SETTLEMENT PATTERN SURVEY IN THE RIZHAO AREA: A PRELIMINARY EFFORT TO CONSIDER HAN AND PRE-HAN DEMOGRAPHY

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ABSTRACT

A key dimension of systematic regional settlement pattern studies in many global regions, such as Mesopotamia, Mesoamerica and the American Southwest, is the use of those data to estimate long-term demographic trends. To date, such estimates have been less prevalent in the recent and rapidly expanding corpus of regional studies that are now being carried out in China. One of these archaeological investigations, focused on the Rizhao region of eastern Shandong Province, has provided locations and size estimates for ancient settlements dating from the later Neolithic through the Han period for a roughly 700 km² study area. Here, several methodological procedures, extrapolated from population estimation methods that have been employed in other world regions, are used to generate rough demographic ranges and trends for our investigatory region in eastern Shandong. For the Han period, these preliminary numbers dovetail reasonably with general population ranges derived from documentary sources, hopefully pointing to population estimation procedures that may have broader applications in constructing ancient Chinese demographic histories.

The study of ancient demography has received little attention in the discipline of Chinese history and archaeology. One main reason is the limited corpus of historical documents. Textual records concerning population did not appear until the Han Dynasty and these texts do not provide detailed information on the populations of specific settlements and regions. Rather, these early written accounts tend to provide general population numbers for large provincial areas.

Archaeologists in China have tried to estimate populations at specific sites based principally on cemetery findings and indeed have made some important progress in these efforts (Zhang Zhongpei 1981; Yan Wenming 1986; Zhu Yanping 1988; Xin Yihua 1991; Zhu Naicheng 1994). However, these kinds of site-focused studies are ill-equipped to provide the numbers for regional demographic studies and research. As in other regions of the world, more and more scholars are coming to realize that only settlement pattern archaeology can help answer the questions concerning how many people lived in particular areas of China during the Han period and earlier times. And even more importantly, how did the growth and decline of population relate to the episodes of rise and decline that characterise early Chinese civilizations?

Archaeological settlement pattern studies arose as a key field procedure in North America and Europe during the 1900s. During the 1950s and 1960s, such regional approaches became more systematic and increased in importance (Parsons 1972). Over the last decades, this kind of regional field study has been implemented in many different regions of the world, contributing significantly to our understanding of the past. Recently, two prominent archaeologists have said that settlement pattern approaches represent 'the single most critical theoretical or methodological innovation in archaeology since World War II' (Sabloff and Ashmore 2001:14).

As we all know, settlement studies can be undertaken at three levels: household, settlement and region. Each of these scales of analysis emphasises a different observation venue that is important for archaeology studies. Yet to study and estimate the growth and decline of population in a certain area or region, broad-scale systematic survey, or regional settlement survey, is the key. Regional settlement surveys can most readily provide information on the shifting in size, number and hierarchy (by size) of settlements in a defined region over time and space. Nevertheless, such studies also have the potential to yield population estimates (Hassan

1981:65). Such estimates of ancient population, although admittedly speculative, are important as they are the only way that we can generate 'ballpark' or rough estimates of population that can be fruitfully compared against the documentary records of population that are available for later times.

SETTLEMENT PATTERN ARCHAEOLOGY IN CHINA

The western concept of settlement pattern archaeology was introduced late to Eastern Asia. In China, archaeological survey was first proposed and discussed by K.C. Chang in the mid 1980s. In 1991, the Chinese government released a policy that permitted Sino-foreign collaborative research in archaeology. This change in policy allowed foreign archaeologists to work in China on Chinese material, thereby promoting greatly the implementation of settlement pattern studies in China. Over the last decade, at least five collaborative projects, which focus on settlement pattern archaeology, have been initiated in northern China. Our collaborative Rizhao project, which was conducted by Shandong University, Yale University, University of Wisconsin-Madison and the Field Museum, is one of these settlement archaeology projects.

The Rizhao area of southeastern Shandong Province has long been recognized as a key area for understanding the Longshan period (and hence the roots of north Chinese civilization) ever since excavations took place at Liangchengzhen in 1936. From the 1950s to 1980s, local archaeologists conducted a few further test excavations at the site and implemented unsystematic reconnaissance in the surrounding region. The fine, black eggshell pottery and jade artefacts found during these early studies led scholars to propose that Liangchengzhen was a Longshan-period center. This interpretation was supported by early estimates of the size of the site (which found it to be large - 95 ha.). The neighboring site of Dantu, originally estimated at 25 ha in size, also was notable for its fine jade artefacts and the identified traces of a rammed earth wall. However, these initial studies in the Rizhao area were all focused on the large sites.

An original aim of our project was to assess objectively and systematically settlement pattern changes over time in the vicinity of Liangchengzhen from the Neolithic age to the Han Dynasty. More specifically, our study was designed to discern whether Liangchengzhen was at the center of a settlement hierarchy or just a large isolated Longshan-era community. With such information at hand, we could better assess the rise of this large late Neolithic settlement and the region's transition to the later Bronze Age.

The Rizhao district has four topographic zones: floodplain, low spurs and rises above the alluvial plain, piedmont ridges, and mountains with coniferous trees such as pine. The most common crops in the area today are winter wheat, corn, soybeans, peanuts and tea. Soils on hill-slope environments are extremely granular, probably resulting from both human and natural erosion forces. The environment is conducive to full coverage survey, especially during the late fall and winter. The survey methods we have used were developed originally by archaeologists working in highland Mexico. Crews ranging from four to eight members walk about 30-50 m apart, systematically walking over the entire landscape. All ancient remains are plotted on 1:10,000 topographic maps. Whenever possible we check for subsurface deposits from exposed cutbanks and we have found a good correlation between surface sherds and subsurface deposits. We make collections of surface artefacts at every site. Prior to preparing final settlement maps for each phase, we analyse the field artefact collections and accordingly make any adjustments of field assessments.

To date, over seven years, we have covered around 700 km^2. Results from the first five years of work have been published and our focus for this discussion of population comes from the first five years of the survey (Sino-American Joint Archaeological Team in the Liangcheng Area 2002). We have investigated primarily the regional and temporal patterns of settlement change in the Rizhao region. Nevertheless, our survey results also provide us with the opportunity to estimate the population of the Rizhao area. Although such estimates are several steps removed from our empirical results, they are useful and important for two reasons. First, they enable us to compare demographic estimates for the area during these early periods with those available from later census materials. Second, they would permit us to look at the relationship between demographic variables and agricultural factors, as well as to assess the role of population changes in the ebbs and flows of political shifts in this key coastal region.

As part of our survey, we are able to generate estimates of settlement location and size by period. If such site locations and sizes are compiled for the entire survey region, maps of regional settlement can be generated for each period. But, such findings do not translate directly into population. In order to calculate ancient populations, a means is needed to estimate the density of people in specific settlements. Large-scale horizontal excavations would provide the most direct measure of population densities in a settlement. The size, density and number of houses would provide a perspective on settlement density. But such information does not yet exist for our region or even for most of China. In fact, the population density of ancient settlements is not empirically known for most regions in the world. For that reason, archaeologists in several global areas have turned to the population densities of modern settlements in their local area as a means to generate ancient population

estimates from settlement pattern findings. For example, in his pioneering study of ancient Mesopotamian settlement patterns, Robert McCormack Adams used a figure of 100-200 persons/hectare of occupation (Adams 1965:25). Adams based this figure on the density of population in contemporary Southwest Asian communities. Likewise, scholars in highland Mesoamerica have used a number of figures to estimate past populations. These figures, which primarily range from 25 to 50 persons/hectare (Parsons, 1971:23; Blanton *et al.* 1982:10), also are based on the density of people in modern Mexican settlements.

Concerning the Rizhao area, no systematically collected data currently exist regarding either past or present population densities within occupied settlements. However, recent census figures have provided us with a means to assess modern settlement densities. In the middle 1980s, the county-level Rizhao City had 22 dependent towns, 1095 administrative villages and a total population of 987,000 (Shandong Provincial Annals Committee, 1988). At that time, the rural population was 877,000 (Department of Rural Social Economic Statistics, National Statistics Bureau 1989:261).

To determine the density of people in current communities, a number of assumptions and calculations are necessary. The smallest settlement in China is the 'natural village'. According to statistical material from five counties (Jiyang, Mengyin, Zhaoyuan, Changdao and Weishan) of Shandong province, each administrative village is composed of 1.44 natural villages (Jin Qiming, 1989:188). Therefore, 1,095 administrative villages equal 1,576.8 natural villages. We also estimated that the size of each town is roughly equivalent to five natural villages. Therefore, the 22 towns in Rizhao District might be considered to be equal to 110 natural villages. Based on these estimations, we will assume that there is the equivalent of a total of 1,678 natural villages in Rizhao City. If we divide the rural population of 877,000 by 1,678 (natural villages), we estimate that each natural village had about 520 persons on average in the Rizhao area.

Through sampling procedures, the senior author measured (from topographic maps) the areas of 100 villages (both administrative and natural) in Rizhao City. Using a planimeter, it was found that these 100 villages averaged 7.2 ha in size. If we then take these two numbers, 520/settlement and 7.2 ha/settlement, we calculate an average local settlement density as 72.2 persons/hectare of occupation.

According to another set of 1985 census material for rural areas in Eastern China, each person occupied 137.45 m^2 (National Administrative Bureau of Land 1994:143). Shandong Province was included in the area for which this figure was derived. If we translate this figure into a larger area, we come up with an estimate of 72.6 persons/hectare. This number is very close to the figure we calculated above and provides a rough measure of rural population density for contemporary settlements. Clearly, modern rural population densities and housing facilities are more similar to past patterns than is the modern urban situation in cities like Rizhao itself. Consequently, we believe that the figure of just over 72 (72.2) people/hectare is a reasonable figure that we can begin with to calculate estimated settlement densities for the deeper past.

APPLYING THE CALCULATIONS TO THE RIZHAO SURVEY AREA

Table 1 provides the estimated total regional population for our survey area, based on settlement size and the figure of 72.2 persons per ha for population density in settlements.

Table 1: Calculated Settlement Areas and Population Numbers for the Rizhao Survey Area (using a population density of 72.2 persons/ha)

Cultural Phase	Total Hectares	Population number
Longshan Culture	873	63,031
Zhou Dynasty	791.6	57,154
Han Dynasty	847.5	61,190

Based on our findings and these estimates, it appears that population numbers flucuated in the Rizhao rather rapidly. There was a population decrease after Longshan. We have fewer than ten sites with Yueshi pottery and no more than twenty with Shang period sherds, although it is unclear whether there was a real population decline or whether these phases were not represented for some reason in the Rizhao region. Population in the Zhou period was less than it had been in the Longshan and the distribution of settlement was very different. During the Han period, the population reached its Longshan levels again. Interestingly, if we take the findings from all seven years of our survey into account, we find that the overall Han period population exceeded that of the earlier Longshan. The Han period occupation was less focused on one site than was the case in the Longshan phase, when Liangchengzhen overshadowed all other settlements in the region.

The Han is the earliest dynasty for which we have population counts from every province in China. At that time, the area we surveyed belonged to Langya Province, which included parts of today's Rizhao, Linyi and Qingdao cities. According to the Chapter termed *Dilizhi* (Chapter on Geography) in the *Han Shu* (Han History) (Ban Gu 1962:1585), the total population of this province was 1,079,100 in AD 2. The whole area of this ancient province, measured by a planimeter, is 2,170,000 ha. If we

use this figure and the reported population, we derive a population density in the Han period of 49.7 persons/km^2 in Langya Province. If that population was evenly distributed (something that is highly unlikely), we calculate a Han period population of 19,880 persons in our 400 km^2 survey area.

If we compare this figure to the one that we calculated above, we note a considerable disparity. This figure from the documents is roughly one-third of that estimated from the settlement pattern findings. There are many possible reasons for this lack of congruence. For one, the Han period in the archaeological record is long and so our archaeological estimate may be too high (combining sites from different segments of the Han era). Alternatively, the historic estimate is from a snapshot of time at AD 2. Nevertheless, it is also worth remembering that the figure we calculated from written texts represents an average population density for Langya province. However, we know that the geography and agricultural potential of Langya province was extremely diverse. The area we covered during our archaeological survey is one of the richest parts of the region that once was Langya Province. Our survey area includes large patches of alluvial plain in front of hills, and the rivers that cross this alluvium bring plenty of water for irrigation. Besides this, the area immediately around Rizhao has a long coastline that could have provided rich seafood resources and salt production.

In fact, the Han Dynasty set up a sea salt administration in Haiqu County, the city located just south of our survey area. Therefore, it is obvious that the Rizhao/Liangchengzhen area had a remarkable resource advantage as compared to the inland and mountainous parts of the ancient Langya Province. The contemporary population densities in the coastal regions of eastern Shandong Province, as around modern Rizhao, are greater than the demographic densities in the interior. We suspect that the same was the case in the past, during the Han period. So, in reality, the figures derived from *Han Shu* may not be so far off from those that we calculated from our archaeological research.

This paper represents just an initial effort to estimate Han and Pre-Han demography in eastern Shandong Province. Although the consideration of population estimates for the area involves many assumptions, it also opens up many questions and research avenues for future studies. As archaeologists expand survey regions and conduct horizontal excavations to determine the density of ancient settlements, we should be able to refine the kinds of demographic analyses that we have begun to explore here.

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