Basin survey tract. The Laohushan cluster had between 292 and 585 people, while the next largest community had between 36 and 72 people.

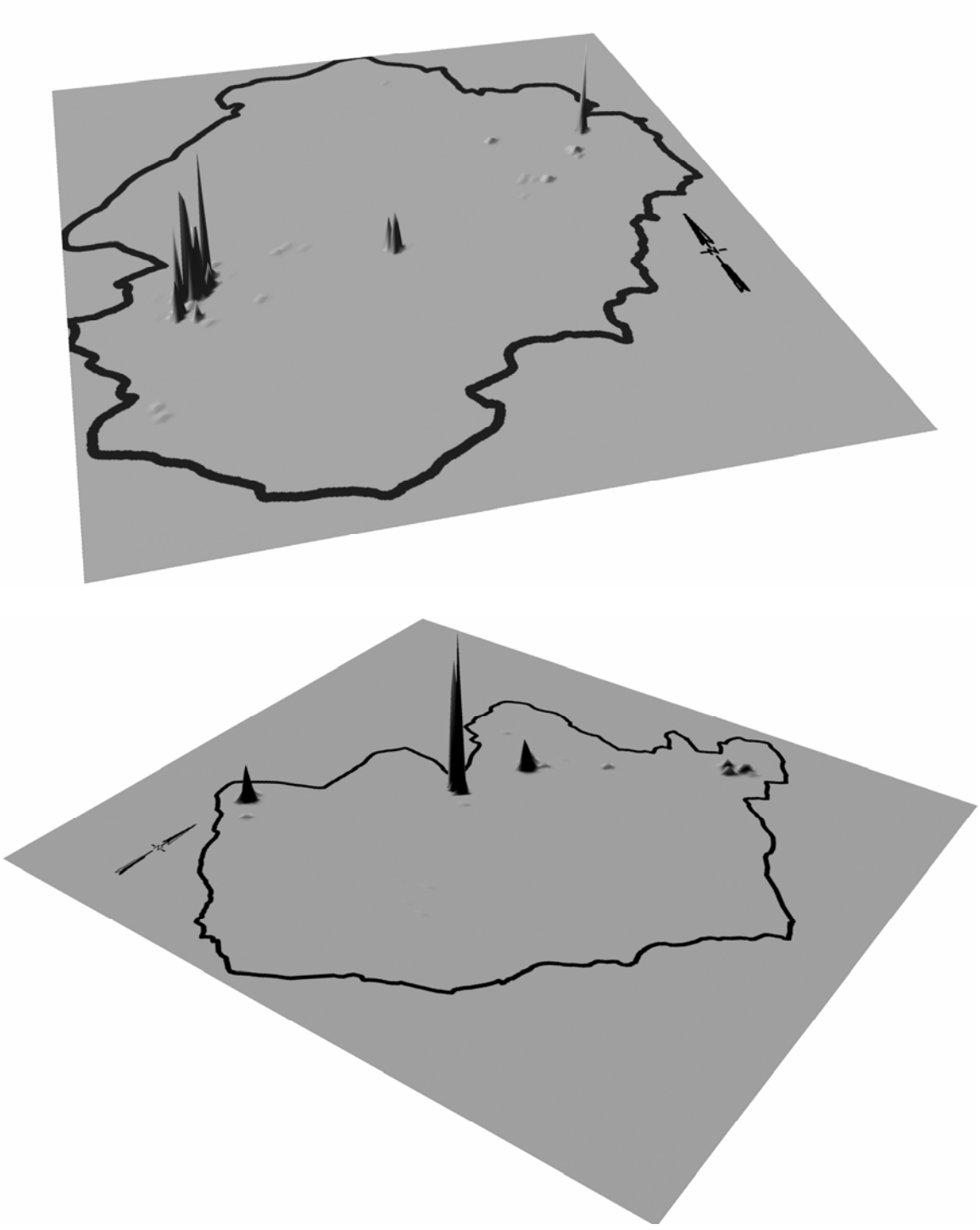


Figure 21. Inverse power of four surface illustrating the Laohushan period occupation in the Yonagxing Basin (above) and Sansumu (below) survey tracts. For scale see Yongxing Basin survey tract (Figure 22) and Sansumu survey tract (Figure 23) contour maps.

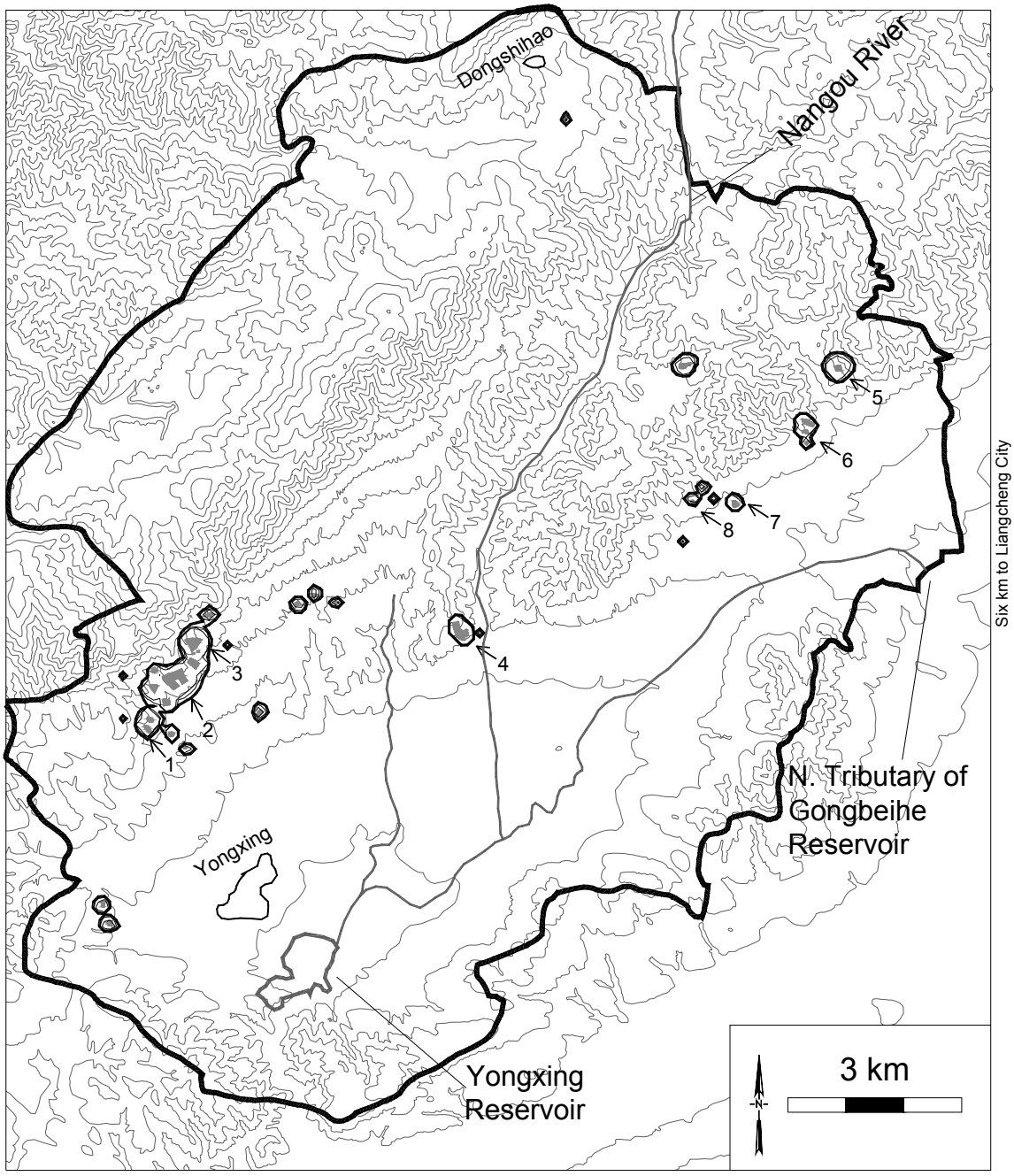


Figure 22. Contour map of the occupied peaks in the inverse power of four surface for the Laohushan period occupation (Yongxing Basin survey tract). The chosen cutoff is the heavy line, which indicates local communities. The numbered sites are: (1) Xibaiyu, (2) Mianpo, (3) Laohushan, (4) Bancheng, (5) Site 600, (6) Site 248, (7) Site 128 and (8) Site 138.

Table 10. Population estimates from each of the Laohushan period local scale communities delineated in Figure 22.

Site	Population
Laohushan Cluster	292–585 people
Bancheng	36–72 people
Site 600	37–74 people
Site 248	6–12 people
Site 128	5–9 people
Site 138	5–9 people

As in the Yongxing Basin survey tract, Laohushan populations in the Sansumu survey tract congregated into small local communities on the south facing slopes of the survey zone (Figure 21, Figure 23). The population distribution among the small local communities was more even in the Sansumu survey tract (Table 11). Yuanzigou had only twice the population of the next two local communities and there were fewer collections found outside these more populous local communities.

Table 11. Population estimates from each of the local scale communities delineated in Figure 23.

Site	Population
Yuanzigou	210–421 people
Hetongyao	118–237 people
Damiao	105–211 people
Baiposhan	73–145 people

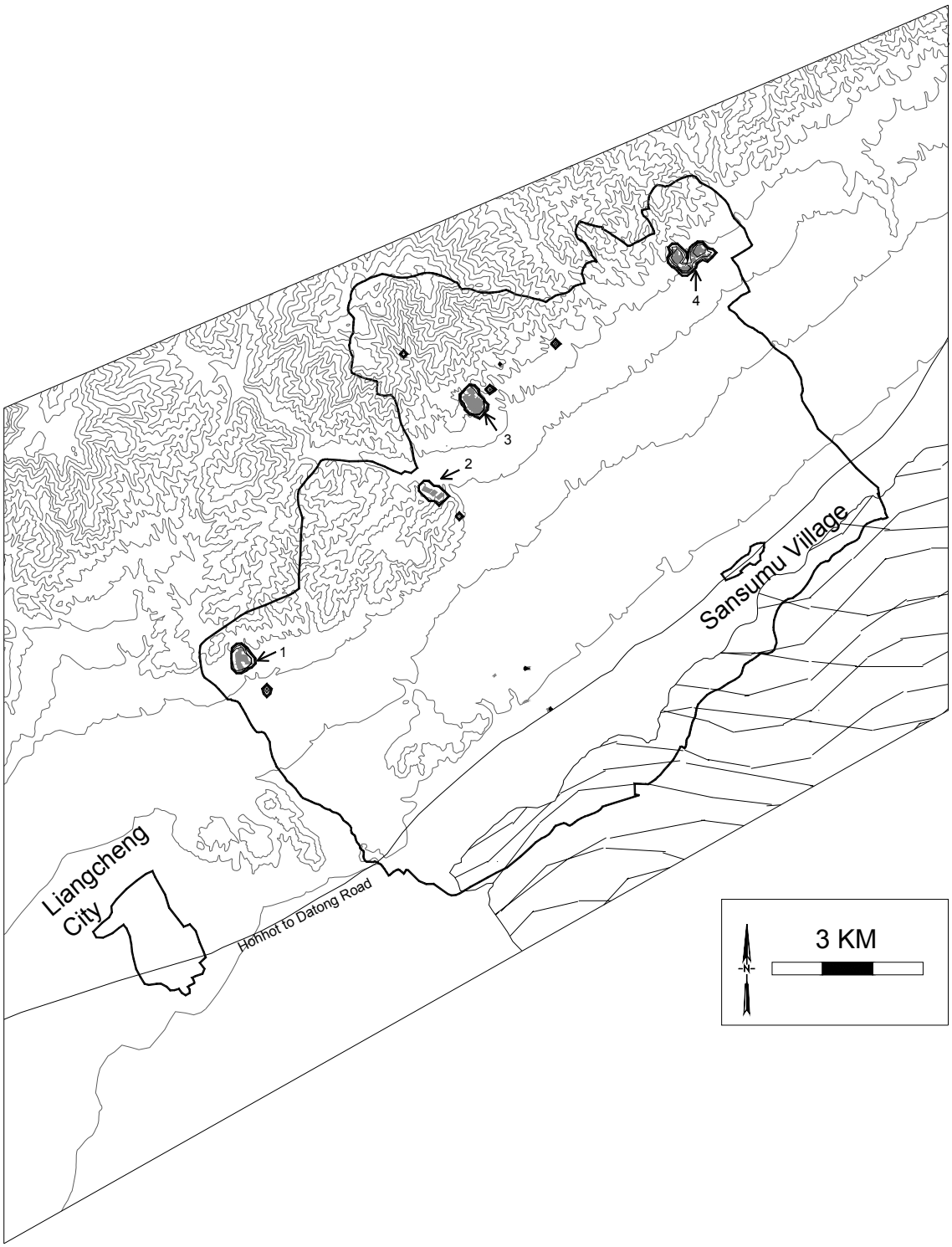


Figure 23. Contour map of the occupied peaks in the inverse power of four surface for the Laohushan period (Sansumu survey tract). The chosen cutoff is the heavy line, which indicates small local communities. The labeled sites are: (1) Baiposhan, (2) Yuanzigou, (3) Hetongyao, and (4) Damiao. The hatched area shows the extent of Daihai Lake at 3000 BCE.

5.1.2. Community organization above the local level community

Higher levels of smoothing reduce the effect of distance on the population density index, resulting in the grouping of larger areas of population into individual peaks that represent higher order communities (Peterson and Drennan 2005: 11). In the plots of local scale communities, the results showed that each small scale community was highly clustered and the communities themselves are dispersed across the survey zone. These two attributes of the small scale communities resulted in a lack of higher level community organization; the small scale local communities in each of the survey zones kept their independence from all other communities (Figure 24). The Laohushan higher order community captured the seven outlying collections that were not in the original local community (an additional 39 to 78 people), but the communities between site 600 and Bancheng did not join into a higher order community (Figure 25). These small local communities appear to be spaced specifically to avoid contact with one another and with the other larger local communities in the Yongxing Basin survey tract.

The local communities of Yuanzigou and Hetongyao, in the Sansumu survey tract, could be interpreted as joining into a single higher order community (Figure 26). Although a slightly lower contour interval would connect these two communities, they are separated by a river. The Peterson and Drennan method treats all surfaces across the region as a flat plain, and therefore does not take into account extra friction for physical barriers to human interaction like rivers or mountains. Surface water would provide a significant barrier to community interaction, therefore these two local communities will not be joined into a higher order community.

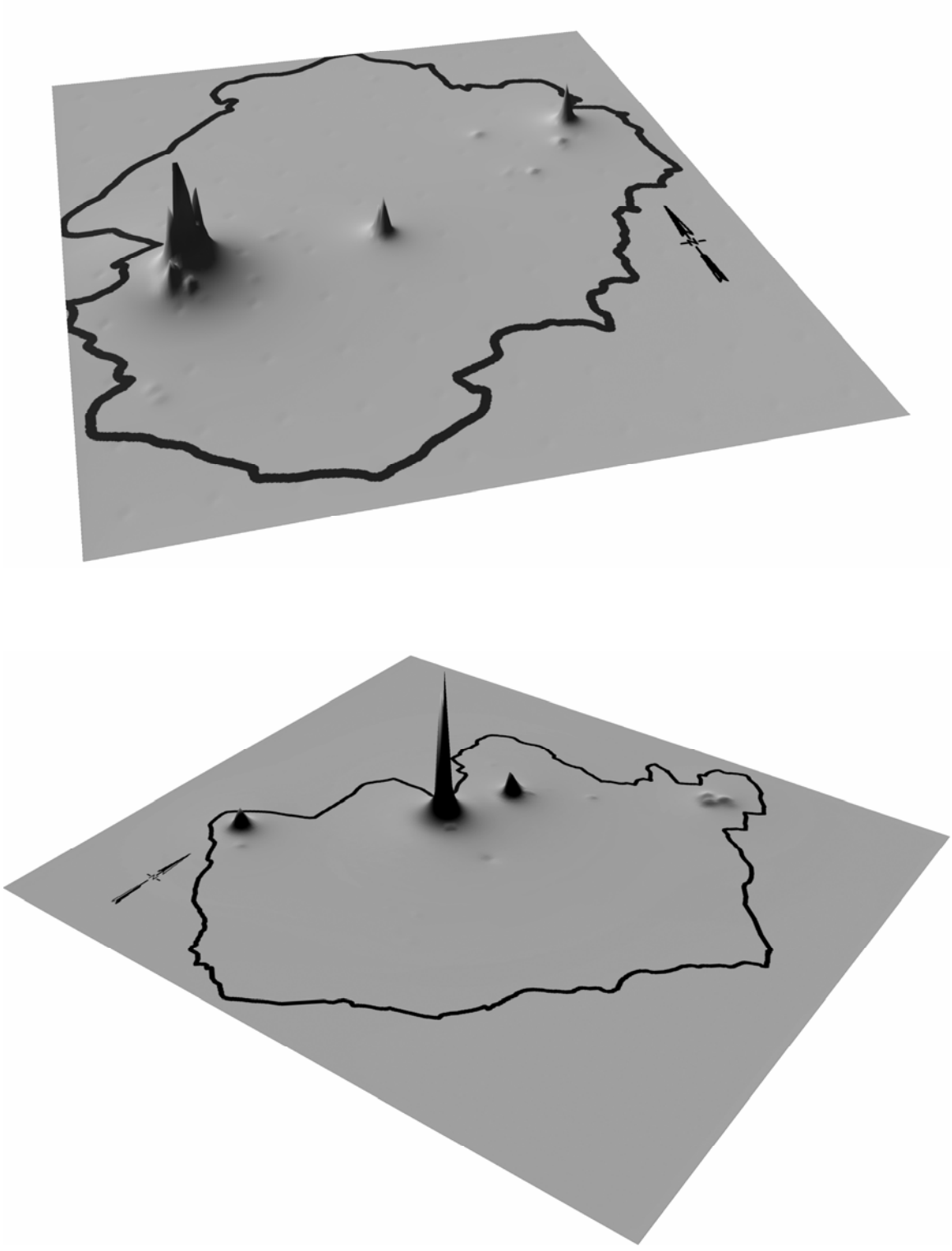


Figure 24. Inverse power of one surface representing the Laohushan period occupation in the Yongxing Basin (above) and Sansumu (below) survey tracts. For scale see Yongxing Basin survey tract (Figure 25) and Sansumu survey tract (Figure 26) contour maps.

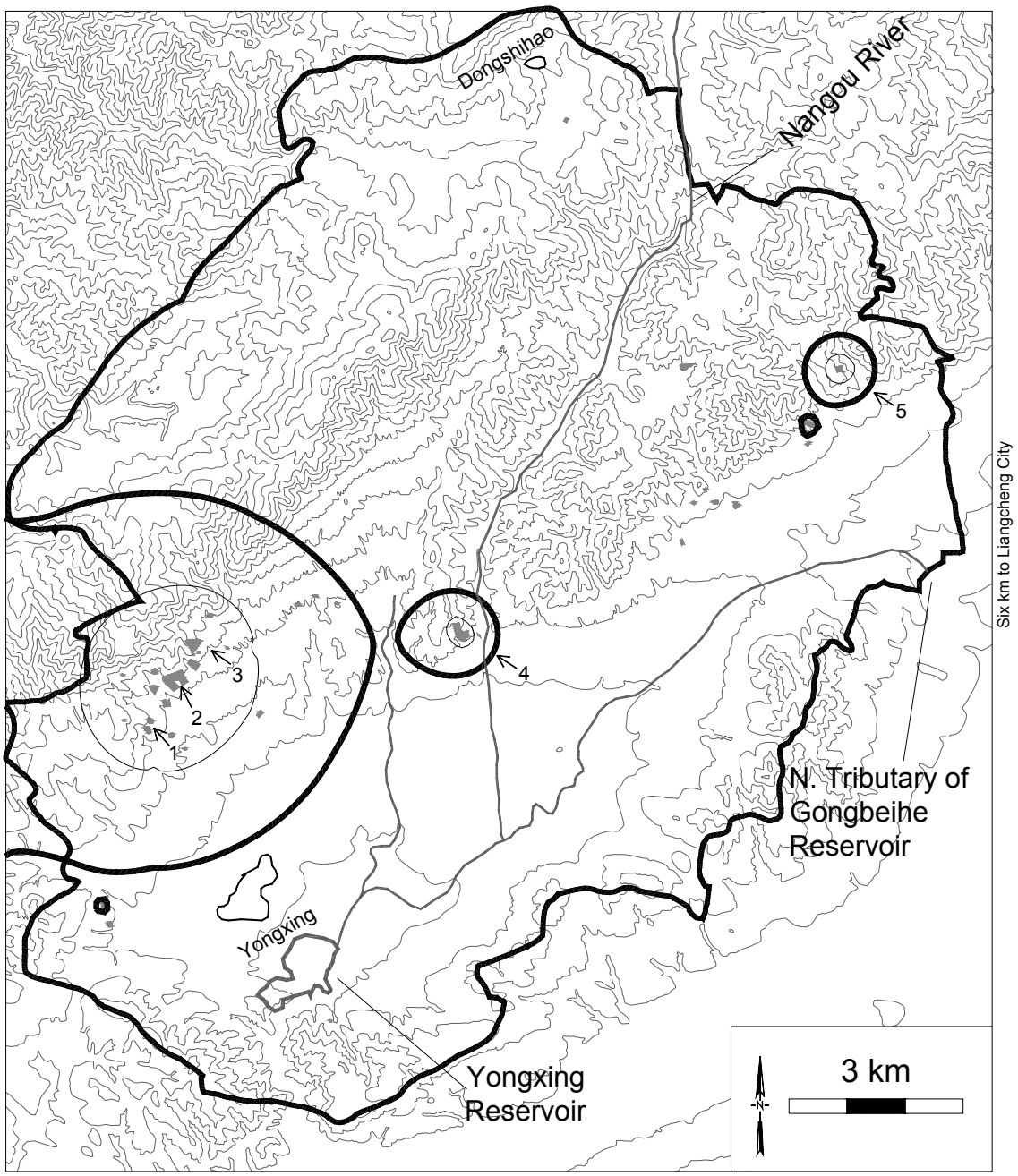


Figure 25. Contour map of the occupied peaks in the inverse power of one surface (Yongxing Basin survey tract). The chosen cutoff is the heavy line, which indicates larger scale communities. The labeled sites are: (1) Xibaiyu, (2) Mianpo, (3) Laohushan, (4) Bancheng and (5) Site 600.

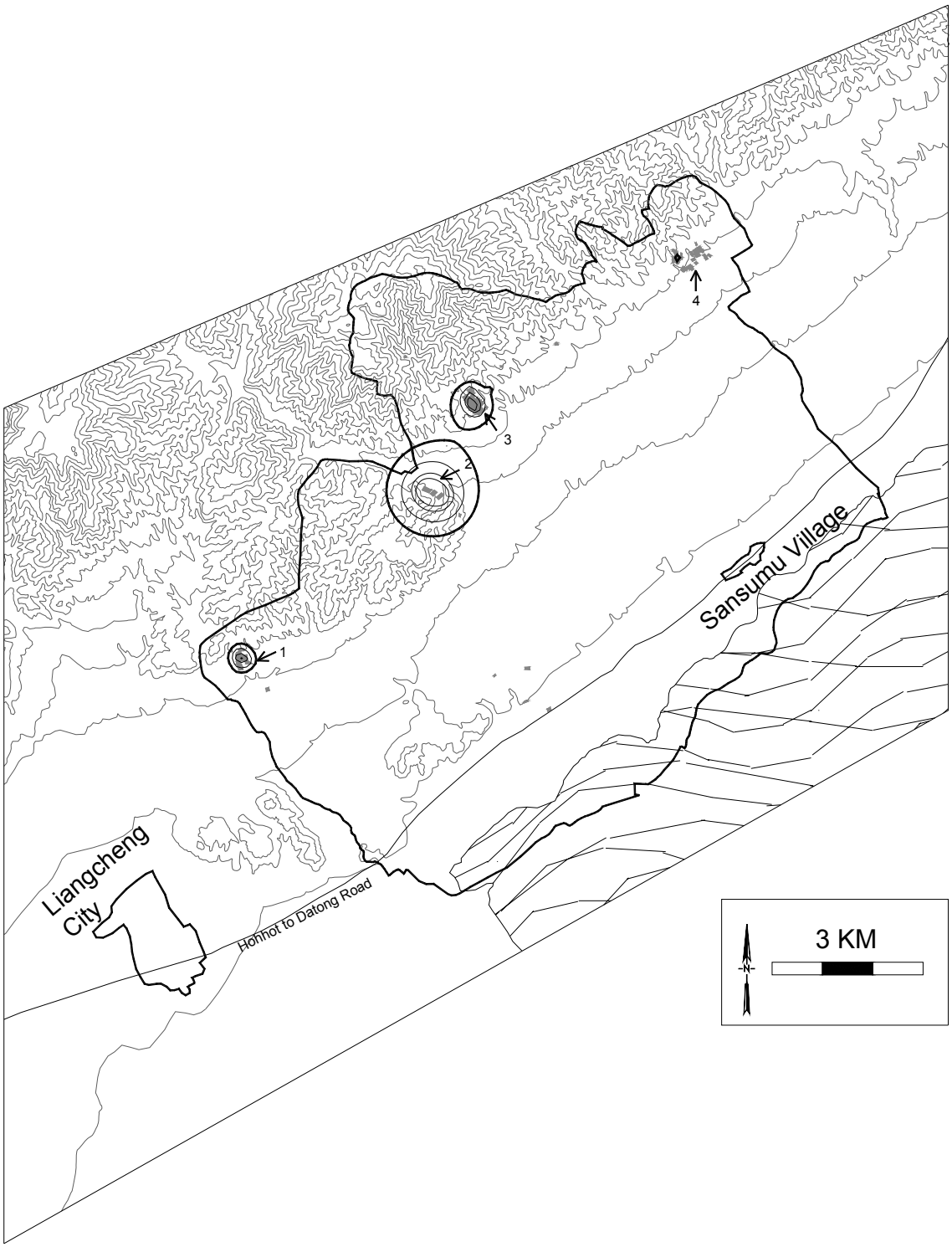


Figure 26. Contour map of the occupied peaks in the inverse power of one surface (Sansumu survey tract). The chosen cutoff is the heavy line, which indicates larger scale communities. The labeled sites are: (1) Baiposhan, (2) Yuanzigou, (3) Hetongyao and (4) Damiao. The hatched area shows extent of Daihai Lake at 3000 BCE.

5.1.3. Community analysis discussion

The pushes and pulls that result in community organization are discussed in Section 1.4. The forces that pull people together include economic integration, social cohesion and community defense. If the forces underpinning community life are weak, then the economic resources outside the community (firewood, agricultural land, opportunities for hunting) or the social complications inherent in living in large communities can more easily cause communities to fissure. If economic integration is very weak and communities do not require a common defense then the threshold at which social conflict or the location of economic resources would cause communities to fissure would be quite low. The distribution of small local communities consisting of just a few households across the slopes east of the Nangou river in the Yongxing Basin survey tract suggests just this sort of weak economic integration between communities.

The internal population distribution of the local level communities at the sites of Baiposhan and Hetongyao (both in the Sansumu survey tract) was not like the distribution of the Laohushan Cluster, in the Yongxing Basin survey tract or the local scale community at Damiao, in the Sansumu survey tract. The latter two communities had identifiable sub communities and walls and the former two communities had a more compact internal structure and were not known to have walls. Although the scale was smaller, Bancheng was the only other community in the survey region that is known to have a wall, and this site exhibits some of the same sub-local community clustering (albeit with only a single collection outside the walls).

It is counterintuitive to connect walls, which were likely built with community labor, and an internal community structure that limits community contact. However, the populations of the Laohushan Cluster and the Damiao local scale community maintained an internal structure that limited the numbers of people that would have maintained day to day contact. The internal structure suggests that either economic integration was very weak or that social forces kept these communities apart. Perhaps these two local scale communities were constructed of co-operating lineage groups that needed protection from others within or outside the Liangcheng

region. The balance of forces that serve to integrate communities or lead to their dissolution were likely different at Baiposhan or Hetongyao and the Laohushan Cluster or the local level community at Damiao.

5.2. Environmental reconstruction of the Laohushan period

The Yangshao period was widely believed to coincide with the warmest and wettest weather in north Asia since the last Ice Age (Shi 1991; Shi et al. 1993; Wang and Feng 1991; Wang et al. 1990). Daihai Lake crests at 1250 masl and rainfall was thought to be near 600 mm a year. The Laohushan period, although still warmer and wetter than today, had less rainfall and lower temperatures than the Yangshao Period. Overall, these changes are not large enough to force an adjustment in the land classification system proposed in the introduction. The lake was thought to recede somewhat from the Yangshao to the Laohushan periods, although not very far. In fact, the Laohushan period level is thought to be 1227 masl, almost exactly the same level as in the 1970's (Table 12).

Average yearly rainfall from 1960 through 2002 was 406.5 mm (Unpublished Data, Liangcheng County Department of Weather Statistics). The rainfall during the Laohushan period, approximately 500 mm a year, would have been higher than all but eight of the last 40 years. The effects of such a small change in the environment would have been minimal, certainly insufficient to change the plains into inhospitable swamps. The change in the environment did likely increase the amount of water available in the drainages adjacent to Bancheng and Yuanzigou, which in the 1950's held water year round. The higher average rainfall would have reduced the number of years when rainfall would have dropped below 250 mm, precluding rainfall based agriculture.

The changes in climate between the Laohushan period and the modern period would have made the landscape more productive, but would not have altered the locations of the best agricultural lands. Increased rainfall would make the slopes more vulnerable to erosion and

perhaps have dampened the differences between the irrigable and non-irrigable plains but populations were so low in these two land classifications that the dampened differences would have had little effect on the analysis of subsistence (see Section 5.3 below). The soils on the plains would still have been thicker than the soils on the slopes and level areas on the basin floors would have remained the easiest to till and the least vulnerable to erosion.

Table 12. The level of Daihai lake in the past 11,000 Years (Data from Liu et al. 1990: 2)

Years BP	Lake Level (masl)	Lake Size (km^2)
1000	1229	234.5
1500	1227	189.6
2000	1228	216.3
3500	1227	189.6
4000	1228	216.3
5000	1227	189.6
8000	1253	391.2
9000	1251	333.6
10000	1247	320.4
11000	1245	311.6

5.3. Subsistence in the Laohushan period

As noted in the introduction (Section 1.5), the modern settlement pattern in Liangcheng was concentrated on the best agricultural land. This translates into a settlement pattern that was focused on the Yongxing irrigable plains and Sansumu soil class one land classifications, with smaller proportions of the population inhabiting Sansumu soil class two, the plateaus, Yongxing non-irrigable plains and slopes. A very small percentage of the population occupied the mountains in either survey tract.

Unlike the modern period, the Laohushan period occupation did not concentrate settlement on either Sansumu soil class one or the Yongxing irrigable plains; less than 1% of the population occupied either of these land classes (Table 13). If, as in the modern period, populations were choosing to inhabit the best agricultural land, then the correlation between the percentage of people occupying a land class and the agricultural productivity rank of that land

class would be strongly positive and significant. The correlation between agricultural productivity by zone and Laohushan population percentage is negative (Sansumu survey tract r_s= -0.738, 0.2>p>0.1; Yongxing Basin survey tract r_s= -0.224, p>0.2). This puts a finer point on the pattern seen in Table 13 and Figure 27, the areas with the best agricultural land are not the locus of population aggregation. This negative correlation, based on a small number of zones, does not have much significance. However, the probability that a sample like this one comes from a population that concentrated populations on the best agricultural land is small. Although we cannot be as confident in this statement as we might like, our best estimates of the correlations are negative and suggest at best a weak commitment to agriculture in the region during this period.

Table 13. Laohushan period settlement distribution in each of the survey tracts utilizing the five agricultural productivity classes outlined in the Introduction.

Sansumu Survey Tract				
	Soil Class One	Soil Class Two	Slopes	Mountains
Agricultural productivity rank	1	2	3	4
Laohushan period population density	0.05 people/ km^2	0.04 people/ km^2	38.1 people/ km^2	8.08 people/ km^2
Laohushan period population rank	3.5*	3.5*	1	2

Yongxing Basin Survey Tract					
	Irrigable Plains	Plateau	Non-irrigable Plains	Slopes	Mountains
Productivity rank	1	2	3	4	5
Laohushan period population density	0.17 people/ km^2	0.11 people/ km^2	0 people/ km^2	13.2 people/ km^2	0.11 people/ km^2
Laohushan period population rank	3*	3*	5	1	3*

*Even though the population densities were marginally different among these land classes, the differences in population density were not large enough to be meaningful and therefore the same population ranks were given to these land classes.

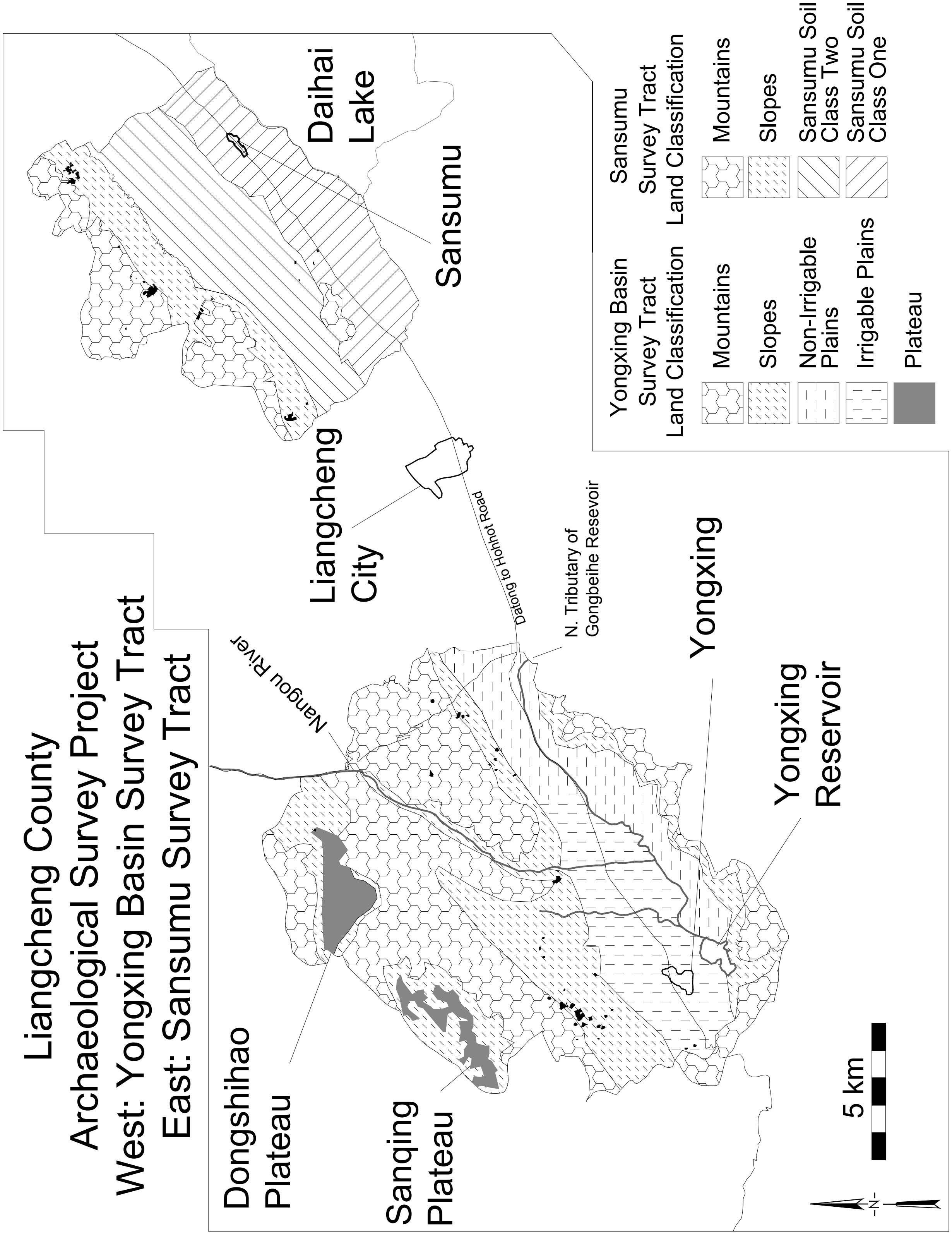


Figure 27. Agricultural productivity land classification in the Sansumu and Yongxing Basin survey tracts with Laohushan period collections.

5.3.1. Settlement and subsistence in the Yongxing Basin survey tract

The Laohushan period settlement pattern did not place populations to maximize agricultural production. The low percentage of occupation on the best agricultural land was mentioned immediately above. The plateaus and the non-irrigable plains in the Yongxing Basin survey tract were also very sparsely populated during this period. Populations were congregating on the slopes, which had the fourth highest agricultural productivity rating out of five. In addition, the positioning of Laohushan occupations within the slopes productivity class itself was not advantageous for agriculture.

The Laohushan Cluster was an example of this pattern. The lower reaches of the Maoqinggou Corridor, which were flatter than the upper slopes adjacent to the Laohushan Cluster, would have been especially advantageous for the collection of rainfall, and therefore the exploitation of domesticated or wild plants. However, the populations of the Laohushan Cluster were between 1.5 and 3 km away from the lower reaches of the Maoqinggou Corridor and were located on lands that would have been subject to sheet erosion during heavy rains. It is very unlikely that the small populations occupying the Maoqinggou Corridor during this period invested the labor necessary to build terraces, making the practice of agriculture on the upper slopes tenuous. The placement of settlements on the upper, not the lower slopes was repeated for the settlements from the Nangou River to the eastern border of the survey area, including the small scale local communities at Sites 600, 248, and 138 (Figure 19). Only the Bancheng site was an exception to this pattern.

5.3.2. Settlement and subsistence in the Sansumu survey tract

The Sansumu survey tract was a better overall environment for agriculture than the Yongxing Basin survey tract. The slopes were less steep, which would slow rainfall runoff as it moves off the mountains. The settlement pattern seen in the Yongxing Basin survey tract, with low percentage of occupation on the best agricultural land, persists in the Sansumu survey tract (Table 13), and the pattern of placing settlements at the top of the slopes land classification (or in the case of Hetongyao, at the bottom of the mountain land classification) was maintained as

well. This preference for the upper slopes and low percentage of occupation on the best agricultural land does not suggest that agricultural productivity was a priority for settlement placement, but rather that hunting opportunities in the mountains were highly valued during the Laohushan period.

5.3.3. Excavated evidence for subsistence strategies in the Liangcheng region

The stone tool assemblages from the Laohushan period sites that have been excavated in this region (Laohushan, Yuanzigou, Xibaiyu, Mianpo and Bancheng) support the conclusion that plant processing was not an important activity at these sites. If the excavated stone tool assemblages are divided among plant processing tools (grinding stones, mortars and pestles), hunting and hide processing tools (projectile points and knives), and wood processing tools (axes and adzes) the proportion of plant processing tools was small (Figure 28). In addition, a comparison of the proportions of plant processing tools at the excavated sites in the Liangcheng region, and the Neolithic sites of Jiangzhai in Henan Province and Cishan in western Shandong province, both early agricultural sites that have produced macro-remains of domesticated crops, shows strong and significant differences (Figure 1) (Handan and Handan 1977; Hebei and Handan 1981; Xi'an et al. 1988). Although the overall stone tool assemblages were small for sites in the Liangcheng region, raising questions about the representativeness of the excavated samples, grinding stones tend to be large and would therefore be over represented, not under represented in an assemblage where only the most obvious of the stone tools were collected.

The next obvious place to continue this analysis is with ceramic assemblages, especially the proportion of storage vessels from excavated Laohushan period sites. This analysis can not be completed until the connections between vessel forms and vessel use can be clarified through use wear analysis. The vessel form that most needs clarification is the *guan* vessel. This jar like vessel form, sometimes exhibiting a neck, collar, and prominent shoulders, is common at almost all Neolithic sites across north China, including those in Liangcheng, but the *guan* vessel maps poorly onto a single use. Although the *guan* vessel is traditionally considered

a cooking vessel (Feng 1994: 7), the excavators at Laohushan propose that it might be a storage vessel during this period (Nei Menggu 2000: 362). Although the proportion of storage vessels in a ceramic assemblage should be high if the Laohushan period made a strong commitment to agriculture as suggested by the excavators (Nei Menggu 2000: 505), or low if this line of evidence agrees with the low proportion of plant processing tools and the land classification analysis (Section 5.3), without a better understanding of the way vessel forms are connected to their prehistoric uses, information that would further aid our understanding of Laohushan period subsistence like the proportion of storage vessels in the ceramic assemblage, can not be accurately calculated.

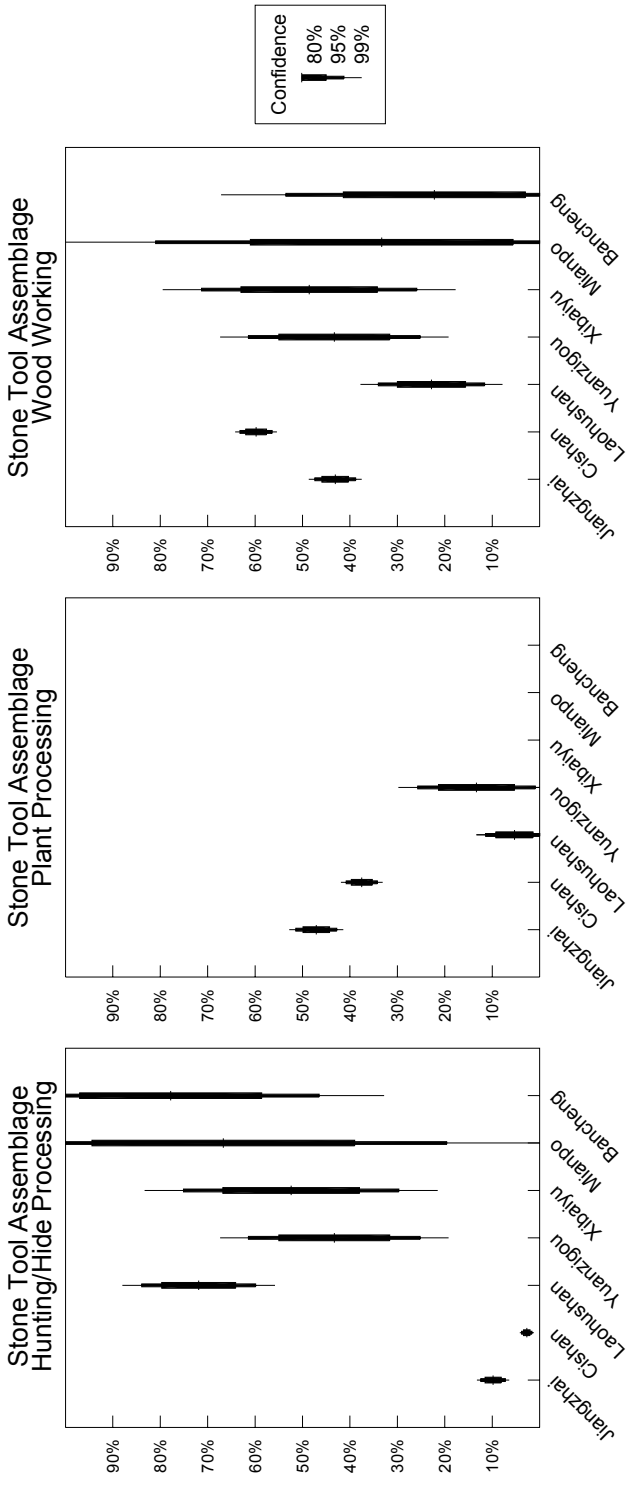


Figure 28. Bullet graphs of the proportion of hunting and hide processing, plant processing and wood working tools from excavated Laohushan period sites in the survey area and from the Neolithic sites of Jiangzhai and Cishan.

5.4. Discussion

During the Laohushan period populations overwhelmingly joined into small local communities. This attribute of the settlement system contrasts strongly with later periods in Liangcheng. Several of these communities appear to have had either weak economic integration or were affected by social stress (Damiao and the Laohushan Cluster). These small scale local communities show different internal population distributions than the other communities. Except for the Laohushan Cluster, populations of more than 300 people budded off to form smaller local communities that occupy similar positions along the southward facing slopes of the mountains.

The Laohushan settlement pattern and the evidence from the excavated artifact assemblages do not preclude the practice of small scale horticulture but do call into question Tian's notion that "developed agriculture" is a hallmark of the Laohushan period (Tian and Guo 2001). The combination of a settlement pattern that did not prioritize locations that would be advantageous for agriculture and excavated data that did not include high proportions of agricultural tools (but did include them) suggests only the beginnings of small scale agricultural experimentation. Farming on the slopes would have been risky, but during good years small plots that did not require much tending would have provided additional subsistence resources that could have been stored.

Only a very small number of collections were located near the shores of Daihai Lake and on the plains adjacent to the rivers that were favorable for agriculture, most representing only a family or two. In the Yongxing Basin survey tract, these included collections 02B060 and 02B032, approximately 1.8 km west of Yongxing, and 02B070 approximately 1.2 km south and east of the Laohushan cluster, on the lower reaches of the Maoqinggou corridor. In the Sansumu survey tract, four collections (04B245, 04B336, 04B332, 04B368) fall between 1.2 and 2.3 km away from the shore of Daihai Lake at 3000 BCE, and were all located in soil

productivity class one. These were all excellent locations to practice agriculture on the best agricultural land available in their respective survey regions. None of these locations have been excavated to date, but their locations, on or near the best agricultural lands in the region and in places that are neither easily defended nor close to the resources available in the mountains, are suggestive that a few families might have made the decision to focus more heavily on plant exploitation.

6. The Zhukaigou period: Community collapse in the late Neolithic

This chapter examines the Zhukaigou period (2000–1500 BCE), the last stage of independent development in the Liangcheng region before it was incorporated into the Zhao Polity during the Warring States period (Chapter 7). The Zhukaigou settlement pattern continued to show several of the attributes of the Laohushan settlement pattern, which placed populations primarily on the slopes and in the mountains. During the Zhukaigou period, total number of sites and overall population were drastically reduced (Table 14), all of the Laohushan settlements on the plains were abandoned, as was all of the settlement in the Yongxing Basin survey tract. The most obvious development between the Laohushan and Zhukaigou periods was this demographic collapse and by extension the complete dissolution of the community organization seen in the Laohushan period (Chapter 5).

Table 14. Basic survey statistics for the Laohushan and Zhukaigou periods.

Period	Sherds	Collections	Sites	Population
Laohushan period	777	131	48	1004–2009 people
Zhukaigou period	25	7	3	37–43 people

6.1. Proposed occupational hiatus between the Laohushan and Zhukaigou periods

The accepted Liangcheng chronology includes an occupational hiatus between the Laohushan (2900–2200 BCE) and Zhukaigou (2000–1500 BCE) periods (Daihai in press; Tian 1991). Before this survey, the only Zhukaigou remains known in the Liangcheng region were from the site of Yangchanggou (Nei Menggu and Beijing 1991). Although recognizable Zhukaigou ceramics were recovered from this site, no stratigraphic excavation took place. The notion of an occupational hiatus is based on a stylistic comparison of ceramics from the Yangchanggou and the Zhukaigou sites. According to excavators, the earliest ceramics from the

Yangchanggou site date to Periods III and IV at Zhukaigou (Tian 2000: 76). Not enough rim sherds were recovered from the collections at the three Zhukaigou sites recovered in this survey to change this interpretation. In addition, the Zhukaigou site is the only Zhukaigou period site to have been excavated, and no sites have been excavated to date that contain both Zhukaigou and Laohushan remains.

The stylistic comparisons between the Zhukaigou site, over 200 km south and west of the Liangcheng region, and remains recovered in Liangcheng are further complicated by the chronological uncertainties at the Zhukaigou site itself. Han Jianye compares Longshan and Zhukaigou ceramic assemblages and posits a date of 1850–1250 BCE for the Zhukaigou site, which would lengthen the gap between the Laohushan and Zhukaigou periods and shorten the proposed occupational hiatus between the Zhukaigou and Warring States period (2005). Utilizing comparisons of the bronze assemblage at Zhukaigou and bronze assemblages on the Central Plain, Linduff (1995) argues for a date of 1900–1500 BCE, which would have little effect on the chronology utilized here.

Little is known about sites coeval with the Zhukaigou period across south central Inner Mongolia, and Liangcheng is no exception. The changes in ceramics and bronzes outside the survey region aside, the Zhukaigou period settlement pattern strongly resembled the Laohushan period settlement pattern, but in much diminished form. A comparison of the settlement patterns between the two periods is suggestive of the continuance of the Laohushan settlement pattern not an occupational hiatus followed by a reoccupation. A large proportion of the Zhukaigou collections either share a location with or were directly adjacent to Laohushan period occupations (Figure 29). Site Number 1073, the largest Zhukaigou Site in the region, shows that many of the inhabitants of the Zhukaigou period lived in exactly the same place as they did during the Laohushan period (Figure 29, Inset A). Site 973 (a single collection) has the highest elevation of any of the Zhukaigou collections, in a very sparsely occupied portion of the Sansumu survey tract in any period, but this collection directly abuts a collection that had

Laohushan sherds (Figure 29, Inset B). The only collections that were neither directly adjacent to nor were not in collection units that produced Laohushan sherds were the two collections in the southern portion of Inset B in Figure 29. These collections are just more than 100 meters from the nearest Laohushan collections and represent the only new occupations in the settlement pattern between the two periods. The settlement pattern data for these two periods, where some of the sites of the preceding period continue to be occupied and little new occupation was present, suggest political collapse more than re-occupation.

Polities have a tendency to cycle, and at their nadir we should expect small, scattered populations like we see in the Zhukaigou period in Liangcheng. It is more intuitive for people to have remained in this region through the zenith of the Neolithic social system, the Laohushan period, and into the nadir of that social system, the Zhukaigou period, than for the population to have left at the end of the Laohushan period and then returned in such small numbers to sites abandoned for hundreds of years. Therefore, the accepted chronology will be adjusted to lengthen the Laohushan and the Zhukaigou period 100 years to 2900-2100 BCE and 2100-1500 BCE respectively. Excavation at Sites 1073 and 973 would provide data to test this hypothesis.

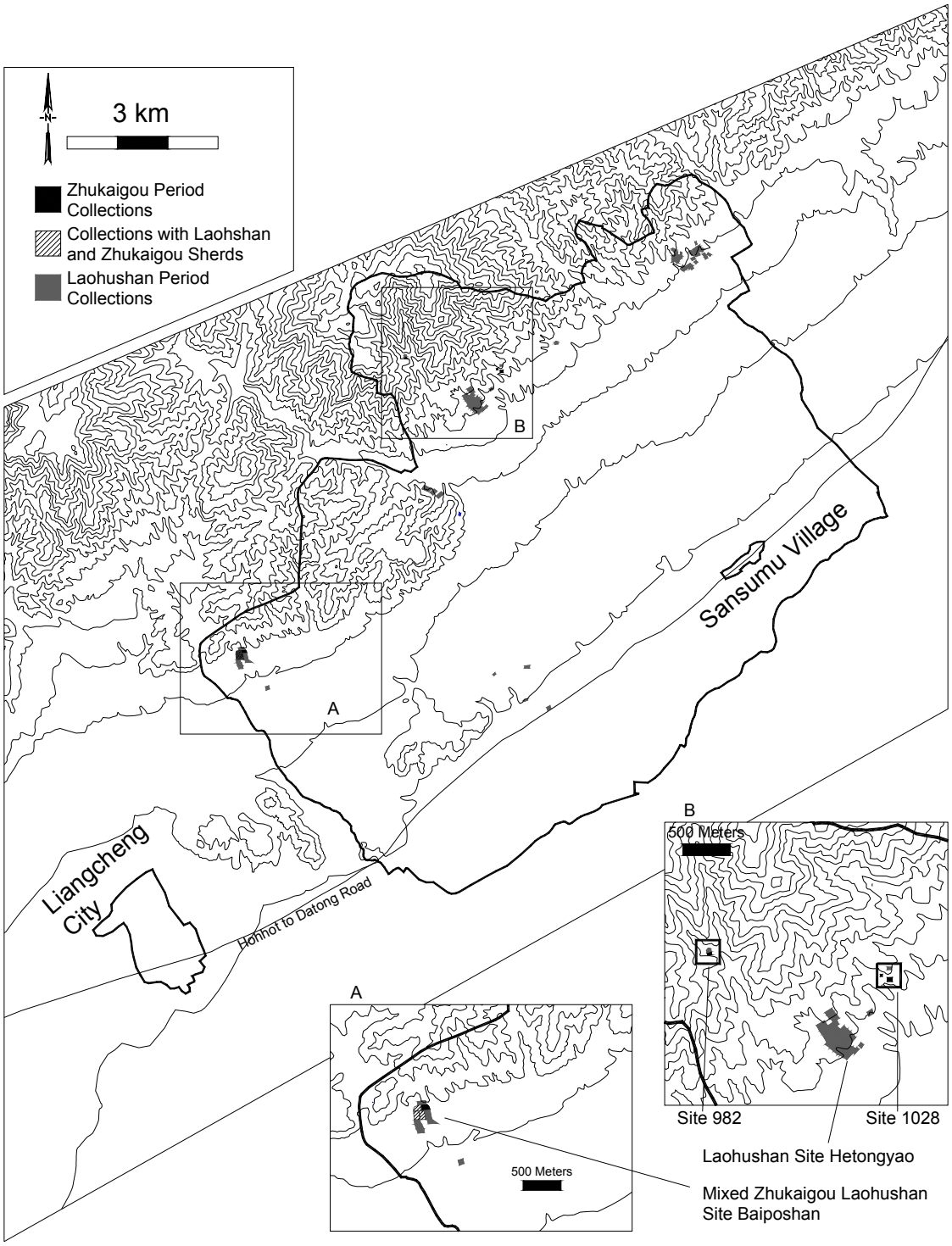


Figure 29. Zhukaigou and Laohushan period collections from the Sansumu survey tract (50 m contour interval).

6.2. Zhukaigou remains in the Liangcheng region

Although the density of remains was considerably lower during the Zhukaigou period, the resemblance between the settlement patterns of the Zhukaigou and Laohushan periods can be seen by comparing the settlement patterns to the agricultural productivity land classification (Table 15). Zhukaigou remains were only recovered in the Sansumu survey tract and they were in the same areas occupied during the Laohushan period, on the slopes overlooking the plains. These slopes allowed equal access to resources in the mountains and on the plains.

Table 15. Laohushan and Zhukaigou period settlement distributions in the Sansumu survey tract utilizing the agricultural productivity classes outlined in the Introduction.

Sansumu survey tract				
	Soil Class One	Soil Class Two	Slopes	Mountains
Agricultural productivity rank	1	2	3	4
Laohushan period population density	0.05 people/ km^2	0.04 people/ km^2	38.1 people/ km^2	8.08 people/ km^2
Zhukaigou period population density	0.0 people/ km^2	0.0 people/ km^2	1.4 people/ km^2	0.4 people/ km^2
Proportion of Laohushan population	0.2%	0.2%	76.9%	22.7%
Proportion of Zhukaigou population	0.0%	0.0%	69.7%	30.3%
Zhukaigou period population rank	3.5	3.5	1	2

The population density ranks in the agricultural productivity land classifications were the same for the Zhukaigou and Laohushan periods. This produced the same strongly negative but

not highly significant correlation between zones of high agricultural productivity and ancient population distribution (r_s= -0.738, 0.2>p>0.1).

There was a slight difference in the distribution of population on the slopes and in the mountains between the Zhukaigou and Laohushan periods (Table 15), showing a slightly higher proportion of the Zhukaigou population occupied the mountains. The populations on the slopes in the Zhukaigou period also occupied the upper slopes, further suggesting that securing resources in the mountains was more important than exploiting resources on the lake basin.

The Zhukaigou sites do not join together into local communities (Figure 30). With population densities this low, and huge territories completely devoid of population, it seems unlikely that armed conflict, as opposed to mobility, would be the chosen mechanism for conflict resolution and none of the Laohushan period sites with walls continued to be occupied in the Zhukaigou period. Although the average temperature during the Zhukaigou period dropped to an average of 2°C and rainfall fell to between 300-400 mm per year, it would be difficult to argue that the carrying capacity of this region was only 50 people, further reducing the likelihood of conflict over resources (Chapter 3) (Liu et al. 1990; Wang et al. 1990; Yang 1999). Although the Zhukaigou sites did occupy highly defensible positions on the landscape, the dearth of population both in this and in neighboring regions makes it difficult to argue for placement of sites to maximize defense.

The dryer and cooler environment that prevailed in the Zhukaigou period would have reduced the return on agricultural labor (Tian 2000). However, two of the three sites in this region are in the mountains, where the soils are thin and agriculture would have been very unproductive. The reduction in rainfall would seem to make the soils near the lake even more attractive than in the previous Laohushan period, and the lack of occupation near the lake shore supports the conclusion that agricultural production was comparatively unimportant in the Zhukaigou period. The single caveat to this idea is that lower temperatures would also reduce potential evapotranspiration, which might have allowed plots on the upper slopes of the

Sansumu soil class two land classification to retain their productivity even with less overall rainfall than in the Laohushan period.

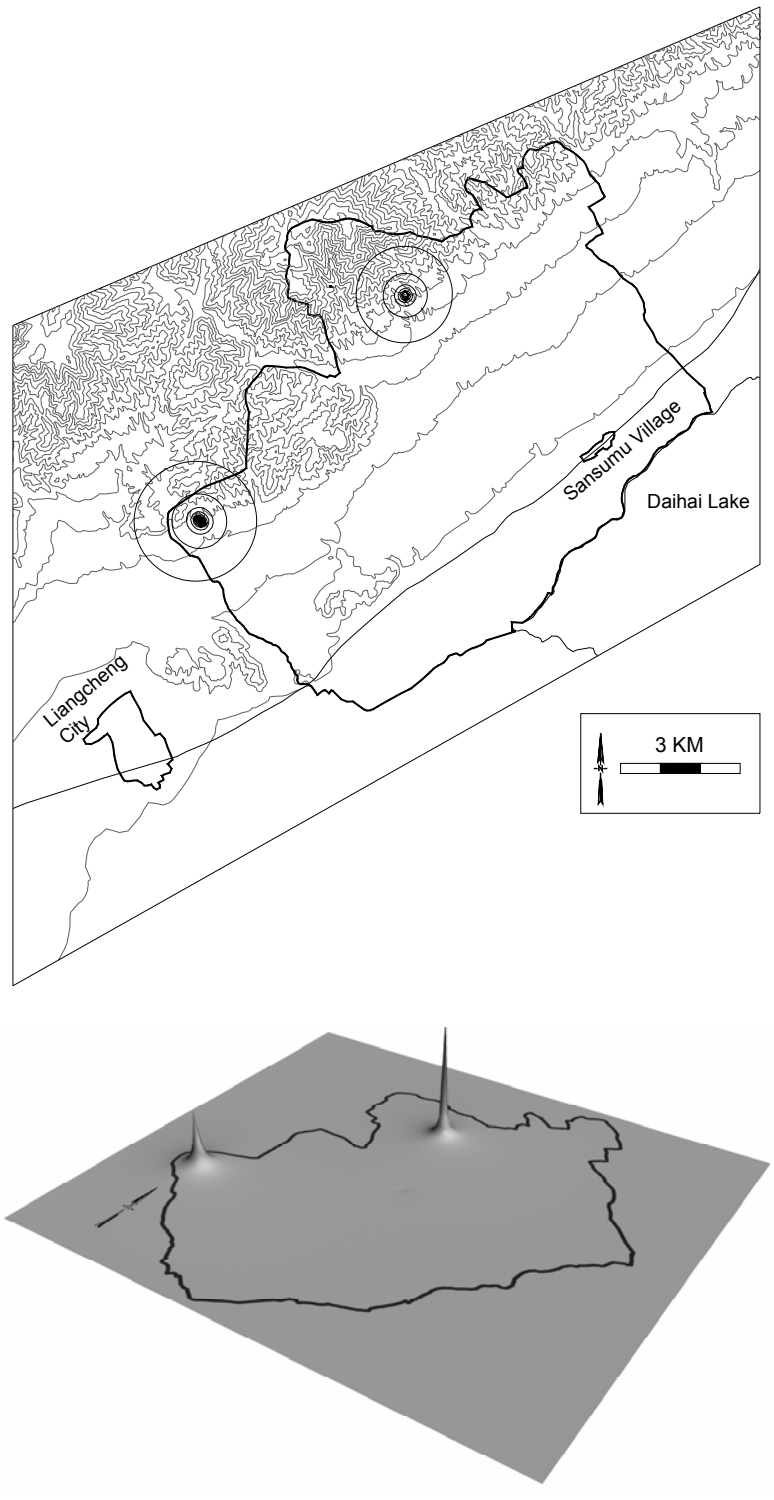


Figure 30. Zhukaigou period Sansumu survey tract contour and density plot at the inverse power of 4.

6.3. Occupational hiatus two: After the Zhukaigou period (2100-1500 BCE) and before the Warring States period (500–200 BCE)

This occupational hiatus is different than the occupational hiatus between the Laohushan and Zhukaigou periods. The first occupational hiatus involves the precise relative dating of two archaeological periods. Material was found during the survey from both periods and the argument is over the precise chronological relationship between the two sets of materials in the Liangcheng region. This occupational hiatus is different because no remains are known for this period across south central Inner Mongolia and into the Gansu Corridor (Table 16). If remains from this period were recovered by the survey, they would not have been recognized as such because no comparative excavated samples are known in this region. The accepted view of this hiatus is that the cooling and drying of the environment of the late Zhukaigou period causes a nomadic interregna across the Northern Zone (Du 2000; Wang 2005; Wang and Feng 1991). In western Inner Mongolia, the shift in subsistence strategy from sedentary agriculture to mobile pastoralism is thought to occur at the Ordos region site of Zhukaigou (Figure 1) (Han 2005; Han 2003; Nei Menggu and Ouerdousi 2000; Tian 2000).

This hypothesis is supported by interpretations of the received texts, and this chronological gap is seen as the chronological beginning of the steppe sown dichotomy set out in the Introduction. This environmental change affects the Central Plain as well (there is a dissolution in the settlement hierarchy at the end of the Yangshao and the beginning of the Longshan period in the Yiluo river valley settlement pattern study), but the Central Plain does not see as large a shift in the environmental regime and therefore does not abandon agriculture completely (An 2000; Wang 2005).

Table 16. Chronological comparison of south central Inner Mongolia and adjoining regions from the late Neolithic to the Warring States period.

<table>
<tr><td>Liangcheng/
Ordos Western
IMAR</td><td>Gansu Corridor</td><td>Chifeng, Eastern
IMAR</td><td>Central Plain</td></tr>
<tr><td>Warring States
600–200 BCE</td><td>Warring States
600–200 BCE</td><td>Warring States
600–200 BCE</td><td rowspan="2">Zhou Dynasty
Spring and
Autumn
and Warring
States periods
1046–226 BCE</td></tr>
<tr><td rowspan="2">Chronological
Gap
1500–600 BCE</td><td rowspan="3">Chronological
Gap
c1800–600 BCE</td><td>Upper Xiajiadian

1000–600 BCE</td></tr>
<tr><td>Chronological
Gap
1000–1600 BCE</td><td>Shang Dynasty
1046-1600</td></tr>
<tr><td rowspan="2">Zhukaigou Period
1500-2100 BCE</td><td rowspan="2">Lower Xiajiadian
1600–2200 BCE</td><td>Xia Dynasty
1600-2070</td></tr>
<tr><td>Qijia
1800–2200 BCE</td><td rowspan="2">Longshan Period
2000-3000 BCE</td></tr>
<tr><td>Laohushan
Period
2100-2900 BCE</td><td>Majiayao
c2200–3000 BCE</td><td>Xiaoheyan
2200–3000 BCE</td></tr>
</table>

The dichotomy between the steppe and the sown is used in the interpretation of historical materials beginning with the Oracle bones at Anyang. The bones and the later texts identify in-groups (allies) versus out-groups (enemies) (Keightley 1983). During the Western Zhou period these outer groups are recognized historically as less agricultural than the inhabitants of the Central Plain. The Western Zhou ends when, after approximately a century of warfare with the Xianyun and the Quanrong, the Western Zhou capital at Fengxi, near modern Xi'an, is overrun by horse riding Quanrong peoples 771 BCE (Hsü and Linduff 1988). To state the case succinctly, these horse riding, less than fully agricultural peoples had to have come from outside the Central Plain and have been located on the borders of the Zhou for hundreds of years. If the interpretations of the historical texts are correct, then these peoples may have come from the Gansu Corridor and the Ordos region, and their mobile lifeways would have left few remains on the landscape.

The interpretation of the archaeological evidence at Zhukaigou cited in support of this explanation is based on the interpretation of artifact style, not on remains that relate more closely to subsistence. The faunal evidence from the Zhukaigou sites does not show an

increasing reliance on herding animals that would have been necessary to make the shift to a pastoral economy (Huang 2000). Houses also do not become smaller and more ephemeral through time at the site. There appears to be little evidence at the site to connect its abandonment to increasing nomadization. The lack of mortuary remains from this period cannot be explained by this hypothesis as well; pastoralists would still likely have left mortuary remains on the landscape, even if habitation remains prove hard to locate in large numbers.

An alternative explanation for this presently recognized occupational hiatus is that the chronologies themselves need to be adjusted. Chinese archaeology is based on the analysis of archaeological cultures. This theoretical approach affects the sites that are selected for excavation. Sites that have mixed assemblages are often not chosen for excavation because these mixed remains are thought to be poor places to learn about an archaeological culture in its pure form. This selection bias means that transitional sites, which are likely to include remains between periods, are unlikely to be chosen for excavation. Across a large area, especially with a general dearth of absolute dates from sites, this selection bias can affect our view of the past. Although our present understanding of the regional chronology makes the elimination of the occupational hiatus based on any one site alone unlikely, Site 1073 has remains from the Laohushan and Zhukaigou periods and the site of Hetongyao has both Warring States and Laohushan materials, making these two sites promising places to begin the exploration of the chronological relationship between these three periods in the Liangcheng region.

7. The Warring States Period (500–200 BCE): New Community Structures in the Liangcheng Region

After what could be up to a 1150 year occupational hiatus (1150-500 BCE), the Liangcheng region was slowly integrated into the polities of the Central Plain, beginning with the Warring States period (500-200 BCE). In the 5th Century, after a series of political and military struggles between the royal lineages, the Jin State separated into three separate states, with Liangcheng falling into the territory of the Zhao State (Figure 31). Since a majority of this time period falls under the reign of the Zhao State, that state will be the focus of this analysis. The settlement pattern and community organization data from the survey shape our understanding of the Zhao governmental system as it attempted to integrate the Liangcheng region into its political sphere.

The use of the label "Warring States period" for this chronological time span is somewhat of an anachronism; historically the Warring States period did not begin until 481 BCE and the earliest date of the remains in Liangcheng has not been established through stratigraphic excavation in this region, and could be earlier (Section 9.1). Since it is unclear when exactly the Warring States period began archaeologically in Liangcheng and the Spring and Autumn period remains in this region (dated historically from 770–481 BCE) cannot be separated from the Warring States period remains, the Warring States period moniker will be used for these remains which are chronologically earlier than the Han, but later than the Zhukaigou period.

Integration into the Central Plain political sphere was not a passive process in which the residents of Liangcheng reacted to the political will of the center, but a process by which both the Zhao government and the local populace acted opportunistically to take advantage of the changing political landscape (Hsü 1999: 571). The feudal system of government based on family relations (*zongfa*), instituted by the Western Zhou when they defeated the Shang in 1046 BCE, was being replaced by a more strictly administrative system based on meritorious service

to the state. In the mid 7th century, the Jin state, the precursor to the Zhao, was especially aggressive in the reform of its administrative structure (Hsü 1999: 558). With the link between extended royal family ties and power weakened, especially in border states like the Jin, able ministers became more powerful and the administrative structure was tightened to place more power in the hands of the ruling houses and their bureaucracies (Hsü 1999: 571-572).

This administrative efficiency allowed military expansion and an increase in the proportion of the populous that was considered eligible for military service, with recruitment expanding ever further into the countryside. This administrative expansion, including regular taxation based on acreage of arable land, was an essential feature of the territorial states that were being constructed out of the feudal manor system of the Western Zhou as well (Lewis 1999: 603). The expansion of administration away from the capital sometimes led to shifts in power away from the capital regions to wealthy peripheral areas (Hsü 1999: 558). The Zhao, in the far north of the Jin state, was one of these peripheral areas that rose to prominence (Hsü 1999: 573-574)

These larger scale political, social and economic changes seen in the Warring States period across north China likely had the following correlates in Liangcheng. The Zhao polity saw the opportunity to increase its tax base and the amount of territory under its control by expanding its borders into the Liangcheng region. It is thought that this official expansion occurred c. 500 BCE, but it is not known if the government followed a group of homesteaders or if the rise in population seen in the Warring States period is due almost exclusively to governmental policies. Collection of taxes would have required that the Zhao effectively organize the populace so that it could establish administrative contact with the residents of Liangcheng. Two conflicting forces worked on the Zhao bureaucracy. Administrative control is difficult to maintain over large distances, so administrative structures would have been established across the landscape, however an extensive network of administrative centers is expensive to operate and difficult to organize. The data from the survey suggest that the Zhao

had only limited success organizing the Liangcheng populace so as to maintain effective control. Liangcheng was 450 km north and east of the Zhao walled capitol at Handan, and the struggles suggested by this data must have been seen in other far flung regions as well (Figure 31).

Figure 31. China after the Jin State succession dispute (Modified from Lewis 1999: Map 9.2).

The indigenous population also saw opportunities. The Zhao likely offered increased access to trade as well as craft specialists within the larger communities that developed on the shore of Daihai Lake during this period. However, inclusion into the Zhao polity also meant inclusion into the Zhao administrative structure, which some residents likely found undesirable; the Zhao, as a successor state of the Jin, which led reform in tax policy in the early Warring States period, would have demanded taxes, corvée labor obligations and military service (Lewis 1999: 604-605). The settlement pattern evidence shows a separation between areas of tight

administrative control and the remainder of the settlement pattern, suggesting that residents wanted access to but not daily contact with the administrative center.

The argument made here is as follows. The Warring States period settlement pattern had two basic components that show the limited influence of the Zhao State administrative structure on the settlement pattern of the region. One portion of the pattern represented farming villages on the best agricultural land in the Sansumu survey tract. The villages did not resemble the settlement pattern elsewhere in the survey region, but they did resemble the Zhou Dynasty settlement pattern in the Yiluo River settlement pattern study (Section 7.1). The balance of the survey (the northern portion of the Sansumu survey tract and the Yongxing Basin survey tract) exhibited a dispersed, homestead based settlement pattern. The dispersed settlement pattern in the Sansumu survey tract had a higher density than the dispersed settlement pattern in the Yongxing Basin (Section 7.4), suggesting interdependence between the two patterns in the Sansumu survey tract.

The dispersed settlement pattern, which exhibited attenuated community development (especially in the Yongxing Basin survey tract, Section 7.3.1), would have created administrative challenges for the Zhao state. The locus of Zhao administrative control was the farming village, which was situated on the best agricultural land in the Sansumu survey tract, and resistance to this pattern of settlement persisted on the northern slopes of the Sansumu survey tract and over much of the Yongxing Basin survey tract. These farming villages on the lake shore were unlikely to have been able to manage populations throughout the entire region and no large settlements or an integrated site hierarchy appear in the Yongxing Basin survey tract. The lack of administrative control throughout the survey tracts would have hampered the Zhao's efforts to win the military struggles that became increasingly common during this period.

7.1. The village: A basic unit of organization on the Central Plain

The Zhou dynasty results of the Yiluo River settlement pattern study (Henan Province) included two large sites (Luokou Dongbei, 20 ha; and Qingyi Zhendong, 15 ha). Only 5 out of the 28 sites had areas less than one hectare that might have represented homesteads (Chen et al. 2003: 181-182). This settlement pattern did not show large numbers of very small sites that would suggest that individual households living on their own land was the basic unit of settlement (Figure 32), but rather that the collection of populations into local communities, likely representing farming villages and towns, was the basic unit of habitation, much like the farming village is the basic unit of the settlement pattern in modern Liangcheng.

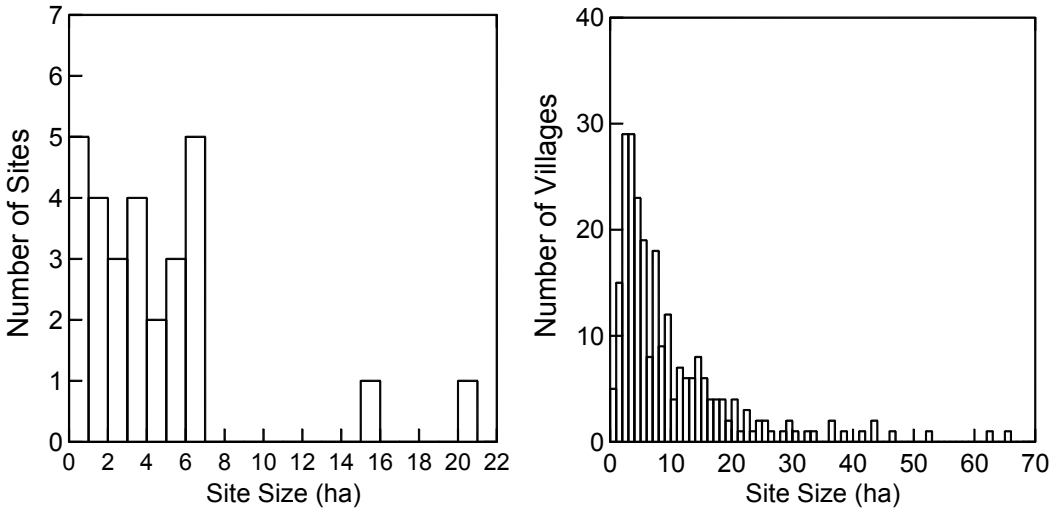


Figure 32. Left: Zhou Dynasty site size histogram from the Yiluo River Valley survey (*Source* Chen et al. 2003). Right: Areas of modern villages in the Liangcheng region without Liangcheng itself. (Histogram bar size is one ha in both histograms.)

7.2. Warring States period settlement patterns

The Yongxing Basin survey tract during the Warring States period contained a population almost twice that of the Laohushan Period (Laohushan population 410–820, Warring States population 967–1440) that was spread over a larger proportion of the survey area (Figure 33, Figure 34). For the first time, occupations were found on the flat lands where the Nangou

River meets the northern tributary of the Gongbeihe Reservoir (below the 1350 masl topographic line). This land, in the center of the Yongxing Basin, was the richest agricultural land in the Yongxing Basin survey tract.

The Warring States period settlement pattern in the Yongxing Basin survey tract had a different site hierarchy than the Laohushan period, showing its dispersed nature. Although total population is increasing, sites on average were actually smaller (Figure 35). This dispersion of the Warring States period population suggests that the Zhao state was unable to organize settlement in the Yongxing Basin survey tract to efficiently tax and manage its populace and this lack of hierarchical settlement organization and central control is reflected in the analysis of communities.

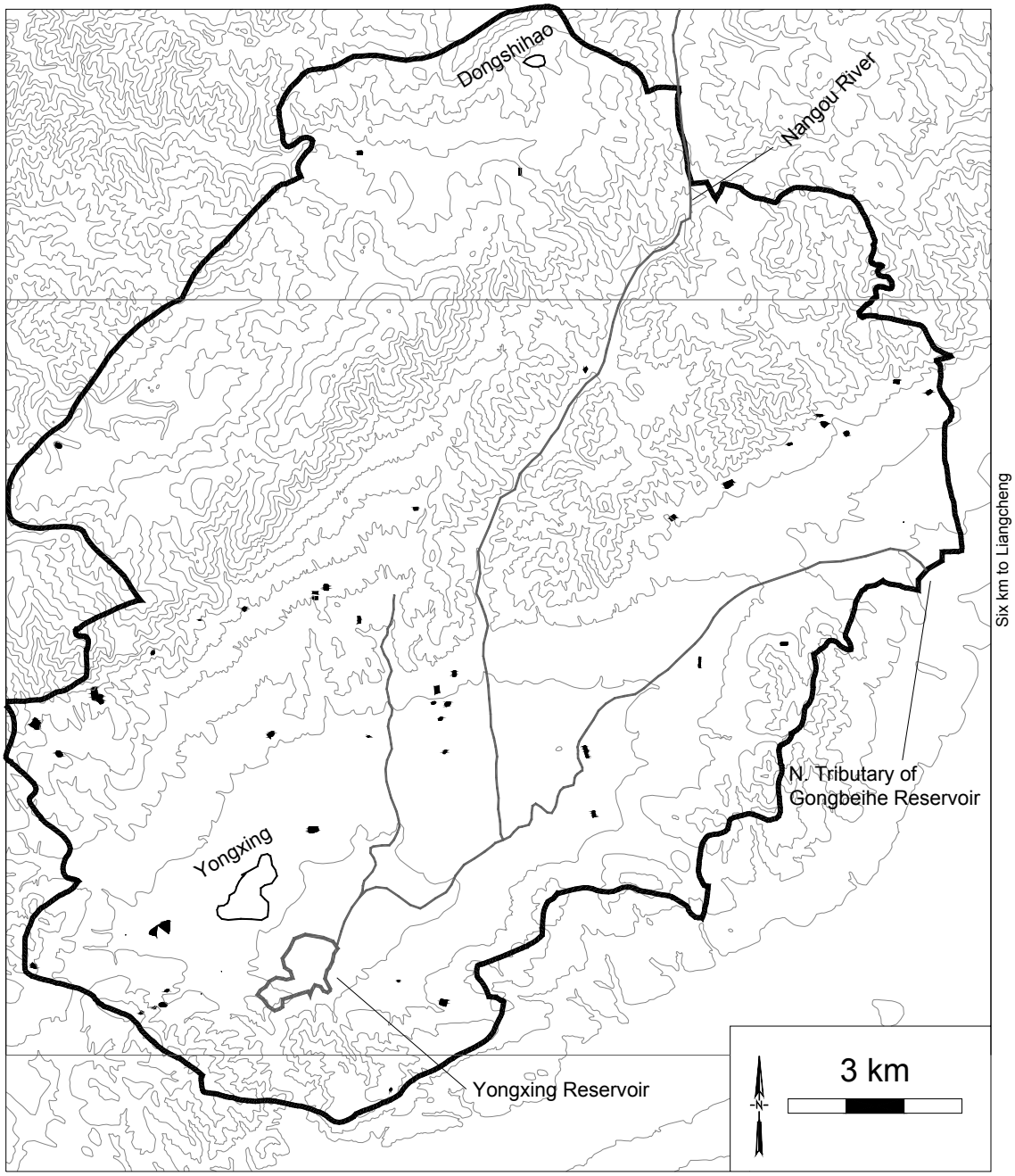


Figure 33. Warring States period collections in the Yongxing Basin survey tract. The grey lines show the extent of Figure 34 (50 m contour interval).

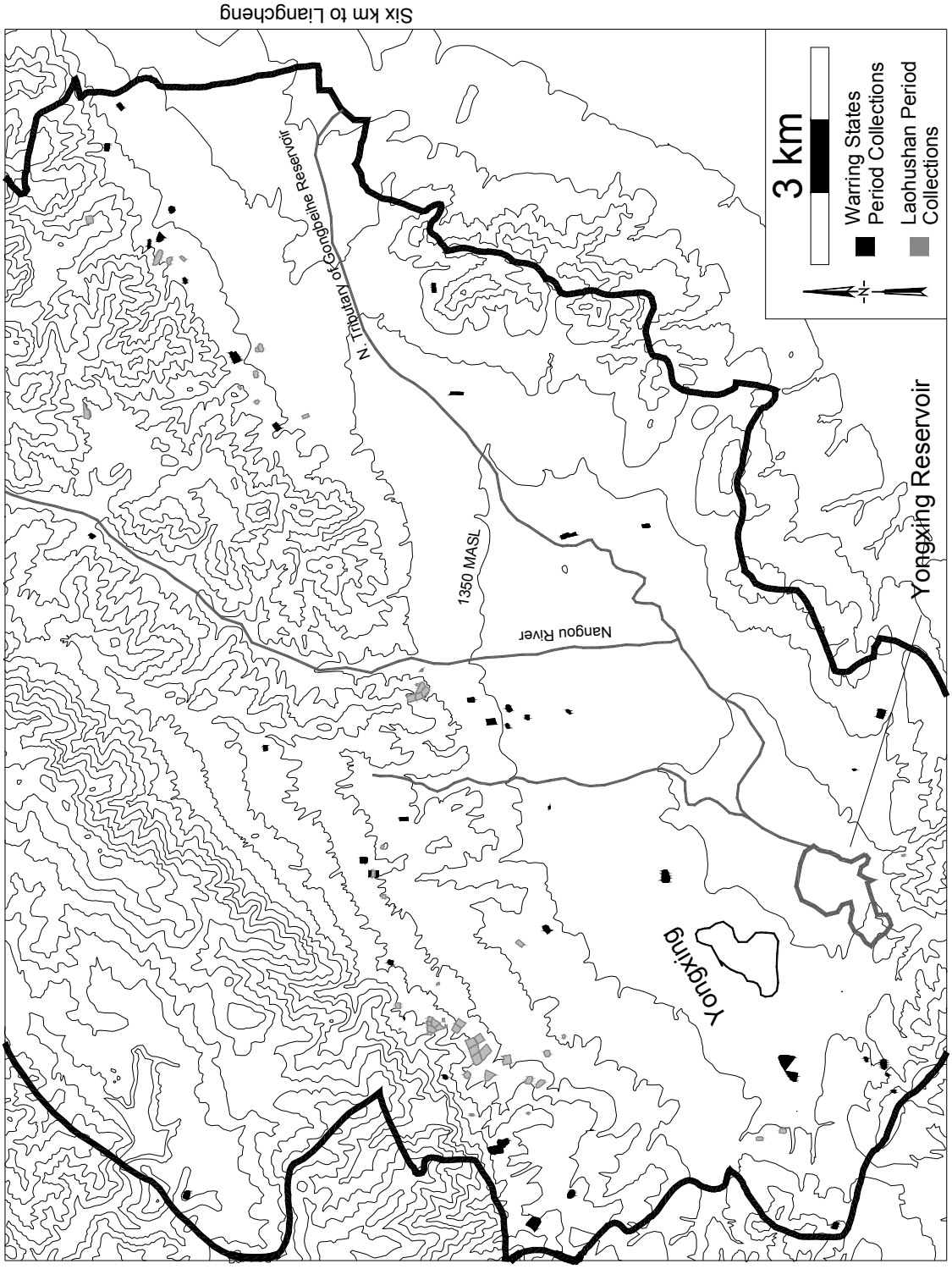


Figure 34. Detail of the Yongxing Basin with Warring States and Laohushan period collections (50 m contour interval).

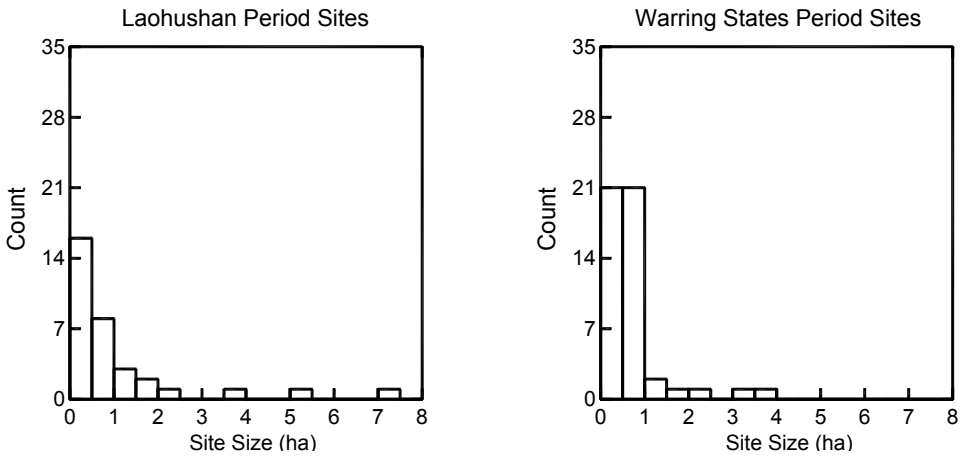


Figure 35. Histograms of the site sizes in the Laohushan and Warring States periods in the Yongxing Basin survey tract.

Although the Sansumu survey tract is only one half the size of the Yongxing Basin survey tract, it contained roughly twice the population of the Yongxing Basin, between 2,000 and 3,100 people. The Sansumu survey tract showed a bipolar settlement distribution with dispersed, small settlements (less than 4 ha) on the south facing slopes and large (7 to 14 ha) settlements on the shore of Daihai Lake (Figure 36). Once again a strong contrast was seen in the distribution of settlement in the Laohushan and Warring States periods. During the Warring States period there were many more homestead sites located in the northern portion of the survey area (Figure 37). Unlike the Laohushan settlement pattern, which shows attenuated higher order community organization (Section 5.1.2), the Warring States period homestead sites joined into small scale local and higher order communities.

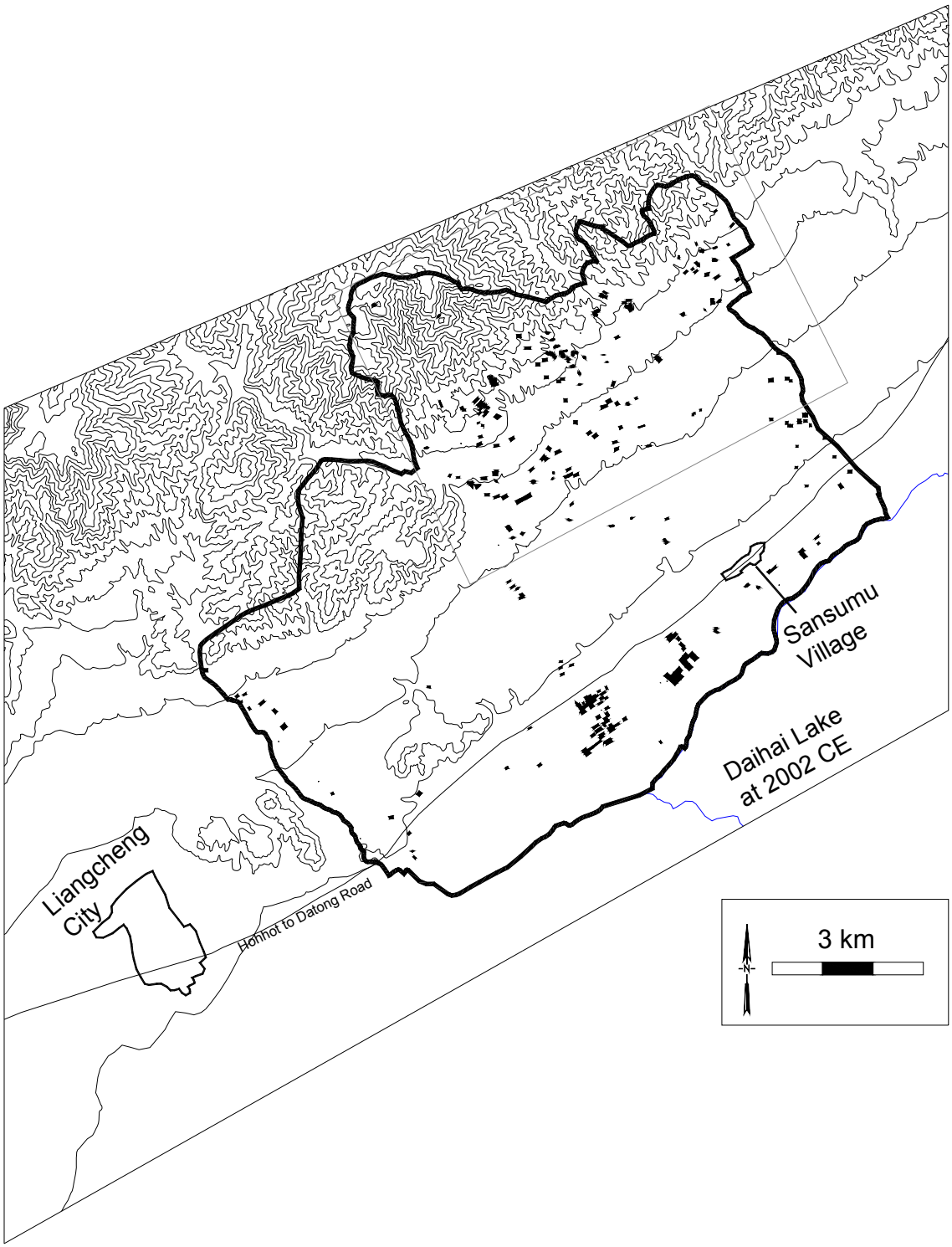


Figure 36. Warring States period collections in the Sansumu survey tract. The grey box shows the extent of Figure 37 (50 m contour interval).

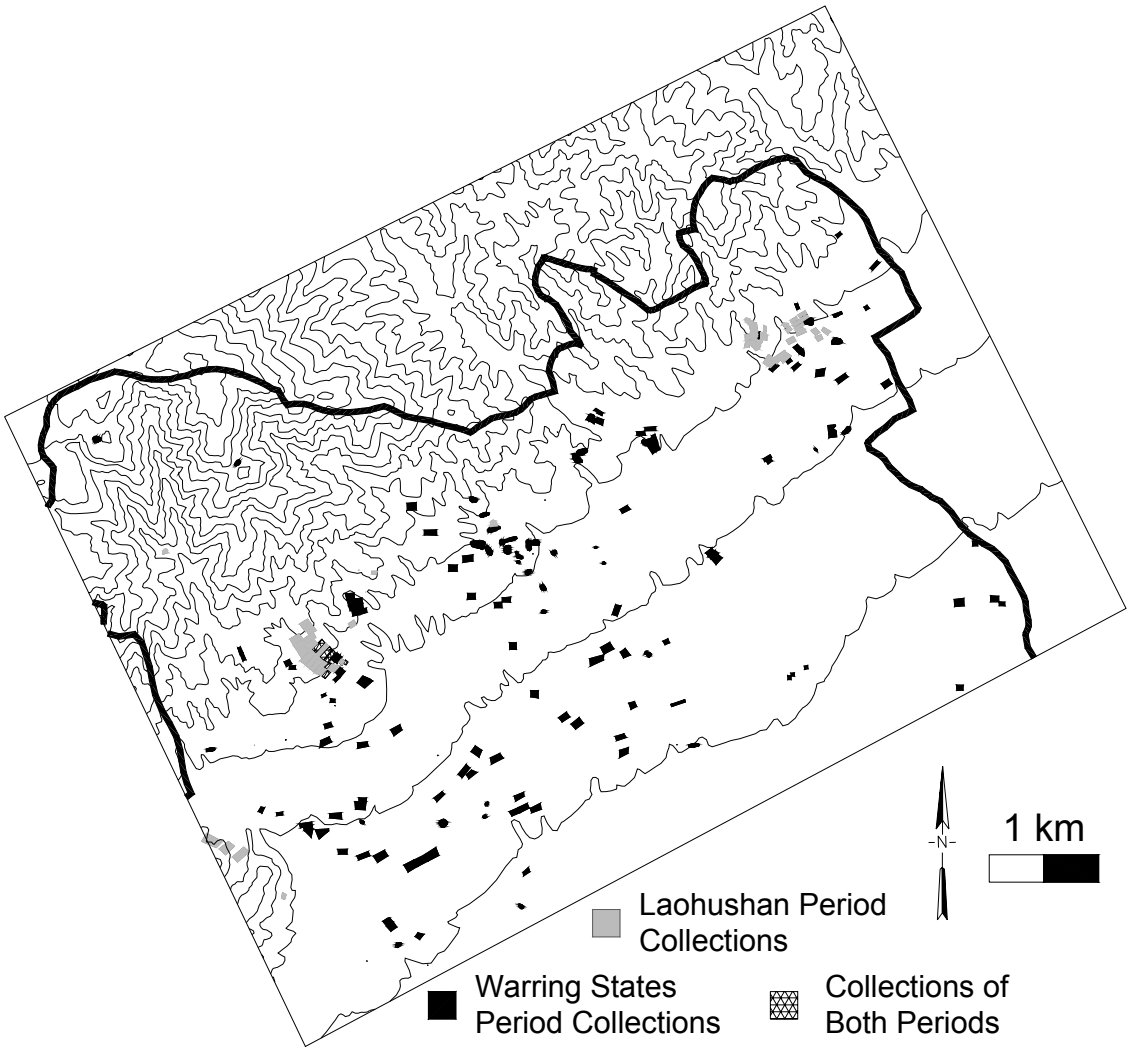


Figure 37. Detail of the northern slopes of the Sansumu survey tract with Warring States and Laohushan period collections.

7.3. Analysis of communities in the Warring States period

7.3.1. Yongxing Basin survey tract

In the density plots representing local communities, the settlement pattern during the Warring States period produces many small jagged peaks across the Yongxing Basin survey tract, showing attenuated community organization (Figure 38). There are three local communities whose peaks rise far above the surface of the density plot; their populations and the populations of five other local communities that include more than one collection are in Table 17.

The Yongxing Basin survey tract population density plots at the inverse power of one show that few of the local scale communities joined into higher order communities (Figure 40). Only two of the local communities, at Sites 376 and 419, entered into a single higher order community of between 350 and 535 people. This higher order community, which was located even higher up the slopes than the Laohushan communities on the Maoqinggou Corridor, was well placed to exploit wild resources in the mountains, possibly outside the survey region. The other local communities are too dispersed across the survey region to have joined together into higher order communities.

Population increased between the Laohushan and Warring States periods, but political organization was not more hierarchical. The largest of the local communities in the Warring States period plot, at Site 419, had roughly the same population, but a smaller area, than the Laohushan Cluster (Figure 41). Community populations decline rapidly from Site 419 to homestead sites with maximum populations of between 17 and 35 people. These homestead sites housed a larger proportion of the population and were more dispersed than any other period.

Attenuated community organization would have made efficient taxation and management of the populace by the Zhao State extremely difficult since the population centers that were found in the Yongxing Basin survey tract were not centrally located, making contact

with the dispersed population difficult. The state would have needed many bureaucrats to ensure compliance with tax and corvée labor requirements over such a large territory, hindering the ability of the Zhao State to fund the wars on its borders.

Table 17. Populations of small scale communities labeled in Figure 39.

Site	Population
Site 380	20–30 people
Site 129	29–43 people
Site 215	32–47 people
Site 540	36–54 people
Site 205	44–65 people
Site 376	61–91 people
Site 154	114–170 people
Site 419	298–444 people

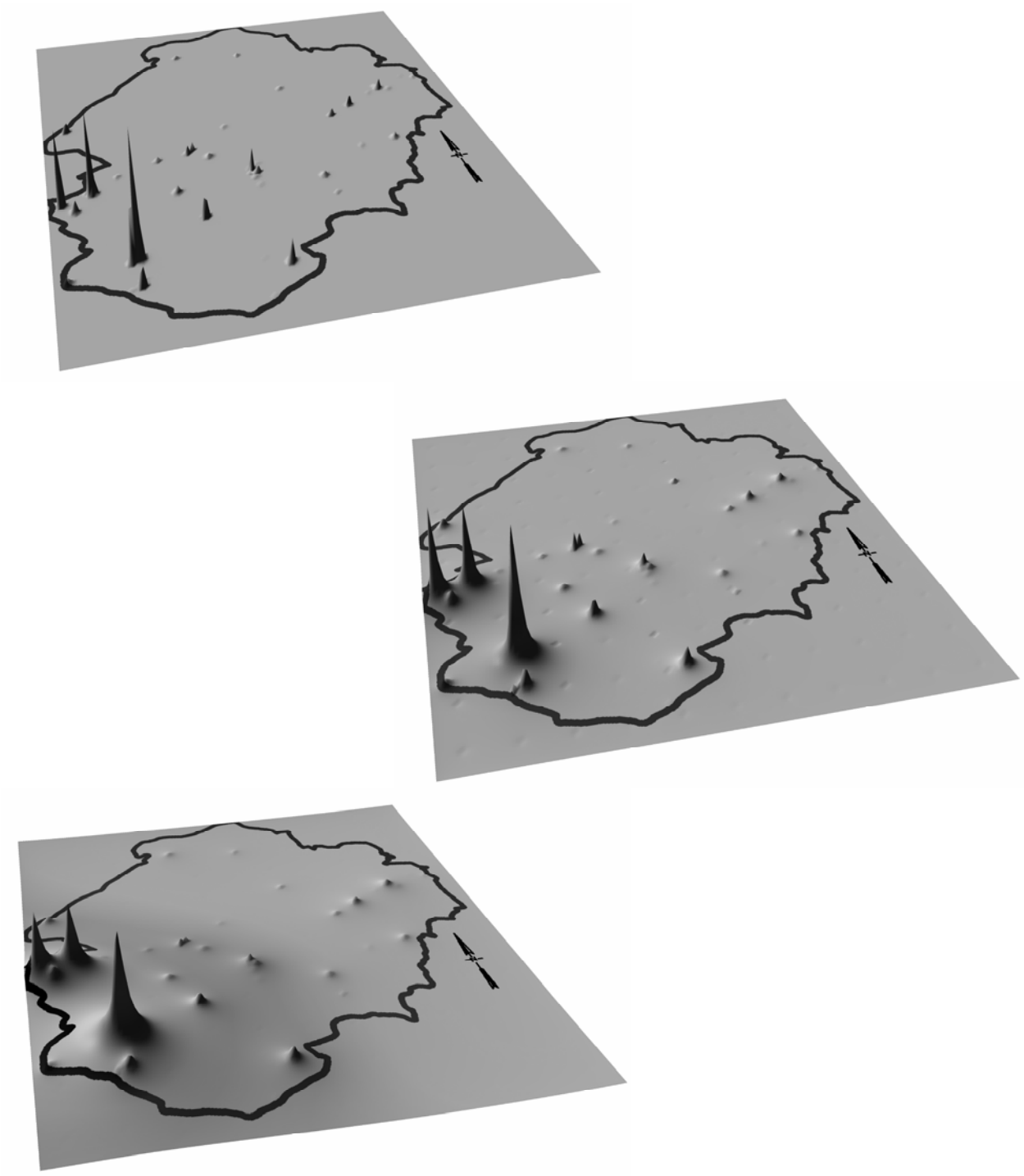


Figure 38. Surfaces representing the Warring States period occupation in the Yongxing Basin survey tract. Smoothing increases from top to bottom, with inverse distance powers of 4, 1, and 0.5 respectively (See Figure 33 for scale).

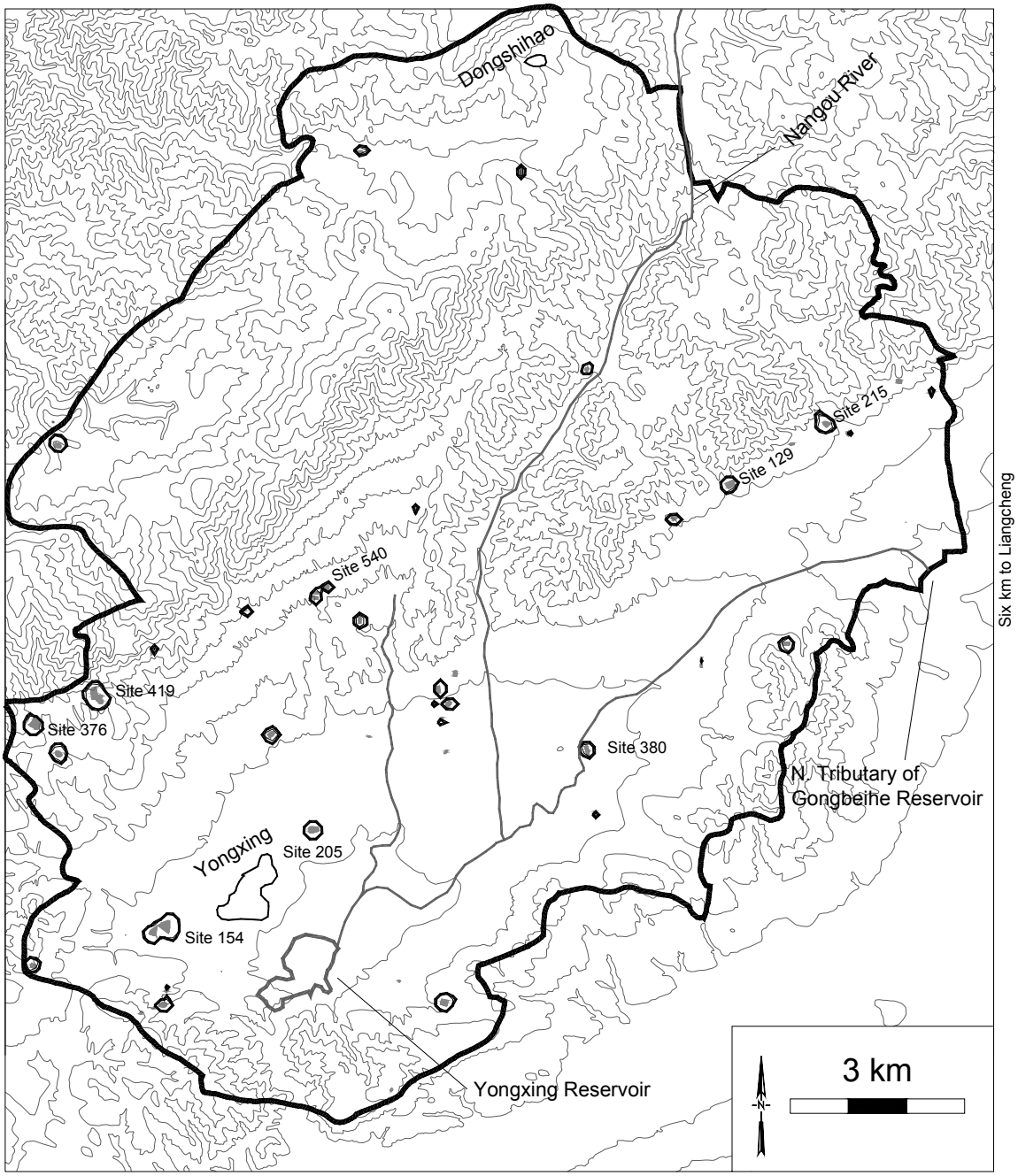


Figure 39. Contour map of the occupied peaks in the inverse power of four surface (Yongxing Basin survey tract). The chosen cutoff is the heavy line, which indicates small local communities. Local communities that include more than one collection are labeled (50 m contour interval).

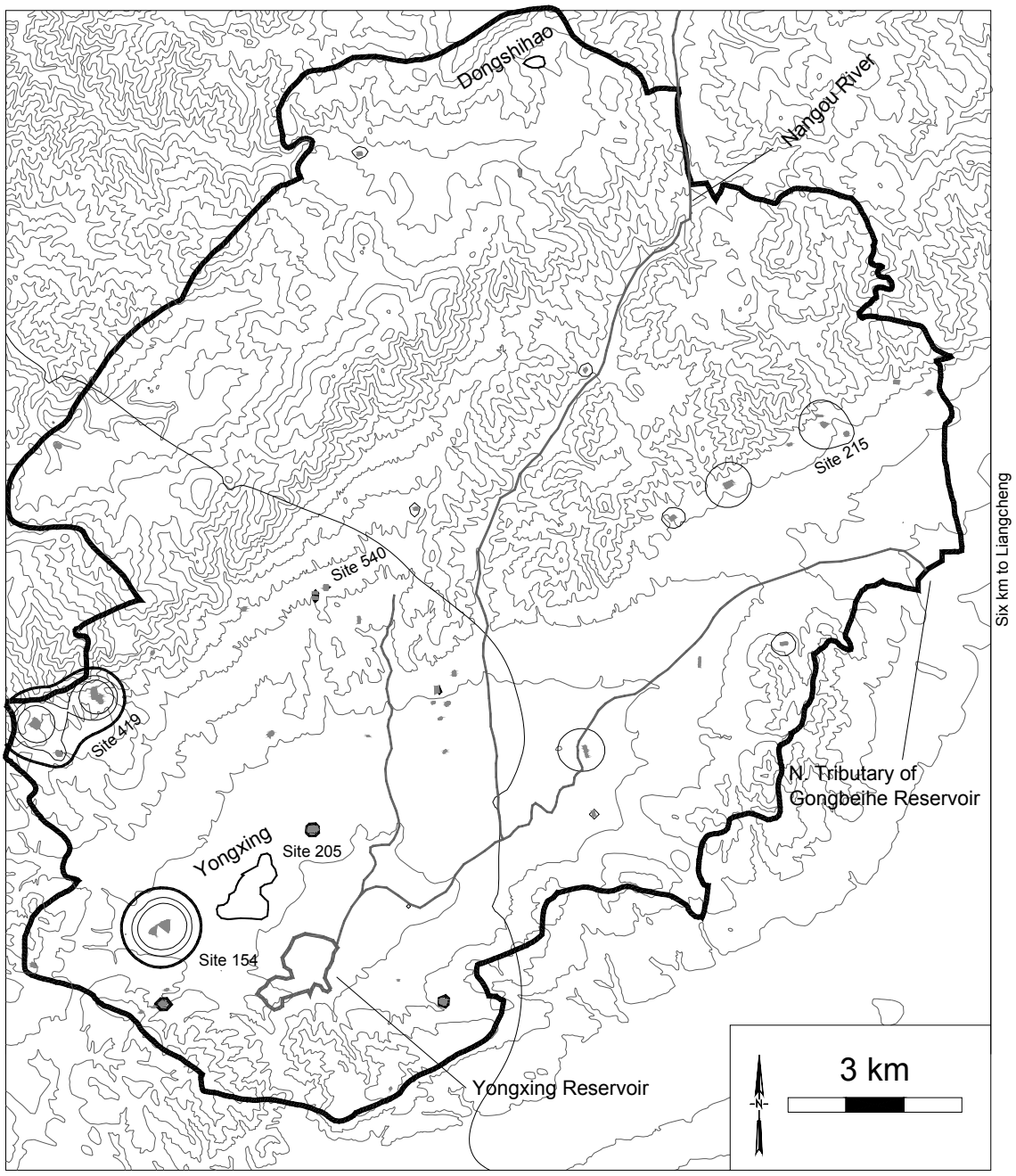


Figure 40. Contour map of the occupied peaks in the Warring States period inverse power of one surface (Yongxing Basin survey tract). The chosen cutoff is the heavy line, which indicates higher order communities (50 m contour interval).

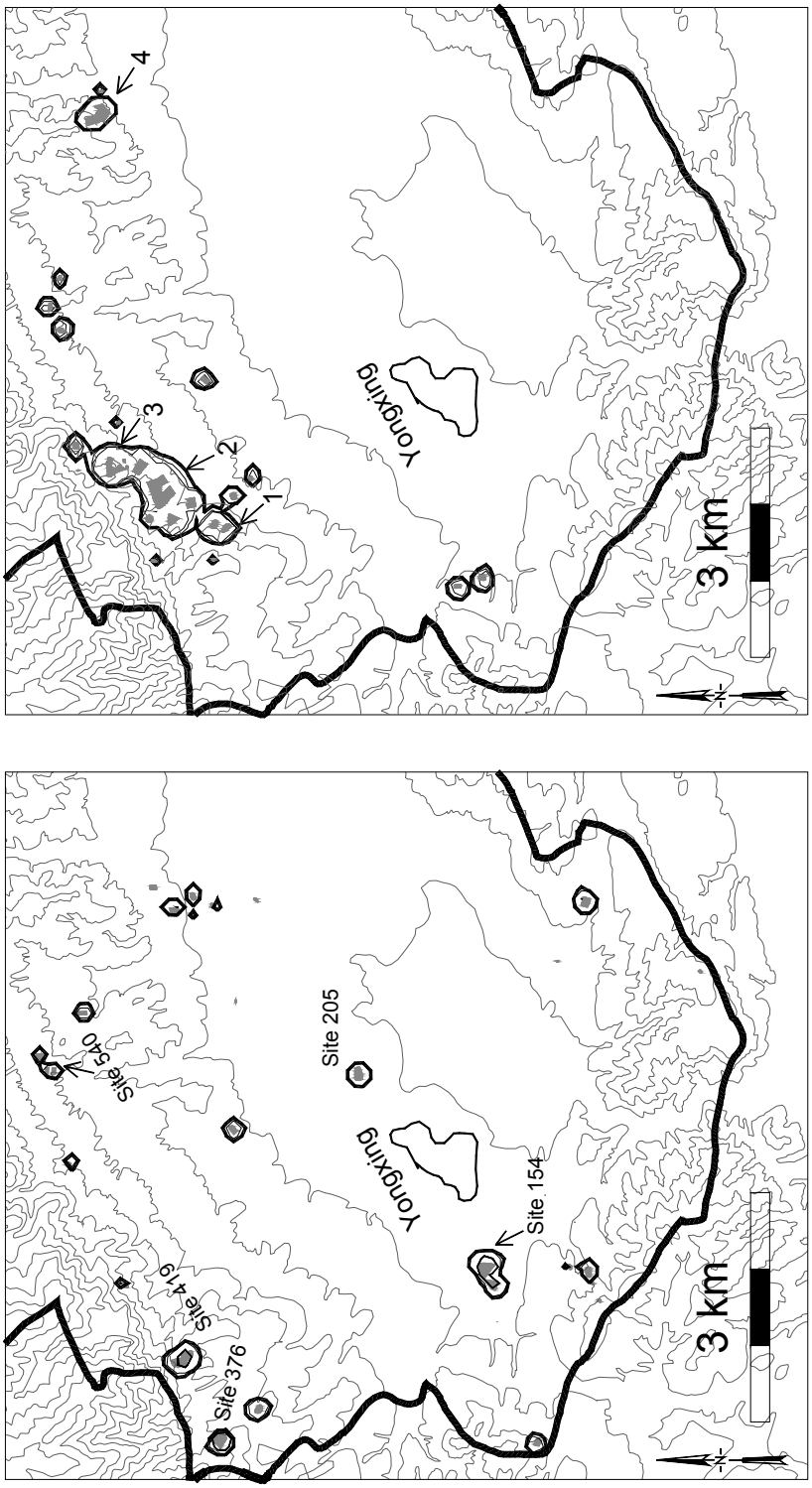


Figure 41. Comparison of local scale community organization between the Laohushan period (Top) and Warring States period (Bottom) as seen in the inverse power of four contour plot. Numbered Laohushan sites are: (1) Xibaiyu, (2) Mianpo, (3) Laohushan and (4) Bancheng.

7.3.2. Community organization in the Sansumu survey tract

The Warring States period settlement pattern on the northern slopes of the Sansumu survey tract shared few characteristics with the Laohushan period settlement pattern (Figure 42, Figure 43). The spatially largest of the Laohushan local communities was the Damiao local community, which had an east-west distance of over 700 m and included 33 collections. The Laohushan period local community with the highest population was Yuanzigou (210–421 people). Both in population and in spatial extent these communities were larger than the Warring States period local communities on the northern slopes. However, the Laohushan population was not evenly dispersed across the northern slopes of the Sansumu survey tract, but was clustered into sites with little intervening population, producing no higher-order community organization.

Settlements on the northern slopes of the Sansumu survey tract, although small, were dispersed more evenly across the landscape, producing many local scale communities. Three local scale communities in the northern portion of the survey area had more than 175 people, and the balance had populations similar to the populations of the homestead communities in the Yongxing Basin survey tract (Table 18). However, unlike populations in the Yongxing Basin survey tract, the dispersed settlement had an overall higher density and did join into higher order communities.

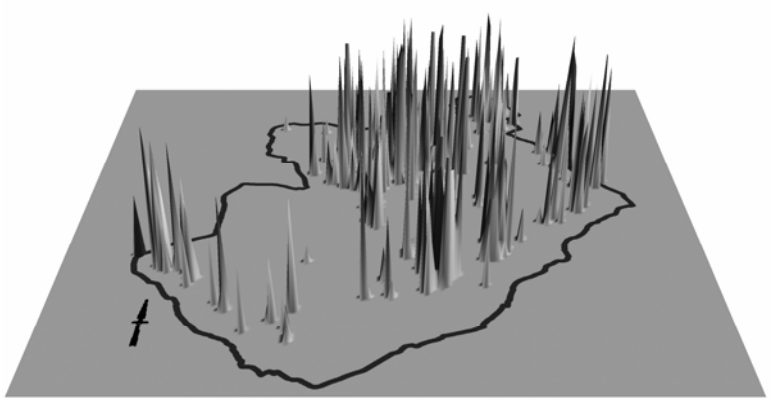
The Warring States period local scale communities with the highest populations were found on the shores of Daihai Lake (Figure 44). These were communities with the highest population in the two survey tracts and are characterized by single peaks, interspersed with unpopulated areas. These local communities became the centers of the higher order communities seen in Figure 45.

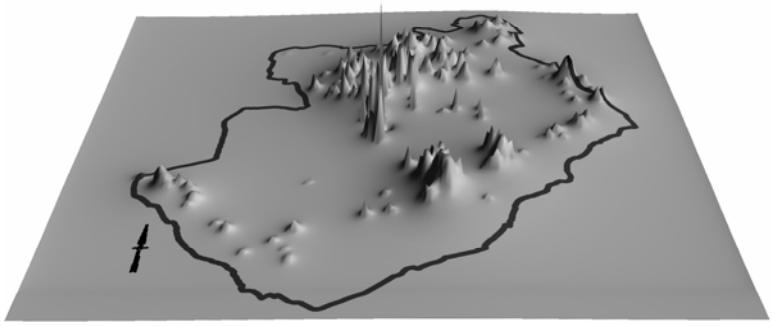
The Sansumu survey tract showed the development of higher order communities that brought 85.5% of the population of this survey tract into the two largest higher order communities. One of these higher order communities was located on the slopes overlooking the

Yuanzigou River drainage and another was located on the shore of Daihai Lake. A third much smaller community (44–65 people) was located in the far northeast corner of the survey area. The Northern and Southern higher order communities had different settlement hierarchies (Figure 46). The Southern higher order community was dominated by the largest of the local communities (at Site 783). The higher order community on the northern slopes and Yuanzigou drainage also housed more than one-third of the population of the Sansumu survey tract, but rather than consisting of a small number of high peaks with long tails representing population concentrations, this higher order community was comprised of large numbers of small local communities dispersed more evenly across the landscape.

Table 18. Populations of local scale communities labeled in Figure 43 and Figure 44.

Community Site Number	Population
Site 783	560–651 people
Site 954	189–220 people
Site 922	173–258 people
Site 1028	172–256 people
Site 989	189–280 people
Site 729	42–49 people





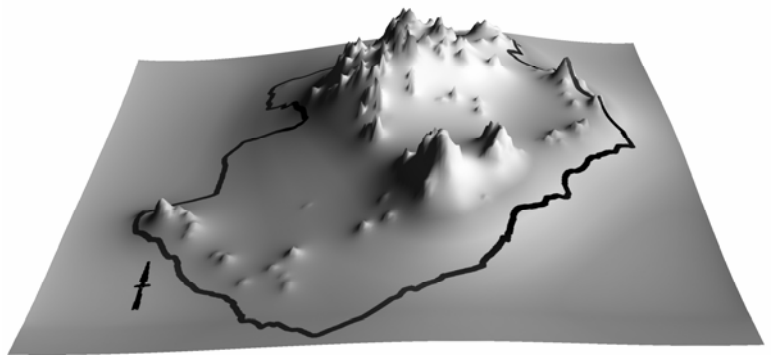


Figure 42. Surfaces representing the Warring States period occupation in the Sansumu survey tract. Smoothing increases from top to bottom, with inverse distance powers of 4, 1, and 0.5 respectively (See Figure 36 for scale).

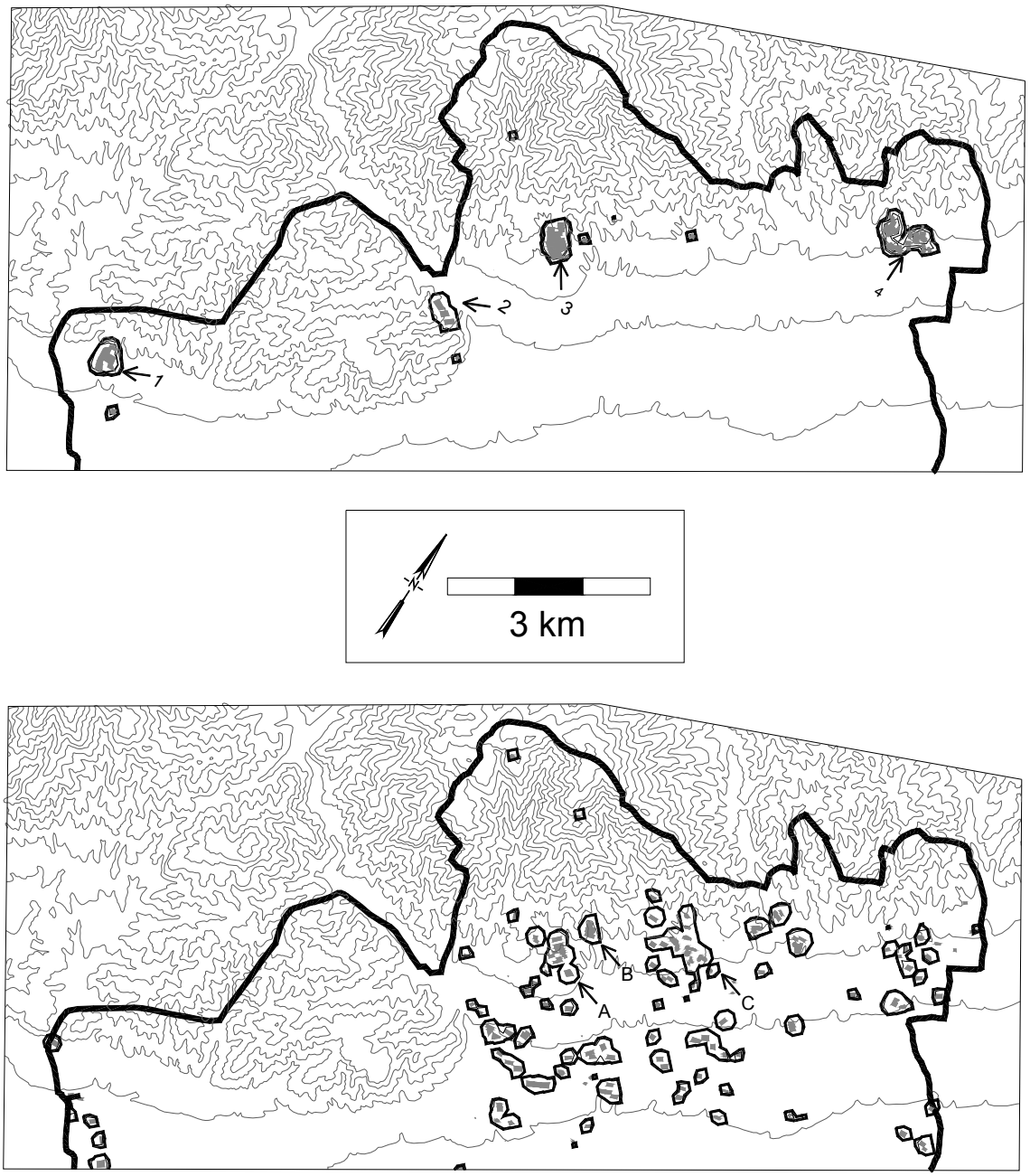


Figure 43. Comparison of the local scale community organization between the Laohushan period (Top) and the Warring States period (Bottom). Labeled Laohushan period communities are: (1) Baiposhan, (2) Yuanzigou, (3) Hetongyao and (4) Damiao. Labeled Warring States period communities are: (A) Site 969, (B) Site 1028, and (C) Site 922.

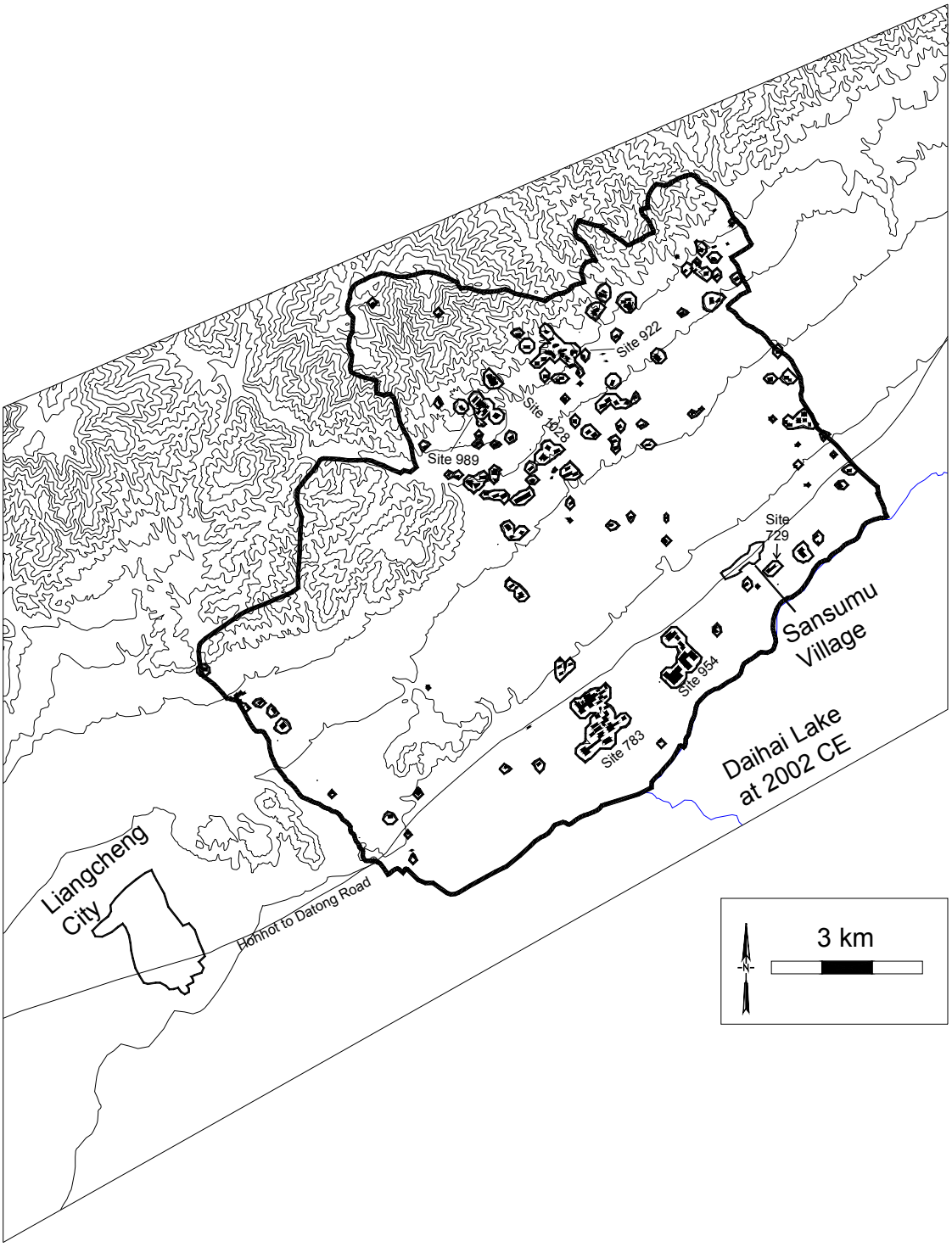


Figure 44. Contour map of the occupied peaks in the inverse power of four surface (Sansumu survey tract). The chosen cutoff is the heavy line, which indicates small local communities (50 m contour interval).

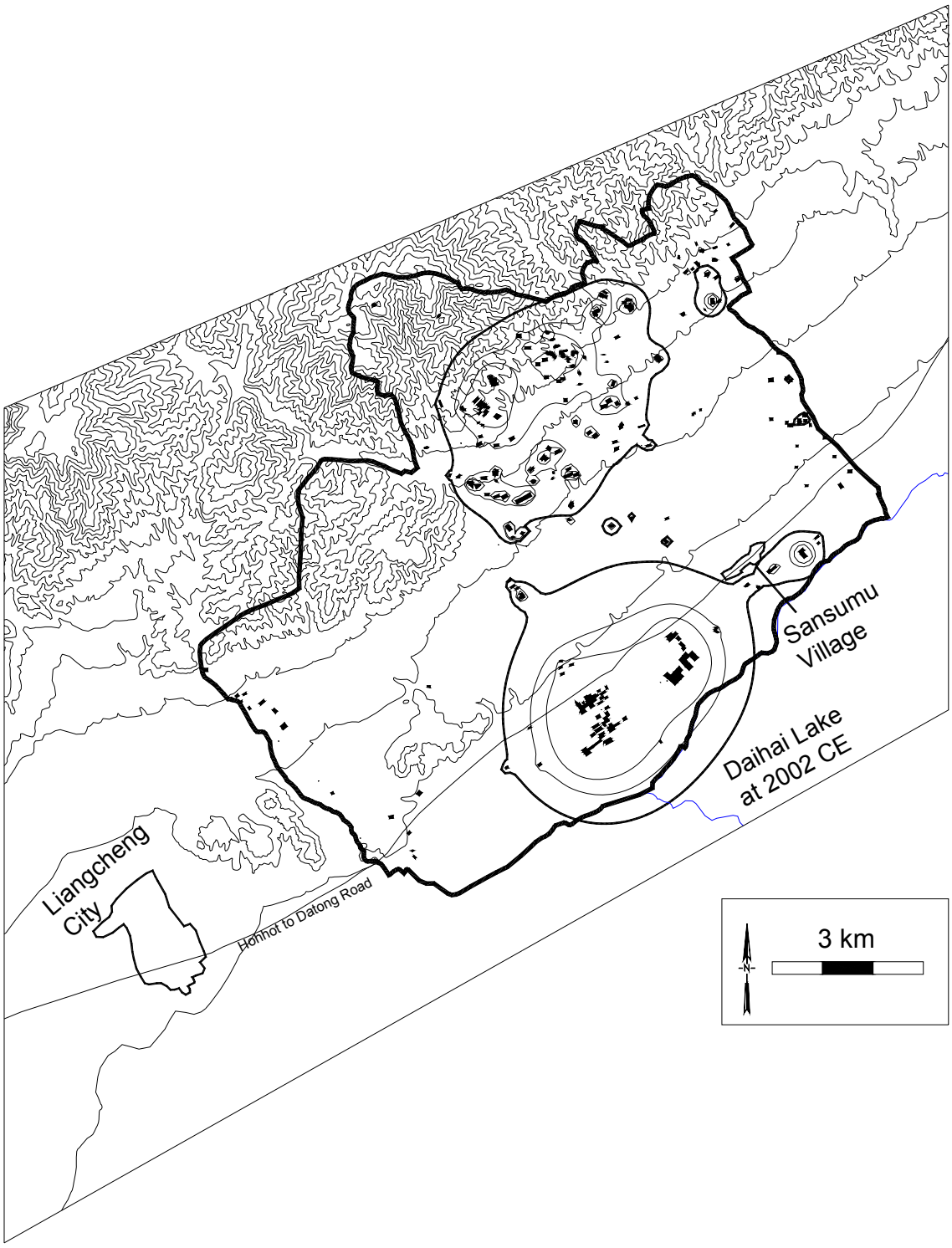


Figure 45. Contour map of the occupied peaks in the Warring States period inverse power of one surface (Sansumu survey tract). The chosen cutoff is the heavy line, which indicates higher order communities. (50 m contour interval).

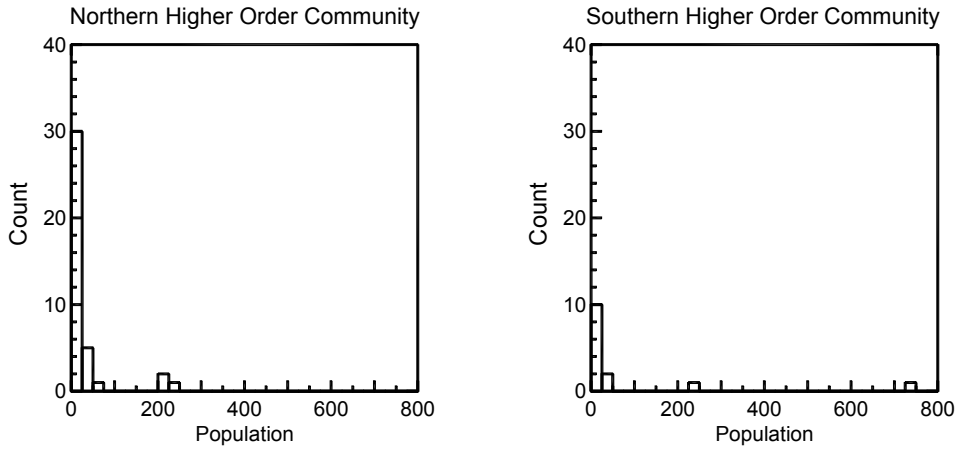


Figure 46. Histogram of the small scale local community populations included in the two large higher order communities shown in Figure 45.

An examination of the hierarchy contained in each of the higher order communities suggests different internal structures (Figure 47). In the north, the rank-size graph shows a poorly integrated hierarchy with several local scale communities of the same size. Drennan and Peterson (2004) have developed a measure (named "*A*") of evaluating both the distance from log-normal exhibited by a settlement pattern and the significance of that distance. When this method is applied to the settlement pattern data here, the Northern community has an *A* score of 0.026 ± 0.310 at the 66% confidence interval (n=39). The Southern higher order community has an *A* score of -1.430 ± 1.085 at the 66% confidence interval (n=14). We can be more than 99% confident that the differences seen in the settlement hierarchy between the Northern and Southern higher order community are not due to the vagaries of sampling. The Northern higher order community, which showed a lack of an integrated hierarchy, had a spatial arrangement that would have made central control more difficult for the Zhao government. The Southern higher order community was more strongly integrated, with a single large community and one medium sized community in the hierarchy. The primate nature of the settlement hierarchy suggests tighter control and the small number of high peaks with long tails represents population concentrations that are reminiscent of the farming village model.

7.3.3. Community analysis discussion

The sites on the shore of Daihai Lake were beginning to develop a primate structure associated with strong central control on the farming village model. The slopes of the Sansumu survey tract developed weakly integrated higher order communities, which were built from individual households living in close proximity. The local scale community plots suggest that many of these homesteads on the slopes were not in daily contact with one another.

The Yongxing Basin survey tract developed weak higher order community organization which included only a small proportion of the total population of the survey region. Most of the population lived in homestead sites with little daily contact with other homesteads and in regions independent of higher order communities. Central control here was even weaker than on the northern slopes.

The basic unit of habitation on the shore of Daihai lake, the nexus of Zhao government control in the region, was the farming village, similar to the basic unit in the Yiluo River Valley settlement pattern study. However, this pattern only included 31.2% of the entire Liangcheng survey population. Although some of the Laohushan and Zhukaigou period settlements in the Liangcheng region were likely homesteads as well, the prevalence of these homesteads across the landscape was a new pattern that resembles the dispersed residence seen at Liaoyang and Erliban. The differences in the settlement patterns suggests that the sites on the shore of the lake, which included higher populations and did not share the internal structures of the other communities in the region, were intrusive to the region. Land classification analysis also shows that these new, intrusive communities were located on the best agricultural land in the region, supporting the idea that these compact communities were loci of Zhao state control that were intended to increase the agricultural production and tax revenue of this region.

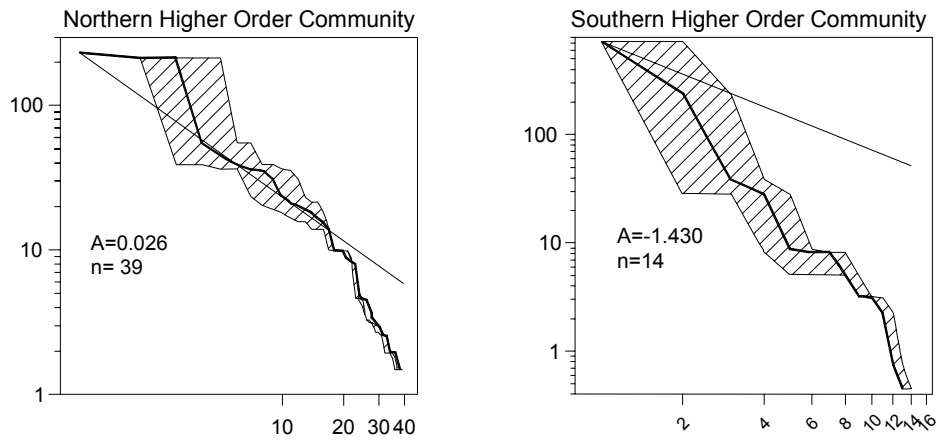


Figure 47. Rank-size graphs for the two largest higher order communities in the Sansumu survey tract. *A* values and 67 percent confidence zones are determined as suggested by Drennan and Peterson (2004).

7.4. Subsistence

In comparison to the Neolithic periods in the Liangcheng region, more of the population occupied the best agricultural land in the Warring States period. In addition, the small scale communities at Sites 154, 205 and 380 on the Yongxing Basin and small scale communities at Sites 783, 954 and 729 in the Sansumu survey tract occupied prime locations within the highest rated agricultural productivity class. Although there were substantial populations occupying the best agricultural lands for the first time, the overall settlement pattern was not distributed to maximize agricultural production (Table 19), and the correlation between the soil productivity ranks and population density in either survey zone was weak and had little significance (Yongxing Basin survey tract r_s= 0.154, p>0.2; Sansumu survey tract r_s= 0.211, p>0.2). However, in comparison to the correlation in the Laohushan and Zhukaigou periods, these correlations are positive, suggesting some tendency towards living on the best agricultural land, even if the confidence in the correlation is low. In the Sansumu survey tract, where population density on the best agricultural land was the highest, these populations were living in farming villages that resemble the Zhou dynasty settlement pattern of the Yiluo River valley (Chen et al.

2003), as opposed to collections of individual homesteads that exemplify occupations on the northern slopes. The Southern higher order community, which has a strongly positive *A* score, was located in the most agriculturally productive area of the landscape in either zone, an excellent location to maximize tax revenue for the Zhao state, but this higher order community was an exception to the pattern seen in the balance of the survey.

Table 19. Warring States period settlement distribution in each of the survey tracts utilizing the five agricultural productivity classes outlined in the introduction.

Sansumu Survey Tract				
	Soil Class One	Soil Class Two	Slopes	Mountains
Agricultural productivity rank	1	2	3	4
Warring States period population density	36.2 people/ km^2	11.0 people/ km^2	41.1 people/ km^2	17.1 people/ km^2
Warring States period population rank	1.5*	4	1.5*	3

Yongxing Basin Survey Tract					
	Irrigable Plains	Plateau	Non-irrigable Plains	Slopes	Mountains
Productivity rank	1	2	3	4	5
Warring States period population density	10.2 people/ km^2	2.4 people/ km^2	1.5 people/ km^2	5.9 people/ km^2	5.9 people/ km^2
Warring States period population rank	1	4	5	2.5	2.5

*Even though the population densities are marginally different among these land classes, the differences in population density are not large enough to be meaningful and therefore the same population ranks are given to these land classes.

The poor correlation between the land productivity index and the population densities suggests that sizeable populations were inhabiting locations where agriculture would have been difficult. This was true even though the settlement plots show that ample high quality farm land was available. Assuming an average of five people per family, there would have been 13.6 ha of soil class one farmland available for each family occupying the best agricultural land in the Sansumu survey tract. The second best soil class was less densely populated, with 45 ha available for each family. In the Yongxing Basin, where population was lower, 48 ha of irrigable farmland would have been available for each family. More farmland was available in these three land classes than any family could utilize effectively. Either people were being kept off the prime farmland by the state (which seems counter productive with so much land available) or populations were marginalizing themselves because not living on the best agricultural land had other advantages.

Surprisingly large populations occupied the mountain zones of each survey tract. In the Yongxing Basin survey tract this was almost all attributable to the local scale communities at Sites 376 and 419 (Figure 39). The communities might have been procuring resources outside the survey region. Other isolated homesteads, like those of the Laohushan period, were spread along the slopes between the Nangou River and the eastern edge of the survey tract and across the mountains slopes transition from the Yuanzigou River to the eastern Sansumu survey tract boundary (Figure 37). These households were well situated to exploit wild resources in the mountains but were less well situated to exploit agricultural resources on the largely empty plains to their south.

The placements of households, not in villages surrounded by farmland, but in loosely formed low density clusters, suggests that these households lived adjacent to their plots of land. A mixed use landscape that is interspersed with housing and farmland is not as efficient as high density housing surrounded by farmland. The spacing between households in the northern portion of the survey zone, although obtrusive, was not large, and suggests that the plots of land

interspersed between households might have been quite small. These smaller plots were also located in areas that did not exhibit the rich soils of the lake shore. The produce from these small plots of land may have been augmented by foodstuffs obtained from hunting or animal husbandry. The spacing among the homesteads would have allowed for both intensive gardening in small plots near the homesteads as well as corridors for herding animals to move among the houses to open areas, either in the mountains or on the plain between the Yuanzigou river and the populations that lived near the western survey boundary. That the three largest local scale communities in the Northern higher order community were all located in areas with unfettered access to the mountain grazing lands is telling in this regard; herding was likely an important activity at these sites.

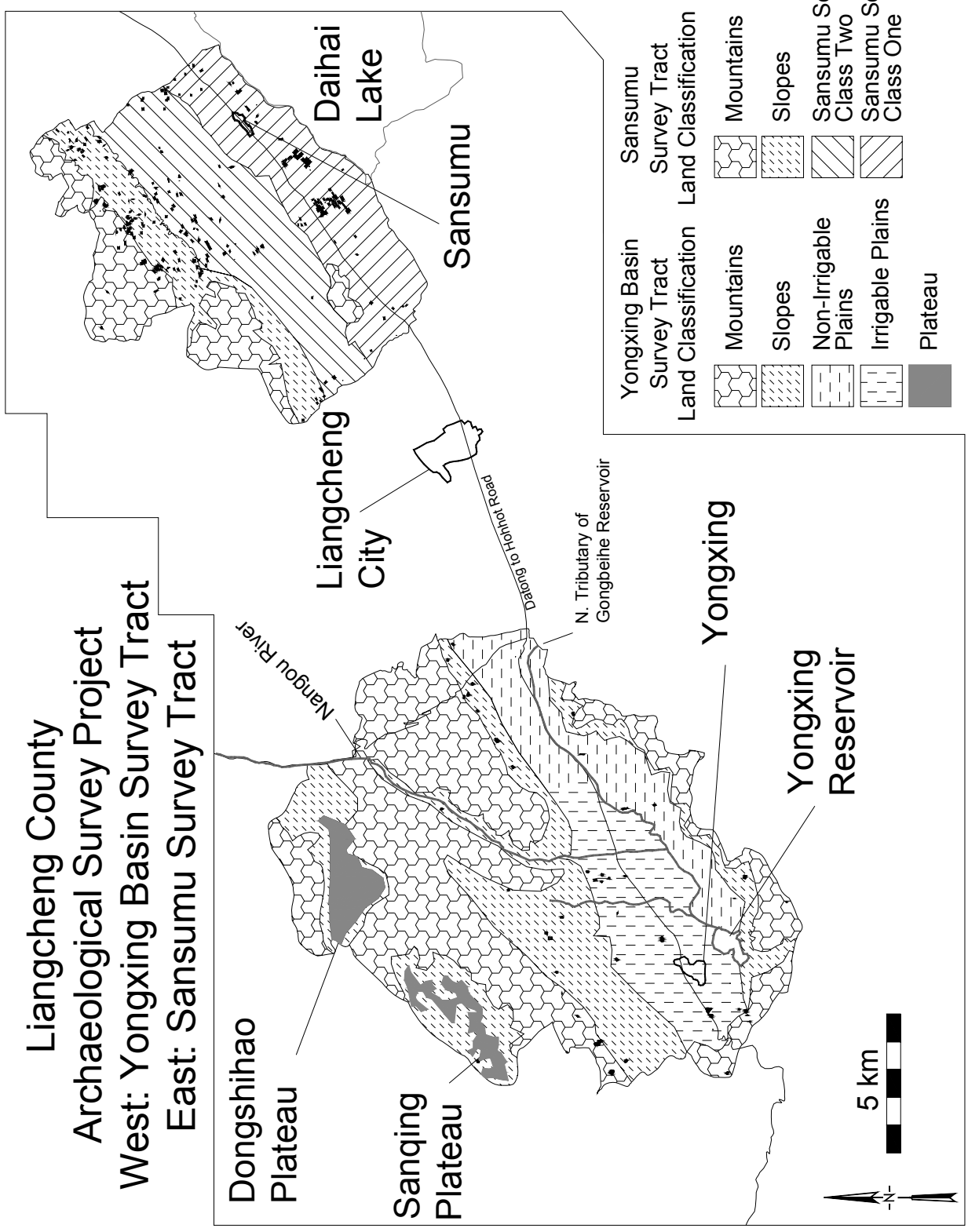


Figure 48. Land classification from Figure 3 with Warring States period collections (Gullies have been removed).

7.5. Discussion

As the Zhao polity entered this region, seeking to expand its borders and tax base to further its war efforts to the south, it appears to have founded a small number of new population centers based on the farming village model on the best agricultural lands. These communities were organized to allow for efficient taxation and political management by agents of the Zhao state living in or visiting the two large villages on the shore of Daihai Lake.

These centers exerted a strong pull towards Daihai Lake. Although the household model was seen across much of the northern portion of the Sansumu survey tract and on the Yongxing Basin, the population density was much higher across the northern strip of settlement from the Yuanzigou River to the eastern border of the Sansumu survey tract, than in the Yongxing Basin survey tract. This differential shows the pull of the settlements on the shores of Daihai Lake and suggests interdependence between the communities on the lake, which were likely loci of trade and specialized production, and the communities in the outlying areas.

In the Yongxing Basin survey tract, none of the population centers, if such a term can be used to describe the small Warring States period occupations here, attracted other small occupations. The attractions were largely weak during the Laohushan period as well, but Figure 41 shows many more small settlements on the outskirts of the Laohushan cluster than around any of the centers in the Warring States period. The lack of satellite occupations around the higher order community at Site 419 and the dispersed settlement pattern highlight the weak political organization that must have been present during the Warring States period in the Yongxing Basin and shows the weak economic integration among these redundant units. Although many of the households in the Yongxing Basin were well positioned to create agricultural surpluses, the Zhao state would have had considerable difficulty taxing and managing these populations.

The settlement system on the shore of the lake was characterized by larger, densely packed sites that resemble modern village organization and the settlement system in the balance of the survey region is characterized by homestead sites. The modern settlement pattern in Liangcheng includes homesteads, but only in the most marginal areas, far from the best agricultural land. These modern homesteads are inhabited by people who prioritize animal husbandry over agricultural pursuits, eschewing village life for convenient animal herding. Although the village system was not well developed during the Warring States period, this does not remove the possibility of living on the margins of the settlement system. The attenuated nature of the core only brings the areas that can be considered marginal closer to favorable land and the villages on the lake. There was abundant open land in soil class one and soil class two of the agricultural production land classification, but populations still chose to occupy homesteads on the upper slopes and lower mountain classes, suggesting a different set of priorities for settlement placement, a greater impetus for hunting and herding, as well as a desire to avoid close contact with the administrative center of the Zhao State in this region.

Peterson and Drennan note that the modern settlement system in the Alto Magdalena shows a settlement pattern "…where modern political authority has no representation at the local level." (2005: 25). After the dissolution of the Neolithic community structures during the Zhukaigou period, the settlement pattern of the Warring States period demonstrates the re-establishment of a social system operating at a larger scale than the local community, but one in which a large proportion of the settlement system consisted of independent households that were not in daily contact with one another. The settlement evidence in the northern portion of the Sansumu survey tract as well as the Yongxing Basin survey tract resembles the system in the Alto Magdalena much more than it does the modern village system.

The contrast between the villages on the lake and the dispersed settlement pattern on the slopes and in the mountains suggests that the sites on the shore of the lake were intrusive to this region. The Zhao State does not appear to be moving large numbers of indigenous

residents to the best agricultural land. However it appears unlikely that this small outpost could have managed all of the population in both survey regions (nothing is known about Warring States period settlement pattern between the two survey zones). The remains in the Yongxing Basin suggest that a large portion of the population must have lived with little contact with the Zhao State, hindering efforts to marshal populations for the wars the Zhao was fighting to the south. This settlement pattern contrasts strongly with the system seen in the following Han Dynasty period where much stronger control over the landscape was seen.

8. Han Dynasty period (200BCE–200CE)

After what might have been a short occupational hiatus (but see Section 8.1), the Liangcheng region entered into the Han Dynasty period. Population continued to climb rapidly in this period: The number of Han Dynasty sherds was more than double the number of Warring States period sherds and the occupied area increases from 132.7 ha to 350.4 ha. Many of the trends seen in the settlement pattern between the Laohushan and the Warring States periods continued to develop in the Han Dynasty period. Larger compact villages were founded on the shore of Daihai Lake during the Warring States period and these villages grew in number and in size during the Han Dynasty period. For the first time the number of people living on the shore of the lake outnumbered the peoples living on the slopes of the Sansumu survey tract. Although there continued to be large populations on the Maoqinggou corridor, the proportion of the population that was placed on the best agricultural land in the Yongxing Basin survey tract continued to grow during the Han Dynasty period.

This settlement pattern suggests that the Han Dynasty was considerably more successful than the Zhao State in deriving surplus from the Liangcheng region. There is an increase in the number of people who occupied the best agricultural lands in the Sansumu survey tract and in the hierarchical organization of communities there. The dense and contiguous settlements on the shore of the lake would have been easily taxed by representatives of the state, and Warring States period occupations on the northern slopes of the Sansumu survey tract, which were located far away from central control and had a dispersed settlement pattern that would have produced logistical obstacles to efficient government, were largely abandoned.

The Yongxing Basin survey tract settlement pattern shows some of the features of the Warring States period Sansumu survey tract settlement pattern and shows the limits of Han control. Although there is an increase in the proportion of the population that occupies the best agricultural land (Section 8.4), there were still large numbers of people who occupied the

slopes, especially in the Maoqinggou Corridor. The main occupation, centered on the plains, would have provided a weaker platform for the management of population than in the Sansumu survey tract but in comparison to the Warring States period occupations, central control in the Yongxing Basin survey tract would have been greatly enhanced.

8.1. Proposed occupational hiatus between the Warring States and Han Dynasty periods

The accepted chronology includes a short occupational hiatus between the Warring States and Han Dynasty periods (Tian 2000). The evidence normally cited for this occupational hiatus is historical. The *Hanshu* describes the loss of the Ordos and neighboring regions after the death of the First Emperor of the Qin (d. 210 BCE) and before the establishment of the Han Dynasty by Liu Bang (202 BCE). Han control over this territory was slowly reestablished during the 50 years following the death of Liu Bang (emperor Han Gaodi), in 195 BCE (Loewe 1986: 128). This period of Han expansion was not a period characterized by constant inexorable consolidation: this was the period during which the Empress Dowager Lu usurped control of the throne from the royal family, and the King of Nanyue declared himself Martial Emperor of the South. In the north, the Han continued to have problems repelling the Xiongnu. Although the overall trend during this period was towards consolidation, imperial control over territories outside of the Imperial District of Chang'an was uneven.

During the Han Dynasty the Liangcheng region was part of the nominally autonomous "kingdom" (*guo*) of Dai near the border of the Yunzhong Commandery and was rarely mentioned in the historical cannon (Figure 49). Therefore, these references do not inform us as to whether the landscape was abandoned during the interregnum of Central Plain control during the period between the fall of the Qin and the reestablishment of Han power or if portions of the population remained on the landscape during this time period. The famous Han loss to the Xiongnu at the battle of Pingcheng (200 BCE), that lead to the *Heqin* Marriage Alliance,

occurred 70 km south and east of Liangcheng. The location of the battle, so far south of the Han Great Wall, bespeaks the tenuous nature of early Han control over the northern zone.

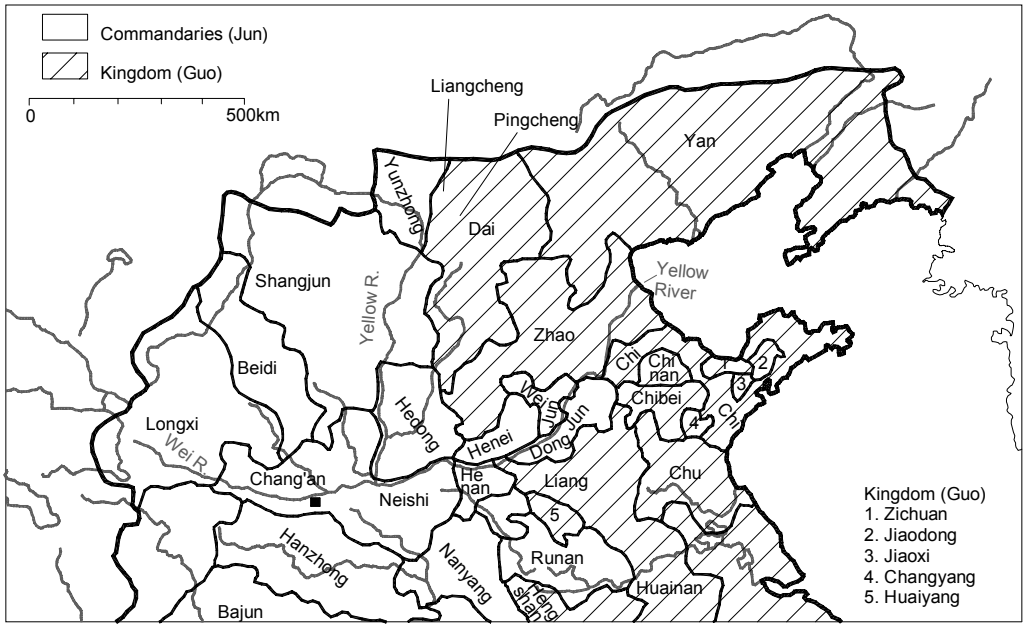


Figure 49. North China during the early Han Dynasty period (c. 163 BCE) (Redrawn from Twitchett and Fairbank 1978: Map 5).

The historical texts and recent archaeological investigations suggest that the loss of Central Plain management (either Zhao or Qin) of Liangcheng would not have necessarily meant depopulation of the region. William Honeychurch's work in Outer Mongolia, and the historical research of Wu En show that the Xiongnu Confederation did rule over sedentary agricultural populations in their territory north of the Han Great Wall (Honeychurch 2004; Wu 1990). But between the Qin and the Han periods, when the Xiongnu Confederation captured territories south of the Great Wall, including Liangcheng, did they chase away the populations of these regions? Did the peasants just pay taxes to other groups when Central Plain political authority waned? Or did they pay no taxes at all?

The accepted chronology assumes the former, which from the standpoint of the Xiongnu political economy seems disadvantageous. Barfield conceives of the Xiongnu as a predatory

polity that redistributed wealth from raids as part of the political economy (1981; 2001). Jagchid conceived of raiding as a way to gain greater concessions from the Han, especially in grains that the Xiongnu did not produce themselves (Jagchid and Symons 1989). Raiding was probably important to both the foreign policy and the political economy of the Xiongnu, but did raiding necessarily mean depopulation? “Mobile polities” are widely considered uninterested in holding territory the way the Han colonized the north (Lattimore 1962). The extent of mobility in the Xiongnu is a matter of debate, but the northern confederacies, which always had lower populations than the Han, could not stand against Han infantry in wars over territory (Barfield 1989: 72). If the early Xiongnu strategy was to win over defectors like the King Han Xin (Barfield 1989: 35), or to increase tribute paid to the *Shanyu* for redistribution (Barfield 2001), then depopulation would seem counter productive.

The histories offer some support for the point of view that the Xiongnu would have become a taxing authority during the Qin/Han interregnum. Chapter 96 of the Annals of the Han (*Han Shu*), mentions that the *Rong* and the *Di* peoples lived intermingled with agricultural populations after the fall of the Zhou. The texts also record a Xiongnu office of The Commandant of Slaves (*Tung Bu)* that managed the holdings of the Xiongnu in the western regions (Hulsewé and Loewe 1979: 72-73). Although neither of these passages recorded management policies in Liangcheng specifically, the fact that the Xiongnu accepted management (as opposed to depopulation) as beneficial elsewhere makes it more likely they would have pursued the same policy in Liangcheng.

Although there seems to be ample historical evidence to support the view that the Xiongnu would not be served by destroying all of the settlements and forcing the farming population to leave their land, none of the discussion above disproves the accepted chronology. However, the survey data shows that the largest of the Han Dynasty period settlements grew from areas where Warring States period sites were located (Figure 50, Figure 51). The largest of the Han settlements were not in exactly the same places as the largest of the Warring States

period settlements, but both the large settlements on the shore of Daihai Lake and the smaller string of settlements on the Yongxing Basin near the road from Yongxing east to Liangcheng had grey Warring States period collections near their cores. There are important differences in the settlement patterns of these two periods (Section 8.2), but the connection between the two appears to be one of development, not of abandonment followed by resettlement.

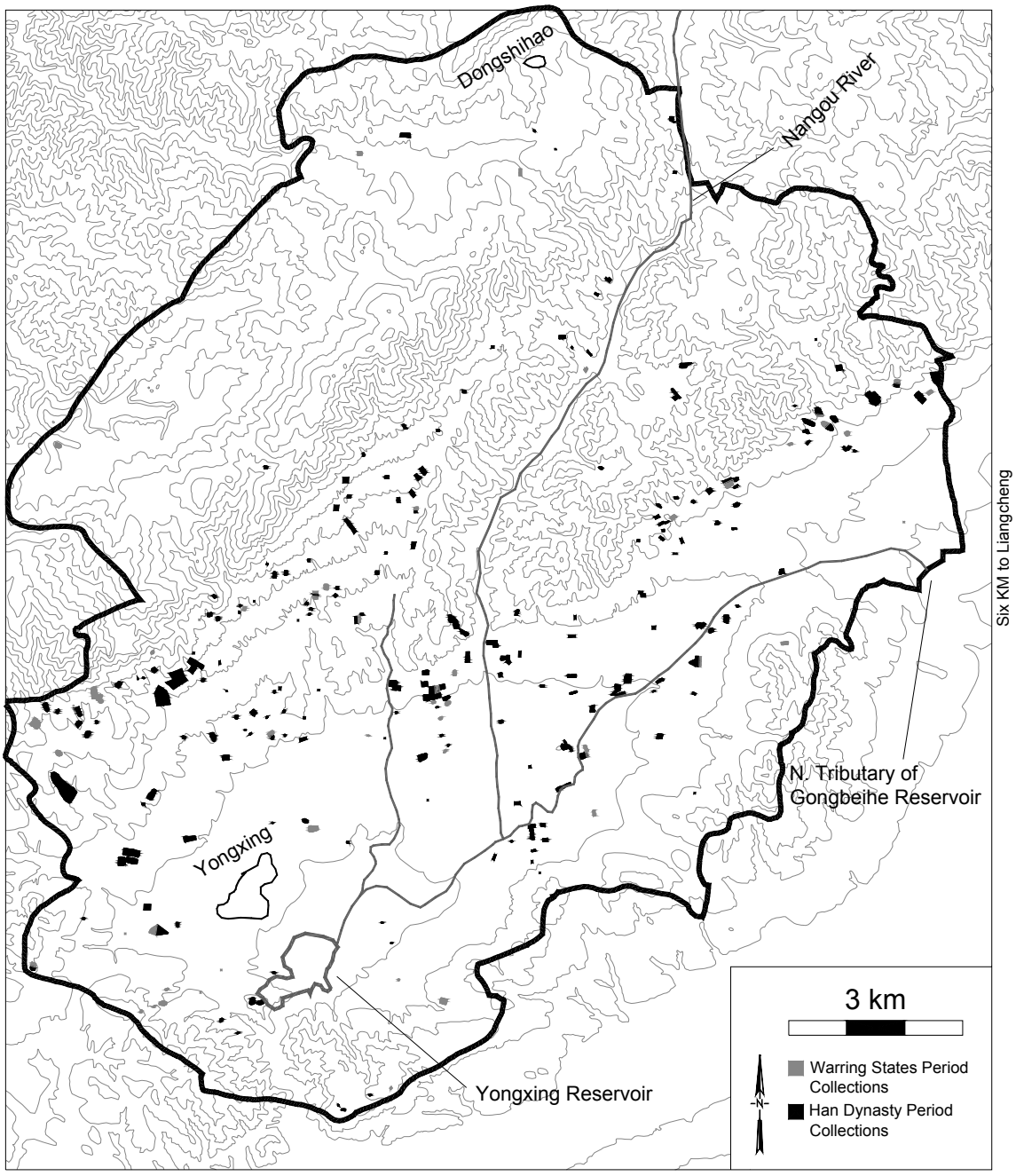


Figure 50. Warring States and Han Dynasty period collections from the Yongxing Basin survey tract (50 m contour interval).

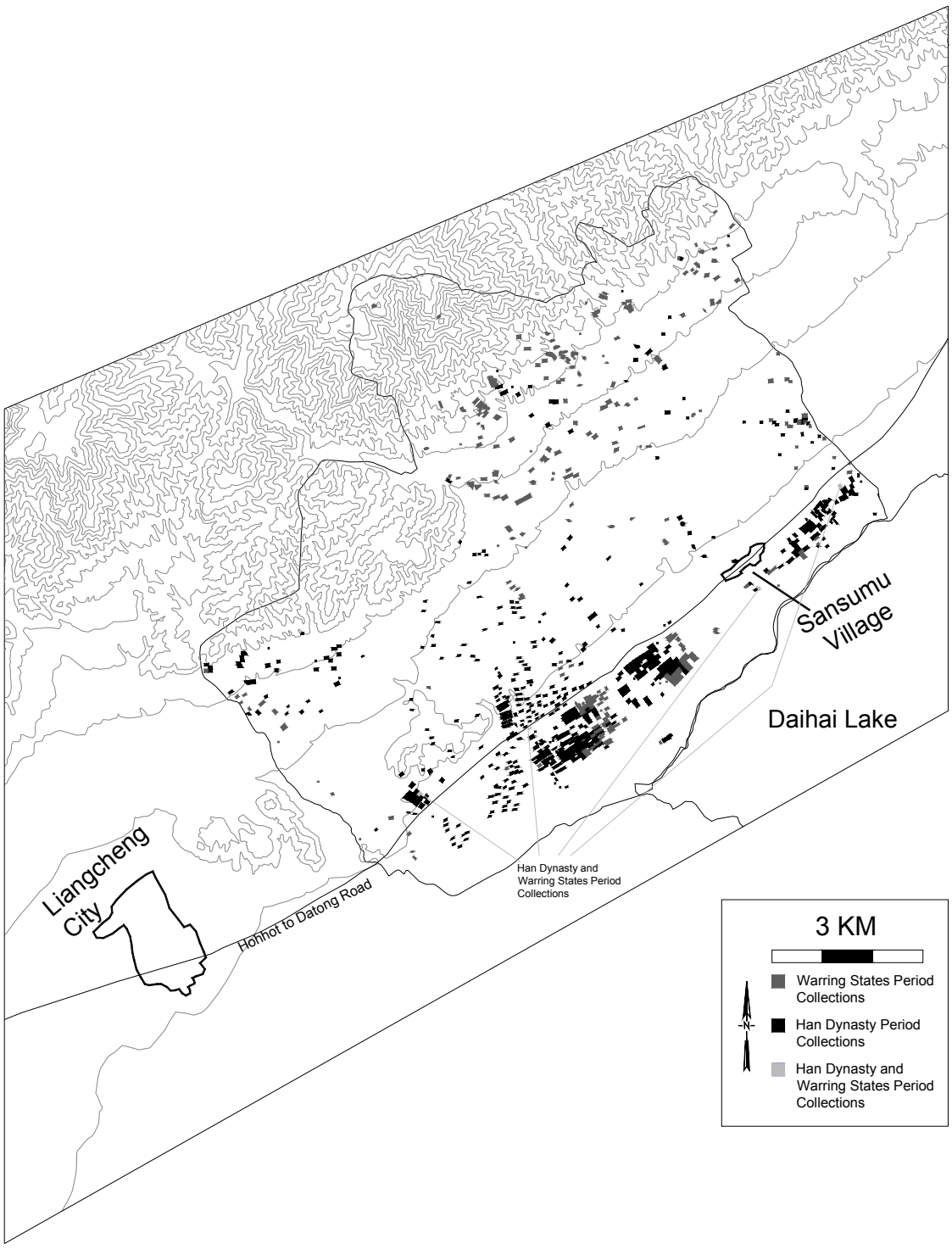


Figure 51. Warring States and Han Dynasty period collections from the Sansumu survey tract (50m contour interval).

8.2. Settlement patterns in the Han Dynasty period

Population expanded between the Warring States and Han Dynasty Periods, from 967–1440 to 3000–4500 people, and in each of the two survey zones the settlement pattern changed. In the Yongxing Basin survey tract, the settlement pattern continued to be more dispersed than in the Sansumu survey tract, but as was seen on the northern slopes of the Warring States period Sansumu survey tract settlement pattern, these dispersed homestead settlements are seen to cluster loosely into higher order communities (Figure 52).

The principal difference in the settlement patterns between the Warring States and Han Dynasty periods is seen in the Sansumu survey tract (Figure 53). The population grows from 2000–3100 people in the Warring States period to 5700–8523 during the Han Dynasty period. On the shores of Daihai Lake, where the largest contiguous Warring States period occupations were located, the Han Dynasty period saw the foundation of even larger settlements. The growth of settlements on the shore of the lake occurred at the same time that the upper slopes in the northern reaches of the survey area were largely abandoned. Populations were congregating on the best agricultural land in numbers not seen before (Section 8.4).

The increase in population between the Warring States and Han Dynasty period occurs contemporaneously with increasing congregation of populations into larger settlements and an increase in site hierarchy. The difference is more dramatic in the Sansumu Survey tract, where the largest site (Site 783), grows to over 60 ha (Figure 54). A similar, if not quite as dramatic change is seen in the Yongxing Basin survey tract, where the largest site grows to over 10 ha, almost three times as large as the largest settlement in the Yongxing Basin during the Warring States period (Figure 55). These site size histograms show an increase in societal complexity between these two periods that is further emphasized by examining community development in the two survey zones.

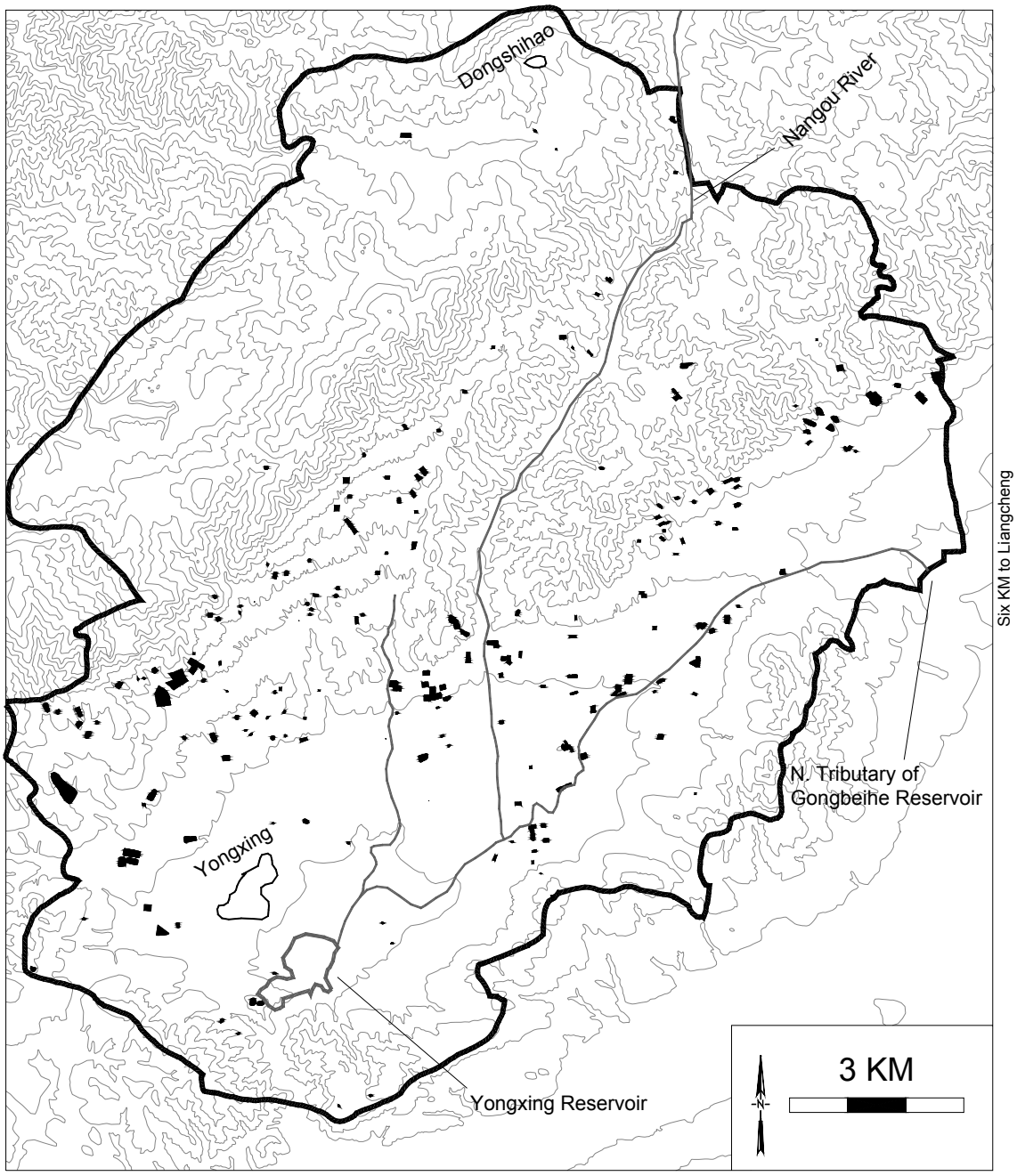


Figure 52. Han Dynasty period collections in the Yongxing Basin survey tract (50 m contour interval).

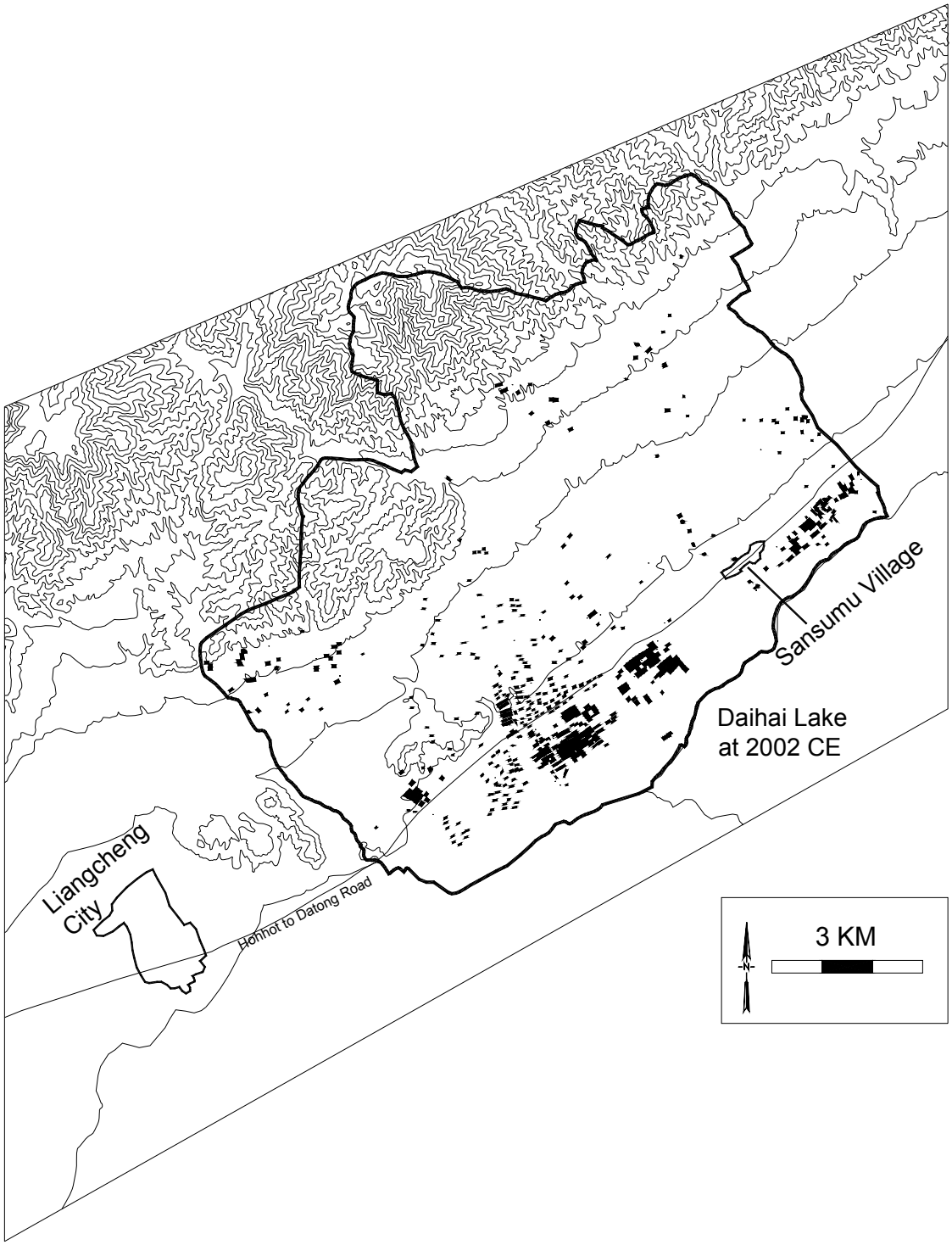


Figure 53. Han Dynasty period collections in the Sansumu survey tract. (50 m contour interval).

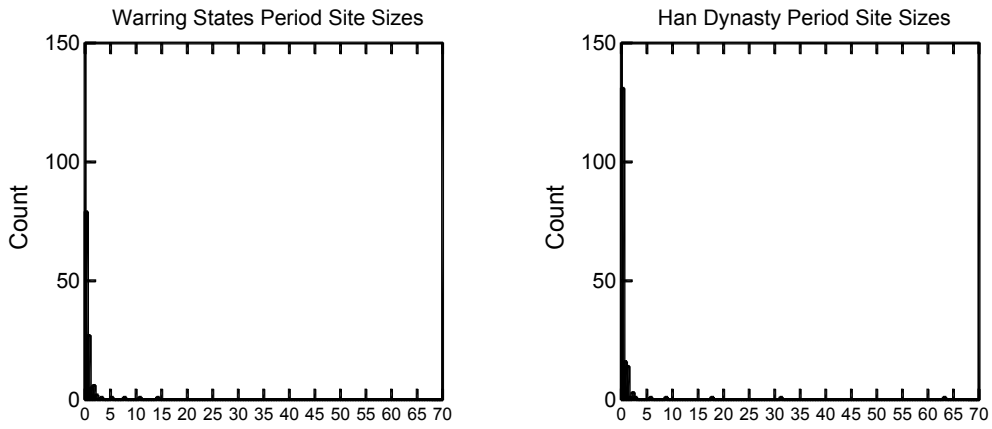


Figure 54. Sansumu survey tract site size histograms of the Warring States and Han Dynasty periods.

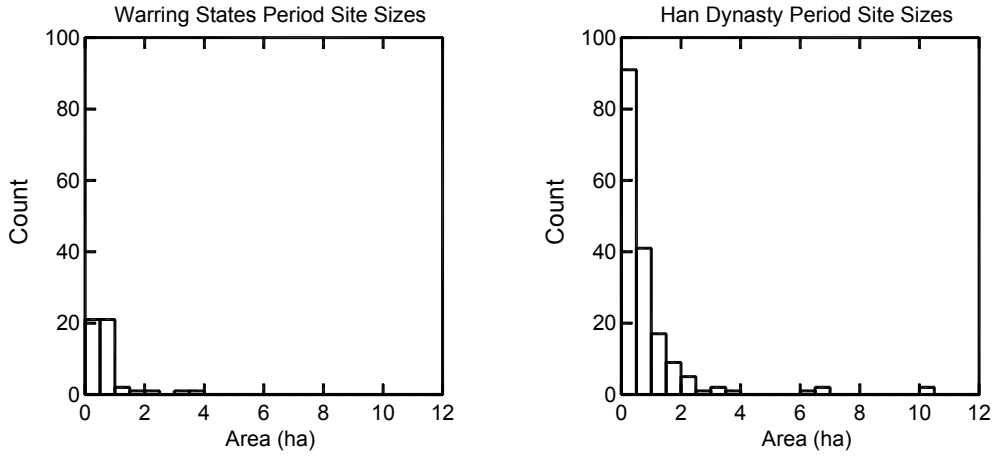


Figure 55. Yongxing Basin survey tract site size histograms of the Warring States and Han Dynasty periods.

8.3. Analysis of communities in the Han Dynasty period

Community organization was stronger in this period than in any other period under discussion here, showing strong differences in the way that the Zhao state and Han Dynasty governments controlled this region. The Zhao State was either content with, or unable to move beyond, the installation of a few large sites on the best agricultural land, with much of the population living in homestead sites on the slopes or in the mountains. Even in the Sansumu survey tract, less than half of the population lived in or near these lake shore settlements, and

government control over the population in the Yongxing Basin survey tract was likely minimal. The Han Dynasty, by contrast, moved (or attracted) a much larger portion of the population into higher order communities that would have allowed greater control of the population.

8.3.1. Local level communities in the Yongxing Basin survey tract

The density plots of Han dynasty population are in Figure 56 and the contour map of the Han Dynasty local community organization in the Yongxing Basin survey tract is in Figure 57. The plot shows clustering in a “U” shaped arch beginning with Site 457 (on the southern shore of the Northern Tributary of the Gongbeihe Reservoir) and continuing along the southern border of the Yongxing Basin, north along the 1350 masl topographic line just east of the Nangou river and then west towards the Maoqinggou corridor. There were small clusters of population all along the Maoqinggou corridor. Four of the fifteen local communities that have more than 50 people were along the northern reaches of this corridor (Sites 529, 503, 429 and 142). Two more communities of this size were found on the lower reaches of the corridor, including the small scale community at Site 429, which had the highest population in the survey region (Table 20). Three clusters of sites were found along the road to Hohhot in the far eastern portion of the survey area, all of which have more than 50 people. This may be the beginning of another large cluster of communities that extends outside the survey zone.

A comparison of the small scale community organization between the Warring States and Han Dynasty periods shows two trends that were seen in the Sansumu Survey tract when the Warring States and Laohushan Period settlement patterns were compared. First, there was an increase in the number of small scale communities with fewer than 50 people. Although the Han Dynasty period settlement pattern in the Yongxing Basin survey tract saw an increase in the number of larger small scale communities on the best agricultural lands over the Warring States period, a large number of new local communities were formed on the slopes and lower mountains as well. And second, the dichotomy between the settlement pattern on the plains and the slopes is not as clean as it was in the Warring States period Sansumu survey tract

settlement pattern, but there was a strip of occupation along the northern reaches of the Maoqinggou Corridor that resembles the strip of occupation on the northern edge of the Daihai Lake basin during the Warring States period. This stripe of high density occupation on the upper reaches of the Maoqinggou Corridor shares the same position on the slope-to-mountains transition as the Warring States period Sansumu survey tract occupation and suggests that considerable populations wanted access to the centers on the plains, but did not desire daily contact with the plains communities.

The settlement pattern in the Yongxing Basin survey tract outside the Yongxing Basin also suggests that contact with other communities was an important factor in choosing settlement locations. If isolation was a reasonable trade off for access to better agricultural fields than what was available on the upper slopes of the Maoqinggou Corridor then locations on the Sanqing and Dongshihao plateaus would have been attractive. The lack of population in these areas suggests that although some distance between these marginal occupations and the plains was desirable, the isolation offered by the plateaus was not.

In the Warring States period Yongxing Basin survey tract inverse power of one plot, only two of the small local communities were joined into higher order communities (Figure 40). In the Han Dynasty period clustering and population both increased dramatically, which resulted in the development of two larger higher order communities, a Western higher order community that encompasses the entirety of the Maoqinggou Corridor and the irrigated plains, and an Eastern higher order community that includes much of the land east of the Nangou River and north of the Northern Tributary of the Gongbeihe Reservoir. The Eastern higher order community extends into the mountains (Figure 59). However, as mentioned above, it appears that this community was truncated by the survey boundary.

Histograms of the local scale community populations included in each of the higher order communities show the overall dominance of the Western higher order community and the development of a settlement hierarchy (Figure 60). The Western higher order community comes

very close to log-normality (*A*= –0.188 ±0.337 at the 66% confidence interval (Figure 61). The proportionally larger number of very small sites and a single large site makes for a more primate settlement pattern and a lower *A* score for the Eastern higher order community (*A*=-0.502 ±0.696 at the 66% confidence interval). The differences between the *A* scores of the Western and Eastern higher order communities is significant at between the 95% and 99% confidence interval. This shows better integration among local scale communities on the best agricultural lands and poor integration among similar sized local scale communities on the eastern portion of the Yongxing Basin survey tract.

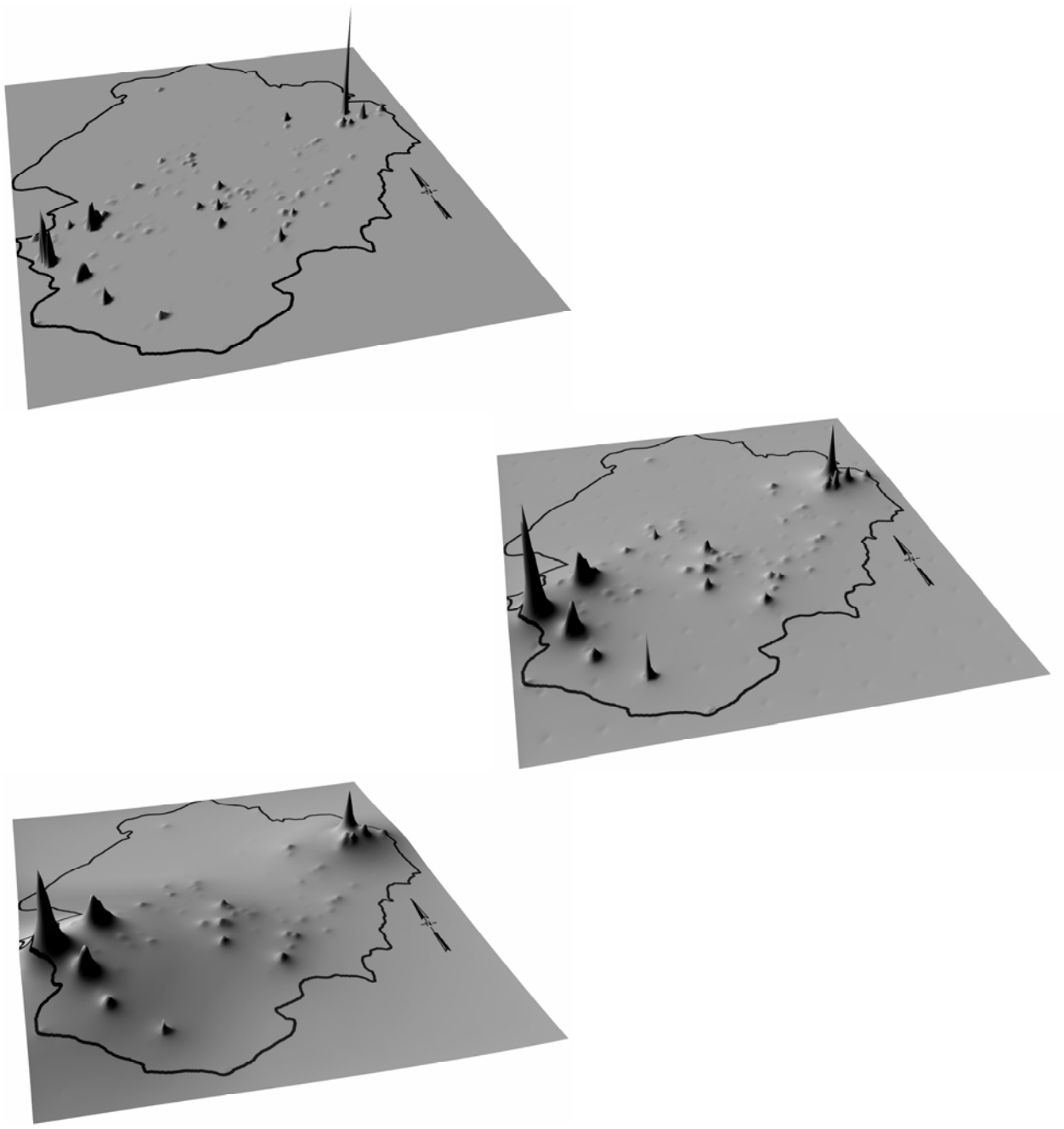


Figure 56. Surfaces representing the Han Dynasty period occupation in the Yongxing Basin survey tract. Smoothing increases from top to bottom, with inverse distance powers of 4, 1, and 0.5 respectively (See Figure 33 for scale).

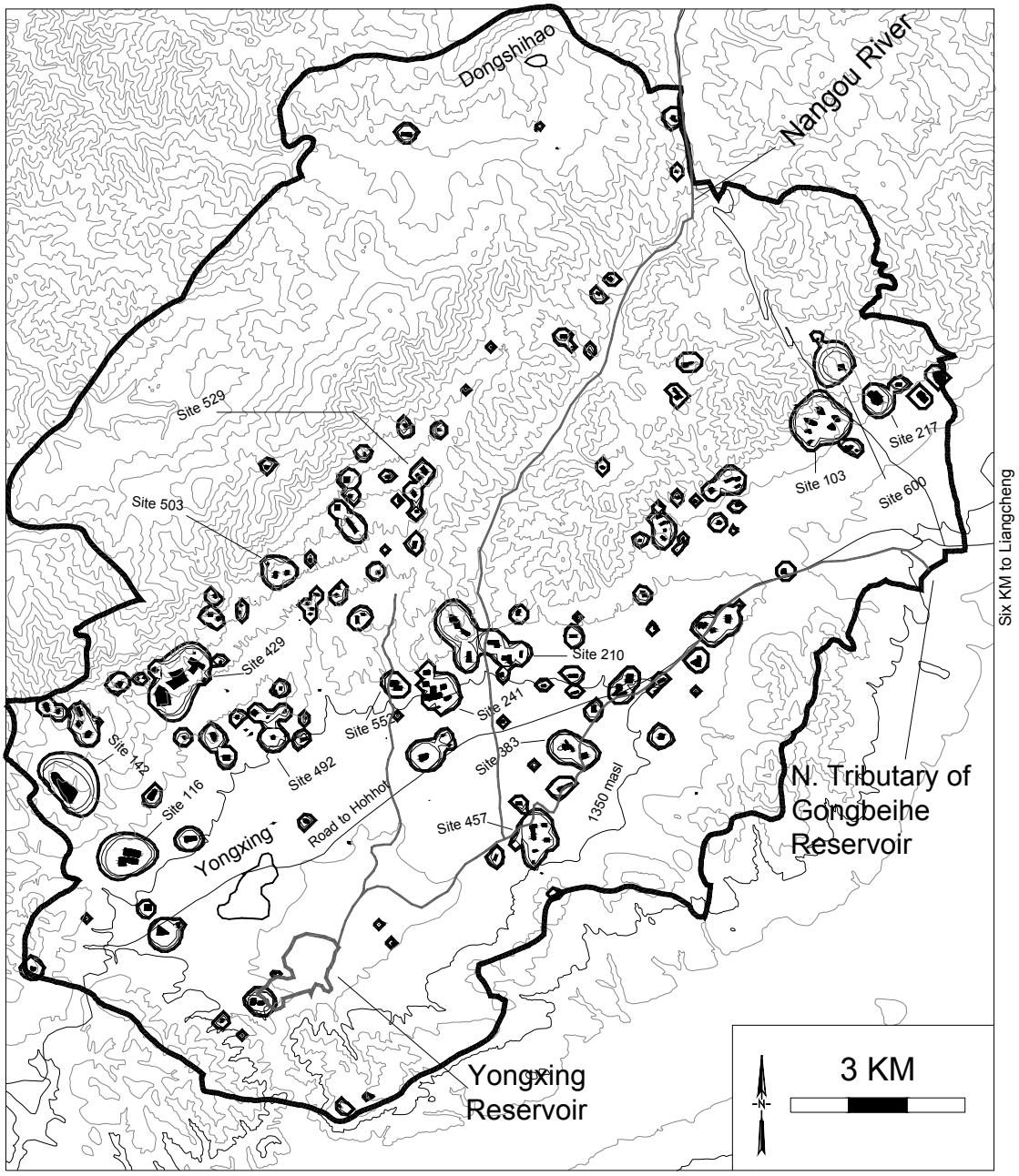


Figure 57. Contour map of the occupied peaks in the inverse power of four surface (Yongxing Basin survey tract). The chosen cutoff is the heavy line, which indicates small local communities (50 m contour Interval).

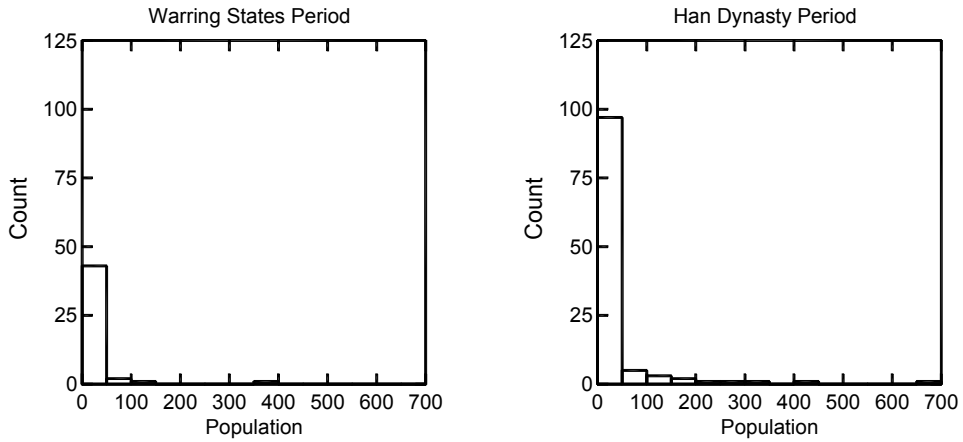


Figure 58. Comparison of local scale community populations in the Warring States and Han Dynasty periods, Yongxing Basin survey tract.

Table 20. Populations of local scale communities with more than 50 residents in the Han Dynasty period Yongxing Basin survey tract.

Local Community Site Number	Population
Site 492	45–67 people
Site 552	54–80 people
Site 237	57–84 people
Site 383	64–95 people
Site 529	66–99 people
Site 241	87–130 people
Site 217	89–133 people
Site 503	109–162 people
Site 103	127–190 people
Site 210	139–208 people
Site 116	161–241 people
Site 457	207–308 people
Site 142	258–385 people
Site 600	355–529 people
Site 429	536–798 people

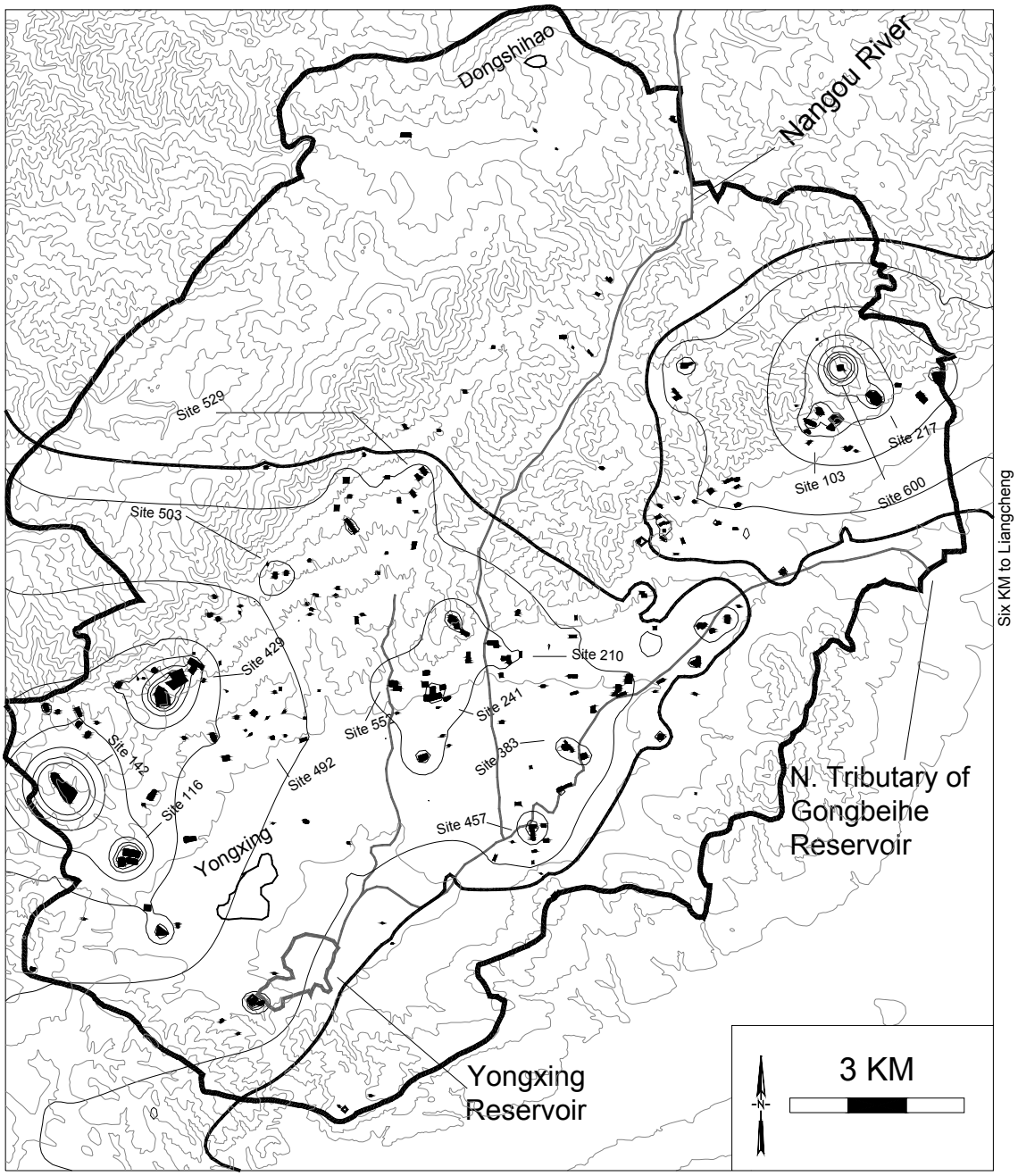


Figure 59. Contour map of the occupied peaks in the Han Dynasty period inverse power of one surface (Yongxing Basin survey tract). The chosen cutoff is the heavy line, which indicates higher order communities (50 m contour interval).

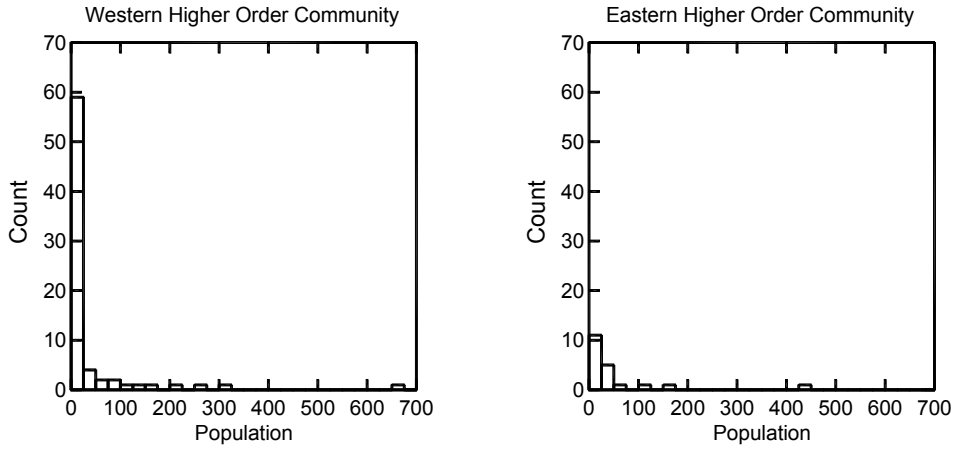


Figure 60. Histogram of local scale community populations in each of the higher order communities in the Han Dynasty period Yongxing Basin survey tract.

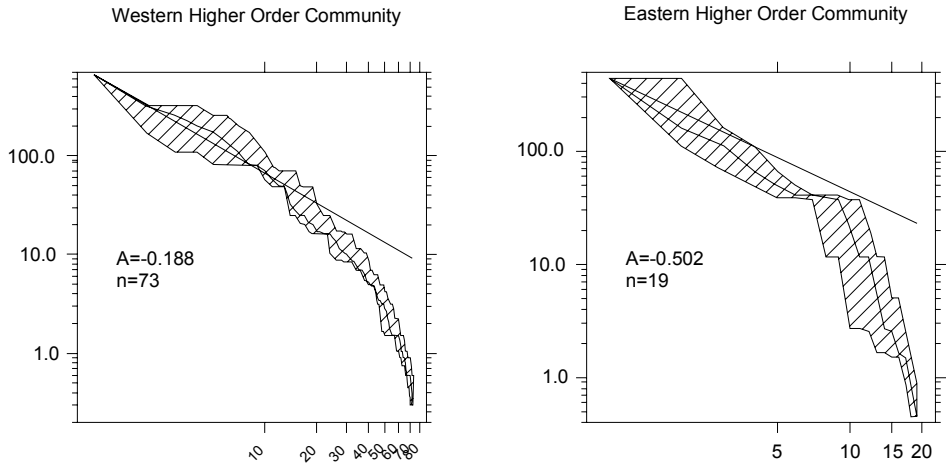


Figure 61. Rank size graphs of the populations of the local scale communities in the Eastern and Western higher order communities in the Han Dynasty period Yongxing Basin survey tract. *A* values and 67 percent confidence zones are determined as suggested by Drennan and Peterson (2004).

8.3.2. Analysis of communities in the Sansumu survey tract

A comparison of the Warring States and Han Dynasty periods population density plots shows differences both in community size and location (Figure 38, Figure 62). Much of the population in the Han dynasty period was clustered into local communities just northeast of the shore of Daihai lake (Figure 63), including the three largest local scale communities in the survey region (Table 21). The increased clustering is as clear as the shift in population. Sixty percent of the population of the survey region occupies the single largest local community at Site 1121. The four most populous local communities on the shore of Daihai Lake contain 87% of the population.

Both of the survey tracts had the same number of local communities. The increased clustering on the lake shore resulted in a larger number of small local communities (of less than 50 people) in the Sansumu Survey tract than there were in the Yongxing Basin survey tract, almost as many independent communities as in the Warring States period (Figure 58, Figure 64). The largest difference between these two periods is that these least populated of the local communities were drawn much closer to the large communities in the Han Dynasty period than they were during the Warring States period.

In the Sansumu survey tract, one larger higher order community dominated the entire settlement pattern, joining together all of the small scale communities on the shore of the lake and the small scale communities that were on the outskirts of these small scale communities as well (Figure 65). Only 1.8% of the population of the Sansumu survey tract lived outside this higher order community. This higher order community was dominated by the local community at Site 1221 (Figure 66), making it more strongly primate than the Eastern higher order community in the Yongxing Basin survey tract (Figure 67). The differences in the *A* score between the Eastern and the Southern higher order communities (A= -0.197 ±0.610 at the 66% confidence interval) were significant at between the 80% and 90% confidence interval. This shows the

tighter integration in the Sansumu survey tract that might have produced tighter control and increased tax revenue for the Han state.

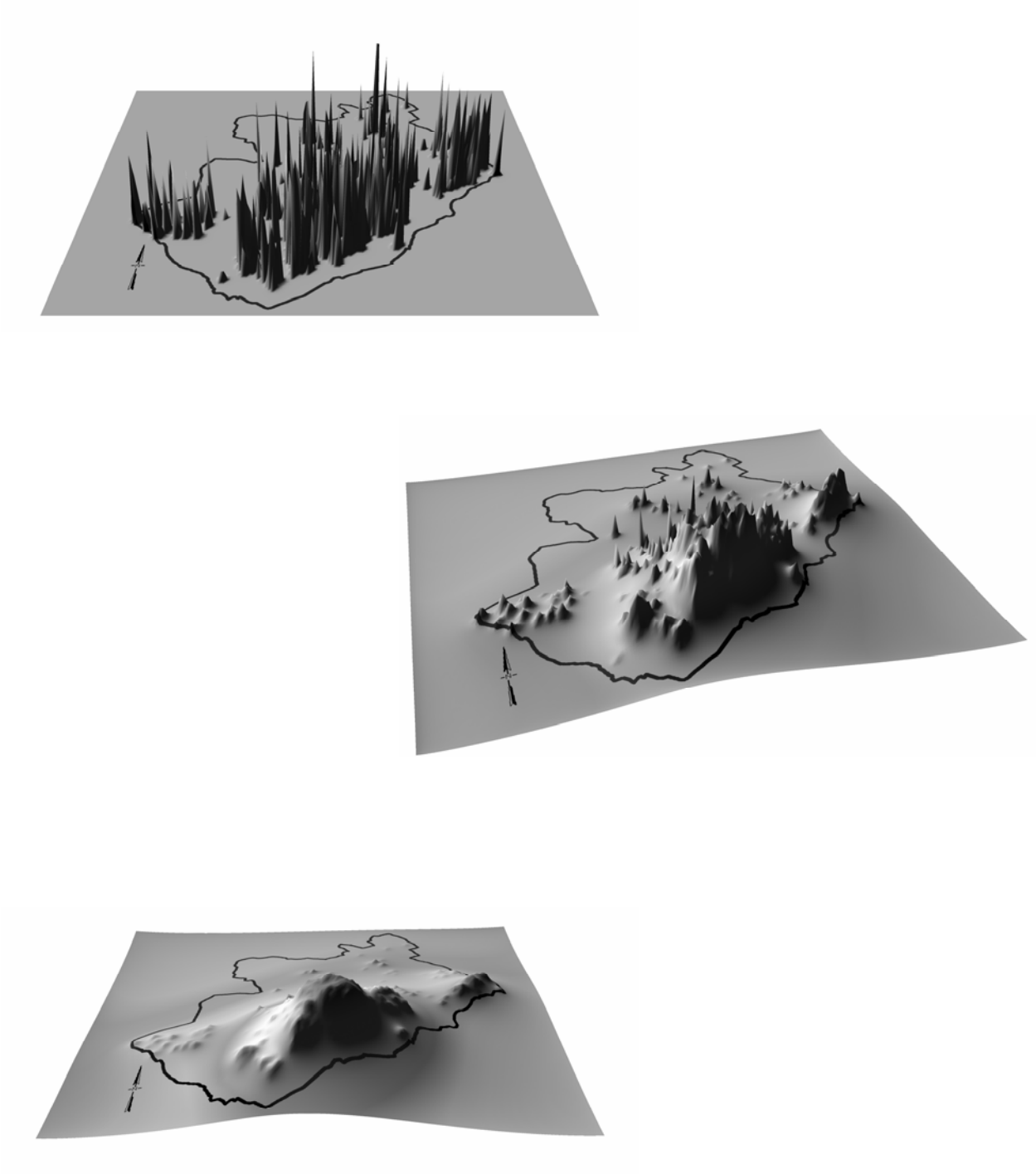


Figure 62. Surfaces representing the Han Dynasty period occupation in the Sansumu survey tract. Smoothing increases from top to bottom, with inverse distance powers of 4, 1, and 0.5 respectively (See Figure 36 for scale).

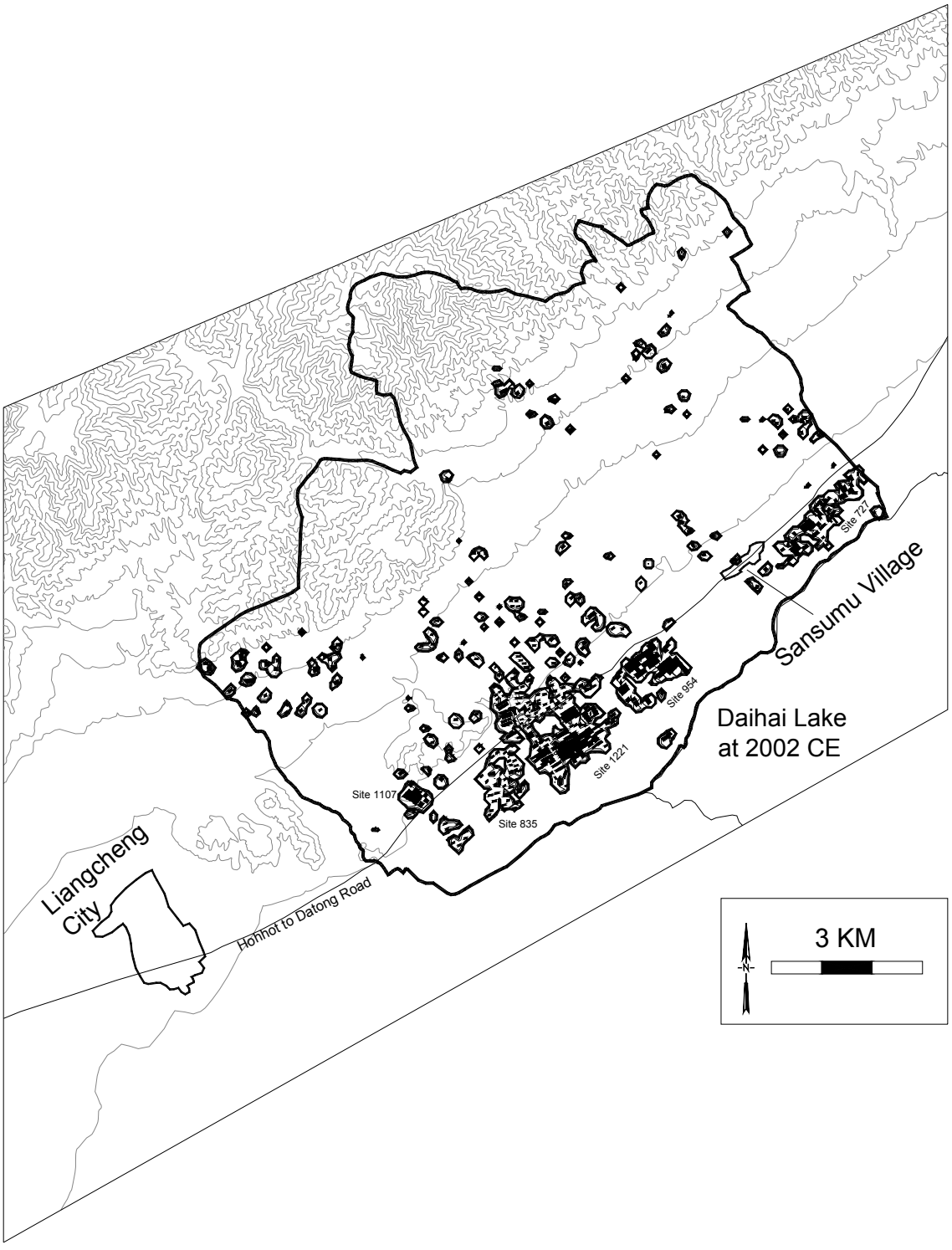


Figure 63. Contour map of the occupied peaks in the inverse power of four surface (Yongxing Basin survey tract). The chosen cutoff is the heavy line, which indicates small local communities. Local scale communities with more than 50 people are labeled (50 m contour Interval).

Table 21. Populations of local scale communities with more than 50 residents in the Han Dynasty period Sansumu survey tract.

Local Scale Community Number	Population
Site 1107	138–205 people
Site 835	162–241 people
Site 727	523–778 people
Site 954	857–1276 people
Site 1121	3416–5086 people

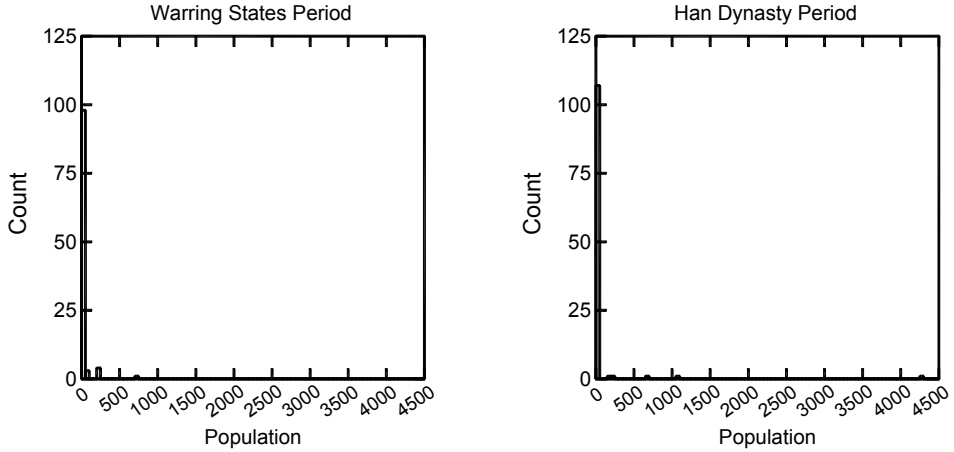


Figure 64. Comparison of the local scale community populations in the Warring States and Han Dynasty periods, Sansumu survey tract.

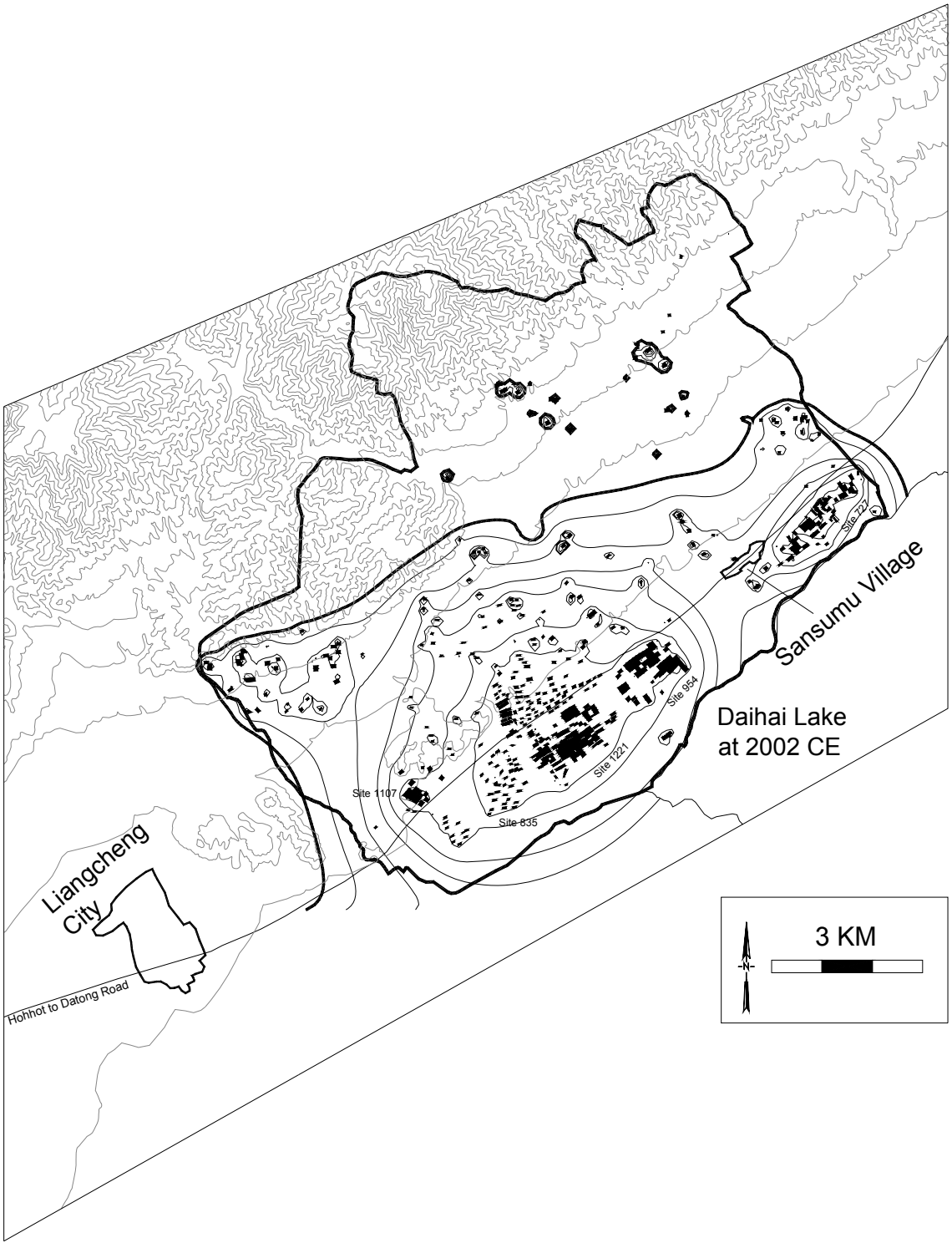


Figure 65. Contour map of the occupied peaks in the Han Dynasty period inverse power of one surface (Sansumu survey tract). The chosen cutoff is the heavy line, which indicates higher order communities (50 m contour interval).

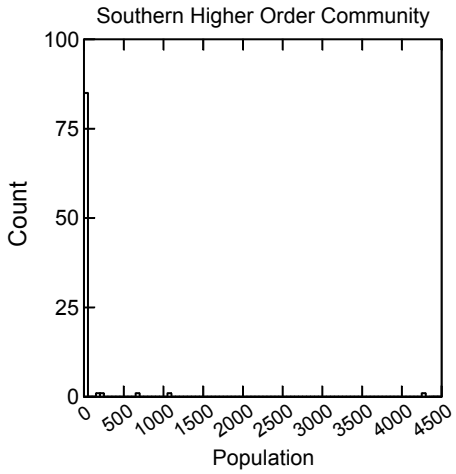


Figure 66. Histogram of local scale community populations in the Southern higher order community in the Han Dynasty period Sansumu survey tract.

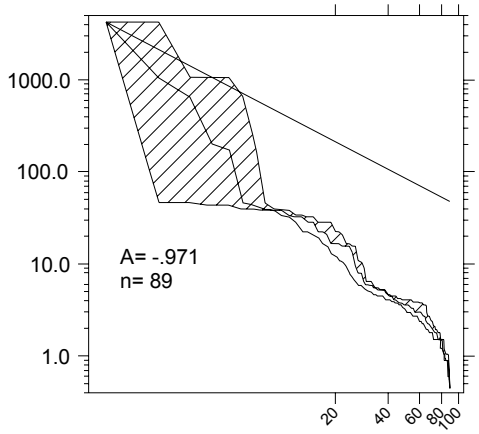


Figure 67. Rank size graph of the populations of the local scale communities in the Southern higher order community in the Han Dynasty period Sansumu survey tract. *A* values and 67 percent confidence zones are determined as suggested by Drennan and Peterson (2004).

8.3.3. Community analysis discussion

A different form of social organization seems to have developed on the shore of Daihai Lake than has developed in the Yongxing Basin during the Han Dynasty period, or in the earlier periods. Essentially the entire population of the Sansumu survey tract has been concentrated into a single higher order community for the first time. This is not a local scale community where the expectation is that daily interaction takes place, but the flat topography and short distances involved (approximately 4.5 km from the center to the outskirts of the higher order community) would not have presented much of a barrier to trade among the residents of the community. In addition, much of this higher order community appears to have resided in the village pattern that first developed in the Warring States period. The residents of the densely populated local scale communities at Sites 1107, 1221, 954 and to a lesser extent 727 all had to walk to their fields from their habitations. The high populations included in these communities and the ring of dispersed settlements surrounding these higher order communities suggests that the distances walked to the fields might have been large, approaching several kilometers. Approximately 6974 people lived in this higher order community. (This is the median value of the low estimate of 5603 and the high estimate of 8345.) Assuming families of 6 people and 10 ha of farmland per family, approximately 11623 ha of farmland would have been required, utilizing the entire lake shore plain (see discussion of subsistence below).

This settlement pattern suggests the success of the Han Dynasty government in organizing populations to produce maximum agricultural surplus (Section 8.4) and also in population management. This settlement pattern, with 91% of the population living within 4.5 km of the center of the higher order community on the shore of the lake, would have been considerably easier to manage than the population distribution of the Warring States period and would have made the organization of corvée labor and tax collection more efficient.

On the Yongxing Basin, the settlement pattern still resembles the Warring States settlement pattern in the Sansumu survey tract. Large portions of the population lived quite

close to large dense population centers on the best agricultural land, but approximately half of the population did not live in the same higher order community as these villages. Approximately 2696 people live in the larger Western higher order community, many on the best agricultural land in the region; 1051 people lived in the Eastern higher order community; and 74 people lived in neither of these communities. Interaction between populations increased between the Warring States and Han Dynasty periods in the Yongxing Basin survey tract, showing that the Han dynasty was likely much more successful than the Zhao in producing agricultural surplus that could be taxed, but this interaction still lags behind the more tightly clustered populations of the Sansumu survey tract.

8.4. Subsistence

The correlation between the agricultural productivity land classification and the population rankings in the Sansumu survey tract was strong and significant ($r_s = 0.949$, $p<0.1$). This is the highest correlation of any period and suggests a strong commitment to agriculture in the Han Dynasty period settlement pattern in the Sansumu survey tract. Populations were drawn to the best agricultural lands and there is little population seen elsewhere in the survey tract. The residents of the stripe of homesteads in the Warring States period that seemed likely to be interacting with the dense settlements on the shore of the lake appear to have been moved just on the outskirts of the densely populated villages, where they would have been easily taxed. The large amount of farmland that would have been needed by the residents of the lake shore communities would seem to preclude the holding of large herds by peoples on the outskirts of the higher order community at Site 1221. They would have had to herd their animals through the farmland of their neighbors, which is exactly the same restriction that keeps large herds from being held in the modern villages on the Daihai Lake basin (Section 8.5).

The Yongxing Basin survey tract showed a weakly positive correlation between agricultural productivity land classification and population density that has very low significance

(r_s= 0.050, p> 0.2). The populations on the Maoqinggou Corridor were drawn to the outskirts of the Yongxing Basin. The pull of these smaller populations appeared not to be as strong as the pull on the settlements around Daihai Lake. As in the Sansumu survey tract during the Warring States period, the population density on the best agricultural land was approximately the same as the slightly more dispersed populations on the slopes (Table 22). However, unlike the Sansumu survey tract settlement pattern in the Warring States period, there was not a large empty buffer between the two settlement patterns. These two patterns blurred into one another, suggesting continuity, not discord. Even though the placement of some of these communities on the upper slopes of the Maoqinggou Corridor suggests greater importance for animal husbandry in the mix of subsistence on the slopes, these populations across the spectrum of agriculture and animal husbandry were all part of the same higher order community. The Han kept even these populations within the influence of the population on the plains. It is not known if the populations were moved there by force or were attracted by economic means, but the results would have been administrative access to more of the population during the Han Dynasty period than during the Warring States period.

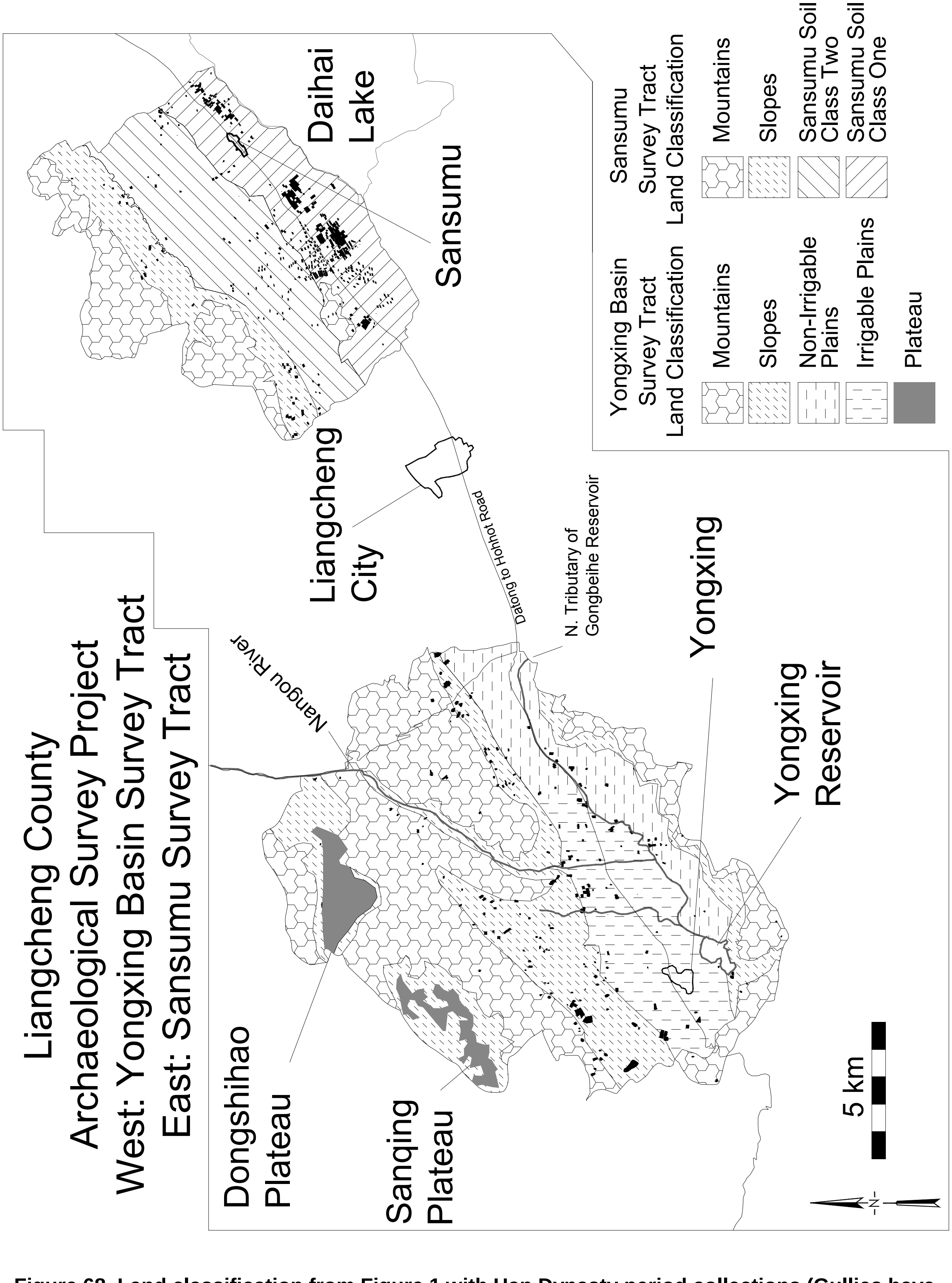


Figure 68. Land classification from Figure 1 with Han Dynasty period collections (Gullies have been removed).

Table 22. Han Dynasty period settlement distribution in each of the survey tracts utilizing the five agricultural productivity classes outlined in the introduction.

Sansumu Survey Tract				
	Soil Class One	Soil Class Two	Slopes	Mountains
Agricultural productivity rank	1	2	3	4
Han Dynasty period population density	201.6 people/ km^2	10.7 people/ km^2	13.5 people/ km^2	1.5 people/ km^2
Han Dynasty period population rank	1	2.5*	2.5*	4

Yongxing Basin Survey Tract					
	Irrigable Plains	Plateau	Non-irrigable Plains	Slopes	Mountains
Productivity rank	1	2	3	4	5
Han Dynasty period population density	33.8 people/ km^2	1.3 people/ km^2	5.6 people/ km^2	35.6 people/ km^2	8.4 people/ km^2
Han Dynasty period population rank	1.5*	5	4	1.5*	3

*Even though the population densities are marginally different among these land classes, the differences in population density are not large enough to be meaningful and therefore the same population ranks are given to these land classes.

8.5. Moving beyond land classification data to look at pastoral subsistence

Subsistence is an important factor that enters into the decision to invest the energy necessary to make a location inhabitable. Therefore, it follows that information about subsistence can be derived from locations chosen for habitation, as well as areas that were available, but left uninhabited (Bettinger 1981). These kinds of analyses usually take two forms, land classification analysis and catchment zone analysis. The analysis of agricultural subsistence in the preceding chapters utilizes the former. The land classifications in the Introduction and the settlement pattern are utilized to ascertain whether or not agricultural pursuits dominated the decisions for the placement of settlements. A better understanding of the way land is used in the modern era can aid in the understanding not only of past agricultural subsistence strategies however, but also of the ways that agricultural subsistence might limit the use of the landscape for pastoral subsistence and how this would affect the placement of settlements.

8.5.1. Agricultural land use and pastoral resources, a modern example

The landscape of modern Liangcheng is multi-use. Very little of the landscape is completely off limits to agriculture and none of the landscape would make unacceptable pasture. The single largest limiting factor on the number of animals that can be herded is the amount of land used for agriculture. The two subsistence strategies compete for land.

There are also scheduling conflicts to consider that go beyond the simple fact that labor used to herd animals cannot simultaneously be used to plant crops. The multi-use aspects of modern land-use also limit the amount of labor available to herd animals, affecting the mix of subsistence strategies that are practiced by local farmers. Local informants relate that in the summer months they must keep the ratio of animals to herders at or below 50 to 1. For a single herder to herd more than 50 animals at once runs the risk that the animals will enter the fields of one's neighbors. In the winter months, when there are no crops in the fields, a single herder can herd 300 head at once, meaning that during the season when agricultural work is the heaviest,

herding must be done in the least efficient fashion, making the scheduling conflicts worse and severely limiting the number of animals a single family would be willing (or able) to herd. In most of the villages on the Liangcheng landscape, herding labor cannot be utilized efficiently, limiting the economic impact of herding on the household income.

The most efficient way to herd animals is to herd the maximum number of animals with each herder, and the only way to avoid the seasonal fluctuations in maximal herd size described above would be to live on the margins of the agricultural system. In the modern settlement system, this means that inhabitants of the Sansumu village would have to herd animals under extreme limitations (Figure 69). Most modern farming villages are, like Sansumu village, surrounded by farmland, making herding small stock that need to be pastured daily during the growing season inefficient. The farmers in this village concentrate on larger stock (mostly dairy cattle) which are tethered to short ropes along the roadside or on the shore of the lake. The inhabitants of villages on the northern borders of the Maoqinggou corridor, the villages on the Nangou River north of its mouth at Bancheng or the Yuanzigou River north of its mouth at the Yuanzigou Village have unfettered access to the mountains. Unfettered access allows herding labor to be used more effectively even if it does require farming slopes and maintaining terraces. Often, the terraced fields surrounding the village are fenced to keep animals out and allow larger numbers of sheep to be herded together.

8.5.2. Ancient marginality as defined by community membership–a working hypothesis

If modern villages with the largest numbers of animals are in marginal locations, largely outside the village system on the plains, is there an ancient counterpart? These sites would be marginal to the rest of the settlement pattern, especially in situations where a large amount of the local land is consumed by farmland. Only the Han Dynasty period settlement pattern in the Sansumu survey tract has a population large enough to fill a large proportion of the landscape with farmland. This is also the period with higher order communities that include the largest proportion of the landscape, making the small populations outside these communities especially

unusual. These marginal communities include communities north and east of the Southern higher order community in the Sansumu survey tract (Figure 65). These collections share marginality, small size and low density of recovered remains that suggest that they share the characteristics of the small marginal homesteads in the modern settlement pattern, where residents prioritize animal herding over farming to a larger extent than other villages within the community structure. These communities need further study as they represent the best chance of recognizing the far end of the spectrum of agriculture and animal husbandry. If the floral and faunal remains from excavations at the communities inside and outside the Sansumu survey tract higher order community are different, this might suggest that different crops were grown on the slopes and on the lake basin or that more small stock animals were kept in households on the slopes than on the shore of the lake. This analogy could be tested again in the Yongxing Basin survey tract by excavating sites along the northeast corner of the Maoqinggou corridor, further north and east of Site 529 and comparing the remains to sites like Site 383 located on the Yongxing Basin floor itself (Figure 57).

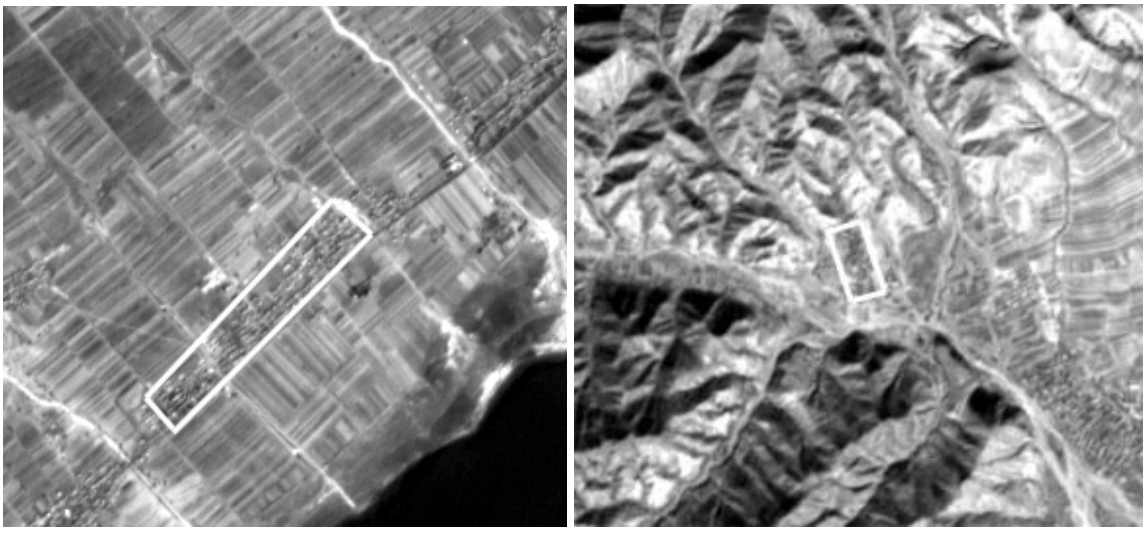


Figure 69. Two portions of the Sansumu survey tract. Left: the modern Sansumu village. Right: a village north and west of Yaozi village.

These excavations will produce data on subsistence strategy (fauna and flora) and if these marginal communities do represent subsistence strategies far along the continuum from agriculture to herding other interesting questions can be asked of the same data. Will households with large numbers of small stock have large quantities of trade items from outside the Liangcheng region suggesting increased contact with peoples from other regions? Will tooth eruption data from the fauna show habitation in only some seasons, suggesting mobility? Or will full time residence, like the marginal villages in the modern Liangcheng settlement pattern, be the norm?

8.6. Discussion

The Han Dynasty period settlement pattern suggests that the Han government succeeded in controlling the landscape in ways the Zhao government did not. The Han Dynasty settlement pattern was organized so that a larger number of people lived on the best agricultural land than in any other period, and lived in hierarchically organized communities that would have aided in the collection of taxes and increased the participation in corvée labor and military service to the state. Although these two periods are often combined in archaeological discussions, it is clear that even in outlying areas like Liangcheng, the two governmental systems were different enough that the people would have been much more affected by the rise of the Han Dynasty than incorporation into the Zhao State. The Zhao State government had a much smaller effect on the landscape, with large populations occupying the same slopes they had inhabited since the Neolithic. The Han settlement pattern saw the abandonment of these slopes for the first time in the Sansumu survey tract, with over 90% of the population occupying the best agricultural lands in the top two agricultural productivity land classifications. The Yongxing Basin survey tract still showed some resistance to this pattern, suggesting that the Han Dynasty was focusing its efforts on the richest lands in the region (the shore of Daihai lake)

where agricultural surpluses were likely the highest, and allowing the Yongxing Basin survey tract populations to maintain more of their original settlement pattern.

The Warring States and Han Dynasty Periods are thought to have an environmental regime closer to modern conditions than any other period under study here (Tian 2000). However, it was during these two periods that changes in the settlement pattern that were most strongly associated with the adoption of intensive agriculture occurred, with populations moving onto the best agricultural land in large numbers for the first time during the Warring States period and a majority of the population in the Sansumu survey tract living on the best agricultural lands during the Han Dynasty. These changes were not connected to changes in environment as much as they were connected with the social and political changes that resulted from the struggle of the Zhao state and then the Han Dynasty to increase its tax base to fight wars, build fortifications on the border and staff the military.

It is not clear how much of the subsistence spectrum from agriculture to animal husbandry is included in the settlement pattern data in either survey zone. On the far agricultural end of the spectrum, the Warring States and Han Dynasty periods moved from farming villages on the best agricultural lands to small towns with thousands of inhabitants. These towns likely included craft specialists as well as agricultural specialists who found it too inconvenient to herd many animals. Although residents likely kept kitchen pigs, sheep would have been valued for their secondary products as well as their meat, and some of the residents on the margins of the settlement pattern may have sold their excess stock to the people in the town, making subsistence another economic specialty of the residents of the increasingly complex Han Dynasty settlement system in the Liangcheng region.

Although this chapter did not start with questions from the historical texts, it does have historical significance. This data suggests the method of colonization used by the Zhao State and then more effectively by the Han dynasty to control the populace, was the farming village. Farming was the “foundation of the empire” according to an edict of King Wen in 176 BCE (Hsü

1980: 149), but not until the systematic study of the Han Dynasty settlement pattern in a marginal location does it seem clearer that the farming village was the basic unit of habitation and that there was another divergent settlement pattern in the region before the integration of Liangcheng into the political, economic and social sphere of the Central Plain. It was in these villages that the social reproduction of the agricultural lifeway that we have taken in the later periods to calling “Chinese” would have occurred.

There is textual evidence that the government moved people to the north from the south to inhabit villages (Hsü 1980: 27-28). The evidence about what happens to local populations when this happens is unclear in the texts. But it appears that, if the villages on the shore of Daihai Lake were an example of this phenomenon, that the inhabitants of the region before integration stayed and were attracted to these centers.

The settlement pattern does not, however, show a population under siege as suggested by the texts. Liangcheng is not far from the frontier, but the population is spread across the Yongxing Basin survey tract in ways that do not suggest that the population was under constant threat. A comparison of the Laohushan and Han settlement patterns in the Yongxing Basin shows that the Laohushan period settlement distribution was better situated for defense than the Han Dynasty settlement pattern (Figure 19, Figure 52).

The village system, although certainly not the only way to control an agricultural population, has been a particularly “Chinese” method of handling the administrative challenges of managing the rural populations. As discussed for the modern period (Section 1.4), central residence allows for easier organization of the populace into administrative units. The Zhao state, which was a particularly effective foe during the Warring States period, would have needed to organize the populace of the Liangcheng region into villages, which aid in the collection of taxes, the production of agricultural foodstuffs and the regulation of the populace. The settlement pattern data from Liangcheng shows that the Zhao state was only partially successful in this effort and likely saw resistance to its policies.

The texts, which are, at least in part, propaganda for the future, emphasize differences among the *Huaren* authors and enemy (*Diren*) 'others'. The settlement pattern data here show differences among the settlement systems of this region that mirror the historical milieu of the steppe and the sown dichotomy, but in less stark terms. The data here show differences between the sedentary agricultural village inhabitants and the sedentary, possibly agro-pastoral homesteaders. The distance maintained between these two groups in the Warring States period may show mistrust or animosity that is also seen in the texts, but during the Han Dynasty period the settlement patterns of the Yongxing Basin and Sansumu survey tracts show that economic relations between the two groups attracts homesteaders towards the farming village, suggesting integration, not partition.

9. Conclusions

This chapter has three aims. First, the Warring States and Han Dynasty period data will be reinterpreted through the analysis of burial evidence from Liangcheng. This analysis allows for a more nuanced view of the adoption of Central Plain social customs by examining the manner in which local populations were opportunistically choosing to adopt particular characteristics of Central Plain burial practice while adjusting others to their own needs. The patterns seen in the mortuary remains suggest that certain aspects of the Central Plain cultural identity were adopted, mirroring the changes in the local lifeway suggested by the adoption of the farming village settlement pattern beginning in the Warring States period. Second, this chapter will return to the larger scale questions originally posed in the introduction (Section 1.1) and examine the ways that studies of the Inka empire in highland Peru can aid our understanding of the Han Dynasty expansion into Liangcheng. Of the three Peruvian case studies examined here, only two mirror the changes seen in the settlement pattern when Liangcheng is integrated into the Han Dynasty, suggesting that when peripheral areas are integrated into larger empires that the resulting social change is a complex mix of the imperial will imposed from the outside and the internal dynamics of the hinterlands themselves (e.g. Morrison 2001; Schreiber 1987). Finally, suggestions for future work will be made suggesting ways to further test and amplify the findings here.

9.1. Burial evidence from Liangcheng during the Warring States and Han Dynasty periods: A reexamination of identity and local adaptation to Han rule

The introduction proposes that the residents of Liangcheng were active, opportunistic participants in the new political milieu that resulted from incorporation into the political realm of the Central Plain (Section 1.1.3). However the interpretation of the survey data has thus far suggested that increasing numbers of Liangcheng inhabitants changed their settlement pattern and adopted the Central Plain village form during the Warring States period and that these villages were the loci of a particularly “Chinese” form of social reproduction (Section 7.5). Village

formation does affect social organization. Life in a multi-lineage village is different from dispersed, nuclear family (or multi-generational) homesteads. The challenges of conflict resolution increase with larger populations, but so do the opportunities for building social solidarity and for the activities of self-aggrandizers. Some of these social activities were likely imported with the immigrant populations from the Central Plain.

The settlement pattern evidence from the Warring States and Han Dynasty periods shows an increasing adoption of the Central Plain farming village in the same way the mortuary evidence below shows adoption of Central Plain mortuary forms. However the mortuary evidence indicates that the Central Plain forms were being adjusted as they were being adopted, suggesting new interpretations of the changes seen in the survey data and ultimately serving to highlight problems with present interpretations of the historical texts that connect polity names with *minzu* (ethnicity) and burial styles (Nei Menggu 1984; Tian and Guo 1986).

The mortuary evidence comes from two cemeteries within the borders of the Yongxing Basin survey tract (Figure 70). These two cemeteries, Maoqinggou and Yinniugou, are both located in the Maoqinggou Corridor, and are thought to include tombs dating from approximately 600 BCE to 200 BCE. Although there is variation within the idealized Central Plain and Northern Zone burial forms during this period, each form has separate tendencies that allow them to be differentiated here: The dominant burial style across the Central Plain can be characterized by second level ledges (*ercengtai*), coffins and items used in daily life including a variety of vessels and tools (Figure 71). Northern Zone burials do not normally include second level ledges or coffins and when ceramics are included in the tomb, a single ceramic vessel is placed in a niche dug above the head of the deceased. Skulls of herded animals (sheep, goat, cow) are often placed in the tombs, as are bronze weapons and “steppe style” bronze ornaments most of which include images of animals. Horse tack and horse bones are often found in Northern Zone tombs as well, but not at Maoqinggou.

Both the Maoqinggou and Yinniugou cemeteries include a mixture of tomb orientations that represent elements from the Northern Zone and the Central Plain. At the Maoqinggou cemetery 12 tombs are oriented north-south, with predominantly Central Plain burial characteristics and 67 are oriented east-west with predominantly Northern Zone characteristics. The east-west oriented burials are similar in form, orientation and offerings to several cemeteries connected with the Xiongnu including Guoxianyaozi and Xigoupan in Inner Mongolia and Daodunzi in Ningxia Province (Figure 1) (Nei Menggu 1989; Ningxia et al. 1988; Tian and Guo 1980).

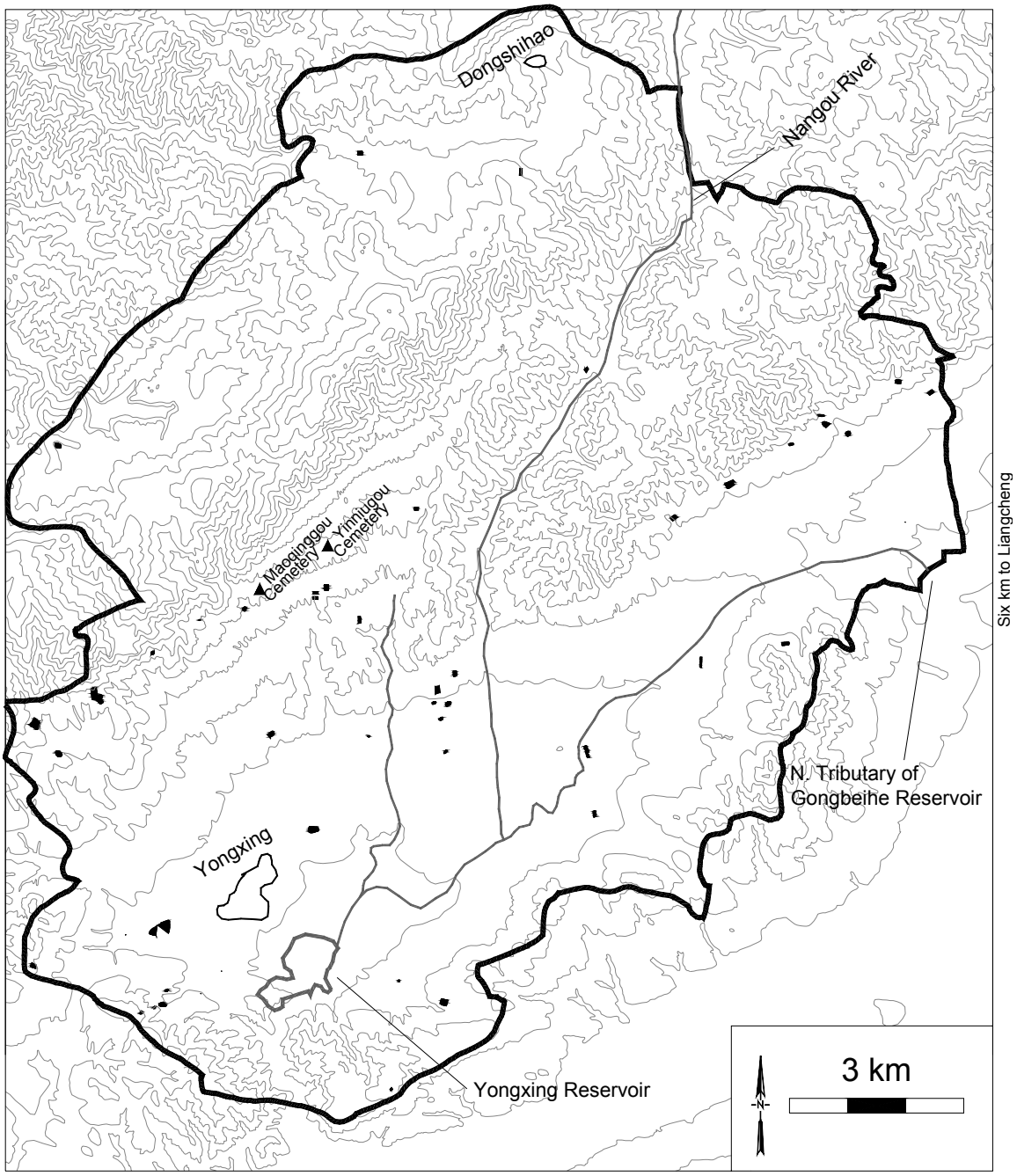


Figure 70. Warring States period collections in the Yongxing Basin survey tract with the locations of the Maoqinggou and Yinniugou cemeteries (50 m contour interval).

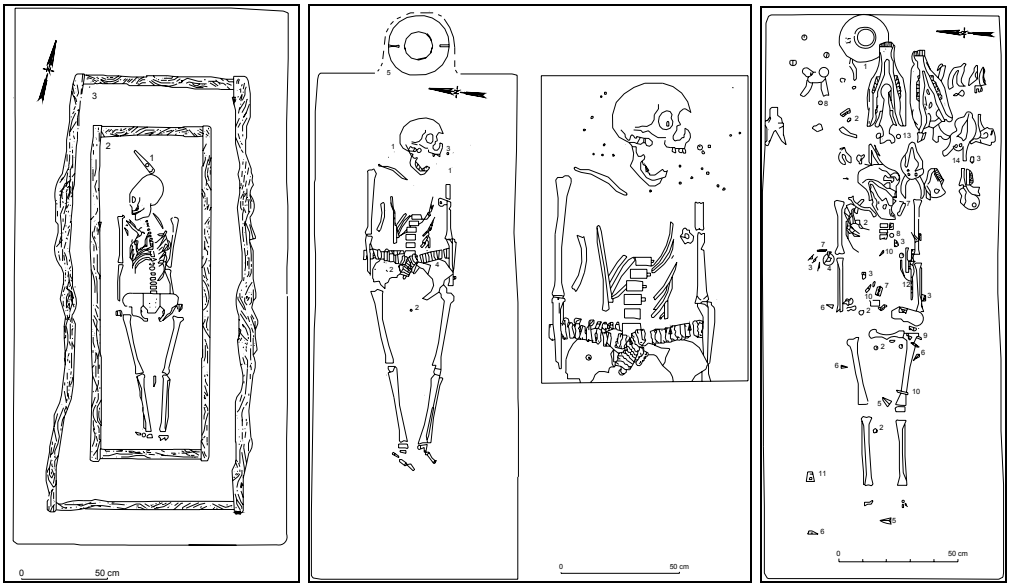


Figure 71. Tombs from Maoqinggou. Left: Tomb M25 with multiple coffins and *ercengtai*. Middle: Tomb M3 with niche and detail of bronze offerings. Right: Tomb M6 with multiple large stock skulls (Redrawn from Tian and Guo 1986: 239, 243 and 235).

The sixty-seven east-west oriented tombs at Maoqinggou have a single *guan* vessel placed in the niche above the head of the deceased. Some include animal sacrifices. The remainder of the tombs at Maoqinggou are north-south oriented. Some of these tombs have second level ledges (*ercengtai*). None of these north-south oriented tombs include the remains of animals. The mixture of burial orientations, and the two styles of tomb offerings suggest that this cemetery includes patrons practicing burial traditions of both the Central Plain and the Northern Zone. This kind of mixed assemblage is suggestive of the social processes of the living.

Although the burials in the Maoqinggou cemetery have two different orientations, Wu suggests that these are not two completely separate traditions operating independently, but are two burial traditions that share some artifact types, with some tombs showing mixed assemblages of Northern Zone and Central Plain artifact types (Wu 2000: 24-25; 2004). When the cemetery is placed within this larger context, the mixed assemblage is suggestive of two

separate but mingled burial traditions reflecting the integration of this region into the Zhao polity (or possibly the mingling of two culturally different local populations before the Zhao State arrived, see below). At a regional scale, the survey results show that the Warring States period settlement pattern includes farming villages suggesting importation from the Central Plain and homestead settlements in locations that have been occupied since the Neolithic.

The Maoqinggou cemetery and the Warring States period settlement pattern thus both show two distinct aspects but these do not seem to represent two separate, un-mixing cultural traditions. The tombs at Maoqinggou show a combination of materials, and this mixing becomes even more prevalent at the later cemetery of Yinniugou which is thought to date to the late Warring States period (c. 450–200 BCE). The cemetery at Yinniugou is less than a kilometer east of the Maoqinggou cemetery, towards the northeast corner of the Maoqinggou corridor (Nei Menggu 1984; Nei Menggu and Riben 2001b) (Figure 70). This cemetery shares the north-south, east-west dichotomy of the Maoqinggou cemetery but the separation between the two traditions, already weakening at Maoqinggou, breaks down even further, meshing well with what is known from the later Han Dynasty period settlement pattern (200 BCE–200 CE). The farming village that was introduced during the Warring States period on lands that had never been occupied before becomes the dominant form in the Han Dynasty period.

There are 13 burials at Maoqinggou which include skulls of large domesticated animals, all are found in east-west oriented tombs. At Yinniugou there are no skulls of large domesticated animals in tombs but there are sacrifices of small domesticated animals in seven of the north-south oriented tombs, including the sheep hooves found in tomb 97YM12 and oxen long bones found in tomb EM10 (Figure 72) (Nei Menggu 1984: 33; Nei Menggu and Riben 2001b: 299). While at Maoqinggou only east-west oriented tombs have ceramic *guan* (considered the diagnostic Xiongnu vessel), 97YM12 is one of the two north-south oriented tombs in the Yinniuguo cemetery with a ceramic *guan* (Figure 72) (Nei Menggu and Riben 2001b: 299). Sixty-seven of 79 tombs were oriented east-west at Maoqinggou but only 16 of the 38 tombs at

Yinniugou are oriented east-west. The trend is towards north-south oriented tombs, suggesting ascendance of Central Plain burial forms, but these forms are “localized” with the inclusion of animal bones (sheep/goat and oxen) in the tombs of the more wealthy deceased.

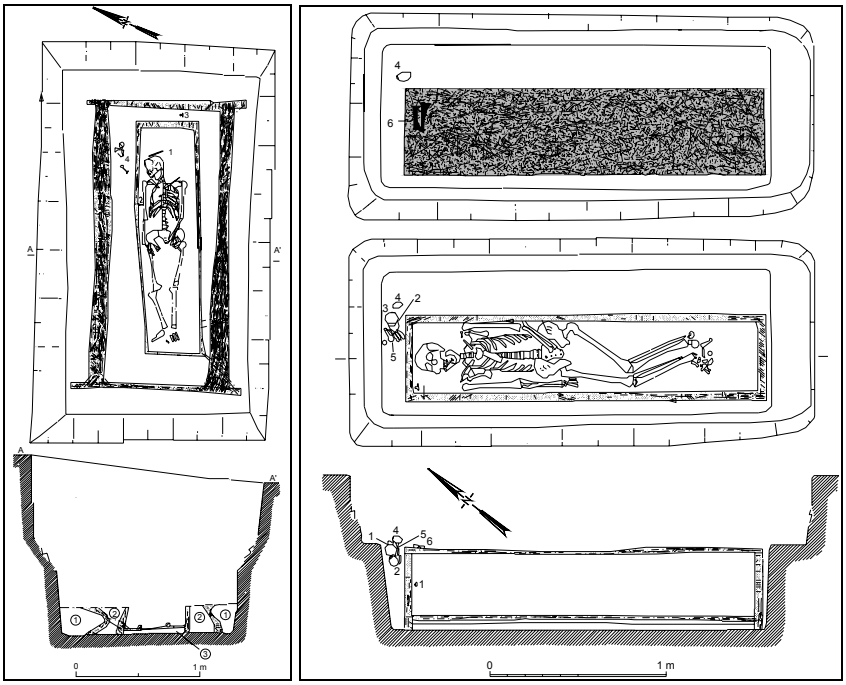


Figure 72. Left: East–west oriented tomb 97YM19 at the Yinniugou cemetery with a second level ledge (Redrawn from Nei Menggu and Riben 2001b: 307). Right: North–south oriented tomb 97YM12 with coffin and animal remains (labeled 6) (Redrawn from Nei Menggu and Riben 2001b: 299).

The mixing of traditions includes not only the adoption of new burial traditions from the south, but also the adjustment of these traditions to include local customs. Although this cannot be discerned at the scale of the survey, we should expect that the residents of the farming villages also maintain some facets of local traditions even while adapting to new, Central Plain inspired habitation contexts.

9.1.1. Chronological issues with the beginning of the Warring States period

Some of the tombs in the Yinniugou cemetery are believed, based on the style of the ceramics and bronze offerings, to date to after the battle that integrated this region into the Zhao

(Nei Menggu and Riben 2001b: 326). Although some of the tombs at the Yinniugou cemetery are thought to date during the period represented by the Warring States period habitation evidence, and the mixture of tombs, which includes larger numbers north-south than east-west burials agrees well with the interpretation of the settlement pattern evidence from the Warring States period, the ceramics from the cemetery are not recognizable as Warring States period ceramics from the survey. It appears that the inhabitants of the Liangcheng region were burying their dead with special mortuary ceramics at the Yinniugou cemetery.

The separation of the Yinniugou mortuary ceramics and the ceramics from the survey raises questions about the separation between the Maoqinggou cemetery and the survey data as well. The Yinniugou cemetery materials and the mixture of farming villages and homesteads from the Warring States and Han Dynasty periods suggest that the process of integration progressed well beyond the battle at c. 350 BCE, might the process of integration have begun before the battle as well, in the settlements already recovered by the survey?

There are three possibilities for interpretation of the Maoqinggou cemetery. Firstly, the people who are buried in the cemetery are people who lived in other regions and were buried in the Yongxing Basin because it was an advantageous location. Although this would explain the dearth of habitation remains by the survey contemporaneous with the cemetery, this scenario seems very unlikely. The second possible interpretation is that proposed by the excavators: the tomb patrons at Maoqinggou were nomads who did not leave habitation remains to be found by the survey (Tian 2000). The fact that surveys like this one do not recover Maoqinggou style ceramics suggests to some that the tomb patrons at Maoqinggou were all mobile and that these inhabitants were chased away by the battle at c. 350 BCE (Di Cosmo 2002: 78). However, this interpretation doesn't agree with the proposal that the north-south oriented tombs at Maoqinggou were the remains of sedentary agriculturalists.

Third, is the possibility implied in earlier chapters (Chapter 7) but made explicit here. This proposal integrates the patterns seen in the settlement data with the connections between

the Maoqinggou and Yinniugou cemeteries (Nei Menggu and Riben 2001b: 326). The Yinniugou cemetery was recognized as the chronological successor to Maoqinggou because both cemeteries share mixed tomb forms, and artifact types. The Yinniugou cemetery is accepted as a place where people were buried with special mortuary pottery and connected with the habitation remains of the survey, this suggests that the Maoqinggou cemetery might be a particularly early manifestation of the influx of people who began to practice Central Plain burial forms, utilized special mortuary ceramics and were contemporaneous with the sites located by the survey as well. This is the reason why the Warring States period here is dated to 500 BCE not to 350 BCE as has been suggested in other contexts (Tian 2000).

Although it may not be the case that every north-south oriented tomb patron was an inhabitant of a farming village and every east-west oriented tomb patron was an inhabitant of a homestead, the Maoqinggou cemetery is another indication of this mixed phenomena of indigenous and imported forms. The transition from the Maoqinggou and Yinniugou cemeteries, with increasing numbers of Central Plain inspired burial forms is another manifestation of the process that brings imported multi-lineage farming villages to Liangcheng. Villages come to house a majority of the population by the Han Dynasty period in the same way that the north-south tombs came to dominate the Yinniugou cemetery.

In addition to the connections between north-south oriented tombs at Maoqinggou and sedentary village populations proposed here, the excavators at Maoqinggou also report one pit that might be the remains of a semi-subterranean house and a storage pit, as well as two kilns that produced pottery with Maoqinggou style decoration (Nei Menggu 1986: 292-294). All of these remains are thought to be contemporaneous with the tombs and point to some connection between the tombs and habitations in the region. None of the ceramics recovered from the habitation remains have been published to date, but if this hypothesis is correct they should resemble the Warring States period ceramics recovered from the survey.

The integration of the mortuary data with the survey data presents a more nuanced view than can be told with the texts or the mortuary evidence alone (e.g. Di Cosmo 2002). Although there likely was a battle c. 350 BCE that resulted in the Zhao winning this region militarily. This battle did not usher in a new settlement pattern in this region that completely replaced the indigenous one, nor did it cause all of the people in this region to begin to practice Central Plain inspired social forms. The change was part of a larger process of integration of this region that began before the battle and lasted for hundreds of years after.

9.2. A reexamination of large scale issues: Expanding empires and social change on the periphery

This dissertation concerns the changes in Liangcheng society during integration into the Central Plain political sphere. The expansion of large empires into hinterlands has been researched in other contexts as well. The Inka expansion across the Andes is chosen as an analogy here because the Inka was a territorially extensive empire with a subsistence system that is thought to have shared a complementary relationship between pastoral and agricultural subsistence strategies (D'Altroy 1992; Murra 1980; Parsons et al. 2001). In addition, comparable regional studies have been completed within the boundaries of the Inka Empire and the results of this work serve to both amplify the results of this survey, indicate ways that the results of the Liangcheng survey might be limited and suggest additional research questions that could be addressed (Figure 73).

It is important to recognize at the outset that the Inka expansion into the Andes is not a perfect analogy for the Han expansion into the Northern Zone. Some of the differences are environmental. The landscape of the Andes has topographic variation that limits the productive potential of certain locations and increases the potential of complementarities between ecological zones (Brush 1977; Murra 1980; Mura 1972 in Parsons et al. 2001). Although I see complementary relationships among the subsistence strategies in the modern and ancient settlement patterns in Liangcheng, the environmental characteristics of the landscape do not

limit subsistence activities in the different land classifications to the same extent that the vertical environmental zones do in the Andes (Section 1.5).

The Tarma Drainage survey area in Highland Peru is an example of this environmental variation. It can be divided topographically into four regions (Parsons et al. 2001: 14-15). Except for localized rain shadows, elevation, average temperature and rainfall co-vary in this region, making elevation the most direct way to divide the landscape into ecological zones. The *cordillera*, or frost desert (4700–5700 masl) is covered by frost year round and is fit for neither farming nor herding. The upper *puna* (4200–4700 masl) is above the limits of effective agriculture and is the main herding zone; the lower *puna* (3850–4200 masl) has a climate that allows for the cultivation of hardy cereals, like *quinoa* (*chenopodium quinoa*) and some tubers. Below the *puna* is the upper *kichwa* (3500–3800 masl), which can support the production of tubers and *quinoa*, and the lower *kichwa* (2700–3500 masl), which allows for the cultivation of maize (*zea mays)*.

As this brief introduction suggests, the environment of this region and other regions across the Peruvian Andes places severe limitations on the subsistence strategies that can be pursued in any particular ecological zone. Although there are tuber varieties that grow at all but the highest elevations, grains have a more limited range. Maize must be grown under 3500 masl and quinoa can be grown in a range from 2570–3800 masl. As elevations exceed 4000 masl, even tuber agriculture becomes less effective and herding becomes more common. These environmental characteristics place greater restrictions on the use of the landscape, but archaeologically these divisions allow for better interpretation of past subsistence strategies and in combination with regional survey data, aid in the testing of theories relating to societal complexity and subsistence change.

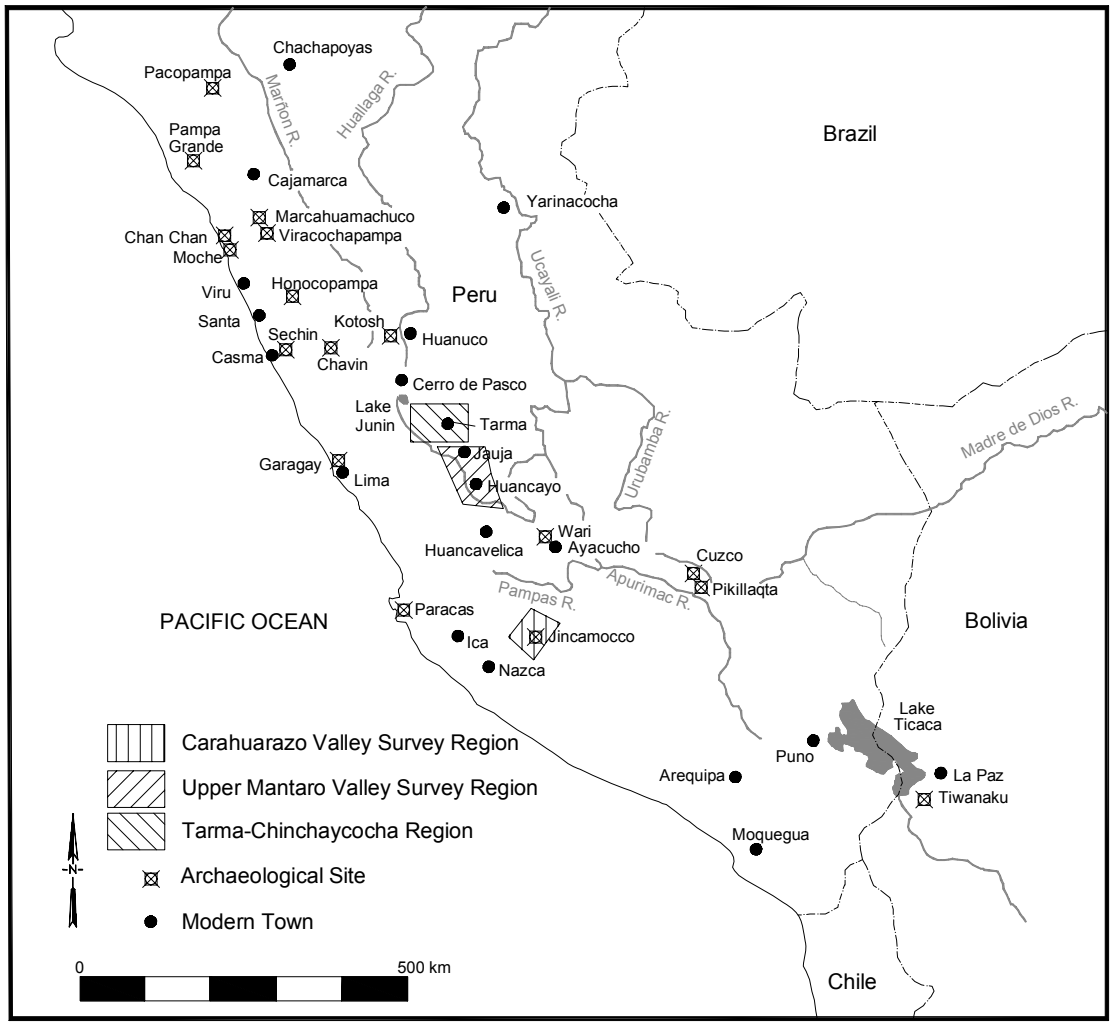


Figure 73. Map of Peru showing principal archaeological sites and approximate locations of regional surveys cited here (Redrawn and modified from Parsons et al. 2001: 2).

9.2.1. The Upper Mantaro Valley survey

The overall political environment in Liangcheng resembles that of the Upper Mantaro Valley (D'Altroy 1987; Earle et al. 1987). This is a region that also witnessed the rise of two different political powers. The earliest polity included in the survey is the Wanka, which is divided into two chronological stages the Wanka I (1000–1350 CE) and the Wanka II (1350–1460 CE). During the Wanka I the settlements were spread across all of the ecological zones, allowing access to the valley floors where grains could be grown and to areas adjacent to the *puna* where tubers would have predominated (nearly 3900 masl). The settlement pattern from this period, which exhibits little settlement hierarchy and a lack of defensive architecture, combined with the exposed position of the settlements on the landscape, suggests that warfare was not common in the region (D'Altroy 1987; 1992: 55). Paleobotanical and bone chemistry analysis suggest that maize was available to all classes in the community (Hastorf 1990).

The Wanka II settlement pattern shows abrupt shifts in the settlement patterns with a developed site hierarchy including competing centers and the construction of extensive defensive architecture at the sites. Sites move off the valley floors and into defensible positions on high ridges (D'Altroy 1992: 58), and this limited access to valley floors affects access of residents to grains like maize, and animals which are herded at higher elevations (Hastorf 1990: 268; 1993: 170). Maize becomes more rare during this period and is associated with elite contexts (D'Altroy 1992: 67; Hastorf 1993: 205).

The settlement pattern changes again with the conquering of the Wanka by the Inka (Wanka III period 1460–1533 CE). D'Altroy suggests, based on historical materials, that when the Inka invaded, the Wanka who chose to fight instead of submitting to the Inka, were dispersed onto the valley floors (D'Altroy 1987, 1992). The survey results show the smaller dispersed settlements were in vulnerable positions on the valley floors without defensive architecture. The valley floors were places where maize could be grown effectively, and paleobotanical studies suggest that once again all classes of people had more equal access to

maize (Hastorf 1990). The large number of storage centers, located near roads, were testament to the surpluses the Inka produced in this and other regions (D'Altroy 1992; Snead 1992).

The changes seen in the Upper Mantaro Valley are not unlike what was seen in the historical periods in Liangcheng and illustrates several of the conclusions as well. First, the Wanka II shift towards the hillsides did not take place because of a desire to shift subsistence regimes or in response to apparent environmental change. Subsistence change here was a proximate result of the shift away from the valley floors caused by conflict (Hastorf 1993: 182). Settlement location does affect subsistence strategy in this case, once again raising the issue of the two part settlement system in the Sansumu survey tract during the Warring States period. Did the residents of the slopes grow different crops better adjusted to these locations? The paleobotanical research required to begin to answer these types of questions in the Upper Mantaro Valley has already been completed, suggesting that in the Wanka II maize may have been a high status subsistence good controlled by the elite (Earle et al. 1987: 101; Hastorf 1993: 205). Might a similar trade in millet have developed between those on the shore of Daihai Lake and habitations on the slopes during the Warring States period? In the Upper Mantaro Valley the subsistence profile shifts again when the Inka moved the populace back to the valley floors, with elites losing differential access to maize. However, elites gained increased access to Inka trade goods. Were similar shifts in subsistence and access to trade goods from the Central Plain seen on the slopes during the Warring States to the Han Dynasty periods? What were the differences in subsistence strategies and access to trade goods in the center of the Han Dynasty period settlement pattern in the Sansumu survey tract and peripheral settlements in the Yongxing Basin survey tract, if any?

The Upper Mantaro Valley survey also shows how empires exert pressure on their populace to produce agricultural surpluses. This surplus funded the Inka state. But this specialization in agriculture had a corollary subsistence specialization in herding on the Puna (Murra 1980: 45). Bates and Lees suggest a pastoral subsistence specialization developing

after the institution of intensive agricultural systems in Mesopotamia (1974: 192) as does Yoffee (2005: 60), the difference is that both envision the process happening concurrently with the development of early cities and states, not at the lower population densities that are seen in the Peruvian and the Liangcheng cases. Might subsistence specialization at one end of the agricultural-pastoral spectrum have also opened opportunities for specialists at the other end of the spectrum? The Inka case suggests that this may have been the case, especially in the Tarma Drainage (Parsons et al. 2001).

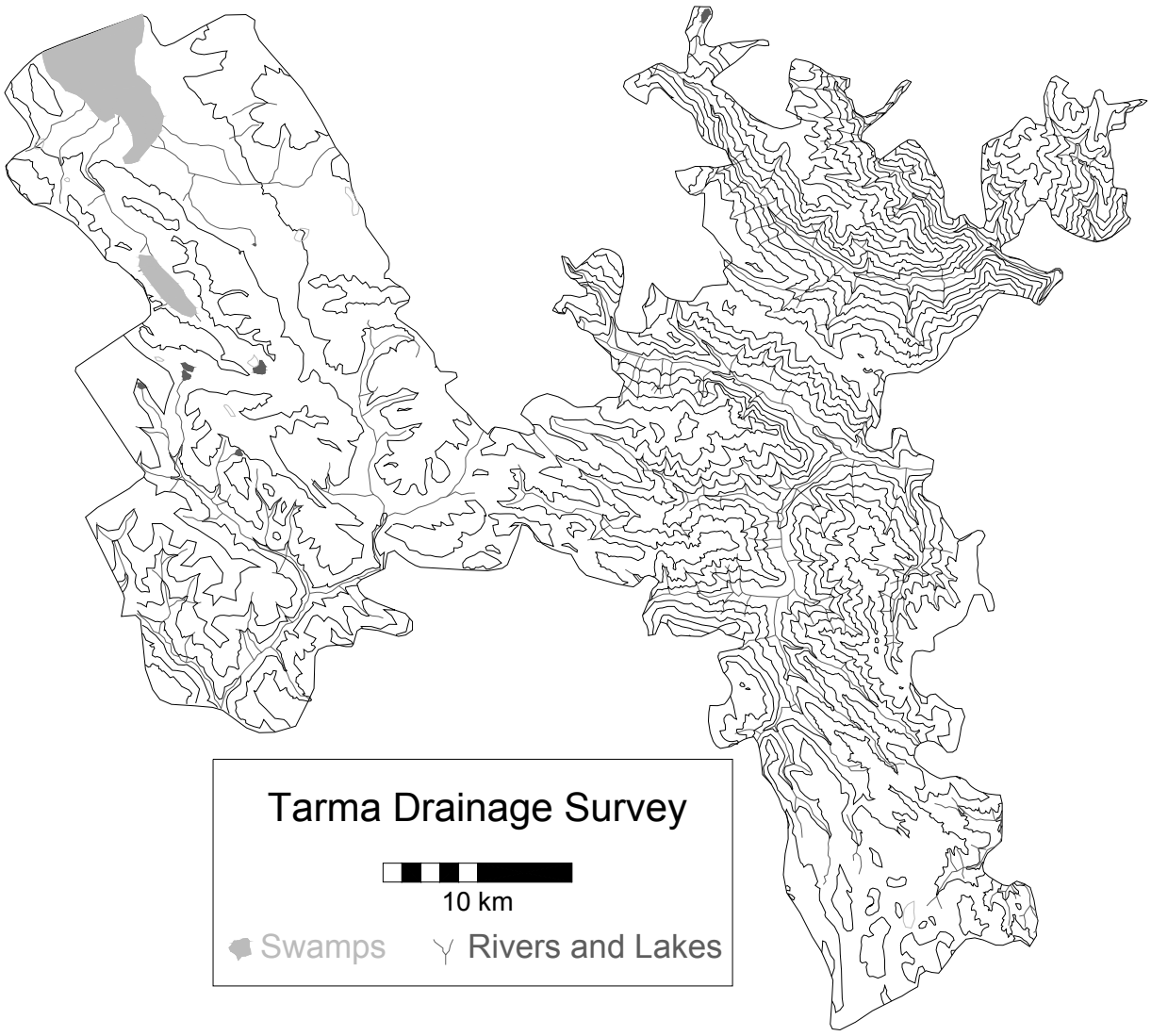


Figure 74. Base map from the Tarma Drainage survey (200 m contour interval) (Redrawn from Parsons et al. 2001).

9.2.2. The Tarma-Chinchayacocha survey

The Tarma Drainage survey was designed to research the integration between the different environmental zones (Parsons et al. 2001: 7) and included more of the highland Peruvian topographic landscape than the Upper Mantaro Valley survey. In the Tarma Drainage survey, the Inka period (or Late Horizon) showed a shift out of the zone immediately surrounding the 4000 m topographic line where herding and some agriculture could be practiced from the same habitation site. If the distribution of settlements across the topographic zones is compared between the Late Intermediate period (c. 1000–1500 CE) and the Late Horizon a shift is seen towards areas where agriculture is practiced. The topographic zone between 3000–3800 masl contains 58.7% of the Late Horizon period sites compared to 28.3% for the Late Intermediate period. In the Late Intermediate period 43.9% of the sites are in the 3800–4200 masl zone where both agriculture and pastoral pursuits might be combined, a percentage that drops to 28.3% in the Late Horizon. Under the domination of the Inka Empire, populations are shifted towards regions where specializations, not combinations of subsistence strategies are most advantageous.

Table 23. Proportions of settlements in different topographic zones in the three periods identified by the Tarma Drainage survey.

Early Intermediate Period		
Elevation Range	Number of Sites	Proportion
4800–4200 masl	8	7.2%
4200–3800 masl	52	46.8%
3800–3400 masl	20	18.0%
3400–3000 masl	29	26.1%
3000–1800 masl	2	1.8%

Late Intermediate Period		
Elevation Range	Number of Sites	Proportion
4800–4200 masl	59	25.7%
4200–3800 masl	101	43.9%
3800–3400 masl	34	14.8%
3400–3000 masl	31	13.5%
3000–1800 masl	5	2.2%

Late Horizon		
Elevation Range	Number of Sites	Proportion
4800–4200 masl	3	6.5%
4200–3800 masl	13	28.3%
3800–3400 masl	15	32.6%
3400–3000 masl	12	26.1%
3000–1800 masl	3	6.5%

After integration into the Inka polity, the Tarma Drainage settlement pattern study suggests a similar shift towards agricultural pursuits as was seen in the Upper Mantaro Valley settlement pattern study. The shift in the Tarma Drainage during the Inka period appears to further isolate the herders on the Puna. A large proportion of the sites move from the boundary area at 4200–3800 masl to the zone below 3400 masl, isolating those who live above 4200 masl. The Liangcheng settlement pattern shows no such isolation. Marginal populations lived quite close to the farming villages, and the Sanqing and Dongshihao plateaus remained virtually uninhabited during the Warring States and Han Dynasty periods. Further research will be necessary to examine the sites at the center and periphery of the Han Dynasty period village

system to better understand what the labels “marginal” and “central” mean in relation to subsistence resources, access to specialized craft goods and imported trade items (Section 8.5.2). The model being proposed here clearly envisions reciprocal relations among specialized subsistence producers but this model will require further testing.

9.2.3. The Carahuarazo Valley survey

This contrast between the Wanka and Inka settlement systems seen in the Upper Mantaro Valley and the Tarma Drainage surveys is not repeated in the Carahuarazo Valley in highland Peru (Schreiber 1987). Like Liangcheng, this valley is peripheral to the capitals of the Inka and the Wanka polities, centered on the archaeological site of Jincamocco south and west of Wari (Figure 73). In this settlement pattern study the most significant changes occur in the Wanka transition. People are moved to areas where grain production is most advantageous and energy is invested into the construction of terraces which most likely produce maize (Schreiber 1987: 271). The incorporation into the Inka empire in the Carahuarazo Valley is much less intrusive than the incorporation into the Wanka polity, but large changes are seen in the surrounding valleys (outside the Carahuarazo survey zone), where provincial capitals were located suggesting that, “…the process of consolidation (and its archaeologically visible end-products) are the result of the interplay between two sets of factors: the needs of the empire, and the extant social system. Although it may seem that imperial requirements are of primary importance, it is apparent that these are mediated by and adapted to the local circumstances” (Schreiber 1987: 281). The already extant settlement organization in the Carahuarazo Valley was sufficient to meet the needs of the Inka, who controlled the valley via provincial centers in the neighboring valleys and with the aid of the local elites, a pattern suggested by the historical texts (D'Altroy 1992).

Schreiber’s results contrast strongly with the results of the Upper Mantaro Valley study, but the differences between the two valleys remind us that sampling small areas of a large polity can produce contrasting results that increase our understanding of the polity as a whole. The

Inka, as suggested by the historical analysis of D'Altroy (1992: 24), did not seek to directly administer every portion of their vast empire, certain areas were chosen for administrative centers and others were only places where roads and storage centers were built to facilitate troop movements and trade. The Carahuarazo Valley appears to be an area where the Inka built roads and storage centers and incorporated elites into their bureaucracy in return for the provisioning of the storage sites and the maintenance of the road system (Schreiber 1987: 282). Therefore, little change in the settlement pattern is seen after incorporation.

The three case studies above highlight the importance of further regional studies across the Northern Zone during the period of integration into the Central Plain political sphere. Was the Zhao polity only concentrating its efforts elsewhere at the expense of management in Liangcheng? Or did the wars on its southern borders consume administrative energy and governmental resources to the extent that the north was not a focus of administration? The Liangcheng data suggest the latter, but without further study it cannot be known if an area immediately adjacent to Liangcheng was the locus of administrative control, as was the case in the Carahuarazo Valley study.

Knowledge of the extent of the administrative hierarchy seen within Liangcheng County would also be furthered by other regional studies. There is a military outpost, called Shuangqucheng, placed on a defensible hillside in the southern portion of Liangcheng County (Figure 18) (Liangcheng Xian 1992: 115). It is not clear how this administrative unit (called Woyang during the Han Dynasty), including two abutting walled areas totaling approximately 16.2 ha in size, would affect the surrounding settlement pattern. Was this an isolated military outpost? An administrative center? Or did it grow from one to the other through time?

9.2.4. Discussion: Disparate approaches to expanding polities

The Peruvian case studies and this interpretation of the Liangcheng data set represent a strong contrast to the way the integration of hinterlands into territorially expansive polities has usually been conceived in North China. The most commonly imagined mechanism of social

change when hinterland areas like Liangcheng are absorbed into the large polities of the Central Plain is population replacement (e.g. Di Cosmo 2002; Tian 2000: 76). The Tarma Drainage, the Upper Mantaro Valley and the Carahuarazo Valley surveys concentrate on the development of polities and what, if any, effects these developments have on local populations. Integration, not population replacement, is considered the mechanism of change. The interpretation offered here for the Liangcheng case, which traces the integration of already extent Liangcheng populations first into the political sphere of the Zhao State in the Warring States period and then into the Han Dynasty is more parallel to what is usually thought about the integration of highland Peruvian communities into the Inka Empire.

The Peruvian case studies also explore the changing subsistence strategies of their regions without first trying to define ethnicity. No connections are made between “people” or “ethnicity” (*minzu*) and either polities or subsistence strategies in these studies. Overlaying difficult questions of ethnicity does not aid in the study of subsistence, especially if subsistence can be affected by changes in societal complexity and is therefore fluid, not static. The Inka likely considered themselves different from the Wanka, and the Inka, like the Han, did emphasize agriculture. The differences among Inka and Wanka “people” may have had an effect on the development of elite behavior in the survey areas, but none of these archaeological studies suggest that they maintained their separate identities long enough to be viewed archaeologically. Separating ethnicity from political affiliation and envisioning subsistence as an opportunistic strategy that changes through time allows different interpretations that better explain the settlement patterns recovered from the Liangcheng survey.

The population replacement hypothesis would view all settlements in both the Warring States and Han Dynasty period plots as new occupations, including the occupations on the northern slopes in the two survey zones that had been inhabited for millennia. This hypothesis cannot view the populations on the slopes of the survey tracts as resisting the new imported

farming village mode of settlement organization or hypothesize that the differences between the Warring States and Han Dynasty period plots reflect increasing integration. Populations that are already ethnically Han and therefore agricultural would not be expected to establish a settlement pattern with two different community forms (homesteads or villages, see Section 7.3.3). All of the populations in the plots from both periods would be new populations from the Central Plain that only inhabited the region after the Zhao government removed the indigenous populations (c. 350 BCE). The two different settlement patterns in the Warring States period plots are very difficult to explain with the population replacement hypothesis, as are the changes seen in the wealthy tombs at the Yinniugou cemetery. Ideas of increasing population integration present a much more cogent argument that better explains the patterns seen in both the mortuary and settlement pattern data.

Returning to the large scale issues presented in the introduction (Section 1.1), the Zhou Dynasty political world, which was one in which client states were largely autonomous, develops into a system consisting of independent territorial entities (Hsü 1999; Lewis 1999). These independent states grew to be more powerful than the Zhou house and quickly began to compete among themselves for hegemony over the Zhou political world. When the Qin won the battles among these states a single, although short lived, territorial empire was created (Shelach and Pines 2006). After the civil war that destroyed the Qin, the Han took over and enhanced the administration of the territorial state, developing a stable empire. The territorial state system established by the Han avoids the threat from over powerful client states that befell the Zhou but is a “high-control, high-extraction system” that is more expensive to administer and is much more likely to lead to specialized production (D'Altroy 1992: 21; Hsü 1965). The argument made here, utilizing data at a regional scale, is that subsistence regimes are included in this specialization and that although the Han self-identified with the agricultural lifeway, both philosophically and in public policy, this very specialization may have produced within its midst

people whose lifeway resembled their enemies, the “pastoral” Xiongnu, and that such specialized production systems could be endemic to agriculturally based empires.

Unlike what would be predicted by the environmental archaeology school, the results of this study suggest that subsistence change was seen in the survey results, not during periods of environmental change, but during periods when changes are seen in social organization. At the local scale, households have only a finite amount of labor to be expended on subsistence. In regions where not everyone maintains subsistence self sufficiency, when subsistence needs arise, whether shortfalls in absolute calories, desires for specialized ingredients for ceremonial meals, or even perceived shortfalls related solely to the acquisition of a more appetizing variety of foods, these needs must be satisfied through social networks. Social storage is only possible if others have surplus to trade or share and these social networks appear to become more complex as society becomes more complex (Underhill 2002).

This is not to argue that the only pathway to subsistence change is through social change. Inhabitants of the Eurasian Steppe may have adopted pastoralism under a completely different set of circumstances, but close to the borders of large territorial states this sort of specialization seems to be endemic to the economic development of these large agriculturally based empires (e.g. Morrison 2001: 272), and is a process that operates at the regional scale. The results of this survey, as well as the work of other scholars who research conditions north of the Han Dynasty Great Wall suggest that the accepted view, envisioning the people south of the Great Wall as exclusively agricultural and the people north of the Wall as exclusively pastoral, is overly simplistic. The evidence here supports the conclusion that as the Han begins to demand surplus agricultural production from a majority of the population, that a small percentage opportunistically settle in marginal locations and pursue subsistence strategies that provide surpluses not produced in the agricultural sphere. This integration is seen to operate not at a supra-regional scale across the Wall, as proposed by historians like Jagchid (1991; 1989), but at a regional scale.

This research, like the Carahuarazo settlement pattern study cited above, also suggests that a diachronic view of the internal dynamics in the hinterlands themselves is also important to the understanding of the process of integration. The changes that occur upon integration are a mix of the will of the center and the states of the indigenous populations at the time of integration. Integration of hinterlands into larger polities cannot be understood without diachronic research into both the core and the periphery.

9.3. Suggestions for future work

9.3.1. Neolithic periods

Although the Liangcheng region has been investigated for several decades, we do not yet have the evidence necessary to answer some basic questions about subsistence and community organization during the Neolithic period. Further work is necessary to build on the foundation forged by this and other archaeological studies of the Liangcheng region.

The chronology of the Yangshao and Laohushan periods will need to be clarified. The spatial distribution of the Laohushan and Yangshao period remains, with Yangshao period remains solely south of Daihai Lake and Laohushan period remains solely to the north, is suggestive not of chronological differences, but of regional variation. Although survey of the southern shore of Daihai Lake will allow us to compare the community organization of the Yangshao and Laohushan periods, survey of the eastern shore of the lake is likely to produce a site that will contain both Laohushan and Yangshao materials, allowing stratigraphic excavation to explore the chronological relationship between these two periods. Excavation at the Baiposhan site will allow an examination of the Laohushan remains in relation to later periods, clarifying the extent of the proposed occupational hiatus between the Laohushan and Zhukaigou periods (Section 6.1).

Could inequality, which is not easily identifiable in the habitation remains of the Laohushan period in this region have been expressed in burial? The burial assemblage recovered to date does not support this conclusion, but the sample is quite small (n<10).

Although no burial remains were found during the survey, as reforestation continues in Liangcheng, a cemetery is likely to be found dating to the Laohushan period. Also related to mortuary study, Carbon 13 analysis of the human skeletal remains already excavated from Yangshao and Laohushan period sites would allow questions of paleo-diet, raised indirectly with stone tool remains (Section 5.3.3), to be answered directly. On the Central Plain, this kind of analysis has already been completed for several Yangshao period sites, solidifying the case for early agriculture during this time period (Cai and Jiu 1985; Pechenka et al. 2002). Similar studies using human remains from Liangcheng would clarify questions of paleo-diet, especially if a combination of central walled sites like Laohushan and small sites like those found on the Daihai Lake basin was sampled. These studies would test the connections made here between ancient settlement patterns and modern land use (Section 5.3).

Agriculture is introduced into Liangcheng, but when does this occur? The inhabitants of this region during the Yangshao and Laohushan periods could have domesticated plants while collecting them before adopting imported domesticates from elsewhere. The floral analysis at some Yangshao period sites suggests that buckwheat could have been domesticated during this time period (Ling 2001), to be replaced by Central Plain domesticates later. This transition would parallel the Jomon domestication of barnyard grass, followed by the introduction of rice farming during the Yayoi (Crawford 1992, 2006). Conversely, Central Plain domesticates could have been introduced early in the sequence and grown in small gardens as specialty foods. These foods would have had little impact on subsistence, but might have denoted status.

9.3.2. The Zhukaigou period

The Zhukaigou period data also presents questions of subsistence. No other period has a settlement pattern that so favors the mountains/slopes transition on the landscape (Figure 29). If the Zhukaigou period inhabitants were pastoralists as suggested by Tian (2000), then we might expect a mobility pattern like that seen in the modern era in the Khanuy Valley, in Mongolia: residents in this valley move very short distances yearly (approximately 10 km). The

pattern consists of returning every fall to a position on the slopes of the valley, where more permanent animal pens and shelters can be found and then moving to a location near the main river in the spring (Houle 2006, personal communication). If this pattern held sway in Liangcheng during the Zhukaigou period Baiposhan would have been a “winter camp location”. The shore of the lake, where summer camp locations would have been located, might not have been the loci of activities that left evidence on the landscape in such quantities that they were located by the survey. Only further excavation at Baiposhan, with special attention given to faunal and floral remains will allow better insight into the question of Zhukaigou period subsistence in the Liangcheng region.

9.3.3. The Warring States and Han Dynasty periods

The Warring States and Han Dynasty period remains present a multitude of questions to be pursued both inside and outside the Liangcheng region. Three other avenues of inquiry are suggested by the mortuary analysis above. What was the relationship among the tomb patrons at the Maoqinggou and Yinniugou cemeteries? Were the tomb patrons in the east-west and north-south oriented tombs distant family? Did they intermarry? Were their subsistence strategies different? Ancient DNA and bone isotope studies on the bones already excavated from these cemeteries would allow the exploration of the issues of tomb patron interrelatedness and questions of tomb style and subsistence. Finally, do the tombs predate the occupations in the region, suggesting that the Zhao government brought in populations after the conquest? Or did integration begin before the Zhao military defeated the local population? Excavations at habitation sites will also aid in the calibration of the relative demographic index allowing for more exact absolute population estimates.

Chemical analysis of the bronzes at Maoqinggou would show whether the chemical composition of the bronzes was similar, suggesting that they were cast at the same location, or that they are the result of trade across the northern zone. Chemical analysis of the pottery in the peripheral and the central sites found in the survey would also allow us to examine the

economic relations between the people on the outskirts of the settlement pattern and those at the center. Was pottery production more centralized during the Warring States period than the Han Dynasty period? These kinds of studies would allow increased understanding of the economic relations among residents in the Liangcheng region as well as further examination of the context of the Liangcheng region within the Northern Zone, further amplifying the work already completed in this region.

APPENDIX A
A glossary of Chinese terms used in the text

Place names are in plain text. Italicized items are words or phrases used in the text. English translations for the Chinese phrases used in the text are included in parenthesis.

Anyang	安阳
Ba (overlord, hegemony)	霸
Bancheng	板城
Bei di (generic name for enemies on the north usually considered to be horse riding)	北敌
Chang cheng di dai	长城地带
Cishan	磁山
Damiao	大庙
Diren (enemies)	敌人
Dongtan	东滩
Duangang Site	段岗遗址
Ercengtai	二层台
Erliban Site, Junge'er Banner	准格尔旗二里半遗址
Erlitou	二里头
Fengxi	沣西
Gaodi (First Emperor of the Han Dynasty)	高帝
Guo (kingdom)	国
Guan (Cooking Vessel)	罐
Handan (capital of the Zhao State)	邯郸
Han Dynasty	汉朝时代
Han Shu	汉书
Hang Tu (Stamped Earth)	夯土
Hebei Province	河北省
Heqin Marriage Alliance	和亲
Hongtaipo (Upper, Lower)	红台坡（上, 下）
Huaren	华人
Huan Jing Kao Gu (Environmental Archaeology)	环境考古
Huizishan	狐子山
Jian Bao (Preliminary Report)	简报
Jin (The State of Jin)	晉国
Jing tian (The Confucian well-field system)	井田
Jiangzhai	姜寨
Keshengzhuang	客省庄
Liangcheng County	凉城县

Liaoyang City	辽阳市
Longshan Culture	龙山文化
Luokou Dongbei	罗口东北
Lutaigang Site	鹿台岗遗址
Mafang	马方
Maoqinggou	毛庆沟
Ming River	洺河
Minzu	民族
Mianpo	面坡
Nangou River	南沟河
Nong you jiao dai qu (Pastoral-agricultural zone of interaction)	农游交带区
Number 6 Dongshencun Section	燕下都的居住遗址的东沈村村东6号居住址
Qingli (cleared)	清理
The State of Qin	秦国
Qingyi Zhendong	清易镇东
Quan Rong	犬戎
*Ren Di Guan Xi (*Human Environmental Interaction)	人地关系
Sanhe	叁合
Sansumu Village	三苏木村
Shaanxi Province	陕西省
Shang Dynasty	商代
Shanyu (Leader of the Xiongnu)	单于
Shihushan	石虎山
Shi Ji (Book of History)	史记
Shuanggucheng	双古城
Shuo Wen Jie Zi	说文介字
Sunjiazhai	孫家寨
Tan (Altar)	坛
Tun Tian	屯田
Wangmushan (Upper, Middle, Lower)	王墓山（上, 中, 下）
Woyang (Han dynasty name for Shuanggucheng)	沃阳县城
Wuyangtai Village section	武阳台村23号作坊遗址
Xia Dynasty	夏代
Xiajiadian (Upper and Lower)	夏家店(上层，下层)
Xianyun	猃狁
Xiaopingtai	小平台
Xiaoheyan	小河沿
Xibaiyu	西白玉
Xiongnu	匈奴
Yan Mai	燕麦
Yanxiadu	燕下都
Yaozicun	夭子村
Yangshao Culture	仰韶文化

Yeren (People of the countryside)	野人
Yiluo River	伊洛河
Yinniugou	饮牛沟
Yongxing	永兴
Yuanzigou	园子沟
Yue Zhi	月氏
Yunzhong	云中
Zhan guo ce	战国册
The State of Zhao	赵国
Zhumian (Living Floor)	住面
Zhongfa	宗法
Zu (Arrow Head)	镞
Zuo Zhuan	左转

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