Rice Agricultural Intensification and Sociopolitical Development in the Bronze Age, Central Western Korean Peninsula

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This research understands the characteristics of the regional and local political economy utilizing an intensive form of rice agricultural technology during the Middle Bronze Age (800-400 BCE), in the central western Korean Peninsula, focusing on how social components (e.g. regional polities, local communities, and individual households), in the context of emergent complexity, were related to each other in shaping a specific sociopolitical organization that utilized improved technology for primary agricultural production.

Relevant information has been generated by reconstructing MBA regional settlement patterns through the use of surface survey and excavation data, analyzing the spatial correlation between regional settlement hierarchy and differences in abundance of rice soils, the necessity of cooperative water management, easy accessibility to important junctions of ancient transportation routes, and investigating household wealth/status variability.

All of this information is used to place MBA society somewhere in the sociopolitical continuum, two ends of which correspond to the extreme top-down and bottom up systems, respectably. The top-down models assume that suprahousehold-level organization and management of labor-pooling necessary to utilize intensive agricultural technology, while bottom-up ones emphasize the individual households' and/or small kin-based groups' role in initiation and maintenance of the system.

I conclude that there was a mixture of the two strategies mentioned above, in MBA rice-agricultural intensification, rather than the consistent compatibility to either strategy. Communities within individual polities were organized differently indicating compatibility with either system, sometimes in substantially different manners. Even when comparing polities located in quite similar environmental settings, there were quite noticeable differences in production and distribution of wet rice.

In this light, beyond simple positioning in the continuum on the basis of reconstructing the differing levels of social organization, this study attempts to make such a reconstruction more dynamic by emphasizing the possible strategies pursued by different social actors, especially elites who are likely to get more benefits from the intensive agricultural systems. A possible strategic activity subjected by elites is feasting. The rigorous participation of commoner households in the intensive production of wet rice is observed at certain center and it may have been encouraged and compensated by feasting activities.

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PREFACE

This dissertation is the end of long journey to be a professional archaeologist and the result of cooperative efforts of decent persons. Without their help and encouragement, I could not have finished the journey. The list of their names would be endless, so I must confine my remarks to a few of the most influential.

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1. INTRODUCTION

Archaeologists have long been aware that many of the complex societies that developed independently in different parts of the world utilized intensive agricultural technologies that sometimes required massive input of human labor but yielded very large returns per unit of land. Such patterns of production have often been the basis of social hierarchy since they provide the means for elites to mobilize the labor of primary producer households toward the generation of the surplus necessary for funding sociopolitical institutions. Nevertheless, the exact ways in which intensified productive systems serve sociopolitical development vary in different trajectories. This has led to considerable, often heated, debate on the relationship between intensive agricultural systems and the evolution of sociopolitical organization in chiefly societies (Delgado-Espinoza 2002; Earle 1977, 1978; Gilman 1991, 1995; Kirch 1984; Spencer and Redmond 1992; Spencer, Redmond and Rinaldi 1994).

However, current information is not sufficient for understanding the nature of this relationship in emergent complex societies (Arnold 1996) for several reasons. First, research has mostly focused on the more complex forms of chiefly organization, leaving the initial development of such political economies poorly documented. Second, the main concern has been the level of social complexity required for organizing intensive agricultural systems, rather than how the relationship worked (Delgado-Espinoza 2002). Moreover, these issues have previously been researched primarily for the ancient Near East and, more recently with considerable vigor, in the New World tropics. Comparatively little attention has been paid to them in the context of early East Asian complex societies.

In this light, it is worth asking how intensive agricultural practices have related to emerging sociopolitical complexity in trajectories outside the areas that have been vigorously investigated to date. The specific case of the Middle Bronze Age (hereafter MBA) in central western Korea seems to provide a good opportunity to approach the issues outlined above. The transition from the Early Bronze Age (hereafter EBA) to the MBA in this area marks the initial emergence of complex social organization (Ahn J.H. 2004; Kang B.W. 1992; Kim J.S. 2003; Kim S.O. 2001) and the intensification of rice production through irrigated paddy fields (Kwak J.C. 2001; Lee H.J. 2000; NMK 2000). This agricultural intensification in MBA appeared after hundreds of years of extensive rice cultivation (Ahn S.M. 2000; Im H.J. 1992; Lee G.A. 2003; Nelson 1999: Rhee S.N. 1999).

Recent discussion of organizational complexity and intensive agriculture based on regional settlement data shows a considerable range of opinion about where to position the societies studied along the continuum ranging from household autonomy in subsistence affairs to direct management of agricultural systems by centralized authorities (Erickson 1993; Scarborough 1991; Stanish 1994). The two ends of this continuum have sometimes been labeled the 'bottom-up' and 'top-down' perspectives on the relationship between sociopolitical organization and intensive agriculture (Erickson 1993; Scarborough 1991). This study attempts to evaluate the applicability of these models to central western Korea in the Bronze Age based on a reconstruction of technological change in the context of regional settlement patterns. Ultimately, such a study could position the MBA society along the continuum, but such a reconstruction would be very static. It can become dynamic when the various strategies pursued by different social actors are emphasized.

By varying the scale of analysis, from quite regional to the household level, this study attempts to approach how social components (e.g. regional polities, local communities, and individual households), in the context of emergent complexity, were related to each other in shaping a specific sociopolitical organization that utilized improved technology for primary agricultural production.

1.1. EMERGENT COMPLEXITY AND INTENSIFICATION OF AGRICULTURAL PRODUCTION

Although empirical data from various parts of the globe show that emerging chiefs could have depended on various sources of power (Earle 1991a, 1997; Feinman 1995), many scholars place elite control over basic economic resources in a position of relative importance (Earle 1997; Patterson 1991).

The early neo-evolutionist paradigm of "managerial leadership" based on non-economic factors such as prestige in relatively simple complex societies (Fried 1967; Service 1962; Renfrew 1974) has been challenged (Earle 1977, 1978; Gilman 1981), and most archaeologists have focused on "exploitative leadership strategies" (Gilman 1981) in the politico-economic domain. Elites are seen as trying to monopolize economic infrastructures in order to mobilize surplus to further their own interests (Earle 1978, 1997; Gilman 1981, 1991; Spencer and Redmond 1992).

From this perspective, leaders' control over the economic means of subsistence (e.g. arable land, capital-intensive subsistence technology) can be seen as essential to a system of "staple finance" that enables elites to consolidate political power through the manipulation of fundamental economic resources (D'Altroy and Earle 1985; Earle 1991; Gilman 1981, 1991).

Moreover the "wealth finance" so important to elites in some societies may rest on the stability of a system of staple finance (Gilman 1991: 157).

In this light, intensifying agricultural production under elite control would be a very appealing way to generate and enhance elite power, because (1) it would provide a reliable source of surplus, enabling leaders to fund new political institutions (Arnold 1993, Gilman 1981, 1991, Spencer and Redmond 1992); (2) it would create fixed and easily controlled capital-improvement of agricultural systems, despite the requirement of high initial investment (Gilman 1981); (3) it would tie people to the land (Drennan 1988; Pohl 1990); and (4) the protection of these facilities against other groups would promote social solidarity (Gilman 1981; Hastorf 1990).

However, the relationship between surplus extraction and management of agricultural intensification projects does not seem this simple. Considering the lack of efficient tribute systems and truly coercive control over people in chiefdoms (Carneiro 1981), it can be convincingly argued that direct management of economic production in a 'top-down' fashion is virtually the only way for elites to obtain a surplus (Delgado-Espinoza 2002). Elite-centered control models without an element of managerial leadership are thus incomplete.

Some studies have focused on an opportunistic aspect of elite strategies, whereby elites just provide incentives to primary producers to intensify existing technology or themselves engage in restricted agricultural intensification specifically aimed at producing surplus to fund the political economy, rather than managing agricultural production on a broad scale, and then collecting tribute to further aims such as long-distance exchanges or military activities (Spencer and Redmond 1992; Spencer, Redmond and Rinaldi 1994; Stanish 1994).

This distinction between managerial versus exploitative leadership should probably not be viewed as a sharp dichotomy but rather as the two ends of a continuum (Shelach 1999: 9-46). Considering a range of possible strategies that fall in between these two extremes will lead us to pay attention to elites' tactical activities that fundamentally favor intensive production, whether by direct management of intensification projects, or by involving commoner producers in such projects with comparatively little coercion. For this purpose, it is important to look closely at how the strategies of elites and non-elites at the household level relate to regional-level macro-socioeconomic changes.

If elites do not actively manage agricultural production in order to generate a surplus to fund chiefly institutions, they may nevertheless acquire the necessary resources from domestic production by controlling labor (Arnold 1992; Earle 1991b; Johnson and Earle 1987: 11-15; Stanish 1994; Webster 1990). Rural households have often been assumed to conform to Chayanov's rule (Chayanov 1966; Netting 1993b), according to which they do not maximize their labor in the absence of political coercion (e.g. political economy) or environmental risk (Arnold 1992; Halstead and O'Shea 1989; Hayden 1996a). When such households are affected by a political economy or incorporation into a market or capitalist economy, they generate surplus by enhancing production beyond "subsistence economic demands" (Johnson and Earle 1987, 2000) and also beyond a taxation burden placed upon them by supracommunity-level polities (Smith 1987).

This leads to inter-household economic variability as some produce larger surpluses than others. This variability can also generate various kinds of craft specialization (Costin 1991; Feiman, Blanton and Kowaleski 1984), competition for arable or easily intensifiable lands (McAnany 1992), and variation in labor pooling (Arnold 1992, 1993; Earle 1987; Webster

1990). All these processes can exacerbate socioeconomic inequality. Such processes, where individual households spontaneously (to some degree) and competitively increase their labor input and/or adopt new technology to obtain more output of agricultural production per unit land without the managerial intervention of regional institutions, amount to a bottom-up strategy for initiating and managing agricultural intensification. Exploring how the various activities of wealth accumulation and/or self-aggrandizement, such as feasting, gift-giving, and various types of exchange (Clarke and Blake 1994; Earle 2001; Hayden 1995, 1996b; Hayden and Garrett 1990) are distributed in elite and non-elite households seems critical for understanding the relationship between top-down attempts to bind non-elite domestic production to regional elites' interests and bottom-up attempts to maintain autonomy and lower labor inputs.

1.2. SOCIOPOLITICAL CHANGES AND INTENSIFICATION OF RICE AGRICULTURAL IN MBA CENTRAL WESTERN KOREA

In central western Korea, the MBA has been identified with the emergence and spread of Songgukri-type assemblages, as an archaeological culture, into Early Bronze Age contexts. As recent research reveals, the formation and spread of this new archaeological culture was accompanied by several kinds of socioeconomic change, such as drastic increase in the number and size of habitations and change in the internal structure of settlements (Ahn J.H. 1996; Song M.Y. 2001); development of defensive works enclosing residential areas of villages and abandonment of houses with abrupt burning (Kim G.S. 1994; Song M.Y. 1995); intercommunity functional differentiation (Ahn J.H. 2004); and mortuary differentiation within and between groups (Kim G.S. 1998; Kim S.O. 2001; Lee S.G. 1996).

In addition, the intensification of rice agriculture has been considered closely related to these phenomena (Ahn S.M. 2000; Cho H.J. 2000; Lee K.S. 2000; NMK 2000). In fact, a growing body of data indicates not only increasing nutritional dependency on rice at the transition from EBA to MBA but also the beginning of wet-rice cultivation in central western Korea during the MBA. Not only are carbonized rice, rice phytoliths, and rice pollen more frequently identified in MBA residential areas than EBA ones (Ahn S.M. 2000; Lee J.J. 2001), actual paddy field plots have been excavated as well (BRICNNU 2001; Kwak J.C. 2001; Lee H.J., Son J.H. and Kang W.P. 2002; Lee H.J., Kang W.P. and Son J.H. 2001).

Based on the newly accumulated information, many researchers propose the emergence of institutionalized leadership at this point, and some of them have suggested a causal relationship between intensification of rice agriculture and enhancement of social complexity. The kind of leadership involved in intensive wet-rice cultivation is argued to generate the aggregation of population into large settlements and the advent of social complexity. In this model a sequence of several stages is suggested: 1) a quick spread of paddy technology, 2) drastically increasing need for labor-pooling for paddy technology, 3) the aggregation of population into specific settlements, and eventually 4) the emergence of an elite who responded to the social need for organizing labor-pooling (Kim J.S. 2004; See also NMK 2000).

Such a model makes several key assumptions. The first is that the adoption and utilization of paddy technology happened by individual household choice, not forced by the political economy. The second is that MBA adoption of paddy technology required a massive labor input all at once. The third is that big settlements attracted people who voluntarily gathered there on the more arable or easily intensifiable land. Finally, the newly arisen elite is assumed to derive from (unselfish) managerial leadership.

At a glance, some of these assumptions seem incompatible with the theoretical frameworks based on long-term comparative studies that are outlined above. Thus, each premise or implication seems to need, on the one hand, intensive reasoning about household economic patterns, and on the other hand, extensive investigation to demonstrate the close, positive correlation between the regional settlement hierarchy and the distribution of arable land.

However, the model was not built on the basis of empirical data or rigorous analysis, but rather on the chronological coincidence between intensification of rice production and the other factors described above, in a vaguely defined vast region. Therefore, it is hard to say whether this kind of model accurately reflects an empirically observable relationship between sociopolitical changes and agricultural intensification. In addition, the assumptions upon which the model is based are still open-ended issues needing thorough testing preceded by appropriate data collection.

Most of the currently available data that contributed to shaping the model discussed above were obtained from archaeological rescue projects in which the selection of sites to be excavated depended on the locations of large-scale construction projects near modern cities. As a result, regional studies that can place such sites in a larger-scale context are rare.

Fuller understanding of the relationship between intensification of rice agriculture and regional sociopolitical change in the MBA of central western Korea requires systematic study of the regional distributional patterns of the evidence as a complement to such things as the identification of small parts of paddy plots through excavation of restricted areas.

The regional study discussed here includes defining the variables taken to indicate the regional growth of sociopolitical complexity and the intensification of rice agriculture, as well as appropriate analytical units for estimating variation in those variables. This makes it possible to explore the spatial correlations of the variables representing the different but synchronic socioeconomic phenomena named above.

In archaeological research, social complexity has usually been measured on the basis of distinctive patterns at two levels of social organization: interpersonal (or interhousehold) differentiation within a community and intercommunity differentiation within an overarching regional polity. The identification of social complexity has depended on inherited personal inequality and functional differentiation between communities indicated in hierarchical regional settlement systems. Therefore a relationship between developing chiefly regional organization and agricultural intensification should be, in part, indicated by variation in regional distribution patterns of indicators of intensive agricultural technology in relation to the regional hierarchical settlement system. In this case, the analytical unit would be individual community. On the other hand, this relationship would be indicated by documentation of intra-community patterns of differential distribution of wealth and/or status.

The main analyses of this dissertation begin by reconstructing the hierarchical regional settlement system composed of local communities (Chapter 4). Next I explore the variation in regional distributional patterns of archaeological evidence related to production and distribution of wet rice (Chapter 5). Finally inter-household wealth variability is assessed within individual communities, each situated in a different position in the regional settlement hierarchy (Chapter 6).

2. ORGANIZATION OF INTENSIVE RICE AGRICULTURE AND RESEARH QUESTIONS

2.1. SOCIOPOLITICAL ORGANIZATION OF AGRICULCURAL INTENSIFICATION

The archaeological literature on the evolution of agricultural production has addressed two major issues. One concerns the causes of agricultural intensification, mostly questioning whether population pressure caused intensive agriculture or perhaps resulted from it (Boserup 1965; Spencer, Redmond and Rinaldi 1994). The other is the relationship between complexity of social organization and intensive forms of agricultural production. Much of this discussion has involved criticism or revision of the "hydraulic hypothesis," which is based on the assumption that canal irrigation systems require centralized management and provide opportunities for centralized control (Parsons 1991; Steward 1955; Wittfogel 1957). Critiques of Wittfogel's premise typically come from a bottom-up perspective, while proponents of a top-down perspective favor revisions of the Wittfogel approach that remain more consistent with its original character (Chambers 1980; Erickson 1993; Scarborough 1991).

2.1.1. Top-Down Approaches versus Bottom-Up Approaches

In the extreme top-down perspective built on Wittfogel's version of "Asiatic Mode of Production" (1955, 1957), centralized administrative organization, managerial leadership, large-scale labor pooling, and groups of users beyond the household and community level are emphasized. The underlying premise claimed by Wittfogel was that the irrigation systems where strong ancient states developed, in general, are large-scale and therefore cover vast areas. Wittfogel discounted the possibility that acephalous communities could manage these systems. Especially in arid regions where water represented a scarce resource, or in risky regions where disastrous flooding frequently happened, hydraulic management involving state elites' control, which appeared despotic in nature, triggered the emergence of complex social systems. Oriental despotism, in this framework, is characterized by the hydraulic hypothesis.

Top-down approaches have often been seen in state-level organization of the construction and maintenance of intensive agricultural facilities, such as terraces (Conrad and Demarest 1984; Sanders et al. 1979), large-scale irrigation (Adams and Jones 1981; Price 1971; Sanders and Price 1968), and more recently and rigorously, raised fields (Kolata 1986, 1991; Parsons1991; Sanders et al. 1979).

Constant revision of the hydraulic theory, or at least strong advocacy of the fundamental premise of the theory, despite a lot of reactive criticism, has arisen from the undeniable chronological association between large hydraulic systems and the development of state organizations in some sequences. For example, in the Basin of Mexico, the complex engineering of intensive agricultural systems including raised field technology utilized in conjunction with various forms of irrigation has been argued to be under the management of the state-level apparatus (Price 1971). The utilization of raised field technology in the lowland Maya area has also been related to the development of an administrative system, perhaps of a feudal sort (Adams and Jones 1981; Scarborough 1993).

In a similar light, the expansion and abandonment of raised field systems around Lake Titicaca are explained mostly in association with the rise and decline of the Tiwanaku state

(Kolata 1993; Janusek and Kolata 2004). The complexity and size of raised fields has been considered to require involvement of the Tiwanaku state bureaucracy. Evidence of this connection has been sought in the form of managerial site location at strategic places in the regional settlement system. Even accepting such evidence, different perspectives have been espoused on the way elites controlled actual production and distribution. Stanish (1994) emphasizes an opportunistic elite strategy in which the whole spectrum of production was not directly managed, but rather incentives were provided to primary producers to intensify existing technology or elites themselves engaged in restricted agricultural intensification specifically aimed at producing surplus to fund the political economy. Although Stanish finds some incompatibility between the original hydraulic hypothesis and his interpretation of patterns in Tiwanaku's hinterland, he does not totally dismiss its underlying theoretical construct.

Nowadays most scholars do not agree with the original hydraulic hypothesis and are suspicious of the alleged causal relationship between hydraulic technology and state organization (Stanish 1994). Many ethnographic studies provide richly detailed information on the social technology of contemporary irrigation systems and are generally critical of the original model as put forward by Wittfogel (Butzer 1977; Geertz 1980; Hunt and Hunt 1974; Gelles 1990). The denial by the extreme top-down approached of the capacity of individual households or small local communities to utilize intensive technology has been repeatedly pointed out as problematic. Nevertheless, scholars are reluctant to dismiss the idea altogether, because of the chronological correlation often seen between state-level complexity and utilization of intensive agricultural technology (Stanish 1994). Especially when the top-down models' theoretical constructs are applied to the less complex social organization of societies such as chiefdoms where coercion is less than in state-level societies, more or less direct management of intensive agricultural production could be more effective than other alternatives for elites to insure some degree of productivity for their own interests.

Appling theoretical constructs developed in the study of state-level societies to chiefly organization requires some rearranging of the original formulation, but the core elements, such as the elite's direct management of intensive agricultural production, and the complexity and scale of agricultural facilities, are not dismissed. The development of complex chiefly organization associated with agricultural intensification in the Mediterranean (Gilman 1981, 1991, 1995; Kristiansen 1991), northern South America (Delgado-Espinoza 2002; Denevan 2001), and Hawai'i (Earle 1977, 1978; Kirch 1984) that was has been explained from the top-down viewpoint. Besides agricultural production, the chiefly elites' direct intervention in other dimensions of economic activities, such as craft specialization, long-distance exchange, and so on, has long been considered in the archaeological literature (Earle 1991; Feinman 1995; Ames 1995)

In contrast, the bottom-up perspective has emphasized local organization and small-scale facilities that can be handled by single households. Sometimes, in studies of this sort, all the key elements of the original hydraulic hypothesis are denied. In fact, many ethnographic and archaeological studies report small or even large-scale systems of intensive agricultural technology that have been initiated and maintained by local communities and households in the absence of population pressure or the intervention of state-level administrative systems (Erickson 1993; Geertz 1980; Gelles 1996; Lansing 1991).

In terms of organization of irrigation, many contemporary and prehistoric societies show substantial variety in complexity and scale and also in alternative organizations managing the irrigative systems. The Balinese 'water temple' network system (Geertz 1972; Lansing 1991) has been frequently named, by proponents of bottom-up perspectives, as a good example of an irrigation system managed by segmented entities without any centralized authorities' intervention. Even in areas where the traditional archaeological view is of irrigation systems intimately connected with state-level administration, for example Mexican *chinampas*, the local communities' roles are sometimes emphasized (Delgado-Espinoza 2002).

In the archaeological literature, the bottom-up perspective has been strongly supported by the notion of the economic autonomy of the household as a basic unit of most pre-capitalist agrarian societies (Bermann 1994; Hendon 1996; Netting 1993a; Netting, Wilk and Arnould 1984; Wilk 1983, 1988). Not only can individual households or kin-based groups manage steady-state intensive agricultural systems without 'external intervention', some experimental research reveals that the initial construction of the relevant facilities does not always need supra-household level labor input (Erickson 1993; Farrington 1980).

Most bottom-up versus top-down debates so far have clearly been centered on state-level societies. Meanwhile, bottom-up approaches to chiefly organization simply emphasize small rural communities' or even individual households' capacity to manage their agricultural production and organize their labor, in a context without state coercion.

However, if external involvement of some sort－whether severe coercion, persuasion, manipulating belief systems etc.－in individual households' participation into intensive agricultural production seems likely, based on Chayanov's notion, it seems doubtful that agricultural intensification is purely a result of the autonomous decision-making of individual households. The chronological coincidence of the emergence of complexity and agricultural intensification at the regional-level cannot be fully understood, as simply spontaneous and simultaneous participation of individual households. It is nevertheless undeniable that the individual producer households might have been the main constituent of actual production and they could have autonomously and independently decided to intensify their productive system. In addition, considering that the top-down approaches have underestimated the household-level decision-making and role in the regional level socioeconomic changes, this perspective still merits scrutiny.

Reviewing current debates on organizational complexity pertaining to agricultural intensification, we see that there is considerable variety in estimating the specific sociopolitical organization of agricultural intensification under study, and much of the recent literature on this subject does not dismiss the possibility either of a centralized political economy that intervenes in the local domestic economy or of the autonomous character of rural peasant households.

In this light, it is possible to see these two alternative views as the opposite ends of a sociopolitical continuum (Erickson 1993; Delgado-Espinoza 2002; Scarborough 1991) rather than as two irreconcilable alternative interpretations. Combining the two perspectives is essential for a complete explanation of how changes in regional patterns of agricultural intensification and increasing sociopolitical centralization could be related to each other (Stanish 1994). Such a combination can be accomplished by focusing on actors in different social positions and on the interactions among the strategies they pursue to accomplish their differing objectives (Bourdieu 1977; Brumfiel 1994; Drennan 2000; Giddens 1979; Hastorf 1993; Ortner 1984).

As many archaeological approaches to prehistoric political economy have pointed out, as an aggrandizing elite's strategy, controlling and alienating domestic labor (Pauketat 2000a, 200b; Sahlins 1972) was conceived of as a key in generating the surplus that funded the newly emerged sociopolitical institutions. How that regional politico-economic process incorporated the subsistence economy would be revealed by understanding the practice of intensive agriculture in relation to the aggregation of population into some settlements and the emergence of significant variation in the population size of individual settlements or communities, that ultimately established a regional settlement hierarchy. Emergent complexity without severe coercion and state-like administrative apparatus would have been a more dynamic process than with state-level society and direct elite management. Peasant households' autonomy could have been expressed according to community position in the regional settlement hierarchy. From the political standpoint, elites would mainly promote nucleation (de Montmollin 1987), despite the fact that intensive care for crops favors dispersal (Drennan 1988).

A closer look at the current debates also reveals that one can see both centralization or local autonomy working in even the same trajectory's patterns. The picture may carry sharply at different levels of analytical focus. Thus, for better understanding of the relationship between sociopolitical complexity and agricultural intensification, it is necessary to incorporate a series of analysis of the patterns at varying scales of socioeconomic organization, such as the regional polity, the community and the household.

2.1.2. Understanding Rice Agricultural Intensification

In attempting to place a specific sociopolitical organization of intensive agriculture along the continuum between the extremes of top-down and bottom-up approaches, research commonly focuses on several dimensions of archaeological information: the abundance of agricultural resources (most importantly productive land), the necessity of short-term massive labor input, and the distributional patterns of inter-household wealth/status variability. Among these, evaluating the necessity of short-term massive labor input has generated minor differences in selection of variables to represent the amount of labor required. For example, in the Intermediate

Area, where top-down and bottom-up approaches to raised-field production have been vigorously researched and debated, some researchers focus on the size and complexity of raised-field plots, while others emphasize the scale of the irrigation canal system (Kolata 1993; Erickson 1993).

Different researchers have made varied selections of variables. In order to select proper variables, we need to understand what kinds of environment limitations needed to be overcome by intensive technology for enhancing the productivity of particular cultigens. In this light, it is critical to understand the technological aspects of wet-rice cultivation so as to understand where massive input of labor might be needed.

Although rice had been cultivated since Late Neolithic, it was not native to central western Korea (Ahn S.M. 2000; Chi G.G. and Ahn S.M. 1983; Im H.J. 1990; Kim J.H. 1997; Lee G.A. 2003; Nelson 1999). Therefore, intensification of rice agriculture in the MBA must be understood in the context of a centuries-long tradition of producing and consuming rice. The MBA residents of central western Korea were already knowledgeable about rice cultivation and its soil requirements. Rice is very nutritious and highly productive per unit area. Moreover, it is very palatable and easily cooked as various forms of feasting foods (e.g. drinks, rice cakes). It appears as a luxury cereal in some East Asian historical documents (Bray 1986; Ohnuki-Tierney 1995; Lee C.N. 1991). Although some dry varieties can be grown on steep hillsides through shifting cultivation, rice is by nature a swamp plant and continuously higher levels of productivity can be obtained from wet-rice cultivation (Ahn S.M. 1999; Bray 1986; Lee C.N. 1992). These advantages however, come at the cost of much greater investment of time and labor, and higher risk due to climatic fluctuations compared to slash-and-burn agriculture. Cultivating wet rice is critically affected by water supply and soil characteristics (e.g. natural fertility and structure of soil) (Barnes 1990; Bray 1986; Kawaguchi and Kyuma 1977). Therefore, wet-rice cultivation involves selection of particular soil types, reliable water sources, and often labor-intensive or capital-intensive infrastructure such as diked fields, irrigation canals and wells or reservoirs to maintain moisture during the growing period and to buffer fluctuations of precipitation. Maintaining moisture levels in a monsoon area during a five-month growing period (the longest among major staple crops) requires farmers' continuous labor. Building a diked field does not seem to require organized supra-family cooperation. In pre-modern East Asian societies, the optimal irrigated field size is less than 0.1ha, even in swampy lowland areas. Thus, leveling and terracing for a single field (sometimes with stone walls and wooden boxes to avoid soil loss) could have readily been handled by a single household (Bray 1986).

Water control, on the other hand, can include irrigation, drainage, and/or flood control and may well require quite large-scale organized labor pooling. Drainage and flood control, especially, may call for particularly extensively organized cooperation (Bray 1986), depending primarily on the location in the local drainage system or channel network (Smart 1972; Strahler 1963). Irrigation can be carried out on almost any scale from a household to a whole regional polity, according to how big the water source is and how it is used (Kwak J.C. 1993). At the household level, a location in the flood plain of a high order stream is undesirable because of the risk of flooding during the monsoon season and the need for large-scale irrigation systems. Based on ethnohistoric research, a single ancient Korean household can barely manage 0.16 ha of paddy field even in the 8th to 9th century A.D. when labor productivity was higher, the state-sponsored irrigation system was better equipped, and subsistence more dependent on rice production than in the Bronze Age (Kim T.Y. 1994; Lee H.C. 1994; Lee J.B. 1999). Parcels of this size are easily irrigated with water from smaller than first-order streams (Kwak J.C. 1993, 2001), and canals for bringing water to such small fields seem not to require a labor force beyond a single household (Farrington 1980).

2.2. RESEARCH QUESTIONS AND ARCHAEOLOGICAL IMPLICATIONS

The central question to be answered in this research is how agricultural intensification was organized and controlled when it began in the MBA, in terms of a continuum with top-down and bottom-up strategies as the two ends.

If a top-down strategy by elites managing primary agricultural production appeared in the MBA archaeological settlement evidence might include some or all of the following:

TD 1 There would be a strong positive association between higher-level administrative sites in a settlement hierarchy and lands that are suitable for wet-rice cultivation and therefore intensifiable (Drennan and Quattrin 1995). MBA communities high in the settlement hierarchy would have catchment areas with larger proportions of land suitable for wet-rice cultivation than communities in the lower tiers of the regional settlement hierarchy.

TD 2 Communities located adjacent to high order streams should be high in the regional settlement hierarchy. These would be the administrative centers where the large labor forces needed for the construction of flood control facilities and irrigation works would be organized and mobilized. It is irrigation, drainage, and flood control directly involving higher order streams that would have been beyond a single household's needs and capabilities. In a top-down system, higher order streams would be the large water sources that were shared to irrigate possibly small patches of arable land.

TD 3 There would be relatively little inter-household variability among the majority of households, but a small number of households of sharply higher status would show much greater concentration of wealth. Elite control would restrict the unequal development of wealth among non-elite households, which would lack incentives to compete among themselves (Hastorf 1990). On the contrary, strong wealth differentiation may be seen among villages as a function of abundance of land suitable for wet-rice cultivation in the catchment area rather than among households.

If MBA intensification of wet-rice cultivation occurred through a bottom-up strategy arising from autonomous households whose purpose in raising yield is accumulation of their own wealth, the archaeological record might show some or all of the following:

BU 1 There would be little association between higher-level sites in the regional settlement hierarchy and land most suitable for intensive wet rice cultivation. Higher-level sites would, instead, tend to be located for ease of tribute collection and management of non-agricultural tasks. Such locations might be in coastal areas or at junctures of ancient transportation routes. Aggregation of sites around higher-order centers would be relatively weak. Instead, the tendency would be for small sites to be dispersed through soils suitable for paddy fields, so that individual family cultivators could make most efficient use of their time and the lands, avoid social conflicts, and claim property rights over the intensively cultivated lands (Drennan 1988; Earle 1991; Gilman 1995).

BU2 Sites would tend to avoid flood plain land adjacent to higher order streams. This would minimize risks from flooding during the monsoon season. Water sources would usually be lower order streams, which would be more easily handled by single households' water management capabilities. Even near higher-level sites, each small paddy field would be organized so that water was provided from a source exploitable with a small-scale labor force.

BU3 There would be high variability among households, which would scale along a continuum from poor to wealthy rather than sort themselves into sharply different poor or wealthy categories. This would result from the different productive capabilities of each independent household, which would be encouraged to exert effort to its own benefit.

3. NATURAL AND CULTURAL SETTINGS OF THE RESEARCH AREA

The region called 'central western Korean Peninsula' has been defined differently among researchers. However, when we discuss MBA socioeconomic patterns that are archaeologically reconstructed, many archaeologists place Chungnam (South Chungcheong) Province (Figure 3.01) in the center of it. One of the reasons that the region has been of more concern than any other region is because the southern part of Chungnam Province was thought to be the first region where Songgukri Culture, equivalent to MBA material culture in the central and southern Korean Peninsula, first emerged. The questions set forth in the previous chapter will be tested with regional settlement data that comes from parts of Seocheon and Buyeo Counties and Nonsan City, located in the southern Chungnam Province (Figure 3.02). Before discussing the geography, soilscapes and hydrology of the research area in detail, I present a brief introduction to the natural environment of the Korean Peninsula and Chungnam Province.

3.1. NATURAL ENVIRONMENT

3.1.1. Brief Introduction to the Natural Environment of Korea and Chungnam Province

Korea is a peninsula that borders China and Russia to the north and is surrounded by seas, the Yellow Sea, the East Sea (also called the Japan Sea), and the South Sea. Its coastal landscape can be characterized as very long and complicated-a typical ria-type- coastline and numerous islands, except for the east coast which is monotonous due to geologic upheavals. The territory of Korea, including 3000 islands varying in size, lies between 124° and 132° east longitude and 33° and 43° north latitude and covers about 221,000 km^2. The peninsula itself is approximately 1,000 km long and 175 km wide (Figure 3.01).

Although, from the global scale tectonics perspective, the Korean Peninsula, like the Japanese archipelago, is located on the very edge of the Northwest Pacific mobile belt, corresponding to part of the unstable Circum-Pacific Volcanic Zone, it was formed together with the old, geologically stable Asian continent. Thus, unlike Japan in terms of tectonics and the composition of rocks from the period of land formation, the geological system of Korea is largely old and stable. The most prevalent rock strata, making up altogether 70% of Korean territory, are gneiss and granite, which formed in the Precambrian and Paleozoic eras, respectively. Mostly the tectonic structure of the peninsula (Figure 3.03) had been formed far prior to the Cenozoic Era, and volcanic terrain stemming from the Quaternary is quite limited in extent (Table 3.01).

As indicated by the two Chinese characters, '高麗 (Koryo)' – literally mean "high mountains and splendid waters – which is transliterated as its current English name, Korea, the land is best characterized geomorphologically as 'a land of lofty mountains and numerous rivers' (Kwon H.J. 2000). Approximately, 70% of Korean territory consists of mountains and hills, with most elevations less than 600m above sea level. To large extent, two major ranges, Taebaek and Nangrim form the backbone of peninsula along the east coastline, as well as do many smaller ones running from the northeast toward the southwest. Rugged landscapes constituted by steep sloped peaks, patches of small plains, and small rivers typical all over the country (Figure 3.4).

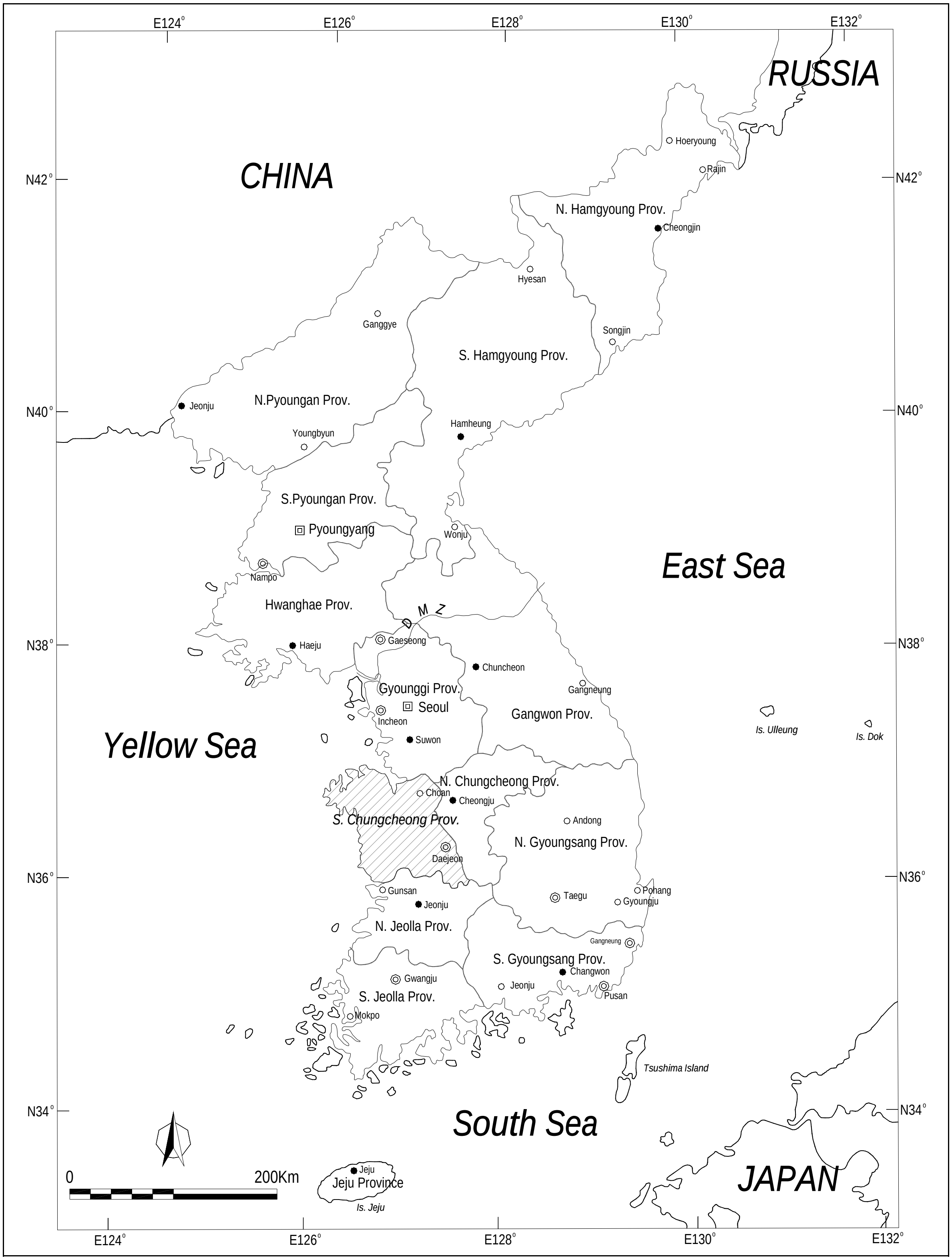

Figure 3.1: Administrative Division of Korea

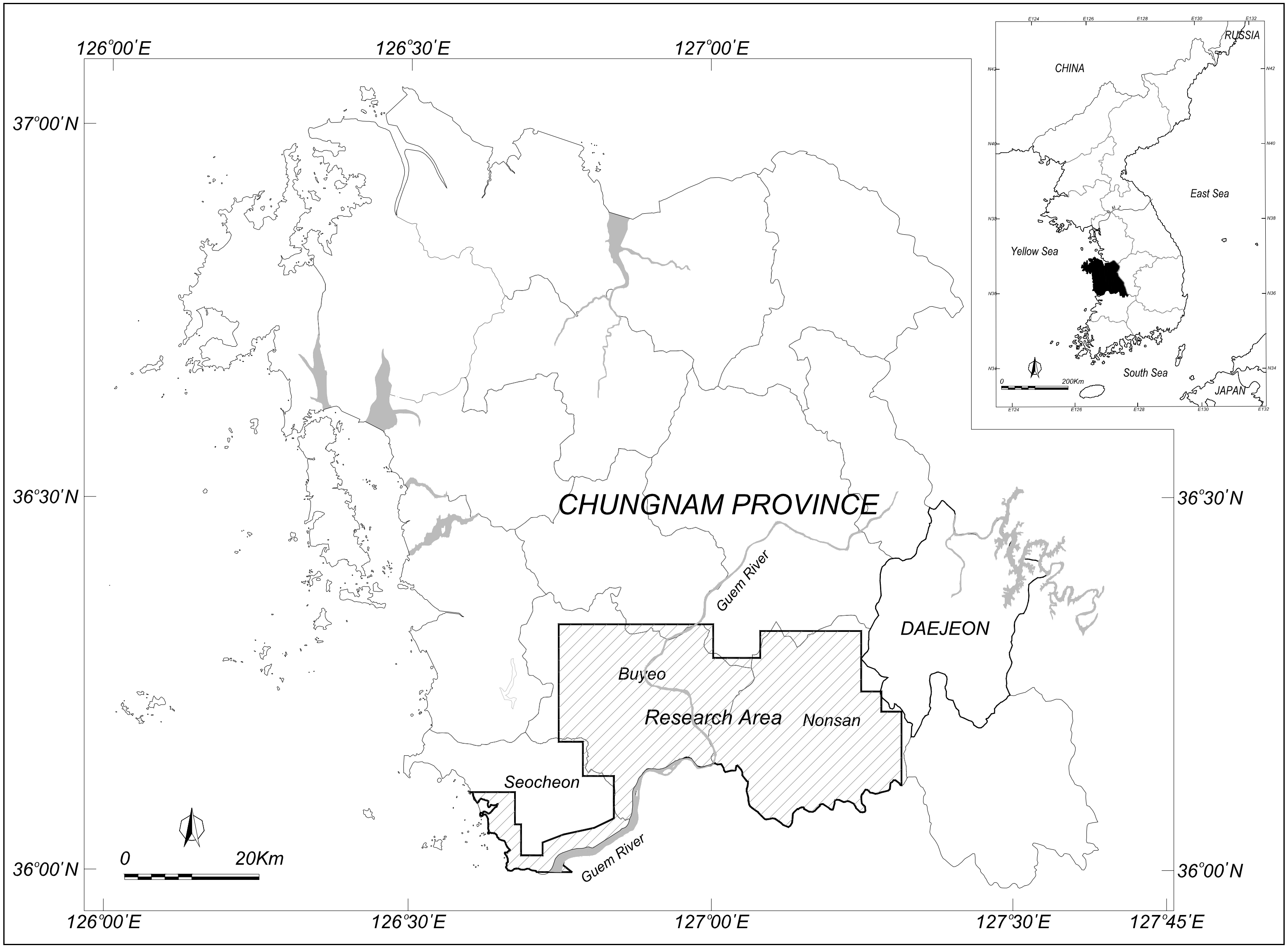

Figure 3.2: Location of Research Area

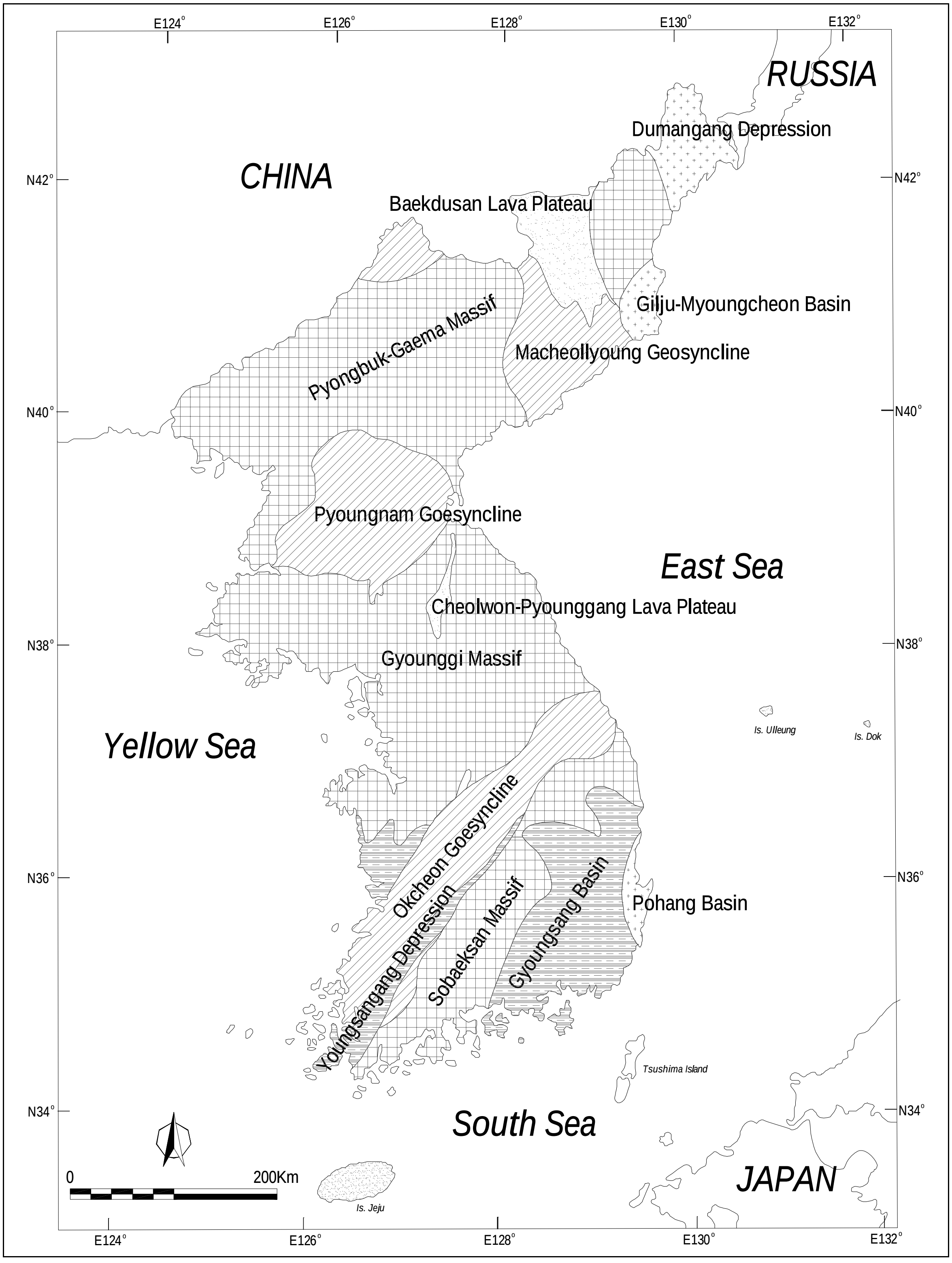

Figure 3.3: Tectonic Structure of Korean Peninsula

Table 3.1: Geologic System of Korea

Age		***Stratigraphy***		***Orogeny and Sediment Environment***
Cenozoic Era	*Quaternary*	Quaternary System	Holocene Deposit	<Terrestrial Deposit, Volcanic Activity>
			Pleistocene Deposit	<Coast and Marine Deposit, Volcanic Activity> ——Bulguksa Disturbance—— (Intrusion of Bulguksa Granite) Volcanic Activity <Terrestrial Deposit> —Daebo Orogeny: Intrusion – of Daebo Granite <Terrestrial Deposit> —— Songnim Disturbance—— <Terrestrial Deposit>
	Tertiary	Tertiary System	Yonil Series	
			Janggi Series	
Mesozoic Era	*Cretaceous*	Kyongsang Supergroup	Yuchon Group	
			Hayang Group	
			Sindong Group	
	Jurassic	Daedong Supergroup	Tansan Group	
			Chungnam Group	
	Triassic	Pyongan Supergroup	Nokam Series	
			Gobangsan Series	
Paleozoic Era	*Permian*		Sadong Series	
			Hongjom Series	
	Carboniferous	Strata Free Period		
	Devonian			
	Silurian			
	Ordovician	Choson Supergroup	Great Limestone Series	<Marine Deposit>
	Cambrian		Yangdok Series	
Precambrian Era		Sangwon System		Granitic Gneiss
		Machollyong System Kyonggi Gneiss Complex Yonchon Group Sobaeksan Gneiss Complex		Granitic Gneiss

*After Jo W.R. (2000: 33)

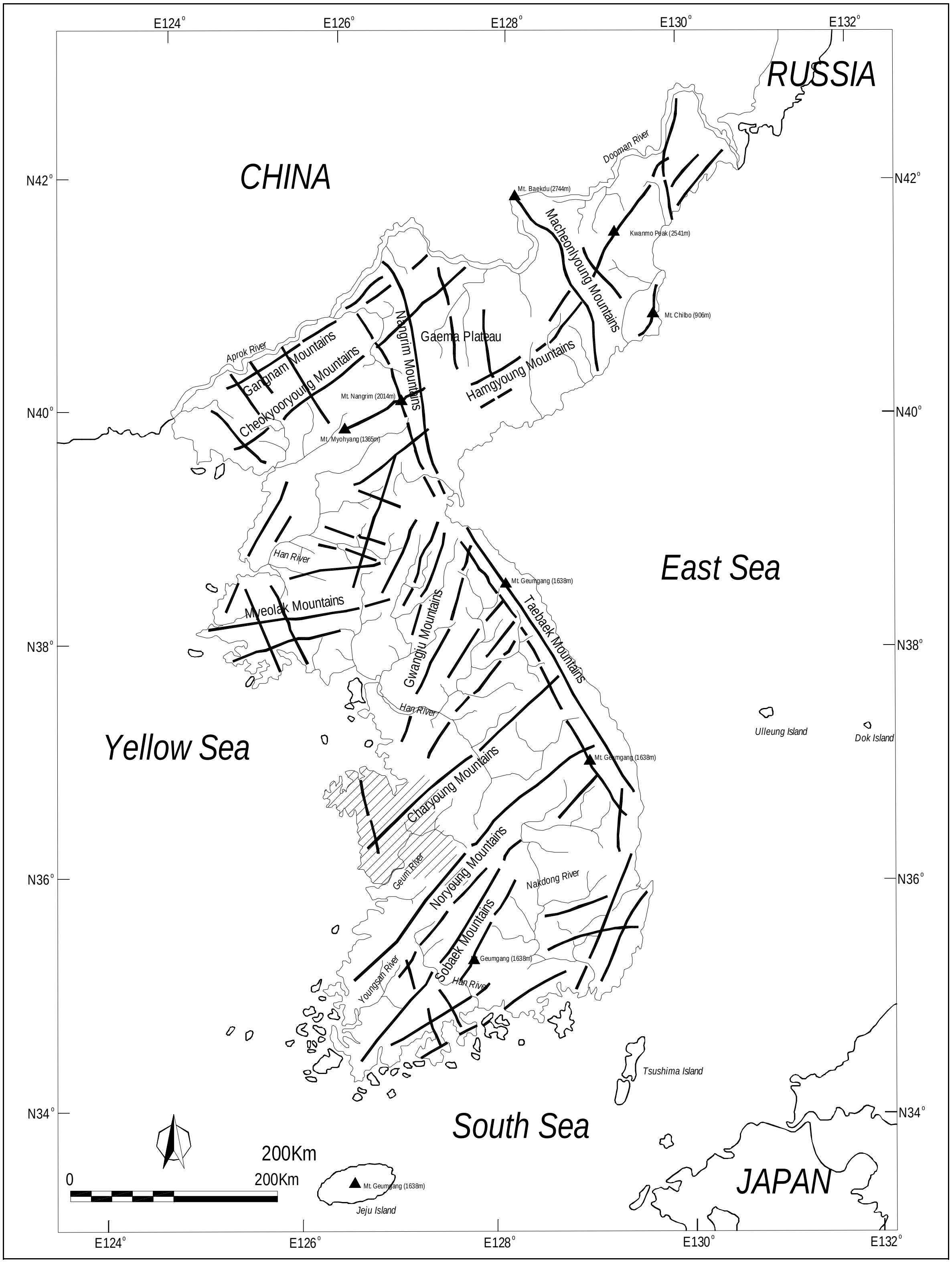

Figure 3.4: Mountain Networks and Major Rivers of Korean Peninsula

Although small areas of flat land in canyon bottoms are numerous, the plains that comprise around 30% of the peninsula's area are found in the lower reaches of large rivers running toward the west or south. Since the Korean Peninsula has remained stable for a long geological period, the drainage network is fully developed and the rivers have mostly gentle, longitudinal profiles without kickpoints that could create rapids. Moreover, the rivers strongly reflect geological alignments, and are mostly constrained by steep peaks, so that sharply incised narrow meanders meeting at right angles are often observed, especially in the Geum and Nakdong rivers.

The Korean Peninsula has four seasons, with long summers and winters, and relatively short springs and autumns. Due to the cold winds generated by the Siberian High during the winter, the mean annual temperature (Figure 3.5) is lower than other regions at the same latitude, such as Japan, Turkey and Italy.

The annual precipitation of Korea, averaging 1,190 mm, varies because of the local influence of landforms, but mostly diminishes from south to north (Figure 3.6). More than 60% of the annual rainfall is concentrated in the summer, especially in the monsoon season of July (Figure 3.7). Therefore, the mountainous regions adjacent to the southern coast suffer severe and frequent floods during the summer.

The climax vegetation of the Korean Peninsula is forest, which is divided into three subgroups: boreal, temperate, and subtropical (Figure 3.8). Although the composition of forests differs from region to region, mostly depending on climate, today's forest zonal patterns do not correspond well to climatic zones, due to the long history of human occupation and intervention in natural forests (Lee H.Y. 2000).

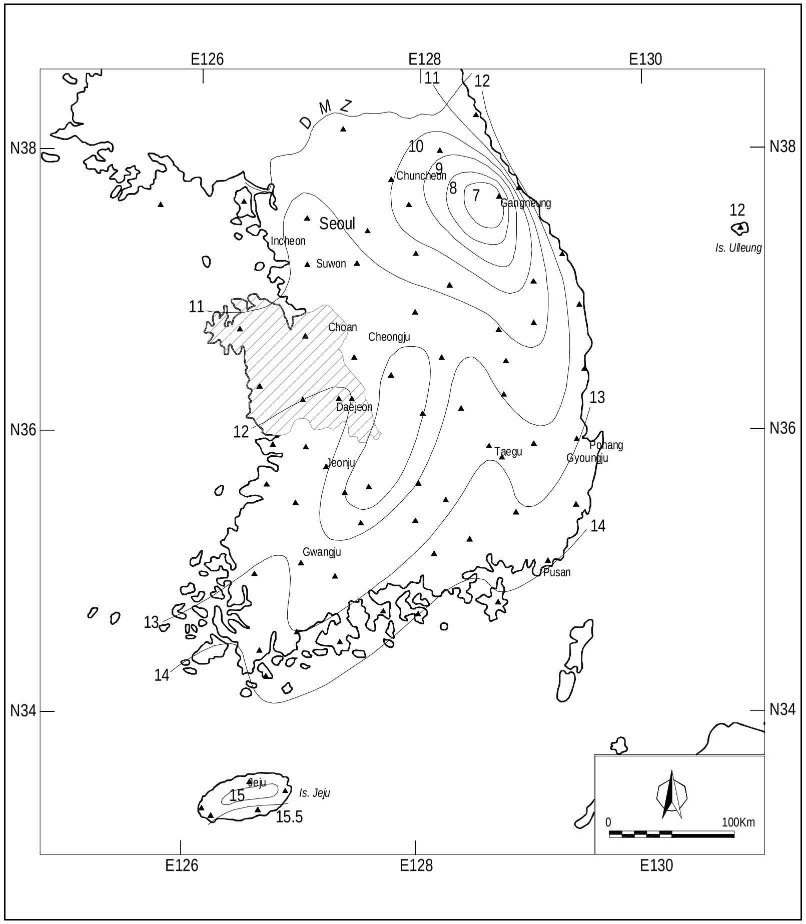

Figure 3.6: Annual Mean Temperature of South Korea

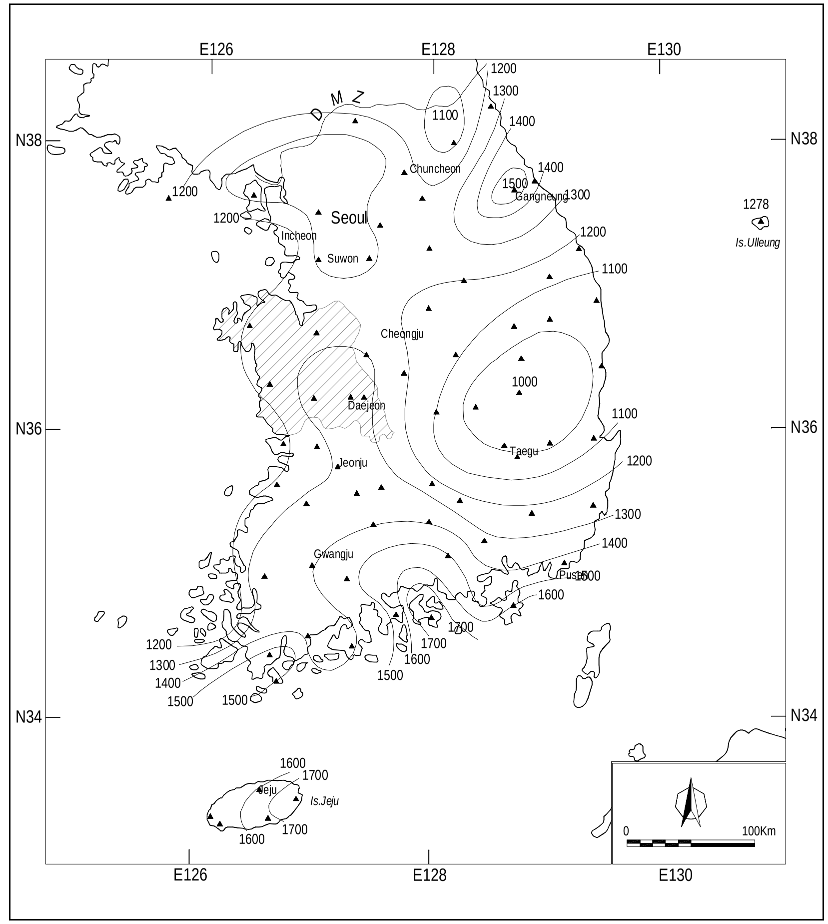

Figure 3.5: Annual Precipitation of South Korea

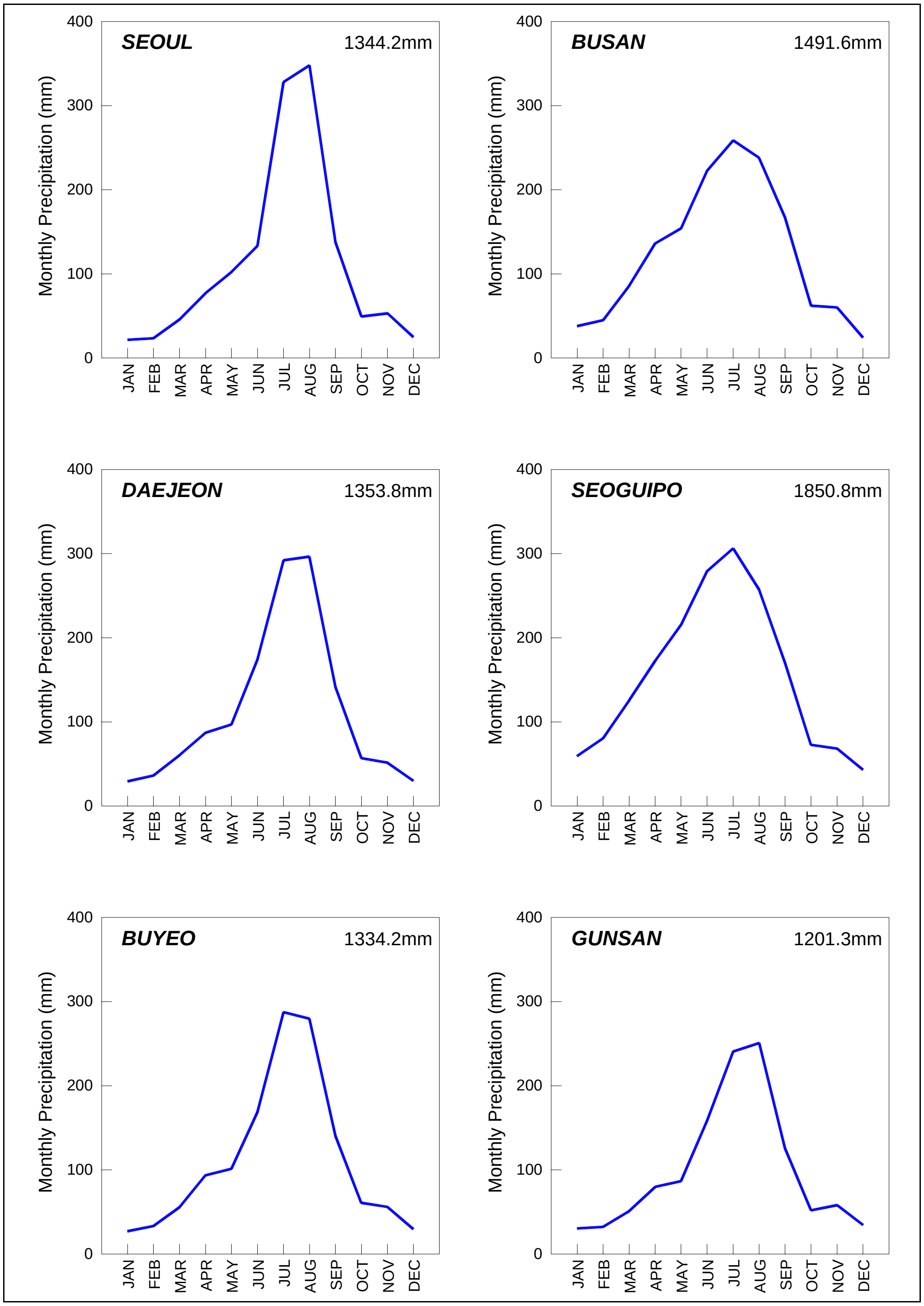

Figure 3.7: Monthly Normal Precipitation of Six Cities. Data from Korea Meteorological Administration: the normal precipitation values are obtained from the means of 30 years from 1971 to 2000. The patterns of Buyeo and Gunsan provide quite close information for estimating distribution of monthly precipitation of the research area.

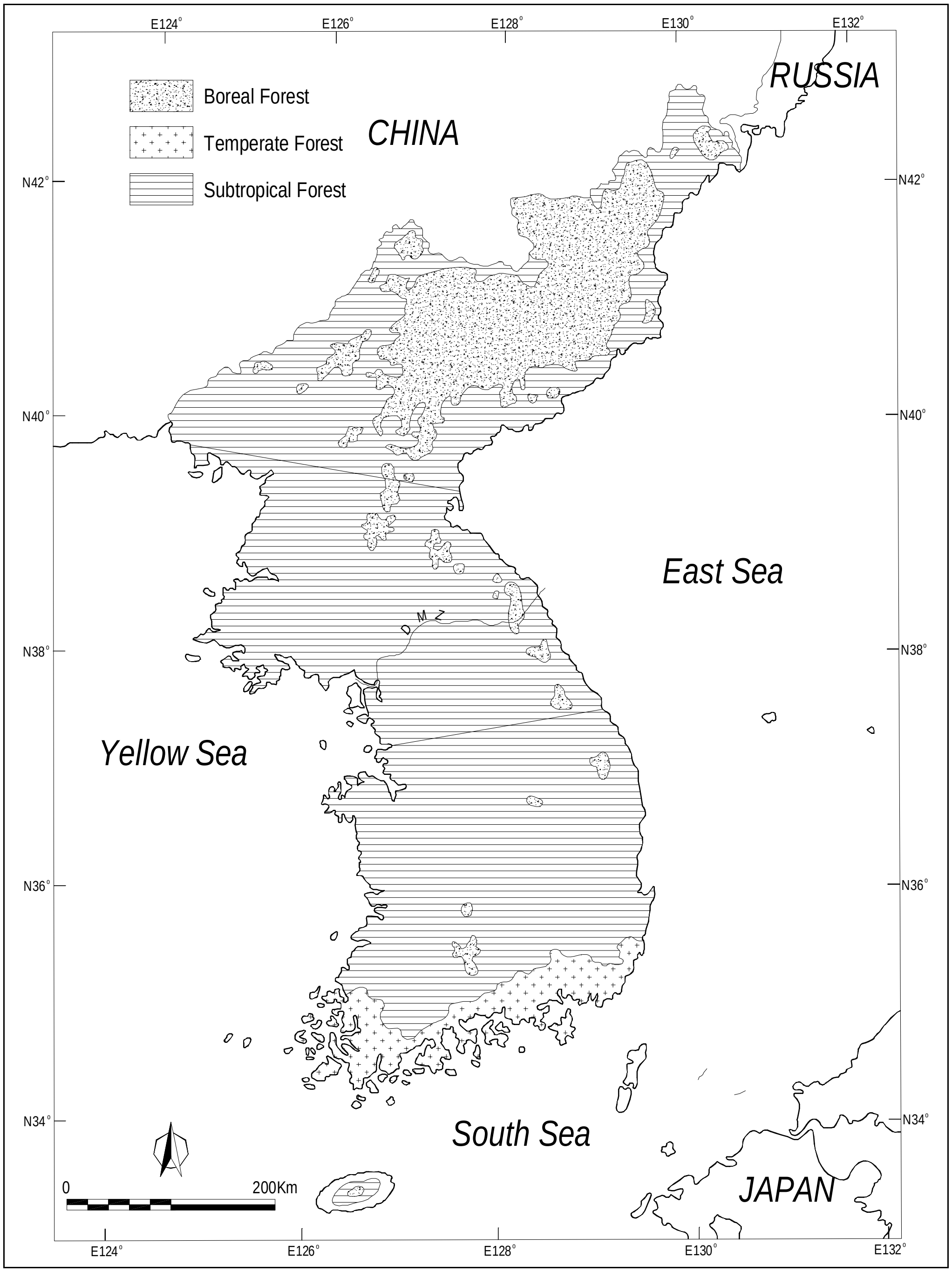

Figure 3.8: Distribution of Forest in Korean Peninsula

The current major administrative division of Korea is largely based on the *Pal Do* (Eight Provinces) system, although most provinces have been subdivided into north and south halves, and some big cities, including Seoul, the capital, have been classed separately as metropolitan cities. The provincial boundaries to a large extent reflect two principal geographical factors, major rivers and mountain ranges, so that individual provinces are more or less geographically separated from each other.

Chungnam Province is delimited from Gyeonggi, Chungbuk, and Jeonbuk by the Anseong River, the Charyoung and Noryoung mountain ranges and part of the Geum River; to the west it faces the Yellow Sea. The provincial territory reaches 8,853 km^2 which is equivalent to 8.9% of the national territory. Gneiss and metamorphic rocks constitute the province's geological foundation (Figure 3.09).

The northeastern part of the province is largely mountainous but, in comparison to other provinces, is not so high. In fact, Chungnam Province shows the lowest proportion of land 100 m or higher among all the provinces, and has no mountains higher than 1000 m. The major river in the province is the Geum River, which forms, with its numerous tributary streams, a major drainage system (Figure 3.10). Although the province's annual temperature is 12°C-25°C and the regional variation is not so critical, during the winter, the coastal area is largely warmer than inland. Annual average precipitation ranges from 1,150 to 1,350 mm, and is substantially higher than the national overall average.

With reference to agricultural practices, Chungnam, from an overall peninsular perspective, belongs to the "mixed farming region"-an intermediate category between the northern dry-farming and the southern wet-farming systems (Figure 3.11). However, the southern part of the province, in which this research is located, has long been one of the most productive regions for wet-rice agriculture.

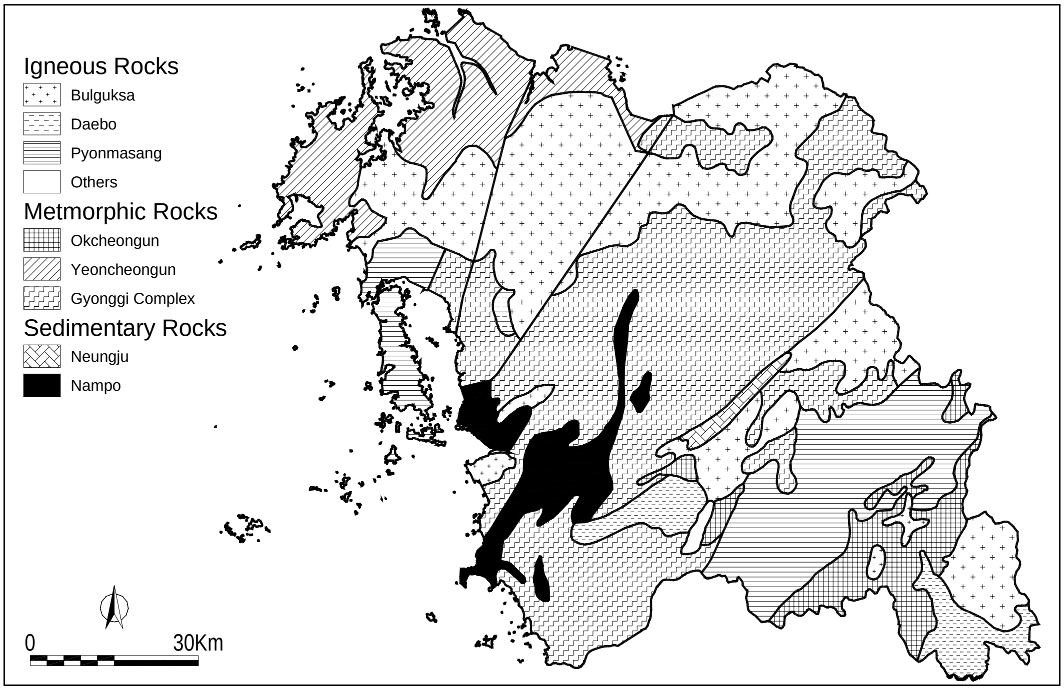

Figure 3.9: Tectonic Groups of Chungnam Province

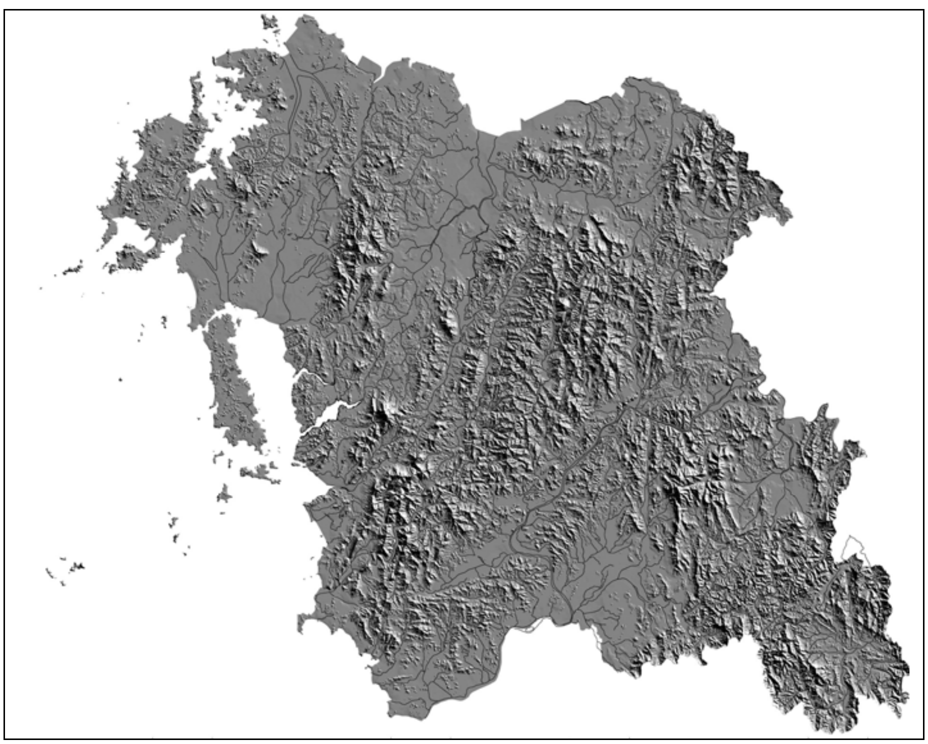

Figure 3.10: Geomorphology and Hydrological Systems of Chungnam Province

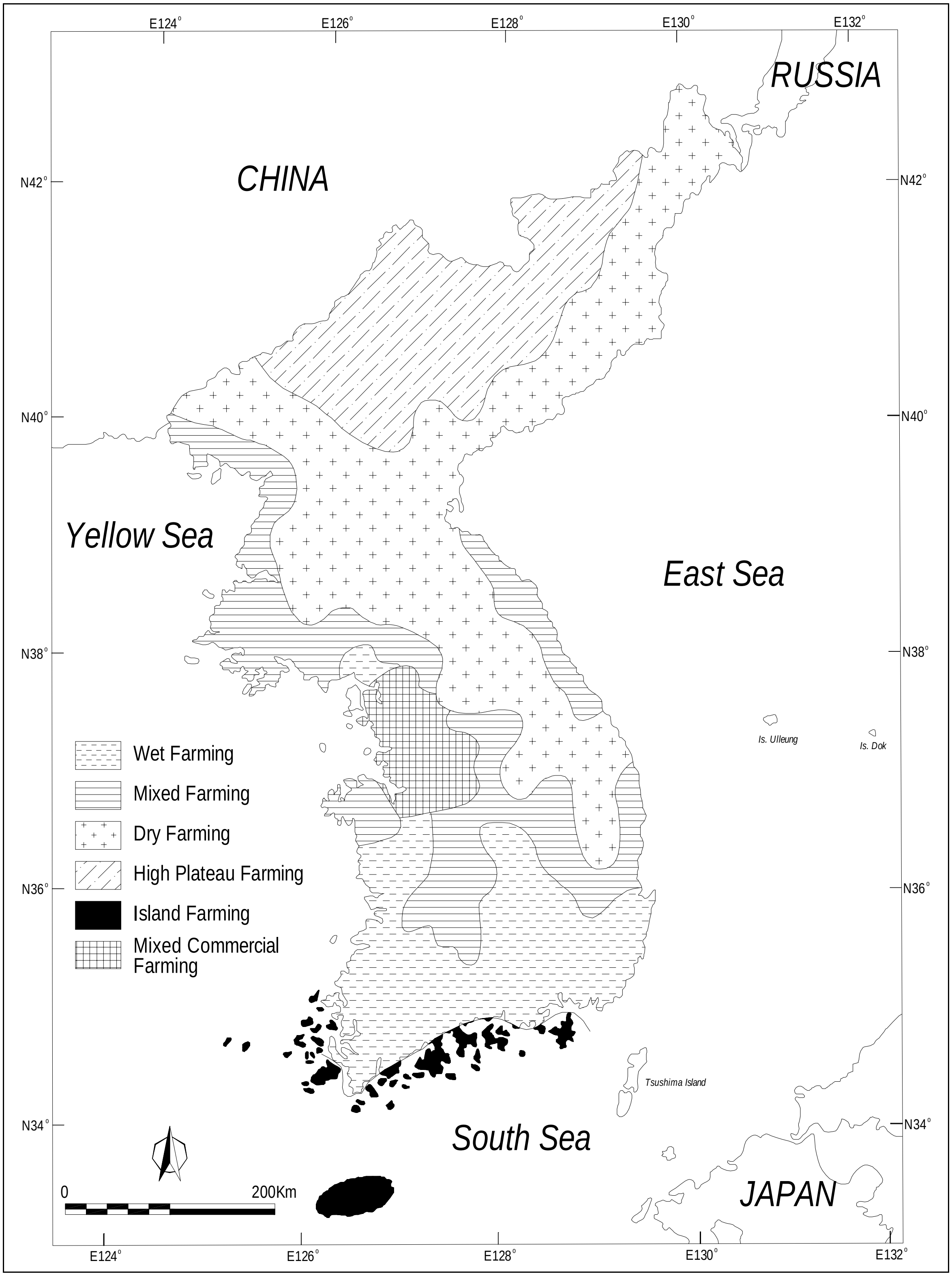

Figure 3.11: Agricultural Regions of Korean Peninsula

3.1.2. The Natural Environment of the Research Area

3.1.2.4. Geography and Climate The research area covers part of the middle and lower reaches of the Geum River, where the major plains of Chungnam Province are concentrated. Its southwestern part, including the coastal zone, represents relatively low elevation and is surrounded by a more or less mountainous zone forming marginal parts of the Charyong mountain ranges (Figure 3.04 and Figure 3.12). The Charyoung ranges get lower and smoother nearing the research area.

3.1.2.2. Soilscapes and Geology Soil, the most important element for the growth of plants, is formed over long periods of time, and a specific region's pattern of soilscapes is decided by rocks, climate, plants, and topography. Although the petrology of the research area is mostly gneiss and metamorphic rocks (Figure 3.09), like many other regions of the Korean Peninsula, the local soils can be broken down into 10 major soil groups, according to the macro soils maps (Table 3.02 and Figure 3.13).

The 10 major soil groups can be divided into 179 subgroups, which are relevant to research on local soil productivity for crops and planting. Among these, 24 kinds of soils are highly relevant to use for the paddy (see also Chapter 5). Although the southern region of Chungnam Province has long been known as one of the most productive zones for wet rice; the soils most suitable for wet-rice cultivation largely concentrate on the alluvial plains of the Geum River and its tributary streams rather than being distributed evenly through the whole area (Figure 3.14).

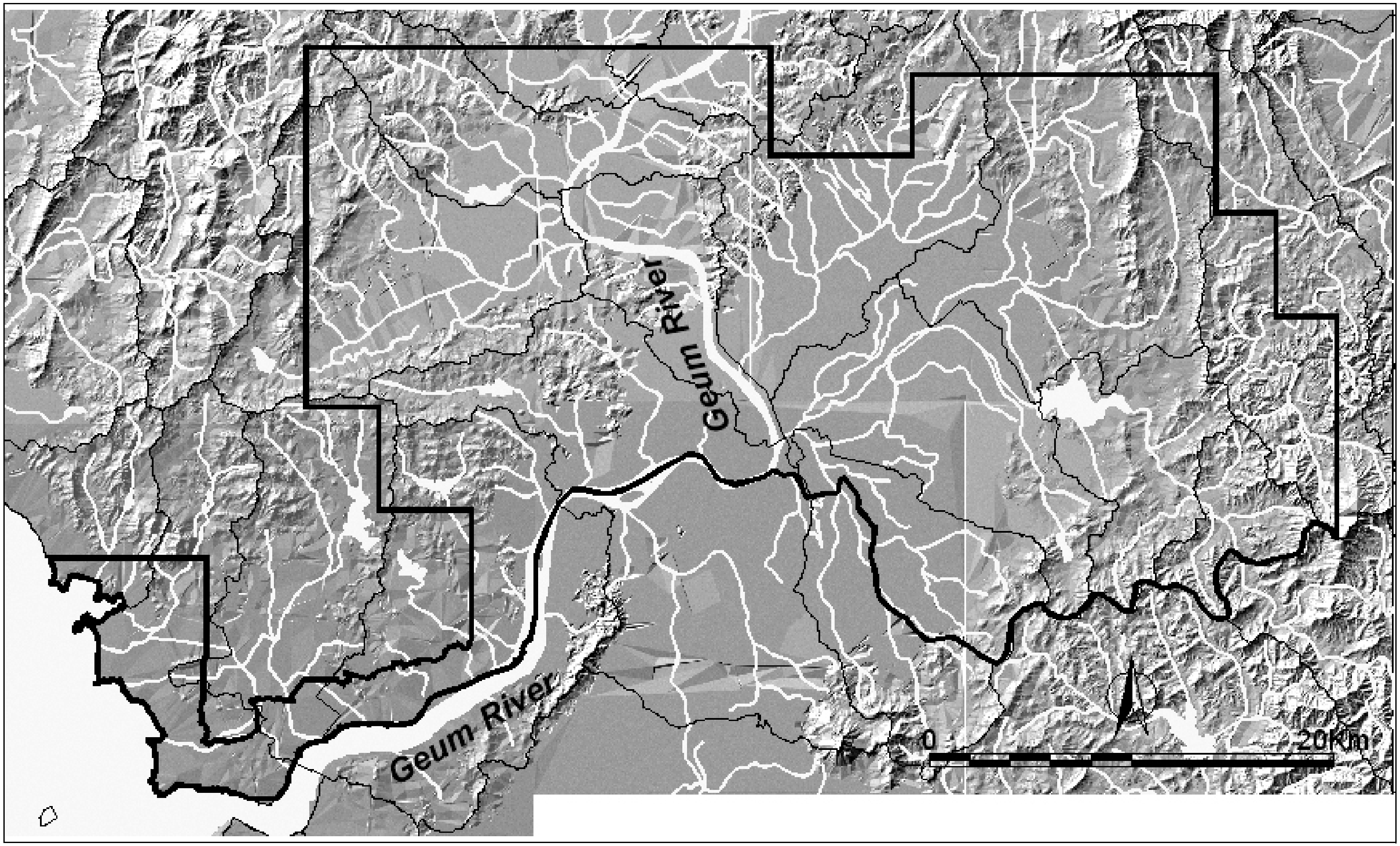

Figure 3.12: Geomorphology Drainage Systems of Research Area
Thin solid lines indicate the basic units of national water management systems (Korea Water Resources Corporation : http://www.kowaco.or.kr/).

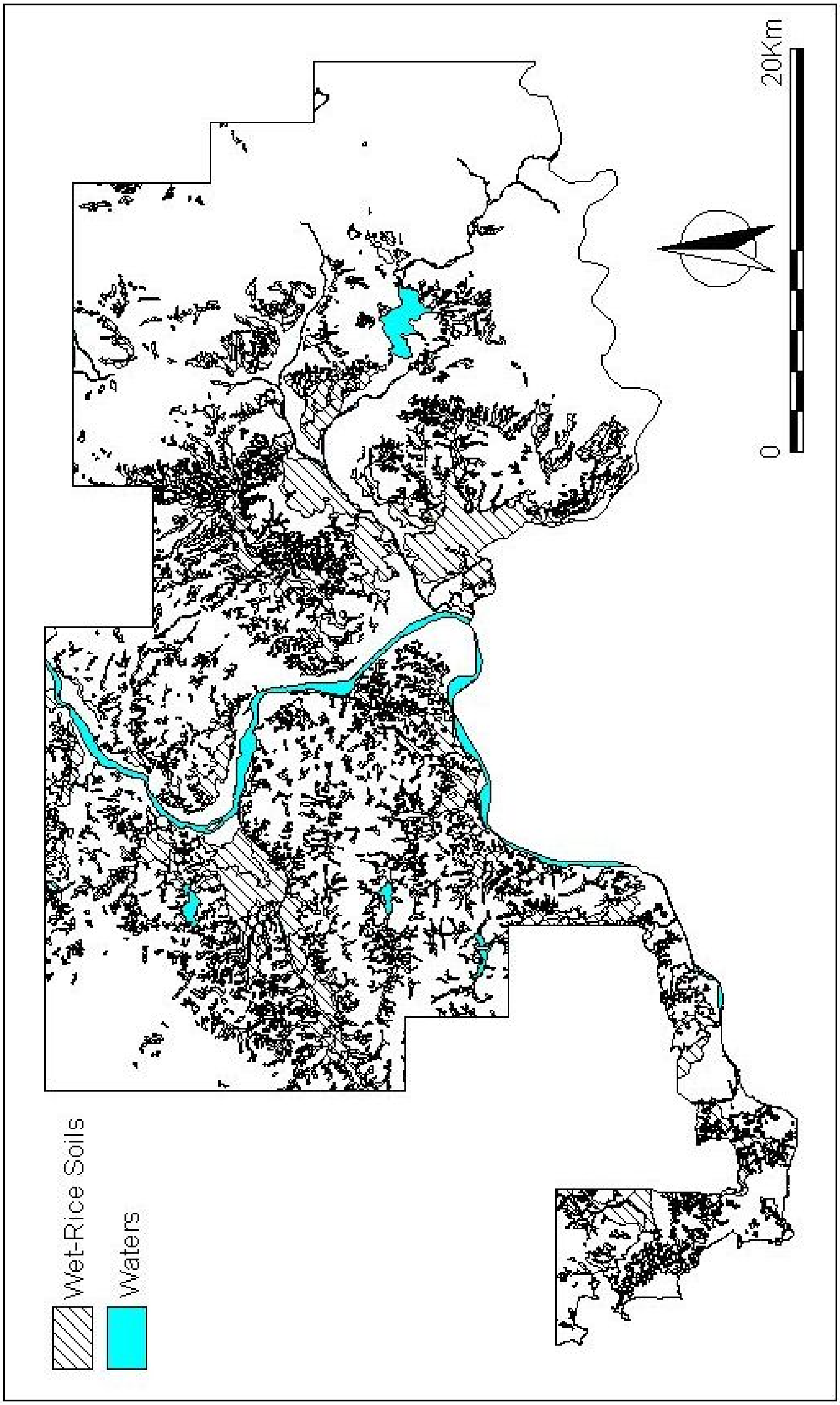

Figure 3.13: Distribution of Soils Most Suitable for Wet-Rice Cultivation

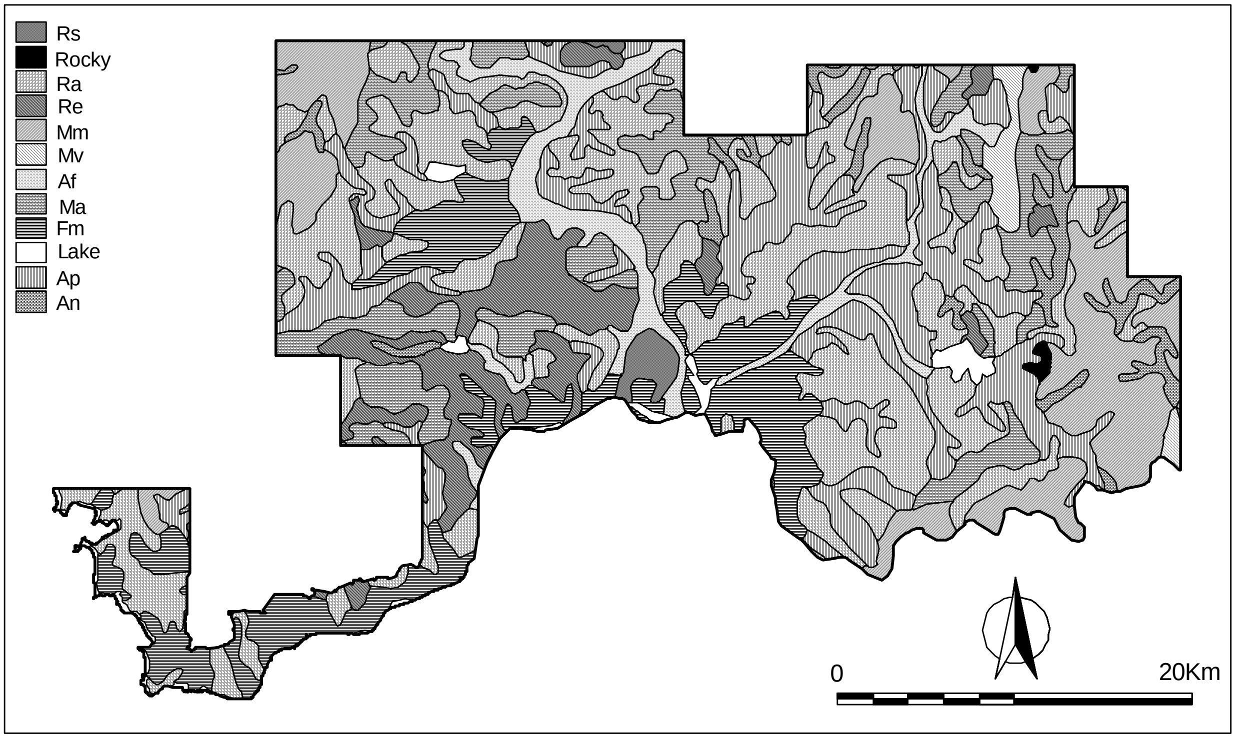

Figure 3.14: Macro Soilscapes of Research Area

Table 3.2: Description of Major Groups of Soils

Soils	***Major Characteristics and Distribution***
Af	alluvial soils and river wash, flood plains
An	complex of soils, narrow valleys
Ap	low-humic gley and alluvial soils, alluvial plains
Fm	low-humic gley and alluvial soils, fluvio-marine plains
Lake	
Ma	lithosols, siliceous and crystalline materials
Mm	lithosols, micaceous and hard siliceous materials
Mv	lithosols, siliceomafic materials
Ra	red-yellow podzolic soils siliceous crystalline materials
Re	lithosols, severely eroded, siliceous materials
Rocky	rocky lands
Rs	lithosols and red-yellow pozdolic soils, sedimentary materials

3.1.2.3. Local Hydrology The Geum River and its numerous tributary streams form the research area's stream system. The Geum River is the third biggest in South Korea, but represents the lowest possibility of flooding, as can be seen in Table 3.03. The flood history presented in the table reflects information from the period prior to the modern massive transformation of the landscape, especially by dam construction, since the 1970s.

Table 3.3: Major Rivers' Flood History prior to the Construction of Large Dams

River	***Basin Area (km^2)***	***Total Length (km)***	***Flood Frequency (1916-1963)***				
			Jun	*Jul*	*Aug*	*Sep*	*Total*
Han	26018.0	481.7	6	38	33	19	96
Nakdong	23817.3	521.5	14	58	35	31	*138*
Geum	9810.4	395.9	8	36	20	11	75
Somjin	4894.5	212.3	6	33	25	19	83
Youngsan	3371.3	136.0	15	39	30	27	111

Based on topographic maps at a scale of 1:25,000, the lower reaches of the Geum River form an eighth-order stream. Its tributary streams vary in their length, width, and order in the drainage system, and some big ones play a central role in individual drainage basins. According to the 'hydrologic unit maps' completed by the Korean government, based on GIS analysis of geomorphology and distribution of rivers, the research area can be delineated into several 'unit' basins where the Geum River's main tributary streams play a major role (Figure 3.12).

3.2. CULTURAL SETTINGS: ARCHAEOLOGICCAL BACKGROUND

3.2.1. The Archaeological Sequence and Terminology for Prehistoric Korea

As mentioned before, the major chronological scheme of Korean prehistory is based on the European Three Age System (Figure 3.13; Choi M.L. 1997; Choi S.N. 1988). However, all periods do not connote all material components identified in European sequences. Therefore, some archaeologists are uncomfortable with the system and prefer to replace some period terms, especially Neolithic and Bronze Age, with Chulmun and Mumun respectively, each period named after its prevalent pottery style. These two terminologies are synonymous; they do not represent different archaeological cultures or time spans.

In fact, the beginning of the period called 'Neolithic' in the Korean archaeological scheme did not witness agriculture or even ground stone tools, unlike the European Neolithic, but instead is marked by the beginning of production and use of ceramic vessels. In this light, it is similar to the way the Japanese Jomon Period has been defined, and thus many Neolithic archaeologists have used the term 'Chulmun,' literally meaning 'comb-patterned' pottery (Figure 3.15). However, a growing body of evidence indicates that crop production and ground stone tool assemblages began only in the Late Neolithic. This is a direct challenge to the conventional definition of the Neolithic or Chulmun Period as a ceramic-making culture relying on a food-procurement economy (Im H.J. 1997). Some scholars even see inequality in Neolithic or Chulmun Period, although they do not specify whether just interpersonal inequality or (more institutionalized) Hegelian hierarchy. They base this reconstruction on elaborate burials goods at some sites, such as Hupori in Ulsan (Choi J.G. and Kim S.M. 1991) and Yeondaedo in Samcheonpo (Han Y.H. and Im H.J.1993) in southeastern Korea, or on Chulmun's contemporaneity and cultural similarity with Jomon complex hunter-gather society, including sedentary life, storage facilities, and so on shown in inland habitation sites (Rhee and Choi M.L. 1996). A majority of scholars, however, do not agree.

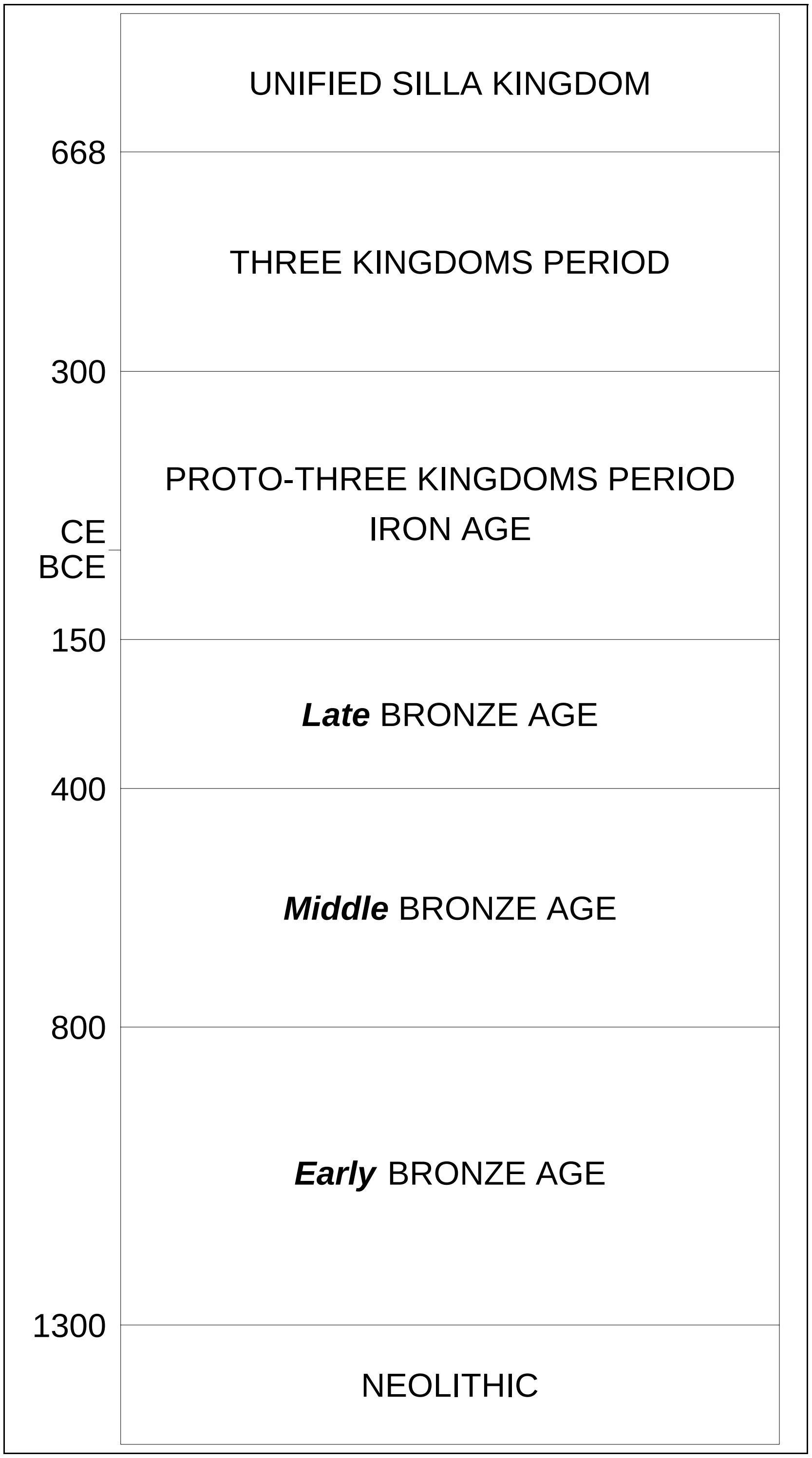

Figure 3.15: Archaeological Chronology of Central Western Korea. After Kim B.C. (2001), Kim J.S. (2002) Kim W.Y. (1986), and Park S.B. (1999)

In similar fashion, it is suggested that the Bronze Age should be called the 'Mumun' Period, since metallurgy is lacking at the very beginning of the period. In addition, it is also suggested that the Korean Bronze Age should be broken into some subperiods, such as the Pre-(Liaoning-Type) Bronze Dagger Period, the Bronze Dagger Period and the (Late) Korean Bronze Dagger Period (Park S.B. 1993a; a similar perspective is presented in Barnes 1993). However, at least in Chungnam Province, this scheme is not supported by empirical data. At the Biraedong Site, in Daejeon, a Liaoning-type bronze dagger was found as part of a dolmen interment dated to EBA (1210-900 B.C. at 95% confidence; Seong J.Y. 1997). Although it is doubtful that bronze implements played roles as productive tools and weapons used in actual fighting, there is no reason not to call the period discussed above 'Bronze Age', based on the production and use of bronze objects. Of course, a real florescence of bronze manufacturing happened in the Late Bronze Age, contemporaneous with the period when the very northern part of the peninsula started to produce small iron objects (Kim W.Y. 1986).

3.2.2. Archaeological Reconstruction of Bronze Age Sociocultural Patterns: Overview

Based on the stylistic variations of several sorts of archaeological features-dwellings and burials-and artifacts-mostly ceramic, bronze, and, lithics-the Korean Bronze Age can be broken down into three subperiods, Early, Middle and Late.

3.2.2.1. EBA (1300-800 BCE) Although not all factors emerged at precisely the same time, several local *mumun* pottery styles, (long) rectangular dwellings, bronze artifacts, and megalithic burials (dolmens) have been considered to characterize EBA. Among them, the time-space systematics of several local pottery styles have been mainly studied to establish the diffusion routes of material culture and patterns of immigration relevant to the formation of Bronze Age culture in the Han River basin, from the central Korean Peninsula southwards. An explanatory model for EBA culture in the central and southern part of the peninsula, which has long been prevalent in Korean archaeology, can be summarized as the northeastern and northwestern traditions' southward advance, following their combination in the Han River basin (Lee B.K. 1975), with some modifications (An J.H. 1991; Kim J.S. 2001 Park S.B. 1999). The Yeoksamdong, Garakdong, and Heunamri styles represent the northeastern, northwestern, and combined styles, respectively. Each of these pottery styles, defined by their characteristic rim-decoration motifs, has been recently designated as an archaeological feature-and-artifact assemblage, as attention has been paid to slight differences in the associated characteristic house plan forms and lithic artifacts. The Yeoksamdong-type assemblage can be characterized by ceramic vessels, especially urns and deep bowls with *gongyeol* (lines of perforated holes), and rectangular houses with pit hearths (Figure 3.16). The Grakdong-type assemblage is constituted of ceramic vessels decorated with *iejoongguyeon* (doubled rims) and *dansaseon* (short slanted lines), and rectangular houses with hearths surrounded by stone slabs or gravel (Figure 3.16). The Heunamri-type assemblage looks like the Yeoksamdong-type one, except for ceramic vessels which include the Grakdong-type decoration motifs (Figure 3.16).

There seems to be some reason why Korean archaeologists have repeatedly emphasized the role of cultural diffusion accompanied by substantial immigration in relation to the formation of EBA culture in the central and southern part of the peninsula. Despite efforts to find some link between the two archaeological cultures (Ahn J.H. 2000; Kim J.S. 2001; Park S.B. 1993a; Shin S.J. 1998), the dissimilarity between them (Kim J.S. 2002a, 2002b) can hardly be denied.

Dissimilarities in several dimensions of archaeological information have been pointed out. Emphasis on the discontinuities and dissimilarities gave birth to the idea of 'ethnic replacement,' based on the extreme diffusionist viewpoint of sociocultural change (Kim W.Y. 1973; Kim J.B. 1978; Kim J.H. 1972).

Some critics of the extreme diffusionistic perspective, since the 1990s, have pointed out its logical problems (Yi S.B. 1990). Although the critics have successfully introduced the logical limitations of 'replacement theory,' they have failed to establish any alternative framework to explain the dissimilarities and/or discontinuities between LN and EBA cultures or to identify the process or cause of the transition from one to another (Kim J.S. 2002a, 2002b).

On the other hand, some research characterizes the LN-EBA transition, accompanied by rice cultivation, as an indigenous sociocultural evolution that solved the population-food imbalance generated by drastic population growth in the late LN, based on archaeofaunal analysis of the shell middens which are prevalent in the coastal and insular landscapes of the Neolithic (Lee J.J. 2001; Norton 2000). This kind of research can explain the adoption of rice agriculture, but it is not sufficient for understanding all the cultural changes (Kim J.S. 2002b). In addition, although such research presents the diminishing return of marine shell-fishing as the major evidence for population growth resulting in overexploitation of marine resources (Lee J.J. 2001; Norton 2000), it seems an inadequate basis for reconstructing demographic changes in populations residing in inland habitats. In fact, as mentioned by even these authors, marine shellfish was a secondary dietary resource to cultivated and/or gathered crops and plants, and shell middens were the products of short-term collecting camps.

Emphasizing the dissimilarity between LN and EBA material cultures and site locations, the increase of rice cultivation, and the criticism of 'replacement theory,' some recent research

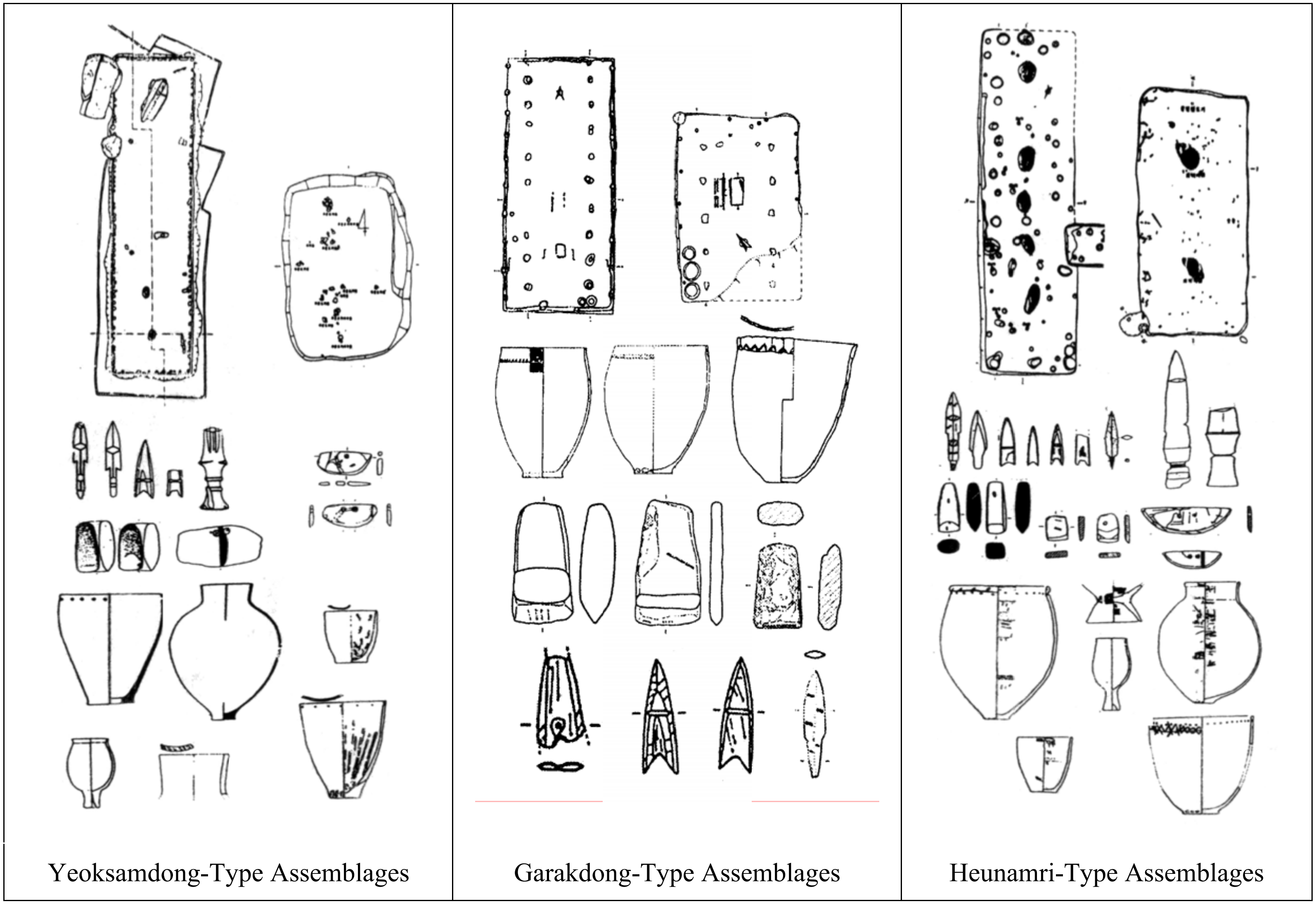

Figure 3.16: Three EBA Local Types of Assemblages

characterizes the transition from Late Neolithic to Early Bronze Age as the importation and spread of a complete package of several components as a whole designated 'EBA Culture.' This package included new material culture – rectangular houses, northern pottery styles, and relatively developed ground stone tools – as well as a (rice) farming economy, and even an exclusive land-use strategy (Kim J.S. 2002a, 2002b, 2003). This author also mentions that the transition was abrupt, discontinuous, and involves the change from food-procurement to crop-production. Afterwards, EBA assemblages throughout the whole of the central and southern peninsula were homogenous. Finally, he concludes that an exclusive land-use strategy, which is conceptually opposed to LN's patch-sharing strategy, accompanied by immigrant EBA people, was responsible for the rapid spread of EBA culture into the Neolithic context.

However, this hypothesis may not be supported by current empirical data in several ways. First of all, contrasting the hunting-gathering (or food-procurement) economy of LN and the crop-farming economy of EBA is, more or less, subjective and impressionistic, and has never been thoroughly explored, at least in his research. Much research, especially archeobotanical analyses have revealed that crop cultivation-most importantly for this study, rice cultivation – not only long preceded the emergence of EBA assemblages but was also more or less fully developed prior to the beginning of EBA (Ahn S.M. 2000; Han C.G. et al 2001; HNUM 2003; Im H.J. 1997; Lee G.A. 2003; Nelson 1993). Although it is undeniable that the nutritional dependency on crops increased from LN to EBA, this does not necessarily mean a drastic change in economic system.

Second, the rapid spread of a specific archaeological culture accompanied by actual long-distance human movement, which is the aspect of the hypothesis advanced to explain the inter-regional homogeneity of EBA material culture, could well have been related, not to an exclusive land-use strategy, which would have diminished the possibility of finding good land, but rather, at least in part, to an extensive agricultural technology, such as slash-and-burn cultivation, (Im H.J. 1992; NMK 2000; Park S.B. 2002) which requires relatively vast lands. In addition, rapid long-distance movement and exclusivity of land use seems to be very dependent on the population size. However, he does not pay attention to this aspect. Unless there is some other reason for high mobility, under conditions of under-population, an exclusive land-use strategy might have not been a very effective mechanism for the rapid spread of material culture. More fundamentally, the judgment of rapidness could be quite subjective and relative. What we see currently are the material culture remains of a period of 500 years. It is thus questionable whether the 'spread of the farming economy' through the 90,000 km^2 area of South Korea can necessarily be considered that rapid. Moreover, much research identifies interregional or intraregional stylistic variations in archaeological artifact-feature assemblages, and designate them as local cultures, such as the Gwansanri style (Cheon S.H. 2003), the Misari style (Lee H.W. 2002; Park S.B. 2003), the Dusan style (CNNUM 1995; Lee H.W. 2002) and the eastern and western Youngnam styles (An J.H. 1991), thus questioning the homogeneity of EBA material culture.

Third, contrasting the two periods' land-use strategies seems based on the analysis of incomparable separate datasets: the one for LN comes from shell middens on small islands, but the EBA one is from inland sites. As most Korean archaeologists agree, marine shellfish was only a secondary dietary resource behind the primary role of inland cultivated or collected crops and plants. In addition, marine shell might have been gathered by short-term travels from inland permanent habitations. No attempt has been made to reconstruct the land-use system or strategy of the inland Neolithic. Moreover, the EBA land-use strategy has never been thoroughly demonstrated. Some research assumes that dolmens played a role as 'territorial markers,' although there are many alternative interpretations, so as to argue that EBA people invested social/physical energy to claim land tenure rights (Park S.B. 1998a). Although it can be concluded that dependency on agricultural products gets heavier, and this would enhance the importance of claiming land-tenure rights, this issue is still open and has never been fully introduced or tested with empirical data: Park's suggestion depends on rough observation of distributional patterns of dolmens overlapped on an ancient map of transportation routes without any bridging argument or rigorous spatial analysis (Figure 3.17). On the other hand, estimating the size of the labor forces invested in building some large dolmens, it could be wondered what sort of social unit practiced exclusivity of land use The biggest dolmen slab in Chungnam Province weighs 100 tons, for example (Lee N.S. 1987; Lee Y.M. 1993), and the labor force required for its building definitely exceeds the population, not only of any single settlement, but of even tens of settlements.

Dolmens, as megalithic burials, are prevalent in Korean Bronze Age landscapes, and in addition to metallurgy, have been pointed to as evidence of the emergence of social complexity (Barnes 1993; Choi, M.L. 1984; Kim W.Y. 1986; Lee J.J. 2001; Nelson 1993), based on the quite impressionistic and simple inference that metallurgy and building the megalithic tombs might have needed esoteric knowledge and leadership for the organization of labor pooling (Choi M.L. 1984; Lee Y.J. 1980). Dolmens were taken to be elite tombs, the largest of which would have required the expenditure of considerable amounts of energy (Choi, M.L. 1984; Lee Y.J. 1980). The association of monumental tombs, elite bronze artifacts, and rice cultivation is assumed from adaptationalist or functionalist perspectives to indicate managerial leadership (Billman 1996; Brumfiel and Earle 1987; Gilman 1981) engaged in coordinating the pooling of

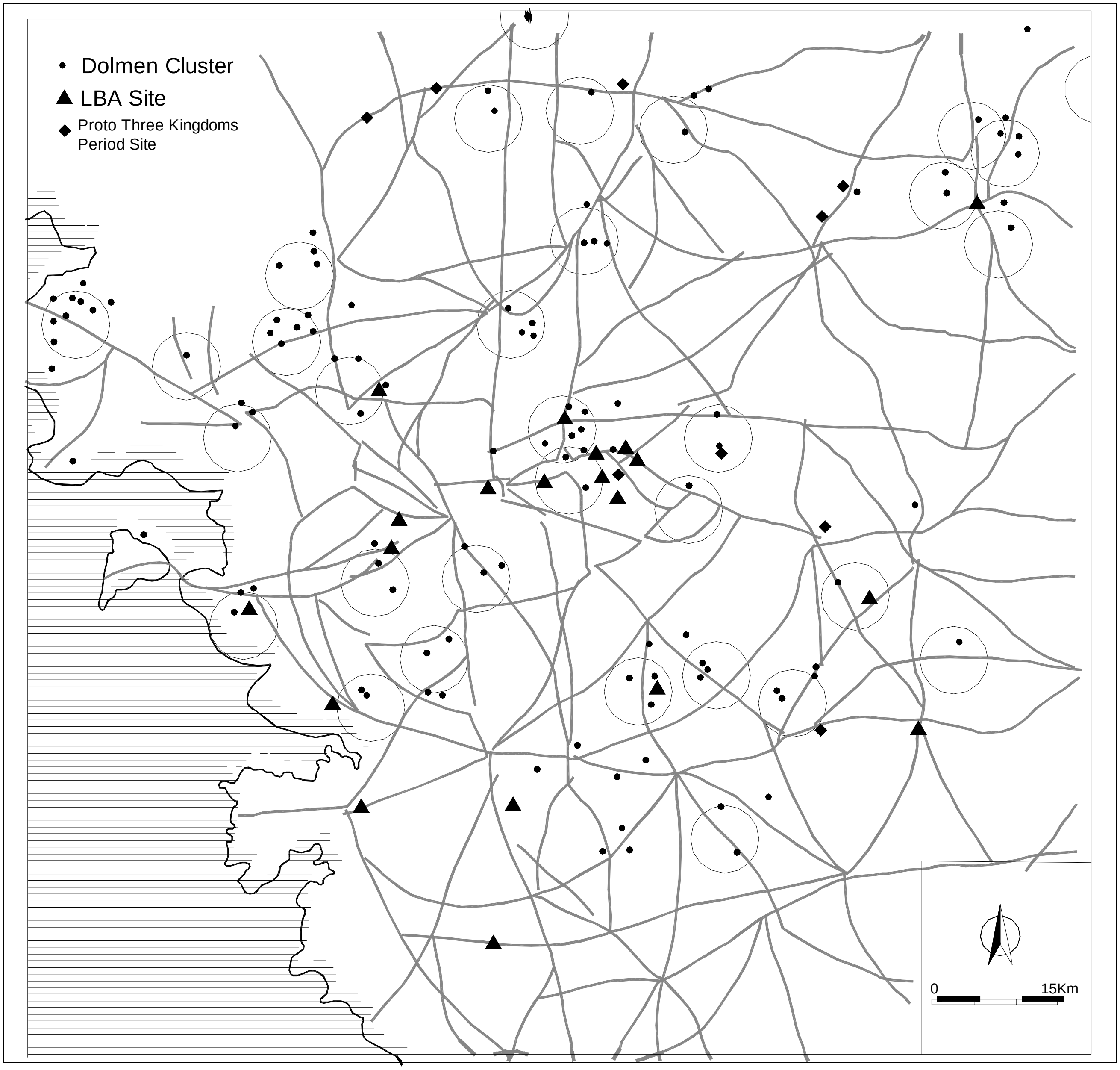

Figure 3.17: Distributional Patterns of Dolmen Clusters in Comparison to Ancient Transpo rtation Routes. Park S.B. (1993) defines a "dolmen cluster" as a group of more than eight dolme ns and overlaps them on the ancient transportation routes reconstructed based on the Daedonyeoj ido which would be used for same purpose in this research (see Chapter 4).

labor for the construction and maintenance of paddy fields and irrigation systems (Choi M.L. 1984; Kim W.Y. 1986). Not all scholars, however, find this reconstruction adequately supported by the evidence. Some critics argue against the notion that the dolmens were elite tombs whose monumentality required a level of energy expenditure adequate to indicate institutionalized inequality during the EBA despite the lack of differentiation in burial goods (Kang B.W. 1992; Roh H.J. 1997; cf. Tainter 1977: 332; O'Shea 1984: 17). This latter interpretation is also supported by the fact that such characteristics of emerging complexity as aggregation of population and differentiation within settlements are rarely seen (Kim S.O. 2001; Pak Y.J. 2000). Nevertheless, the monumentality of EBA sites cannot be entirely ignored in the discussion of sociopolitical development during the MBA, because it might have been the initial foundation for labor pooling at the supra-village level or of the ideological materialization invested in by elites-to-be during the MBA (Earle 1991b; Nelson 1999).

Moreover, the evidence of rice agriculture seems inconsistent with notions of EBA managerial leadership. Carbonized rice, imprints on pottery, pollen, and related cultivation tools (e.g. grooved stone adzes and triangular stone harvesting knives) have been given as proof of rice cultivation during the EBA (Chon Y.L. 1992; Im H.J. 1992; NMK 2000). However, both botanical analysis and the lack of evidence of paddy field systems, at least in the central western Korean Peninsula indicate that EBA rice cultivation was an extensive system, probably swidden agriculture, rather than an intensive system that might have been controlled by elites (Im H.J. 1992; NMK 2000). As Nelson points out, overemphasis on the role of rice in EBA contexts, in this case, seems attributable to the tendency of northeast Asian archaeologists to take the development of farming capable of supporting complex social organization, as a synonym for the development of rice cultivation (Nelson 1993).

However, long before the EBA, the residents of the Korean Peninsula cultivated and were substantially sustained by several crops, including rice, that might have been cultivated by extensive techniques.

3.2.2.2. MBA (800-400 BCE) As mentioned in the previous chapter, MBA in the research area has been characterized by the emergence and spread of Songgukri-type assemblages. These assemblages are constituted of various kinds of archaeological indicators, such as Songgukri-type dwellings, Songgukri-type pottery, Songgukri-type tombs (stone slab tombs and urns), some stone tools – triangular ripping knives, grooved stones, arrow heads – and so on (see Chapter 4).

Investigation of the assemblages was initiated by the accidental discovery of a stone slab tomb with a Liaoning-type bronze dagger (Figure 3.18; An S.J. and Yoon M.B. 1978; Kim G.S. 1998) and a couple of seasons' succeeding excavations near the tomb at Songukri, Buyeo, in the late 1970s. During the three ensuing decades there were further discoveries of more sites with similar assemblages and continued analysis of individual artifacts, aimed mostly at establishing the chronology (Bae J.S. 2001; Cho H.J. 1989; Roh H.J. 2001; Yi G.M. 1992a) and spatial patterning of the sites at the various scale (An J.H. 1993; Kwon O.Y. 1996; Lee G.U. 1993; Lee J.M. 2003; Song M.Y. 2001). Most Korean archaeologists finally reached a substantial consensus that the Songgukri-type assemblage represented MBA culture from central western Korean southwards. The assemblage, as a polythetic grouping, has been observed with considerable coherence in a vast area including Chungnam, Chungbuk, Jeonbuk, Jeonnam, and Gyoungnam provinces (Figure 3.19).

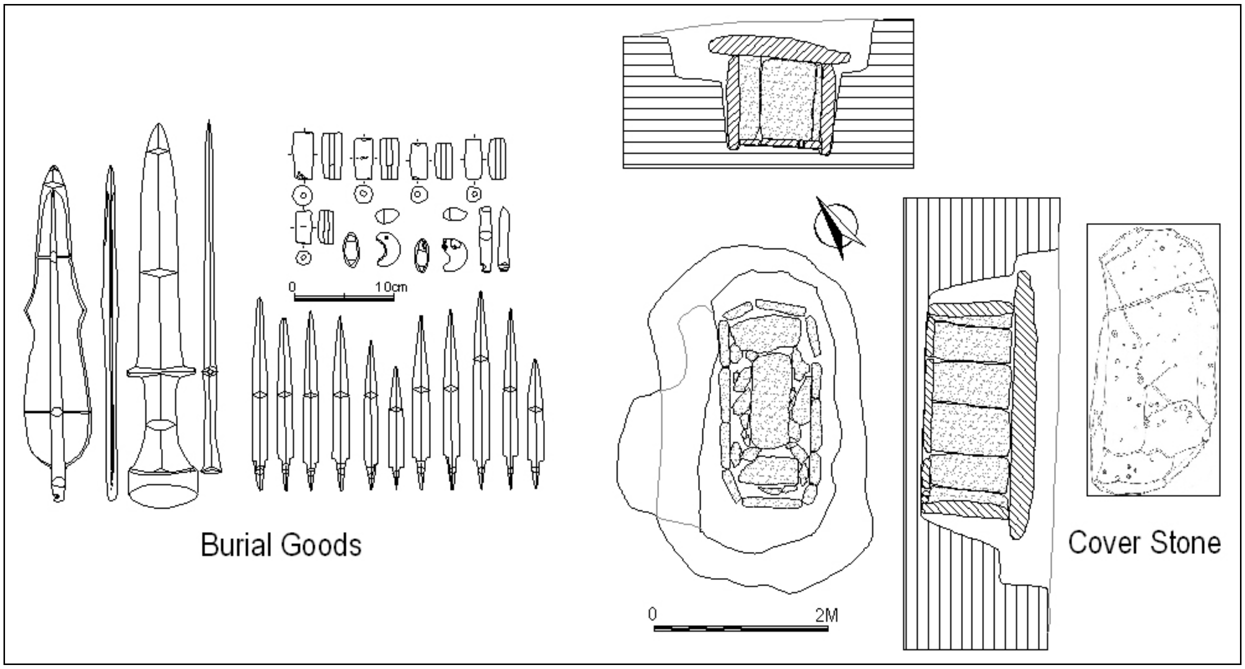

Figure 3.18: Tomb No. 1 of Songgukri Site and Its Burial Goods

Moreover, large-scale excavations, as part of CRM projects, have exposed whole settlements sometimes enclosed by palisade, moats, and ditches, and with adjacent actual paddy fields (see Chapter 4). Technical advances in excavation and analytic methodology have identified considerable direct and indirect evidence of a developed system of wet-rice cultivation. This has led Korean archaeologists to pay close attention to the relationship between the emergence and spread of Songgukri-type assemblages and sociopolitical changes in the MBA, which resulted in the emergence of big settlements with defensive features. They have stressed the role of wet-rice cultivation in these sociocultural changes.

Much of the research initiated by this attention has concentrated on central western Korea, attempting to explain the more or less remarkable dissimilarity between EBA and MBA material cultures, and the apparent separation of EBA/MBA regional settlement distributions (Figure 3.20). There is much disagreement among scholars, but they can be categorized largely

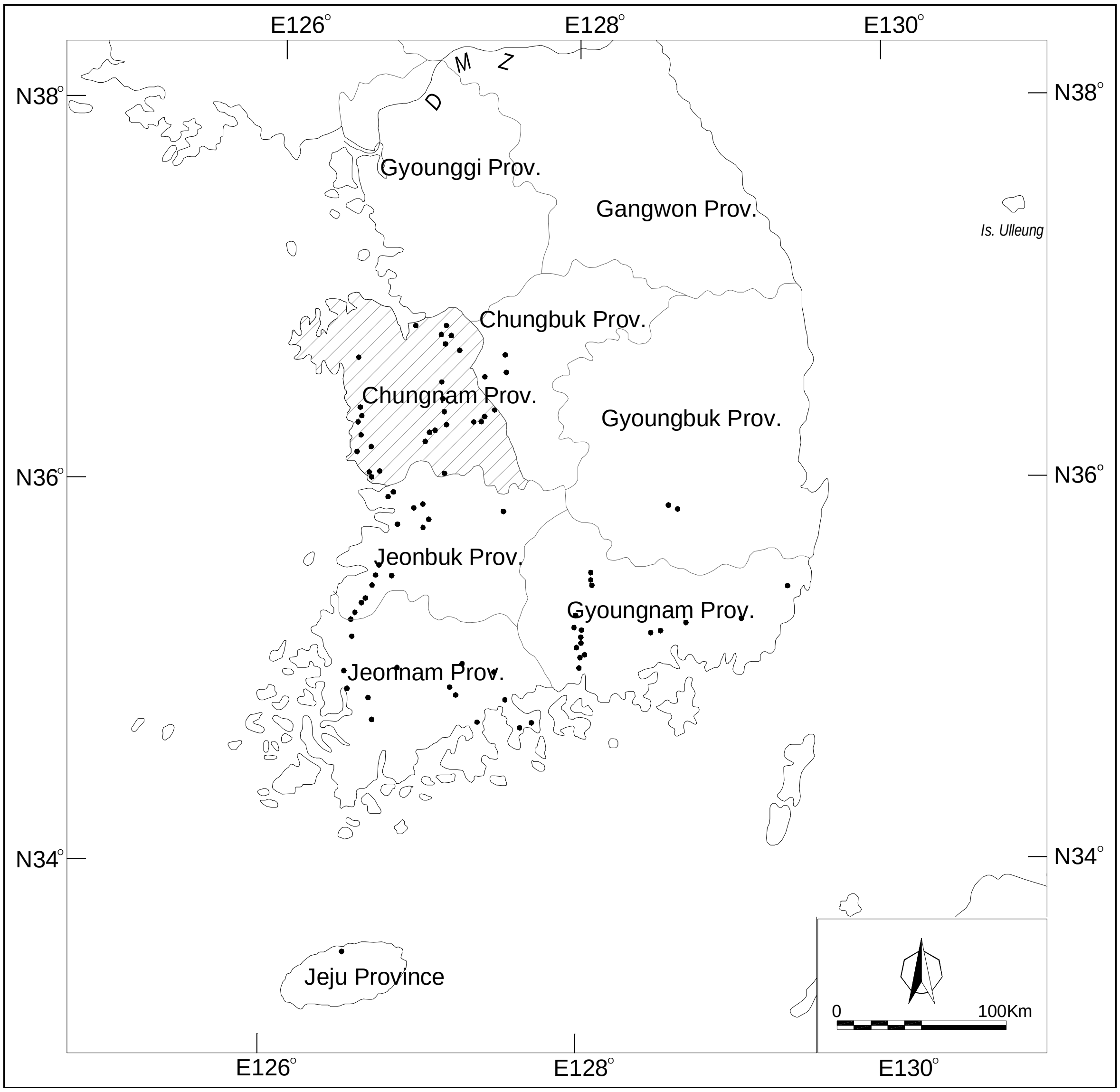

Figure 3.19: Distribution of Songgukri-type Sites in Southern Korean Peninsula. After Kim H.S. (2002). It has been redrawn and modified.

into two groups. One group sees an influx of new culture accompanied by substantial immigration, emphasizing the dissimilarity and separateness between EBA and MBA material culture and settlement patterns. However, this group has not, so far, found the donor region or culture from which the Songgukri Culture originated, nor have they suggested any push or pull factor for the sociocultural changes.

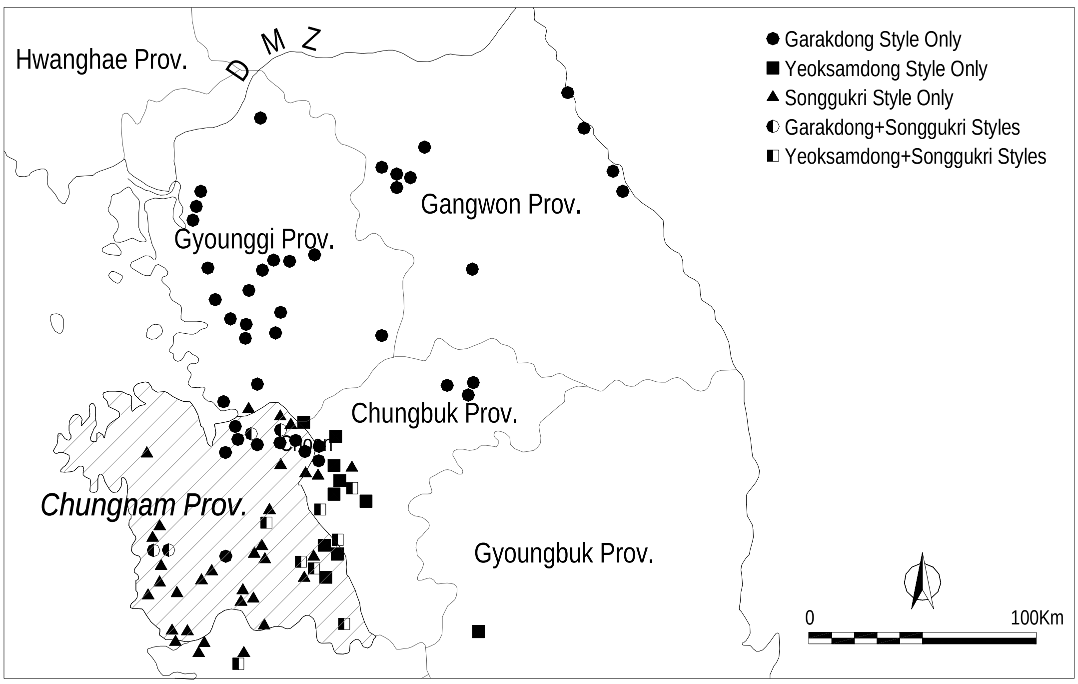

Figure 3.20: Distribution of EBA & MBA Sites in Central Korean Peninsula. After Lee J.M. (2003). It has been redrawn and slightly modified.

The other group of researchers suggests indigenous evolution of the socioeconomic system and invention of material culture, finding some stylistic links between EBA and MBA assemblages in central western Korea. The scholars of this group make enthusiastic efforts to connect the sociocultural changes ultimately to the replacement of material culture along with the initiation and prevalence of wet-rice cultivation, as an intensive form of rice production.

These efforts include establishing an intermediate cultural stage or assemblage between EBA and MBA, the so-called “Pre-Songgukri-type,” and suggesting that local population growth resulted in a food-population imbalance, overexploitation of soil productivity and deterioration of sustained yields, and local population movement into the lands suitable for wet-rice cultivation. However, these attempts have had only limited success, because they remain very hypothetical, not based on any substantial collection and analysis of data.

3.2.2.3. LBA (400-150 BCE) The LBA can be characterized by the florescence of bronze culture (Yi G.M. 1992b, 1992c) and the influx and spread of ‘*jomtodae-togi* (rolled-rim pottery) assemblages’ into central and western parts of the Korean Peninsula (Kim B.C. 2001; Park J.I. 2000; Park S.B. 1993b, 1998). LBA bronze culture of the region has sometimes been designated as ‘Korean Style Bronze Dagger Culture,’ which can be distinguished from Liaoning-type equivalents, as prototypes, and includes new items (Figure 3.21). A set of bronze ritual artifacts interred into a new style of burial, stone-filled stone slab tombs, have been taken to characterize the period’s sociopolitical changes, which include individualization in elite burials (Kim B.C. 2001), intensification of religious leadership (Kim J.I. 1994), and the agglomeration of local small polities (Park S.B. 1998a, 1998b).

This period’s archaeological artifact assemblages have also been called ‘Jeomtodaetogi Culture’ after its prevalent pottery style (Figure 3.22). Different from two precedent subperiods’ material cultures, the formation of LBA’s in the central and western Korean Peninsula has been, with some consensus, thought to be initiated by the adoption and recombination of cultural traits originating outside the peninsula (Kim B.C. 2001; Kim J.I. 1996; Park S.B. 1993b, 1998). Its formation and spread has also been considered closely related to the drastic sociopolitical

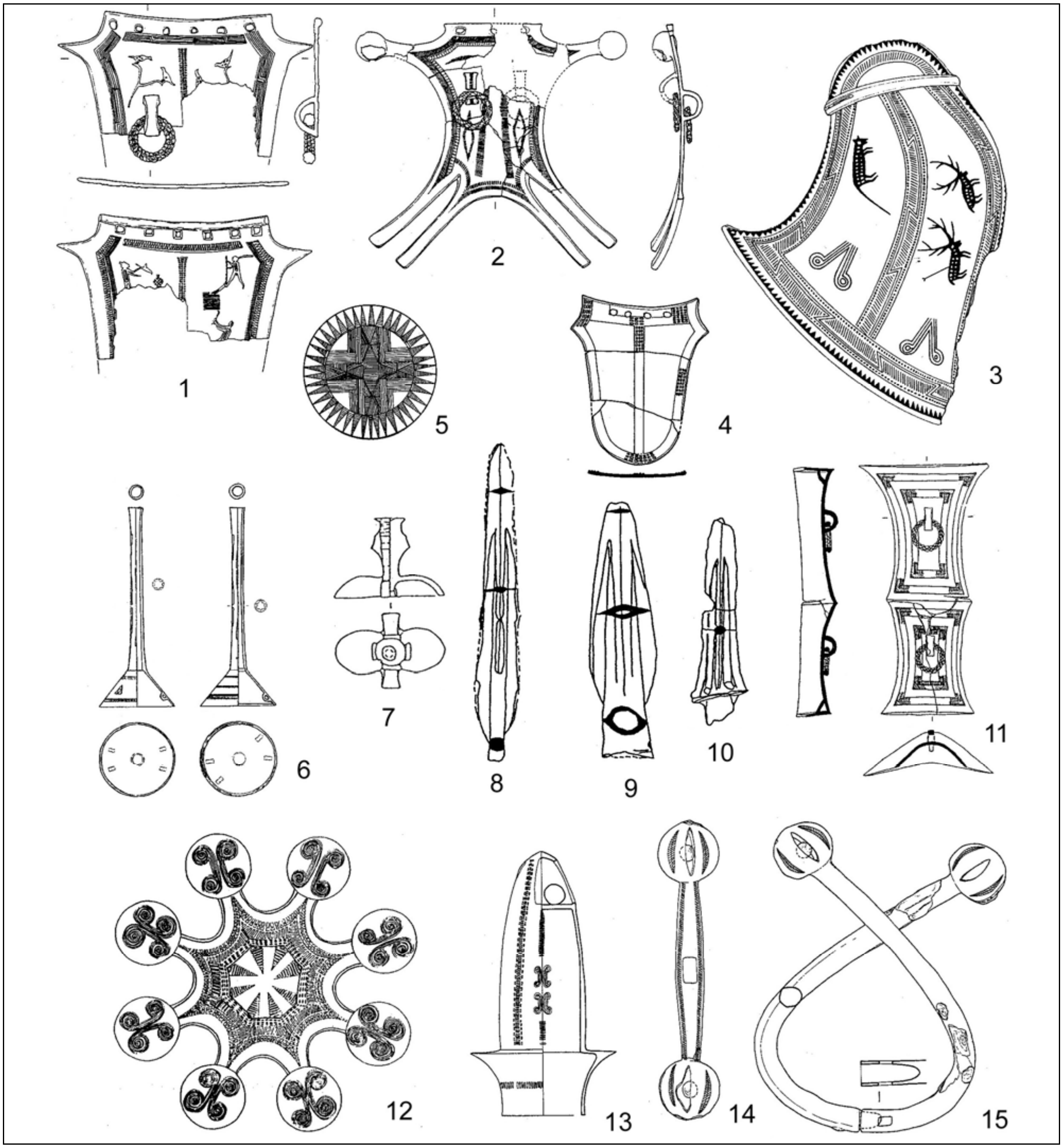

Figure 3.21: Assorted Bronze Artifacts from LBA Burials

1 Agriculture-Motif Object; 2 Shield-Shaped Objects; 3 Shoulder Protector; 4 Shield-Shaped Objects; 5 Mirror; 6 Trumpet-Shaped Object; 7 Dagger Hilt Ornament; 8 Dagger; 9 Hallberd; 10 Spear Head; 11 Sheath Ornament; 12 Eight Branch Bell; 13 Stick Bell; 14 Two Head Bell;
15 Fabricated Bell

circumstances of the so-called 'Yellow Sea Interaction Sphere' (Barnes 1993), during the late Warring States Period of China (third century BCE), which appears in historical documents (Kim B.C. 2001; Park S.B. 1998b).

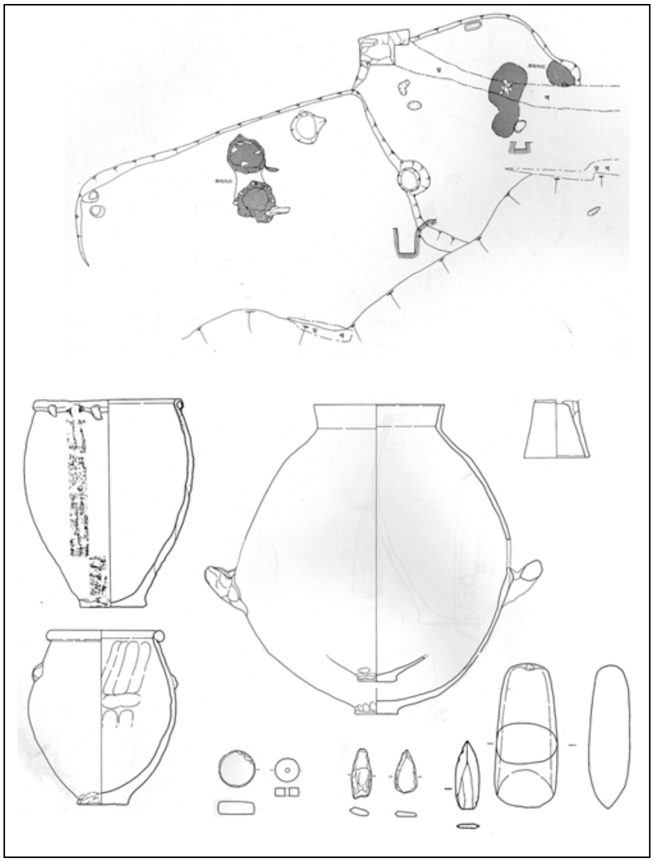

Figure 3.22: Jeomtodaetogi Assemblage

4. MBA SETTLEMENT PATTERNS IN CENTRAL WESTERN KOREA

4.1. DATA COLLECTION: REGIONAL SURFACE SURVEY AND INCORPORATON OF PREVIOUS DATA

The dataset for this study comes from two different kinds of sources: this study's own regional surface survey carried out in the western part of the research area, and information from previous excavation and survey projects prior to the study. The analysis of these settlement data aims first at exploring regional patterns of MBA settlements in the research area, on the basis of analyzing the surface-collected and excavated archaeological materials in temporal and spatial dimensions.

4.1.1. Regional Surface Survey

This study's own regional surface survey was performed in the southern part of Seocheon County along the coastline and the lower reaches of the Geum River. It covered 62.1 km^2, during the late fall and early winter season from November, 2003, to January, 2004. Since plant-raising and harvesting were over, this season provided very good surface visibility in the survey area (Figure 4.1).

4.1.1.1. Survey Procedure The surface survey for this study consists of complete and systematic coverage. All three or more team members walked in a row at intervals of less than 50 m in a zigzag pattern with slight overlapping across the entire landscape. Any locale with archaeological evidence, such as monumental architecture, domestic features, scatters of pottery sherds and lithics, and the like has been recorded. Each collection has been made based on collection unit area of no more than one hectare. However, a substantial number of collection units are less than the standard one hectare, because some isolated scatters are smaller than one hectare, and the marginal parts of bigger-than-one hectare scatters were not necessarily that large. Because most collections were made in the dry fields and fruit gardens adjacent to the hilltop forest zone and in modern residential areas, the boundaries of the collection unit areas have been affected by the overall shapes of the fields and fruit gardens.

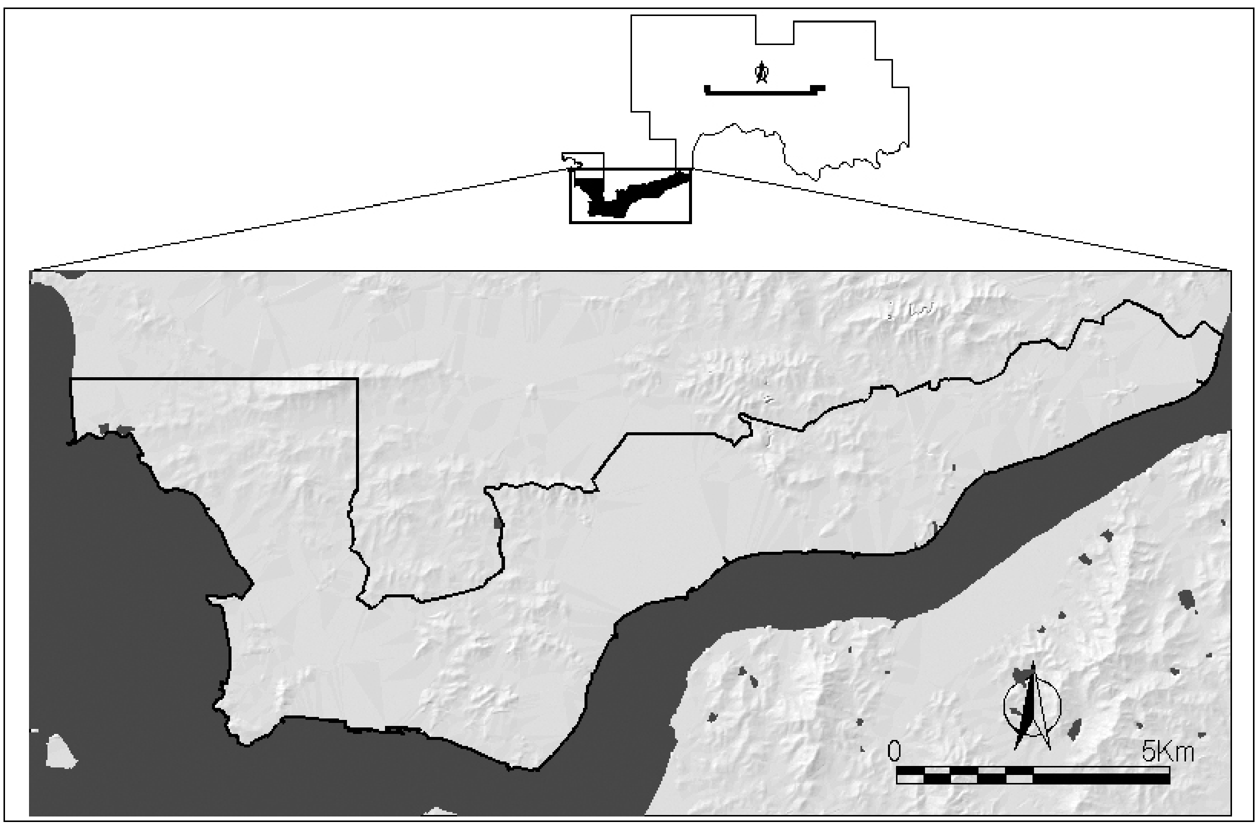

Figure 4.1: Survey Area

Although surface visibility is good during the winter season, it is possible that long-term intensive land use, especially with deep plowing, can make finds of very small numbers of artifacts (sherds and stone tools) misleading due to recent transportation (Drennan et al. 2003). Traces of ancient features, of course, are not subject to such movement. When archaeological features were not found, a minimum of three or more sherds and/or stone tools per hectare was required for recording a substantial collection. Architectural remains such as silhouettes of houses and tombs found on the ground or in profiles have been recorded as a collection unit, even without any presence of pottery sherds or stone objects.

Some collections have been made by systematically collecting all artifacts within circles 3 m in diameter. Multiple circles were collected until a minimum of 25 artifacts were recovered so that it would be possible to estimate proportions of artifacts in each collection area with error ranges no greater than ±10% at the 90% confidence level (Drennan 1996). However, in most collection units, the distribution of archaeological remains was so dispersed and the densities were so low that systematic collection in this manner was not fruitful, and therefore, general collections were made by recovering all artifacts seen. General collections, like systematic ones, were restricted to areas no larger than 1 hectare each (Drennan et al. 2003).

The procedure mentioned above is analogous to the one applied to the context of northern China by the Chiefeng International Collaborative Archaeological Research Project (CICARP 2003) and amounts to a spatially-extended version of the "siteless survey" strategy advocated by some researchers (Camilli and Ebert 1992; Dunnell and Dancey 1983; Ebert 1992). That is, the whole procedure is designed to record how archaeological remains are distributed on the landscape of the research area rather than to designate specific locales as sites through arbitrarily delineating the boundaries of loose concentration of artifacts or isolated features. Therefore, the traditional concept of site does not play a role at the initial stage of observation.

Although an individual cluster consists of contiguous multiple collection units and a single collection unit isolated from others father than 100m can be designated a site, as a substantial area where archaeological records distribute and which is distinguished from the others, in many cases the whole area cannot be taken as ‘a site’ representing an occupation of a specific period. Therefore, it is not possible to define sites even as a conceptual unit until the chronological assessment of surface collections is complete. However, chronological assessment has been totally moved into the laboratory and ‘sites’ were defined *post hoc*. By moving chronological assessment out of the field and regularizing the surface collection, the survey has proceeded efficiently and effectively.

4.1.1.2. Summary of Survey Results The field survey, following the above procedure, produced 197 collection units that contain more than three pottery sherds and lithics, and/or dolmens, stone chamber tombs, silhouettes of houses, storage pits, pit tombs and kilns (Table 4.1 and Figure 4.2).

The minimum number chosen for a meaningful collection unit was arbitrary, as is usually the case when regional surveys decide how many pieces of pottery sherds and lithics in a cluster were enough to designate as a site. Nevertheless, 92.4% of the collection units produce more than five artifacts (Table 4.2).

The total area occupied by these collection units is 136.8 ha and they locate mostly at elevations between 10 m and 80 m above sea level. Although nine collection units do not include any pottery sherds or lithics, 188 (equivalent to 95% of all collection units) contain three or more artifacts. The nine collection units without artifacts just include megalithic monuments and the archaeological features exposed in profiles made by accident and in the excavated area corresponding to the Dosmri Site excavated by the Research Institute for Archaeological Resources at Korea University.

Table 4.1: Summary of Survey Results

Period	*Collection Units*	*Area (ha)*	*Contents*
BA* *(1200-100 BCE)	98	72.20	*mumun* pottery, stone projectile points, stone axe Dosamri Site, dolmens
PTK* *(100BCE-ACE300)	54	39.17	stamped earthenware pit tomb surrounded by ditch(es)
TK* *(ACE 300-668)	135	100.47	undecorated stone ware, stamped stoneware (grid-motif) stone chamber tomb, roof tiles, big urns
USK* *(ACE 668-)	191	135.98	stamped stoneware, pottery with dark glaze, celadon, porcelain, roof tiles, ancient coin pit-tombs

Table 4.2: Number of Artifacts per Collection Unit

Number of Artifacts	5 or Less	6-10	11-15	16-20	21-25	26 or More	Total
Percentage	7.5%	16.2%	20.8%	17.8%	12.2%	25.4%	99.9%

The collections represent several consecutive periods such as the Bronze Age (BA), the Proto Three Kingdoms Period (PTK), the Three Kingdoms Period (TK) and finally the Unified Shilla Kingdom Period (USK). Archaeological remains dated to the Palaeolithic and Neolithic, the earliest two periods in the chronology of Koran archaeology, have not been found in this survey (Table 4.1 and Figure 4.3).

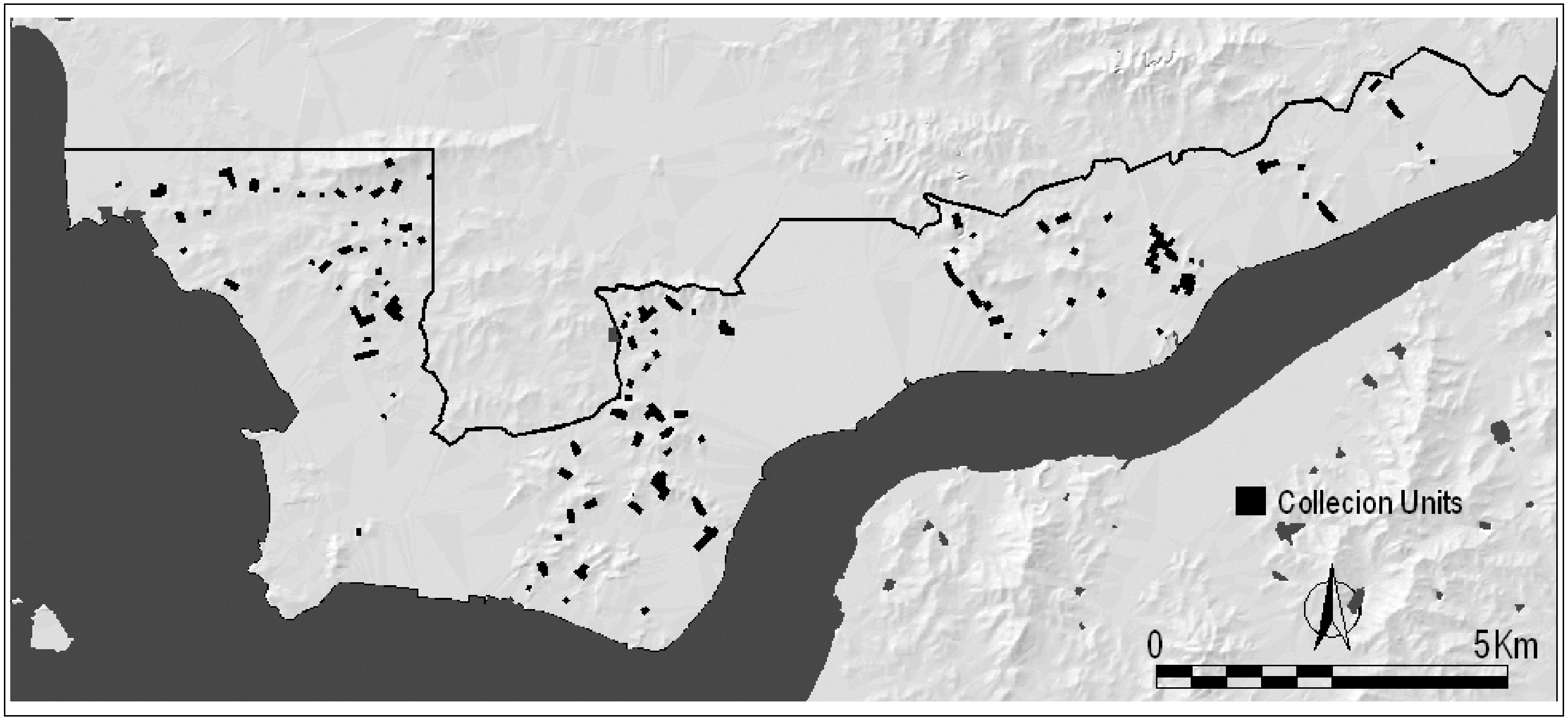

Figure 4.2: Distributions of All Collection Units

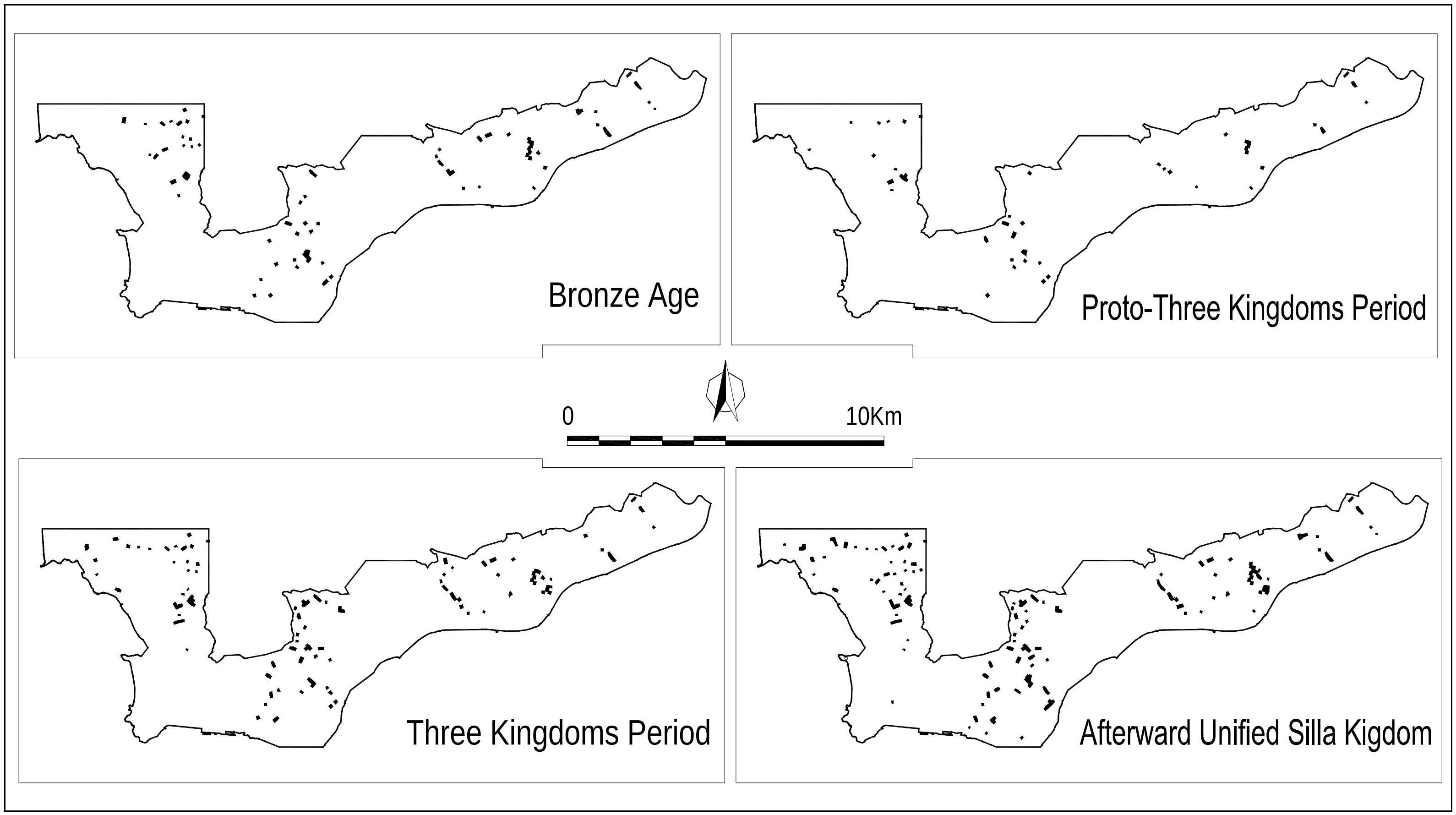

Figure 4.3: Distributions of Collection Units per Period

4.1.2. Previous Excavation and Survey Data

The published data accumulated by the projects carried out prior to this study come from two kinds of sources: 1) surface survey data that covers the eastern part of research area and 2) excavation data that provides information in detail on 16 MBA sites. Both will be incorporated into this study's overall dataset on the one hand, to reconstruct MBA settlement patterns in the whole research area and on the other hand, to investigate intra-community wealth stratification through exploring the distributional patterns of individual households' possessions (Chapter 5).

4.1.2.1. Overview of Previous Excavation Data So far, in the research area, excavations of 16 MBA sites have been completed (Figure 4.4 and Table 4.3). Although there have been sporadic discoveries of tombs dated to MBA, a series of discoveries and excavations in Songgukri, Buyeo, was the momentum for the central western region to get the attention of Korean Bronze Age archaeology. However, even more drastic development of MBA archaeology in the region owes to CRM work initiated because of massive construction projects in quite recent times. As a matter of fact, 12 sites, equivalent to three-fourths of all sites in the research area have been excavated by CRM projects since the mid-1990s. The rest, except for the Songgukri site, are relatively small-scale and rescue excavations of archaeological features and artifacts found by accident and sometimes damaged by modern land use. Despite some laments about problematic aspects of CRM projects (Kim S.O. 1996), it is undeniable that salvage excavation projects for CRM purposes have contributed data, especially in quite recent times, for the study of Bronze Age regional settlement and household patterns in this region. The excavations have revealed the spaces used for various human activities, such as residential areas,

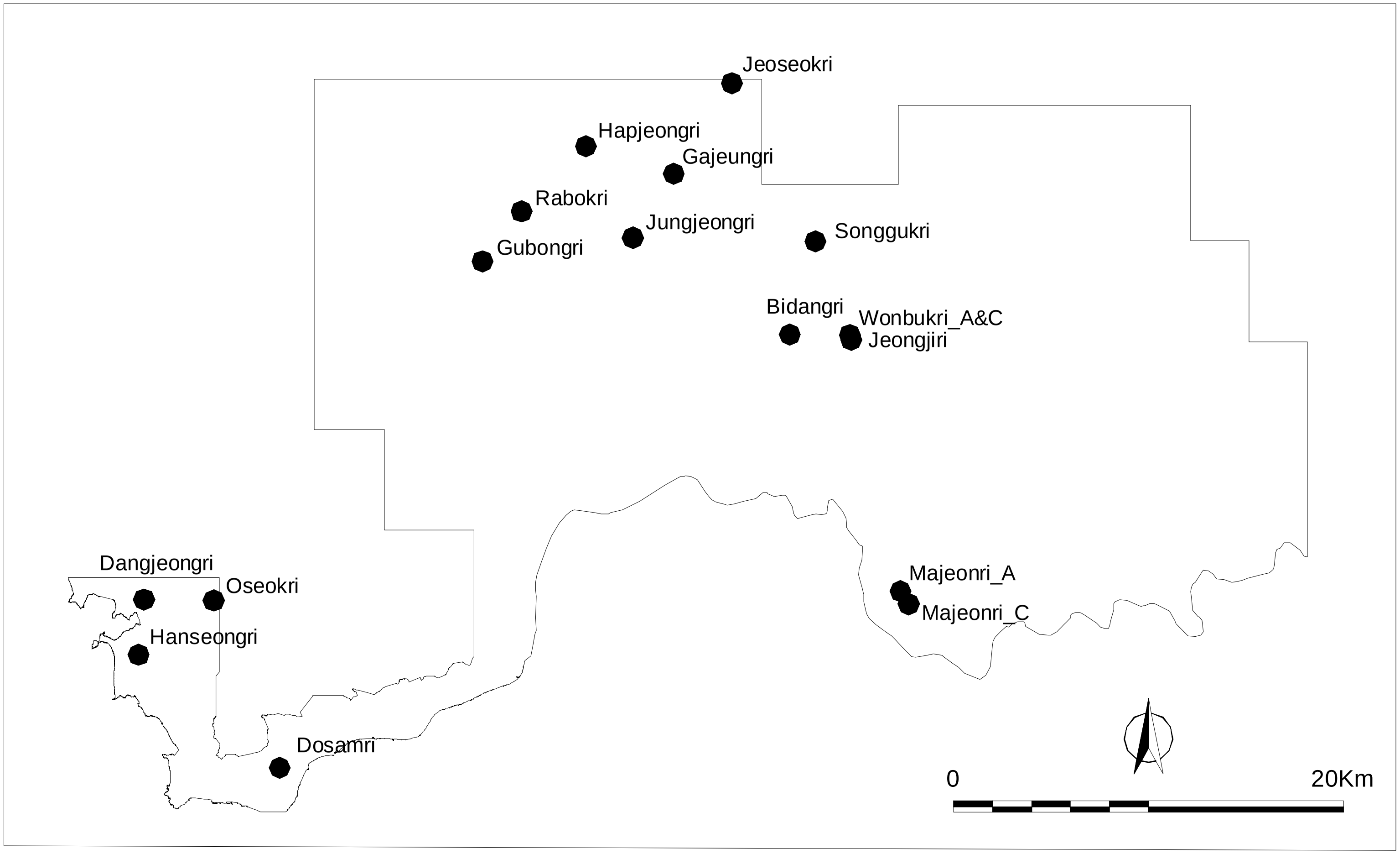

Figure 4.4: Locations of 16 Excavated MBA Sites

including not only dwellings but also facilities for storage and craft production, cemeteries, and paddy plots.

All final excavation reports provide information in detail on stratigraphy, all the features and artifacts discovered, absolute dates-mostly radiocarbon dates-physical and chemical analysis of pottery, soils, and so on. For eight sites, the final excavation reports provide detailed information on the features and artifacts, but for the rest, information is quite brief. Nevertheless, the preliminary excavation reports provide information on the location of sites and excavated areas, site plans and important artifacts for cross-dating.

Table 4.3: Excavated Sites in the Research Area

No.	*Site Name*	*County City*	*Activity Area*			*Exposed Area(ha)*	*Report*	*Reference*
			R	*B*	*C*			
1	Bidangri	Buyeo		O		-	Brief	Lee G.S. 1977
2	Gubongri	Buyeo			O	0.15	Preliminary	BRICNNU 2001
3	Gajeungri	Buyeo		O		-	Brief	Arimichi 1959
4	Hapjeongri	Buyeo	O			0.13	Final	BNRICP 2000
5	Jeoseokri	Buyeo		O			Final	Lee N.S. 1997
6	Jungjeongri	Buyeo		O		-	Brief	
7	Rabokri	Buyeo	O	O		2.20	Preliminary	CDI 2002
8	Songgukri	Buyeo	O	O		-	Final	Kang I.G. et al. 1979 Chi G.G. et al. 1986 Ahn S.M. et al. 1987 GNM 1993 BNM 1993
9	Majeonri A	Nonsan	O			1.12	Final	Lee H.J. et al. 2001
10	Majeonri C	Nonsan	O	O	O	0.86	Preliminary	Sohn J.H. 2001
11	Jeongjiri	Nonsan	O	O		3.80	Preliminary	CNNUM 2001
12	Wonbukri	Nonsan	O	O		3.26	Final	JARCCH 2001
13	Dangjeongri	Seocheon	O			1.74	Final	BNRICP 1998
14	Dosamri	Seocheon	O			1.22	Preliminary	RIARKU 2003
15	Hanseongri	Seocheon	O			0.22	Final	BNM 2000
16	Oseokri	Seocheon	O	O		1.86	Final	Lee N.M. 1996

* Activity Area - R: Residential; B: Burial; C: Cultivating

All residential areas have been found at the side and/or top of residual hills meeting the plain zone. In the residential areas, surrounded by wooden palisade or ditches at some sites, have been discovered not only dwellings but also other features reflecting domestic and productive activities for daily life, such as, storage pits, open kilns, outdoor hearths, and so on. All dwellings are subterranean, round or square in plan. Most of them are Songgukri-type houses, which are characterized by small central pits with a pair of interior holes, nicknamed ‘pig nose’, due to their shape, despite the differing number and display of main postholes around it (Figure 4.05).

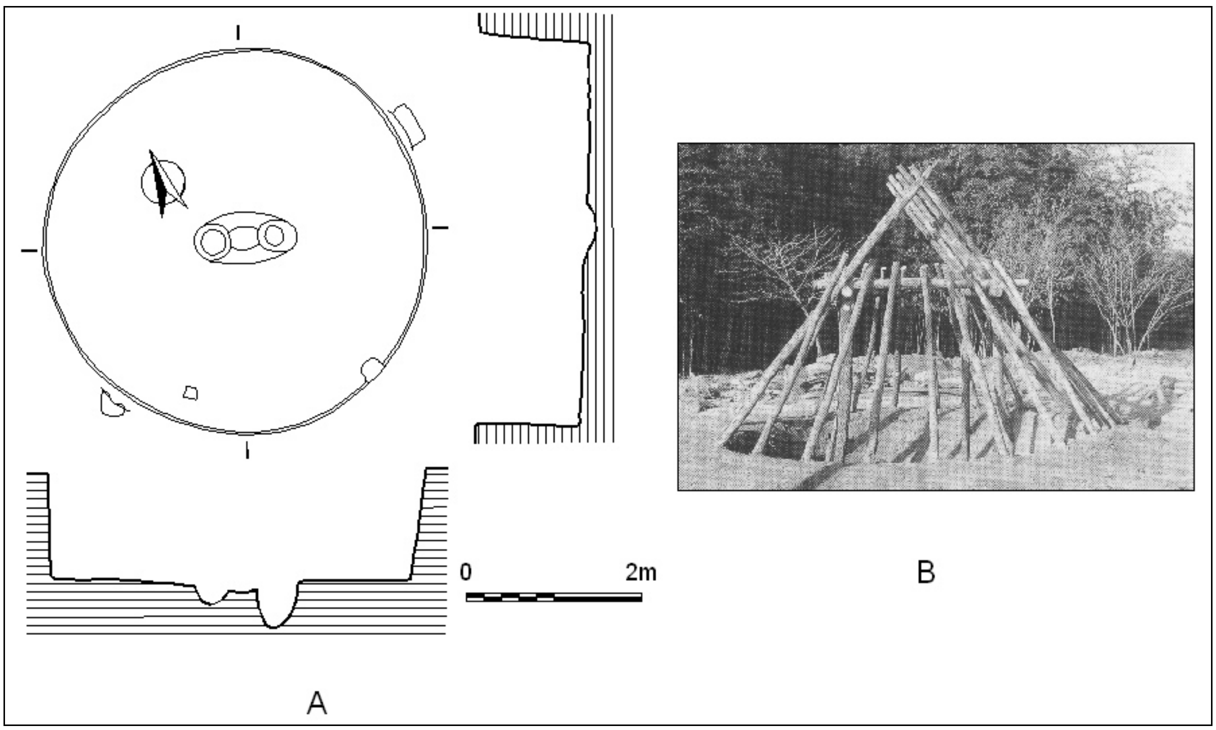

Figure 4.5: Songgukri-type Dwellings. A: Floor Plan; B: Reconstructed Structure.

The cemeteries have been found in almost the same geographical setting as the residential areas. Although some small scale excavations in earlier times discovered clusters of tombs isolated from any other kind of area, many recent bigger scale excavations exposed cemeteries related to habitations where the people who made them resided, in the vicinity or even in substantial distant locales. For example, the cemetery of Wonbukri site, Nonsan is about 300 m from the residential area which includes dwellings, storage pits and kilns, while at the Oseokri site, Secheon, and the Majeonri C site, and the Songgukri site, Buyeo, the cemeteries are located

Figure 4.6: Songgukri-type Burials
After Kim S.O. (2001). It has been redrawn and slightly modified.

quite close to, or in the middle of the residential area. In the cemeteries, several kinds of burial types, such as stone slab tombs, pit tombs with stone covers, pit tombs, and urns are mingled together (Figure 4.06).

Two excavations in the research area discovered MBA paddies, at Gubongri, Buyeo, and Majeonri C, Nonsan. Both excavations were limited to a small area in comparison to today's common scale of CRM work, thus the plots might not have been revealed en their enirety, but these excavations provide very useful information about what the MBA paddy plots looked like and how they worked. Besides diked fields, irrigation features, such as channels, ponds, wells and wooden devices to control water flow, have also been found. Individual diked fields are, although not perfectly shaped, largely rectangular. In addition to this variation in shape, the sizes of individual fields differ from each other. According to two excavations at Gubongri, Buyeo, and Majeonri, Nonsan, the area of individual diked fields ranges from 11.4 m^2 to 73.6 m^2 (0.001-0.008 ha). Although the Japanese Yayoi Period, largely contemporaneous with the Korean LBA, witnessed differing strategies and scales in plotting paddy fields, large-scale paddy-plot strategy dated to MBA has not been, so far, identified (Figure 4.07).

4.1.2.2. Overview of Previous Survey Data Korean archaeologists have not paid much attention to the quantification of the data obtained by surface survey. Worries about the extent to which the helter-shelter collections of artifacts often made on regional survey can accurately represent subsurface remains seems one of the most fundamental reasons. Doubts about considering surface survey data quantifiable are a major reason why salvage excavation projects aim at exposing the whole area threatened by construction, and this further undermines efforts to quantifying the surface data.

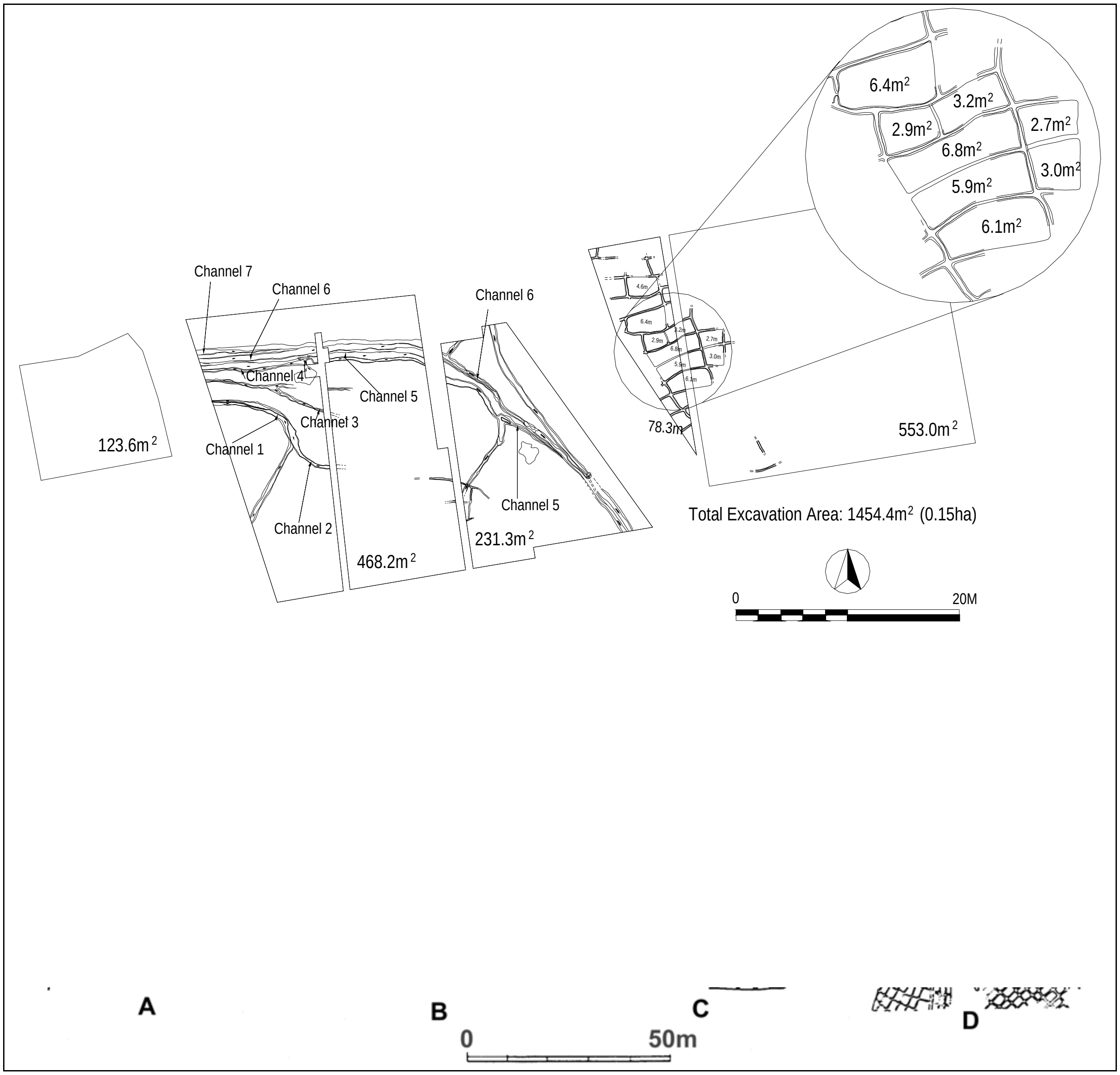

Figure 4.7: Plot of Paddy Field at Gubongri Site, Buyeo (upper) and Two Strategies of Yayoi Period Paddy-Field Layout (lower). Large individual fields were excavated at Tori site (A), but at other Yayoi sites excavated since then, most large field areas are internally divided into many small paddies of varying dimensions (B, C, and D). Illustrations have been redrawn and modified. After after Barnes (1993:1).

Nevertheless, Korean archaeologists have recently made stronger efforts than before to get archaeological information through surface survey, because various scales of construction projects that produce massive transformation of the landscapes have increased continually, and the whole process of salvage excavation, by law, should start with a determination of the location and boundary of site to be excavated. Accordingly, the areas to be transformed by construction projects have been intensively and fully surveyed, and then excavated via the procedure of test-excavations with trenches. Besides the archaeological projects relevant to salvage excavation, many individual archaeologists and academic institutes have surveyed to find sites.

Furthermore, as large-scale construction of highways, railroads, industrial complexes, apartment complexes, and the like have drastically increased in recent times, the need for systemic information for efficient cultural resource management in large areas have been growing. As a result, local governments have recently sponsored mapping historical relics and scatters of archaeological remains at the scale of 1:5,000. These maps synthesized the fragmentary data that has been previously accumulated and provide substantial information on the locations and boundaries of all archaeological and historical sites in the research area, with brief descriptions and illustrations of collected artifacts. For Buyeo County and Nonsan City, almost corresponding to the eastern part of the research area, that kind of cultural resource maps published by two local archaeological institutes are available (CDI 1999; CNNUM 1998).

4.2. INCORPORATING REGIONAL SETTLEMENT DATA: TEMPORAL AND SPATIAL DIMENSIONS

Archaeological studies of regional patterns, like others, depend fundamentally on time-space systematics. The step that must precede reconstructing regional politics, economics and other sociocultural phenomena is to define temporal and spatial units and place the data in both these dimensions.

The area covered by the data dealt with here, as mentioned in passing in a previous chapter, does not conform to any culturally bounded unit. Rather it is just defined to cover different geographical settings: the high inland zone and the low coastal zone in the Geum River basin.

On the other hand, the temporal focus for this study has been specified from the beginning as Middle Bronze Age, a subperiod of the overall Bronze Age, which witnessed drastic sociocultural changes in central western Korean prehistory and is archaeologically definable, according to local chronology, by identifying the Songgukri-type assemblage.

Finally, temporal and spatial analysis of settlement data, prior to exploring MBA settlement patterns, is to identify which survey collections and/or excavated areas include the indicative component(s) consisting of the Songgukri-type assemblage and locate them in geographical settings, based on the local chronological system and the explicitly defined observational and analytical units.

4.2.1. The Temporal Dimension: Chronological Affiliation of Excavated Features and Survey Collections

The MBA in the research area can be characterized as the emergence and spread of the Songgukri Culture into EBA contexts, which is archaeologically defined by the Songgukri-type assemblage. The Songgukri-type assemblage is constituted of various kinds of archaeological indicators, such as Songgukri-type dwellings, Songgukri-type pottery, Songgukri-type tombs, certain stone tools-triangular ripping knives, grooved stones, arrow heads-and so on.

A set of characteristic artifacts and features have been found in consistent association, and the typological scheme of components of the assemblage is more or less broadly shared among the scholars (Ahn J.H. 1992, 2002; Kim S.O. 2001; Lee H.J. 1996; Lee J.M. 2003; Woo J.Y. 2002). On the basis of this consensus, all final excavation reports thoroughly examine the chronological affiliations of all features and artifacts exposed by the excavations. Accordingly, it could be quite straightforward to assess how archaeological features and artifacts dated to MBA in excavated areas are distributed, and additional classificatory analysis of the excavation data, beyond just reviewing the reports, would not be necessary for this study.

On the other hand, analysis of surface collections made by this study's own regional surface survey and other projects requires additional chronological sophistication in a consistent manner, because they are just classified as Bronze Age sites or collection units. Identifying Bronze Age sites and collection units in this study, like any other regional surveys, mostly depends on the presence of particular pottery types.

In the research area, the Bronze Age pottery assemblage consists of several kinds of ceramic vessels, mostly with plain coarse paste, which are referred to as *mumun* pottery. Relatively small amounts of red and black burnished ceramic vessels have also been found. Bronze Age Mumun (plain coarse) pottery is easily discerned from that of other periods, even with small pieces, due to its characteristic paste. However, its classification for identifying subperiods-Early, Middle, and Late Bronze Ages-totally depends on the stylistic differences in *mumun* pottery assemblages (Kim B.C. 2001; Lee C.G. 1988; Lee J.M. 2003; Park S.B.; Woo J.Y. 2002). Despite different thoughts on the formation of subperiods and on pottery-manufacturing traditions, the general picture of the stylistic differences between the subperiods' pottery assemblages seems broadly shared (Lee J.M. 2003; Park S.B. 1999; Kim J.S. 2002; Woo J.Y. 2002).

An obvious difference that is applicable to the classification of sherds encountered during the surface survey is related to the shape and decoration motifs of vessel rims. Regardless of vessel size, the indicative attributes exclusively shared within each subperiod's pottery assemblage, especially by the dominant or newly appeared kinds of vessels (Lee J.M. 2003).

The most indicative element of EBA pottery assemblage is the decoration motifs around the rim, such as *gongyeol* (lined perforated holes), *dansaseon* (incised short slanted lines), *gusungakmok* (notches on the edge of the rim) and *iejoongguyoun* (doubled rim with clay strip). These decorative elements, by themselves or in combination, represent the different local pottery traditions mentioned in the previous chapter: the Yeoksamdong, Garakdong, and Heunamri styles (Figure 4.8).

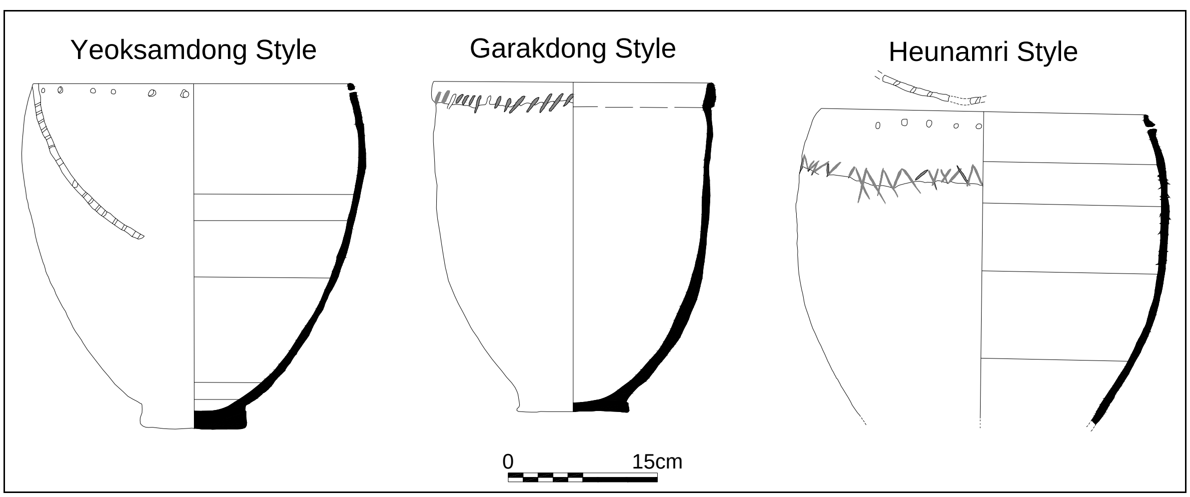

Figure 4.8: Various Rim Decorations of EBA Pottery

Songgukri-type pottery indicative of MBA in the research area has several formal characteristics which EBA pottery lacks, the most apparent being that the upper part of the vessel shows a slightly curved exterior rim and a short neck above a slightly restricted body (Figure 4.9).

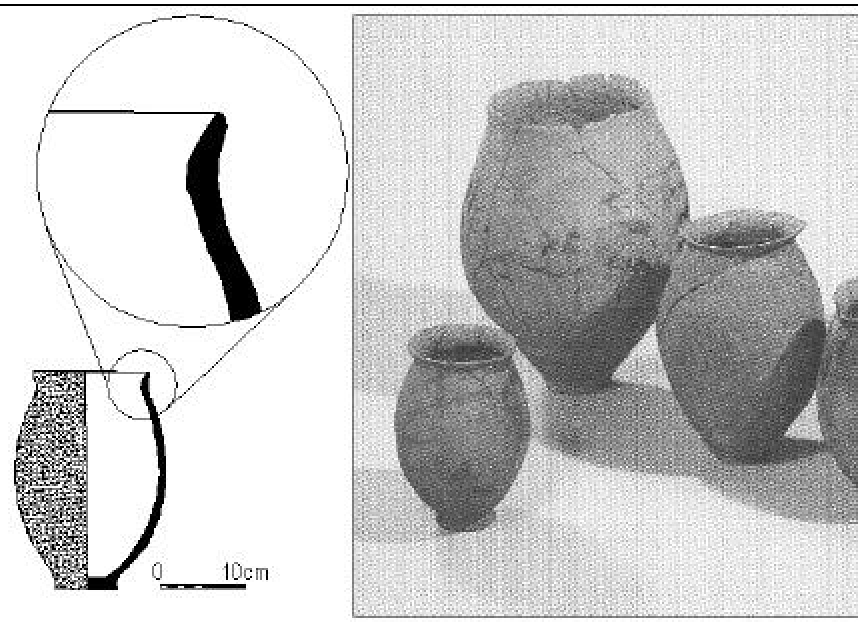

Figure 4.9: Songgukri-type Pottery of Various Sizes

The LBA pottery assemblage consists of several kinds of vessels, and some of them, such as jars, deep bowls, and bowls with pedestals are decorated with a rolled clay strip on the rim (Kim B.C. 2001). A set of rolled rim pottery characterizes this period's pottery assemblage, so that usually the archaeological culture of LBA is commonly called Jeomtodaetogi Culture. Besides, rolled-rim pottery, various types of handles and black burnished long-neck jars occur exclusively in this period and not in the preceding periods.

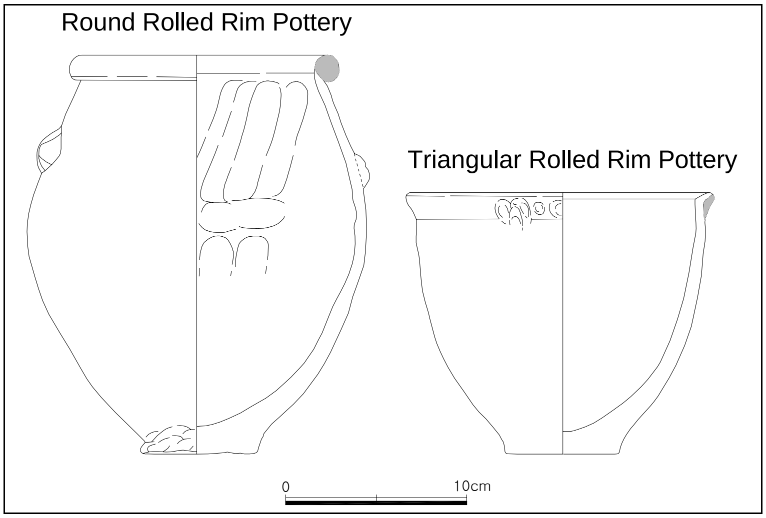

Figure 4.10: Rolled Rim Pottery

4.2.2. Spatial Dimensions: Defining Units for Spatial Analysis

4.2.2.1. Collection Unit and Site In observational and analytical respects, this study does not depend heavily on the concept of 'site' conventional in settlement archaeology. At the observational level, the surface has been initially recorded, as discussed above, by collection units rather than sites. However, this does not mean that the concept is totally discarded in this study. Some usefulness could be found as a conceptual unit in spatial analysis. One critical reason is related to the fact that surface collections made by previous survey projects and excavation data were based on the traditional concept of site. Another reason, as will be more thoroughly discussed in the next chapter, is to make possible the application of site catchment analysis for examining the dynamic aspects of MBA settlement patterns with reference to soil suitability for wet-rice cultivation, accessibility to tribute collection, and effectiveness of water management.

After chronological assignment, surface survey data accumulated by previous projects and generated by this study's own survey can be straightforwardly incorporated into analysis aiming to reconstruct the MBA settlement system based on the sizes of occupied areas by digitizing the locations and areas of the sites, and incorporating them all into the same into coordinate system.

However, the incorporation of excavation data mostly generated by recent CRM projects into the entire picture of MBA regional settlement patterns sometimes needs more careful treatment, due to two different pitfalls related to the fact that the area to be excavated in CRM works are not determined by the boundaries of past occupations.

On the one hand, some excavations, especially those initiated by road construction, seem not to have excavated the whole areas of sites except at interchanges or highway junctions. As a matter of fact, the excavations initiated by road-construction projects are supposed to be limited to a 50 m-wide area toward both sides from the center of the road. When a site extends farther than this, its area is likely to be underestimated. Therefore, measuring site area requires reviewing the reports of survey and test-excavation prior to final excavation. Only by combining the information from pre-excavation reports, final excavation reports, and relevant other survey results, can we properly define site areas.

On the other hand, there is also the possibility that a big area exceeding any single period's site has been excavated The whole area excavated by a CRM project, in Korea, is routinely designated as 'a site' and named after the administrative village and described as if had been fully occupied in each period. In this case the area representing any single occupation is likely to be overestimated. For the purpose of this study to explore MBA settlement patterns, the area representing the period's occupation should be based on chronological classification of excavated features, as mentioned above.

Besides these problems due to the nature of CRM work, it is questionable how the boundaries of the area representing excavated MBA occupations can be measured for proper comparison with surface measurement of site size from surface survey data. In practice, for measuring the site area, this study adopts a method quite similar to registering collection units in this study's own survey in Seocheon County. The first step is to put standardized one-hectare grid(s) on the site plan digitized on a topographic map. The first feature at either side of the site at issue represents the area of one hectare, and without any gap of 100 m between the features, or geographical barriers, such as steep slopes, gullies and big streams, more grid units would be placed continuously from the first until all the MBA features were included.

After temporal and spatial classification of the data generated by 1) this dissertation's own survey and 2) previous excavation and survey projects, 79 spatially discrete locales representing MBA sites have been located in the research area. All sites occupy a total area of 171.1 hectare. Most sites are located below the elevation of 50 m above sea level, and only exceptional cases are higher than 100 m (Figure 4.11 and Figure 4.12).

4.2.2.2. Defining Analytical Units: Community Although some use for the concept of site, as a sort of observational unit, has been found, it cannot serve as the final analytical unit for this study. As mentioned in a previous chapter, this study aims to explore how social components (e.g. regional polities, local communities, and individual households [Parsons 1972; Trigger 1968]), in the context of emergent complexity, were related to each other in shaping a specific sociopolitical organization that utilized improved agricultural technology. That is, the

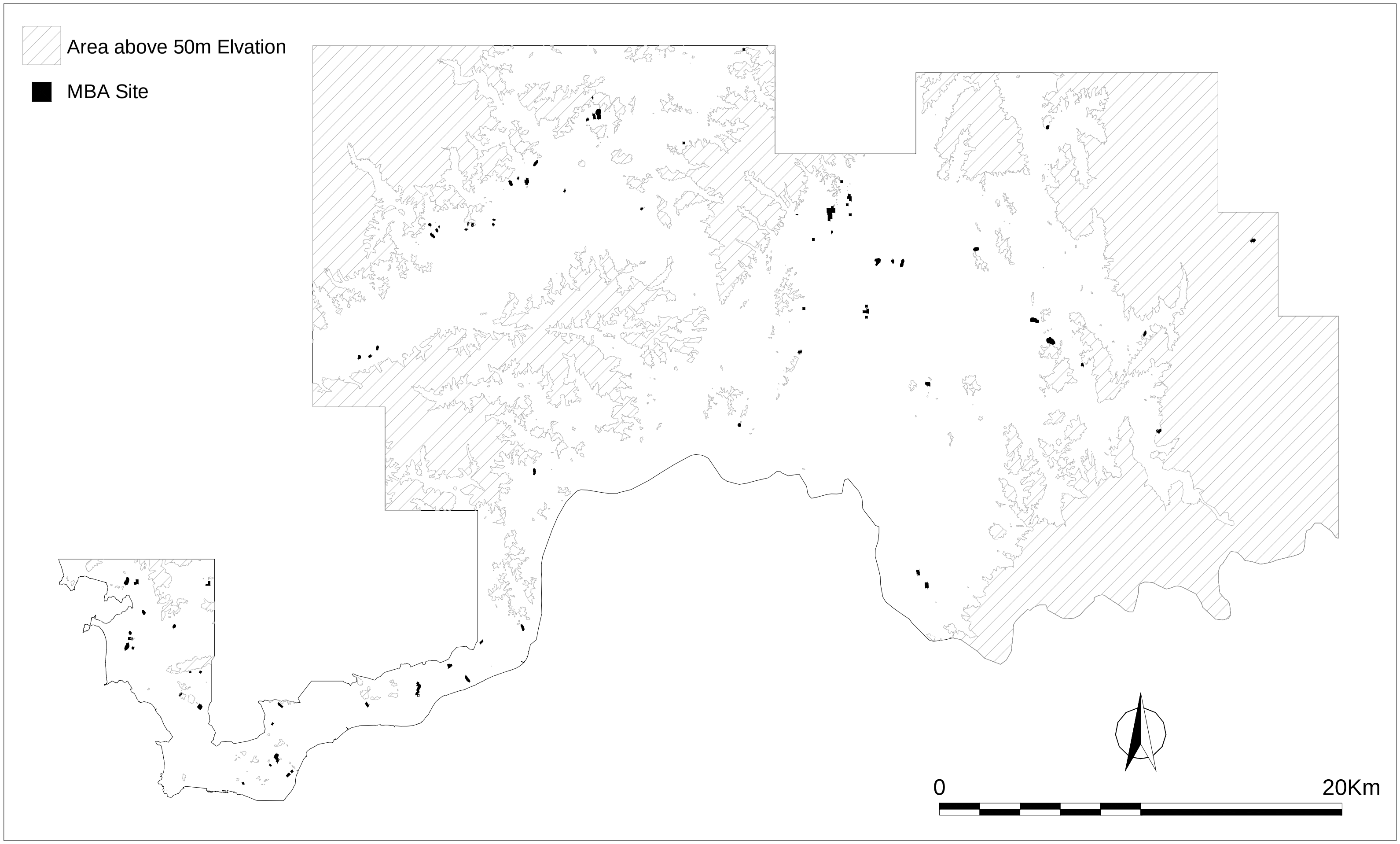

Figure 4.11: Distribution of 79 MBA Sites

interactions that generated patterned relationships between communities or households are focused here, and therefore, exploring MBA regional settlements patterns is primarily serving to understand inter-community relationships.

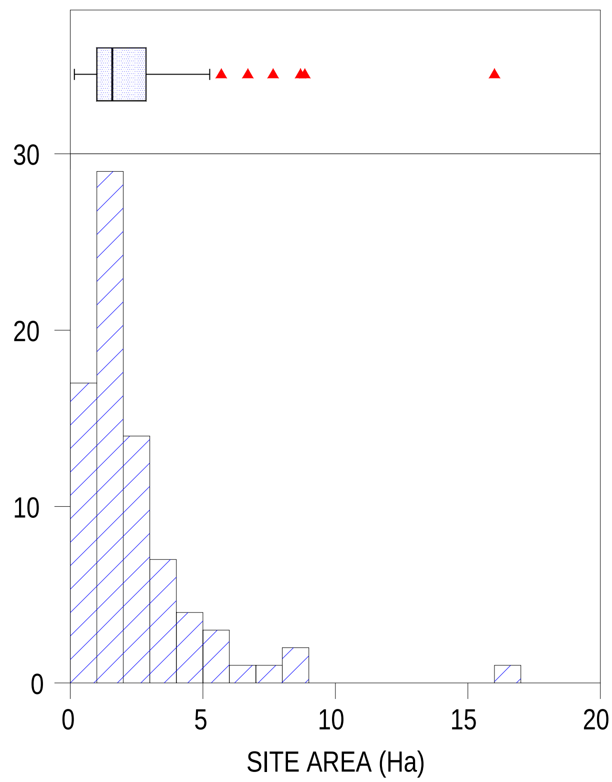

Figure 4.12: Box-Plot and Histogram of Area for the 79 MBA Sites

Most regional studies labeled settlement archaeology have focused on a 'site' as a unit of spatial analysis, roughly assuming that it corresponds to a community, as an agent of interactions which ultimately could generate social changes, such as the emergence of complexity from an egalitarian context (Peterson and Drennan 2004).

Small Local Communities in Agrarian Societies Community has multiple meanings and connotations (Hegmon 2002; Kolb and Snead 1997; Peterson and Drennan 2004; Yaeger and Canuto 2000), In a similar light, as many archaeological and ethnographic studies show, depending on what sociocultural interactions are pursued (Peterson and Drennan 2004; Yaeger and Canuto 2000), or what kind of historical and external forces are at work (Wolf 1956), or how self-identification is configured (Cohen 1994), the communities to which individual households or villages belong can be defined differently, and thus their spatial boundaries can be variously delineated.

In regard to exchange, religion, ethnicity, and the like, the range of the community could be much bigger than when daily economic activities, production and consumption of staple grains, for example, are at issue. Various levels of traditional Korean agrarian communities constituted of non-commercialized peasant households can be a good example of this phenomenon (Choi J.S. 1975). Lots of ethnographic research shows that the constituent households cooperate for agricultural production with other households of the same village or of other nearby villages, while other kinds of interactions-for example, traditional periodic market systems, assembly of consanguinity, etc.-are much more inclusive: for periodic exchange-usually at five-day intervals-farmers travel for several kilometers from their villages, even without modern means of transportation. Figure 4.13 shows reconstructed pre-modern travels for periodic markets from the Gubongri site, Nonsan.

The interaction this study is mainly concerned with is the economic activity focusing on the utilization of intensive technology for rice production. The activities are quite communal and need frequent contacts between participant households. Therefore, the community unit most important to this study is a small-scale and locally-oriented one ensuring constituent households' daily face-to-face interaction rather than imagined, symbolic or sporadic relationships. In this light, Murdock's classic definition (1949) focusing on co-residency, daily interaction, shared experience and common culture, and some archaeological definitions inspired by it (Peterson and Drennan 2004; Varian 2001) would be a starting point for defining and delineating the small local community for this study.

Delineating Small Local Communities Despite the multiplicity and inconsistency found in the general conceptualization of community, defining and delineating the small local community, as an operationalized analytical unit in this study, based on the distributional patterns of archaeological data, should be very straightforward. Furthermore, distance and intensity of interaction, two major principles that configure the spatial range of a community should be measured consistently and objectively in the whole region under study (Peterson and Drennan 2005). Although the boundaries of the local community based on day-to-day relationships can be strongly influenced by travel distance under circumstances lacking modern transportation, it is also likely that the larger the population group, the more it attracts and generates interaction.

In this light, a couple of ways used in other contexts, such as grouping separate distributions of occupations which locate closely, and simply creating a specific size of buffer surrounding them is not compatible with this study. Both ways are prone to ignore the intensity of interaction that can differ according to interactive population size, but also depend on arbitrariness in deciding how close is sufficient for grouping and how big a buffer size is appropriate.

In order to delineate small local communities in the research area, this study follows the approach suggested by Peterson and Drennan (2005), finding that their analytical premise and

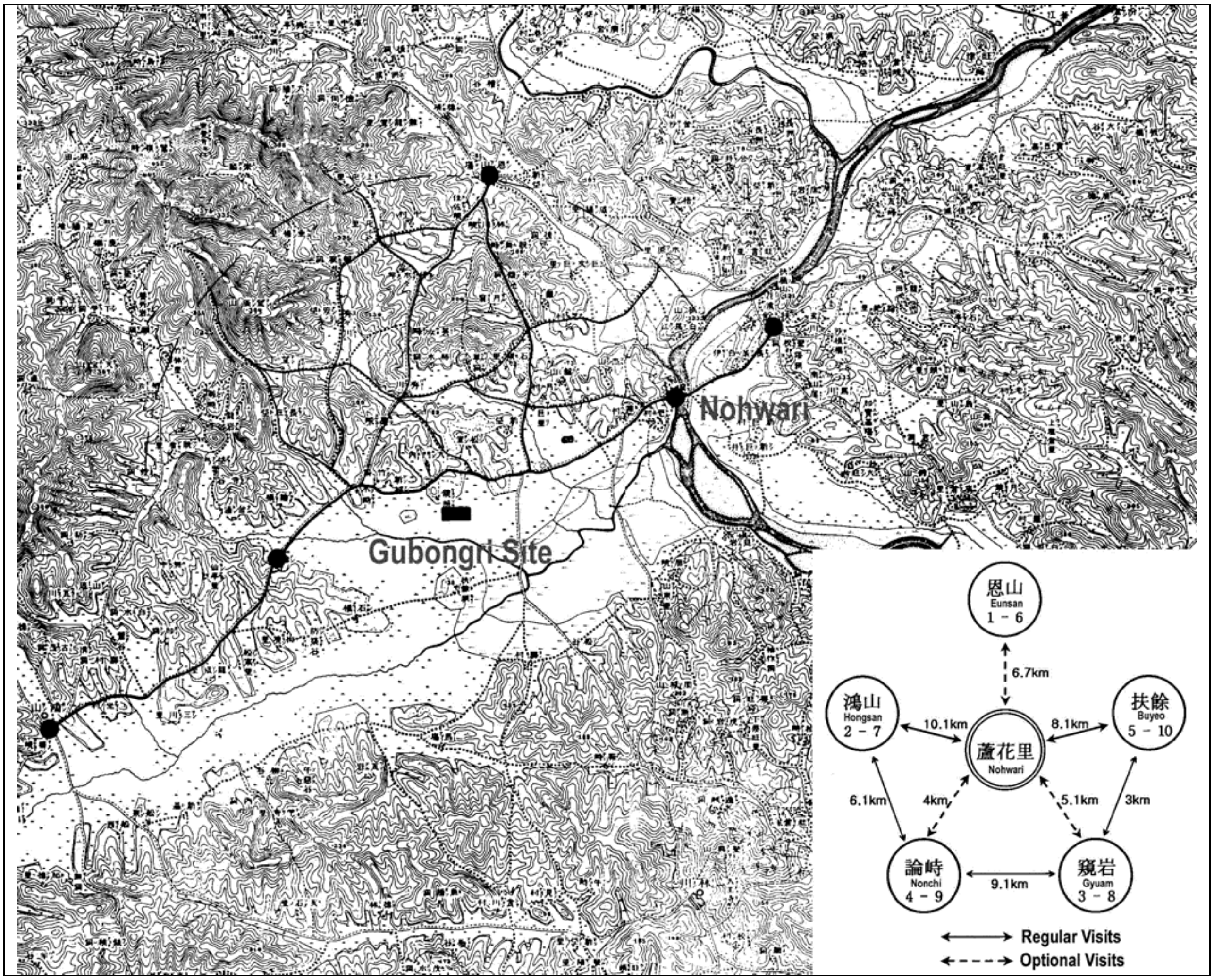

Figure 4.13: Travels to Periodical Markets from Gubongri Site, Nonsan. Reconstruction Based on Topographic Map Manufactured in 1907 with Schematization. After BRICNNU (2001)

procedure, and examples of empirical data-especially Hongshan, China-which the method was applied to and/or generated from, are compatible with this study's dataset. In the authors' application, besides distance between spatially separated occupations, intensity of interaction, assumed to be ultimately represented in reconstructed population size, is also considered of importance. A specific occupation's population size can be archaeologically estimated based on the area and density of artifact scatters, and thus it is important to measure how two kinds of estimates differ through all the individual artifact scatters.

However, applying these authors' method to the dataset of this study requires some slight modification, mostly due to the unavailability of density values. In fact, the data generated by previous survey projects do not provide values of artifact density. In addition, for the excavated areas the same criteria cannot be applied, because the method concerns surface density of artifacts. Therefore, to all sites where archaeological artifacts and features have been identified, an identical density value was imposed.

Nevertheless, the distance-interaction principle set forth by these authors, that the bigger human groups have stronger and broader interaction spheres, has not been violated, because the computation procedure makes higher peaks for larger occupations despite applying the same density value, as shown below.

Through applying the method discussed above, surfaces representing the MBA occupation have been generated (Figure 4.14). Along the different contour levels of peaks generated in unsmoothed surface map of the power 4 (f) presented in Figure 4.14, 79 MBA sites could be merged into smaller numbers of possible local communities (Peterson and Drennan 2004). Each of three levels of delineation chosen here regroups 79 sites into 58, 50, and 46 possible small local communities, respectively (Figure 4.15). Among them, the delineation

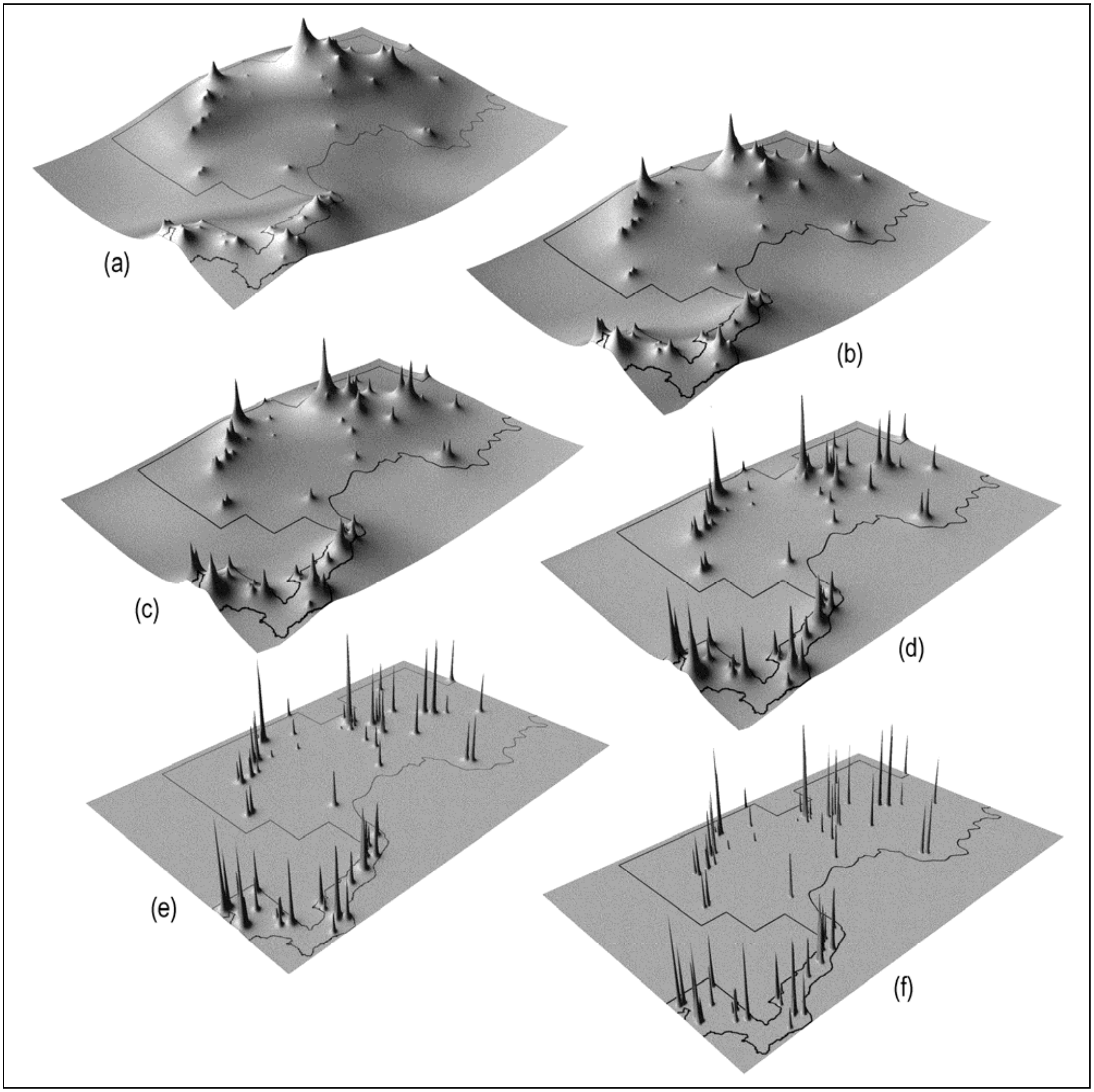

Figure 4.14: Surfaces Representing MBA Occupation in the Research Area. Smoothing incr ease from bottom to top with the inverse distance powers of 0.001, 0.25, 0.5, 1, 2 and 4)

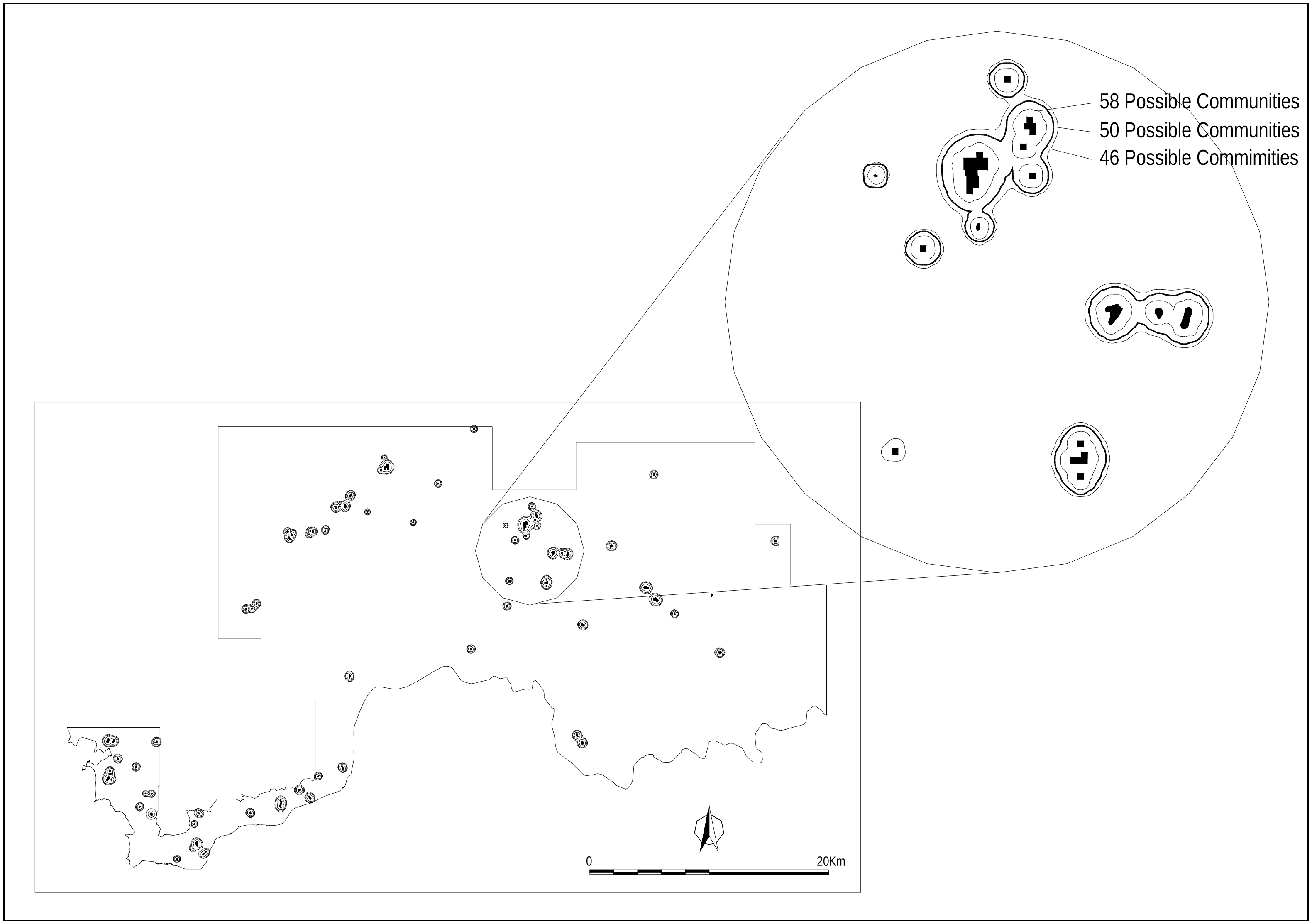

Figure 4.15: Possible Small Local MBA Communities in the Research Area

producing 50 communities has better fitness for this study focusing on the economic activities of daily life. The one producing 58 communities separates some sites located quite close to each other. On the other hand, the delineation of 46 communities is not much different from the one that generates 50 communities, although in some cases, it merges sites that seem too distant-for example, farther than 1.5km-to maintain daily face-to-face relationships.

4.3. RECONSTRUCTING THE MBA REGIONAL SETTLEMENT SYTEM

4.3.1. Inter-Community Hierarchy and Centralization

Exploring the area occupied by each community tends to show some groupings making a multiple-tiered settlement system. There is often a single community that is conspicuously bigger than any others (Figure 4.16).

However rank-size graphs for the three different levels of possible communities defined in the research area show convex patterns (Figure 4.17). Each of them is constructed with different strength and statistical significance-the A coefficients of shapes are 0.447, 0.307, and 0.301, and three rows of graphs, from top to bottom, are associated with the confidence level of 66%, 90%, and 99%, respectively (Drennan and Peterson 2004; all these graphs are produced by the special programs written by Robert Drennan [2004]). By this measure, at least, there is very little centralization at the scale of the region defined in this study. As long recognized in the regional settlement literature, convex patterns may represent “pooling” of multiple independent systems (Johnson 1977, 1980).

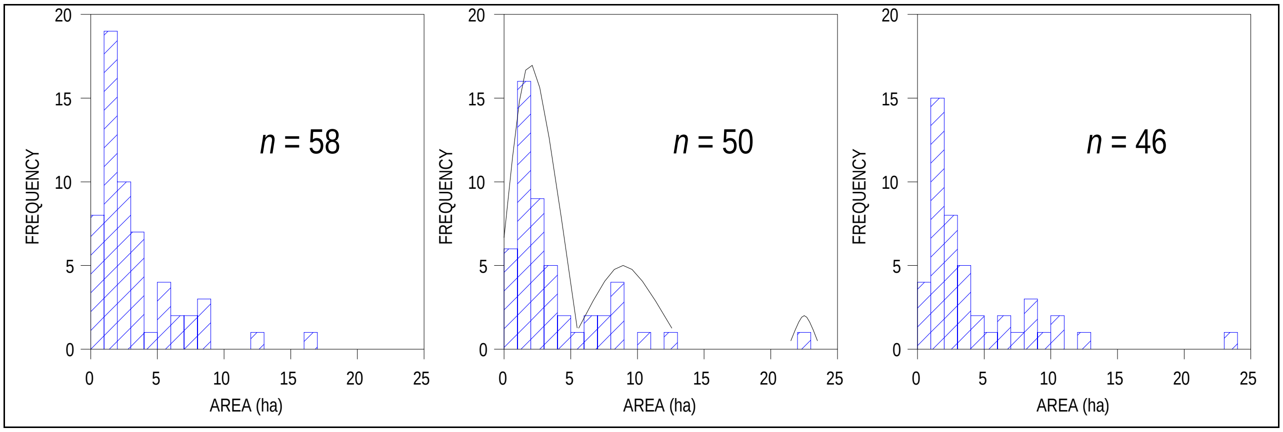

Figure 4.16: Histograms of Area for Possible MBA Small Local Communities

As mentioned above, the research area was not delineated originally to represent cultural or political entities, and therefore, it is possible to find that some entities larger than small local communities partition the whole research area. Each of the larger, higher-order communities or 'districts' could have been externally more or less independent but internally centralized and thus can be designated as a 'polity.' To pursue this possibility, the 50 possible small local communities discussed above could be grouped into the polities delineated by cutting off the bottom of peaks that have been generated by much more smoothed surface: in this case, surface at the power of 0.001, which is identical to Surface (a) in Figure 4.14 (Figure 4.18).

In the surface presented in Figure 4.18, we can see three large peaks that are separated by the apparent valleys and several small isolated peaks. Along the bottom of three large peaks we can delineate three possible polities labeled A, B, and C. These three polities include, in sum, 44 out of 50 possible local communities within research area, and occupy about 89% of the area all 50 communities do (185.42 ha). Some basic statistical analysis and rank-size graphs constructed

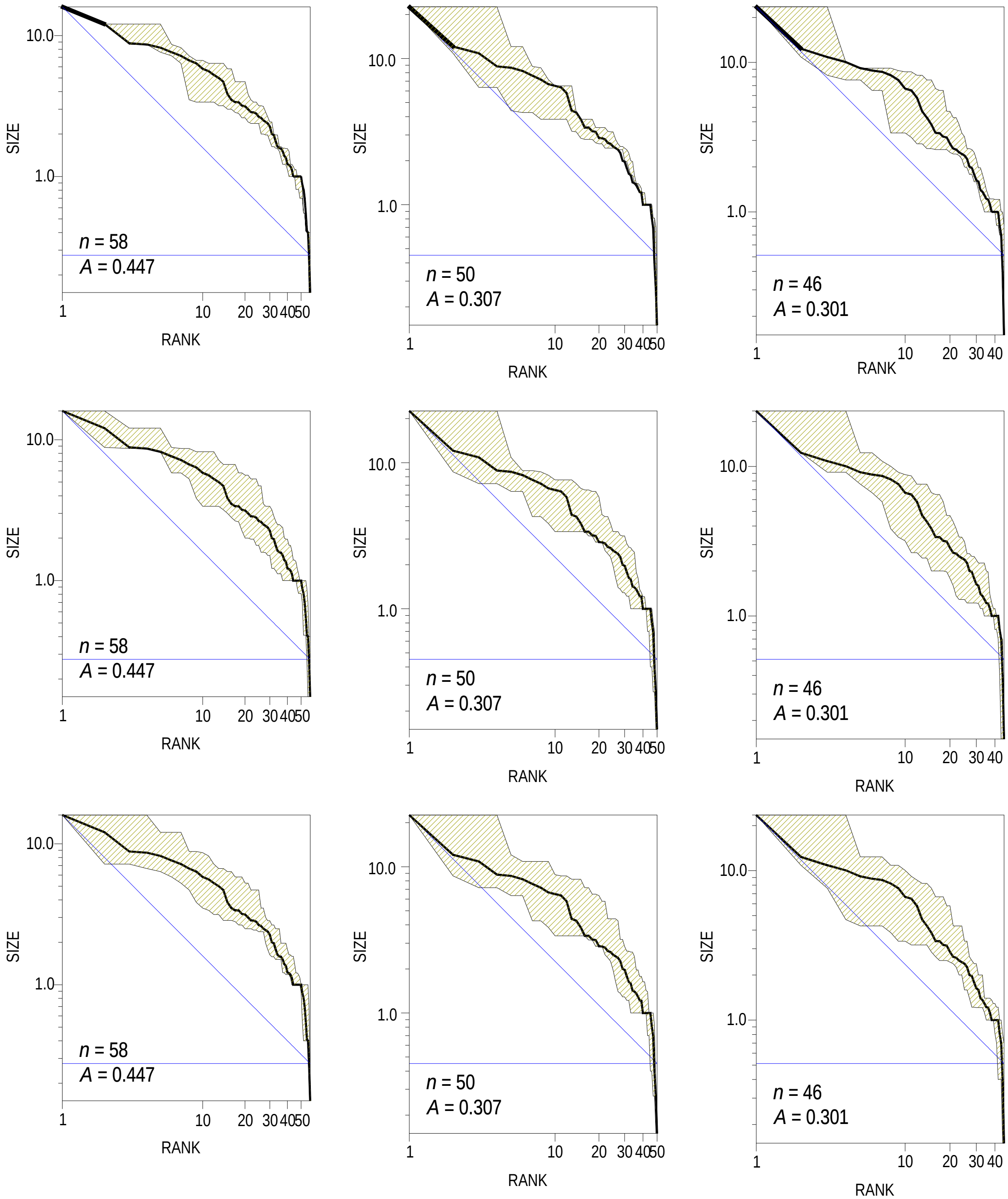

Figure 4.17: Rank-Size Graphs for the Possible MBA Local Communities

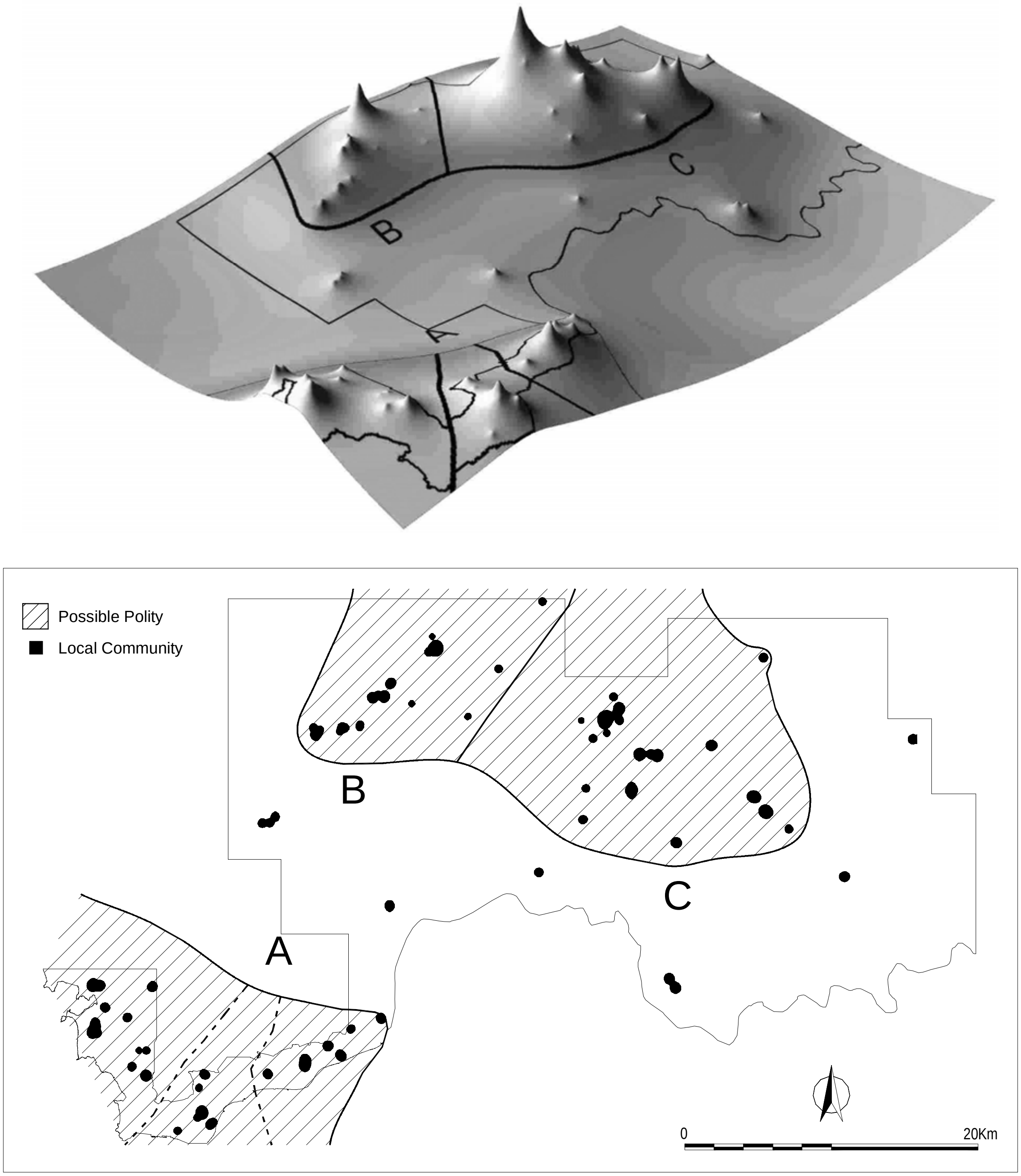

Figure 4.18: Highly Smoothed Surface and Recognizing Possible 3 Polities. The surface [up per] is identical to one with inverse power of 0.001 (a) in Figure 4.15. After cutting off the botto m of the smoothed peaks, 44 local communities belong to three separate polities [lower].)

for each of these three groups shows substantial differences from the one in which all 50 possible communities are taken as an overall population of MBA local communities in research area.

Comparing three polities to each other with histograms of area and rank-size graphs also shows considerable similarities and dissimilarities. With reference to rank-size patterns, Polities B and C look essentially log-normal with quite low coefficient A values, respectively. In addition, both polities show substantial similarity in terms of dominance of the biggest communities-the biggest one in each group occupies 31.6% of the total area of all communities. On the other hand, the rank-size graph of Polity A, even after the partitioning, indicates a very convex pattern with substantial statistical significance ($A = 0.503$, $p = 0.001$). The clearly dichotomized double-peaks pattern shown in histograms of area and spatial distribution of large communities make clear that Polity A lacks centralization, unlike Polities B and C (Figure 4.19). Of course, it is possible that a quite big community could be found outside the research area but near polity A. Thus, if the investigation expands towards the adjacent area, a different pattern of surfaces from the ones presented Figure 4.15, and a rank-size pattern indicating a more integrated or centralized settlement system can be found.

However, the possibility should also be pursued that there was much smaller-scale centralization than Polities B and C. In fact, it is unlikely that a large community near Polity A, even though it might have existed, was critically influential, because Polity A is bounded by a relatively high mountainous zone (see Figure 4.01). Another look at the southwestern part of Figure 4.18 lets us find several small peaks distinguished from each other by valleys inside Polity A. Therefore, it might be reasonable to partition Polity A, in the same way as when identifying the polities in the overall research area, and look inside each of the partitioned groups closely, considering the possibility of 'multiple-system pooling' that results in a convex pattern.

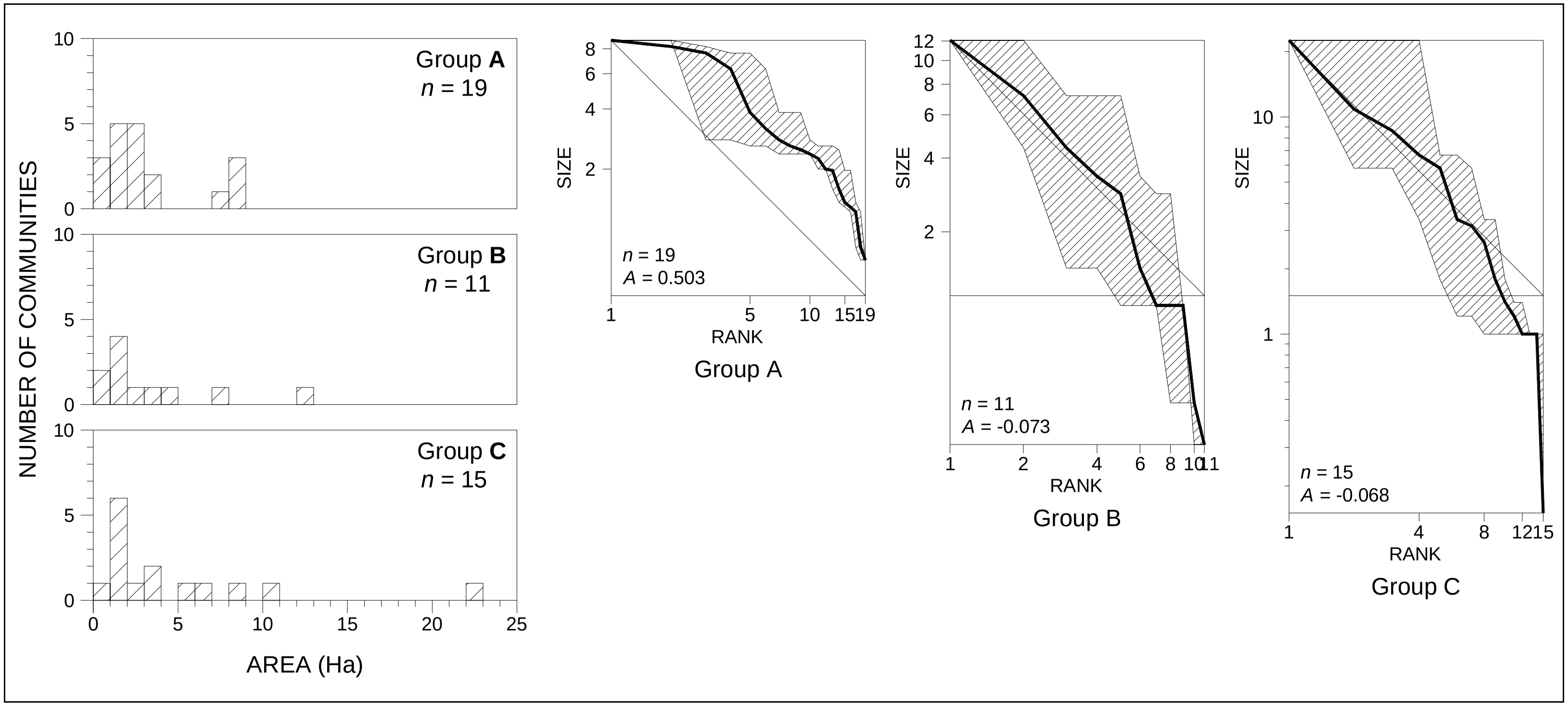

Figure 4.19: Histograms and Rank-Size Graphs for 3 Polities

Within Polity A, three individual clusters of small local communities form up, each of which includes one or two of the larger local communities from Figure 4.20. In fact, this sort of pattern is not found in Polity B or C. Rank-size patterns within Polity A' s subgroups indicate centralization similar to that of groups B and C, even though the error ranges turn to be quite big due to the very small sample size (Figure 4.20).

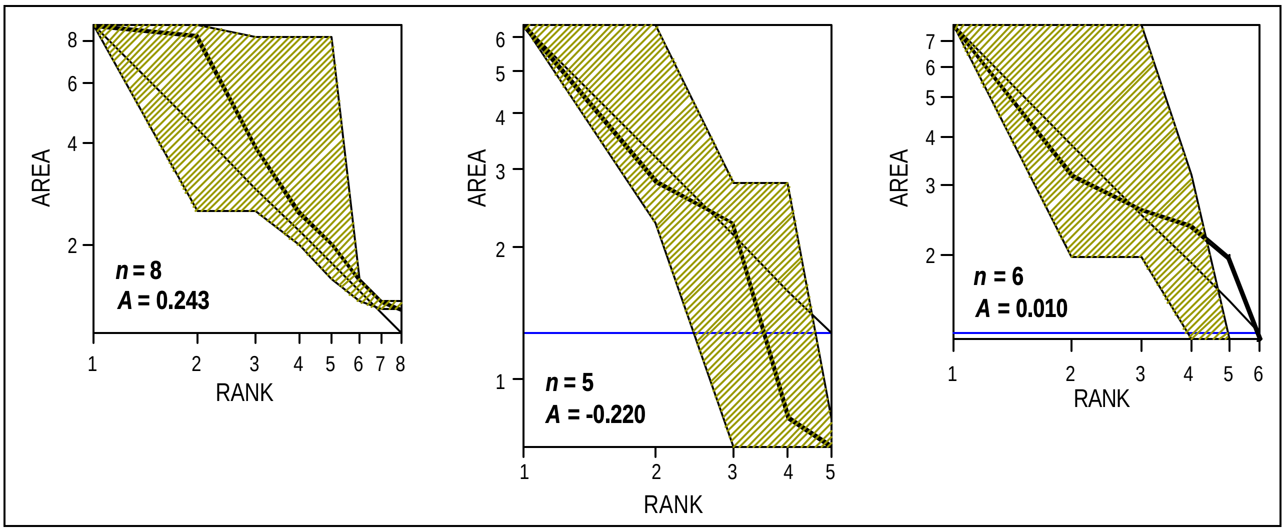

Figure 4.20: Rank-Size Graphs for Subgroups of Polity A

Based on the rank-size analysis discussed above, it could be concluded that centralization or integration at the level of the individual polity was relatively more rigorously accomplished in the inland area of the Geum River' s middle reaches (Polities B and C), while in the coastal area and the lower reaches this was much less the case (Polity A).

4.3.2 Brief Description of Ranked Communities: Excavated Areas

The first-tier communities in the histograms of area (Figure 4.16) can be taken as primary centers for political and economic decision-making within the higher-order communities discussed above. In the same vein, the second-tier group of communities can be named secondary centers and the third-tier group of communities can be classified as rural villages (see also Table 4.3 and Figure 4.21).

Table 4.4: Basic Statistical Description of Ranked Communities

	Primary Centers	***Secondary Centers***	***Rural Villages***
N	2	7	35
Min	12.07	6.35	0.15
Max	22.55	10.86	6.67
Sum	34.62	57.69	72.77
Median	17.31	8.21	1.59
Mean	17.31	8.241	2.079
SD	7.41	1.44	1.486
Proportion	0.210	0.349	0.441

4.3.2.1 Primary Center Some parts of two communities classified as primary centers have been excavated by several local institutes: the Hapjeongri site in Seocheon County, and the Songguki site in Buyeo County. The Songgukri site corresponds to the core part of the primary center of Polity G-though it does not include the entire area-has been excavated, and a series of final reports have already been published, so that we can be informed in detail about what the MBA primary centers looked like.

The site which is routinely called the Songgukri site *de facto* consists of at least five discrete settlements scattered in the area of around 4-5 km^2 (Figure 4.22). Seven seasons' excavations from 1978 to 1996 with different concerns have mostly been concentrated in the

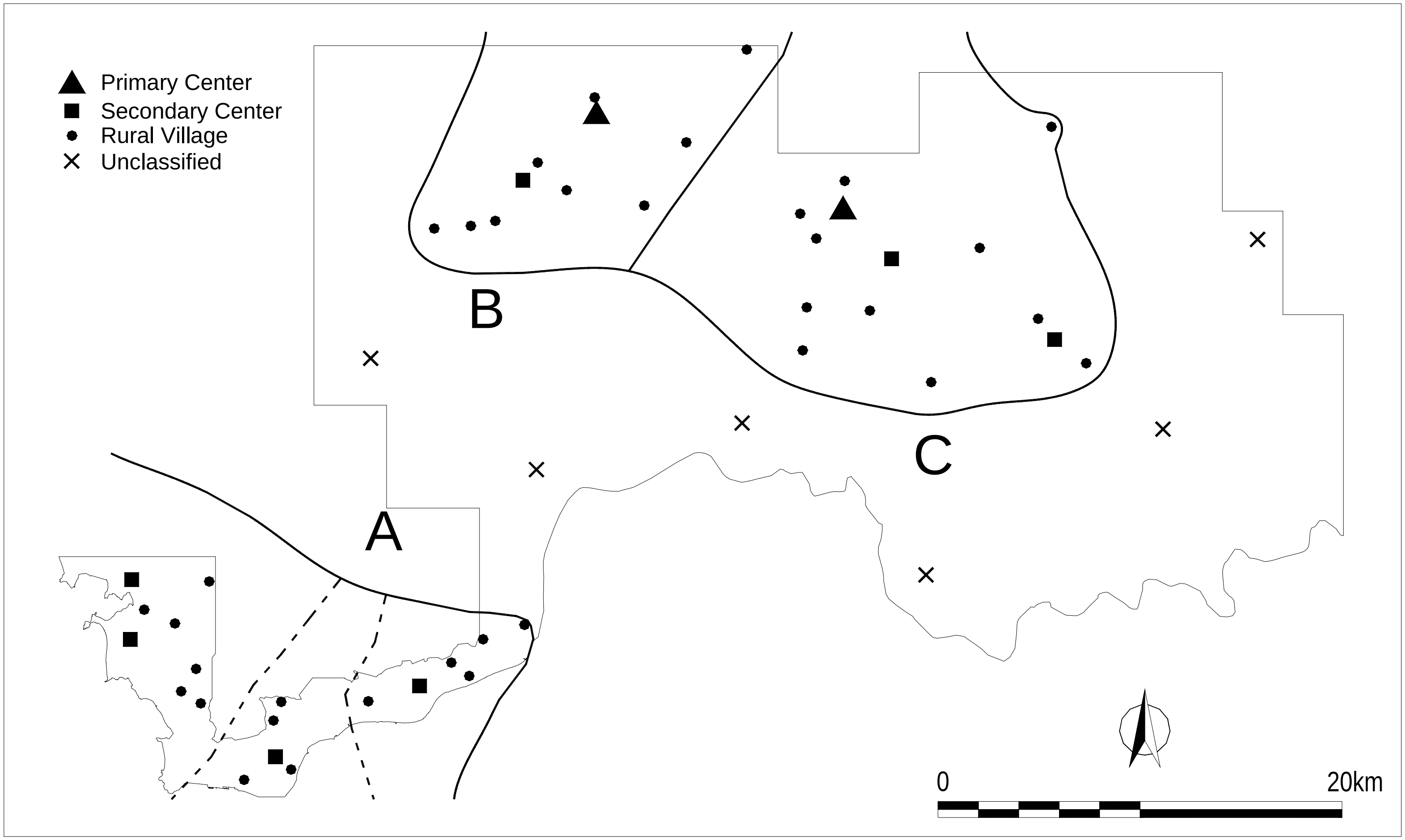

Figure 4.21: Figure 4.22 Schematic Map of Three-Tiered Local Communities

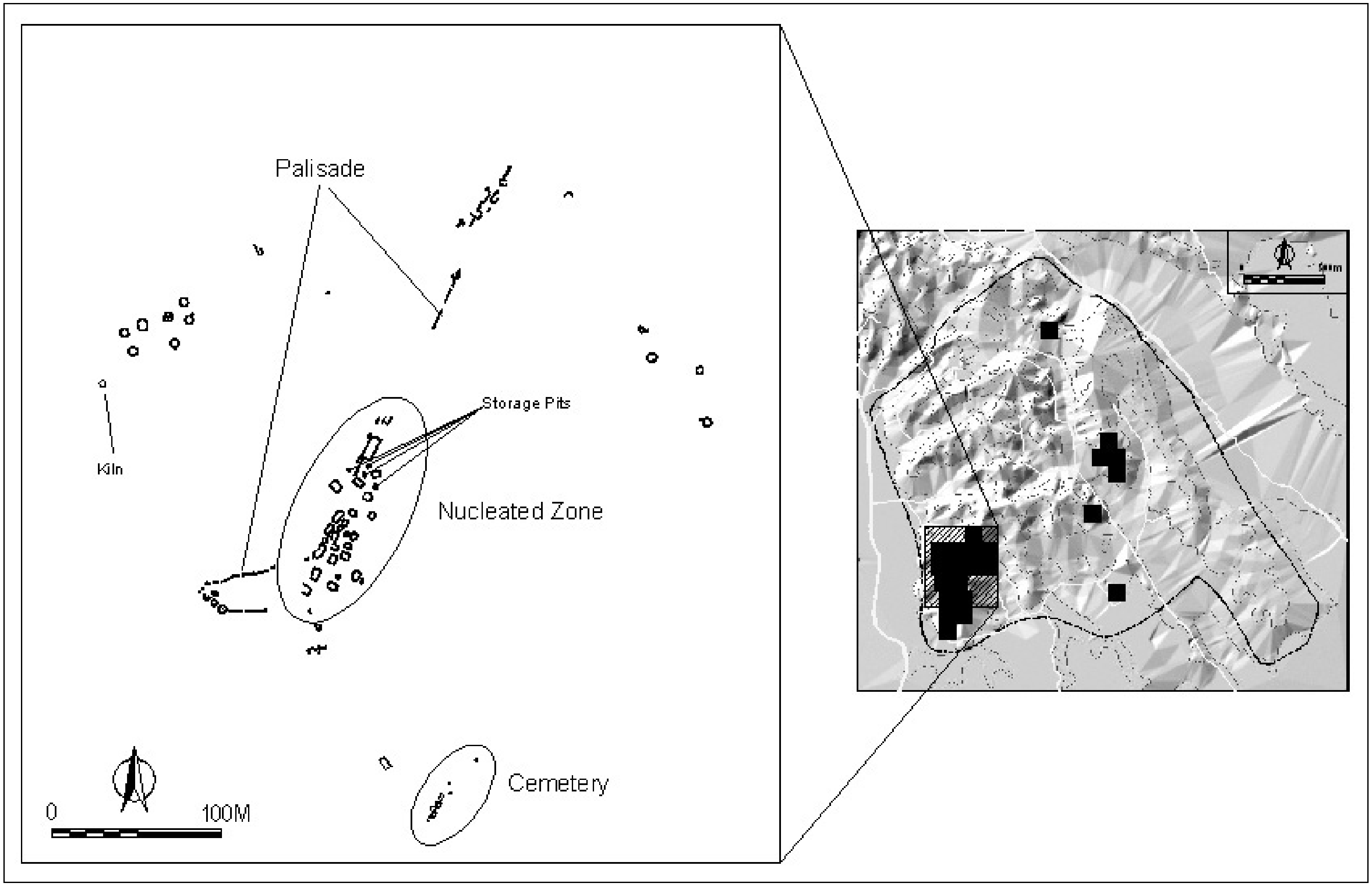

Figure 4.22: The Songgukri Site

southwestern part of the whole area inferred to be a central place on the basis of the first three excavations accompanied with surface surveys.

The excavations have, so far, exposed residential areas located in several locales. The areas in sum include 61 round and square houses, 8 outdoor storage pits, and a kiln and cemeteries composed of several types of Songgukri-type tombs (Figure 4.07). A substantial part of the residential area built in the main sector's southern part is loosely surrounded by a palisade, whose total length extends to at least 375 m, along with ditches of various sizes. The residential area surrounded by the palisade is a sort of nucleated zone and includes the biggest dwellings. Despite long-term, multi-season excavations, each excavated area was, in comparison to today's CRM work, relatively small-scale and academic, so that except for the southwestern part of the area, most of the site still remains unexposed. Even in the southern part, the area outside the nucleated residential zone needs excavation.

The community which includes the well-known Songgukri site, as shown in Figure 4.19, is conspicuously larger than any other in the research area. When we delineate much bigger and more inclusive regional polities than the 50 or more individual local communities, it could have played a more powerful and central role than any of the other centers. In addition to the size and massiveness of the earthworks for defensive purposes, such as the palisade, Tomb No. 1 (Figure 3.18) which is located in the cemetery at the southern tip of the site is enough to command the Korean archaeologists' attention and lead to the suggestion of a regional chief's tomb (Kim G.S. 1998; Kim S.O. 2001; Kim Y.B. and Ahn S.J. 1975), due to its elaboration and burial goods, including a Liaoning-type bronze dagger. Only two Liaoning-type bronze daggers associated with EBA and MBA features have, so far, been found in the entire Chungnam Province of 8590.2 km^{2,} including Daejeon Metropolitan City (see Figure 3.01), and the other (Seong J.Y.

1997) is located 40 km to the southeast of the Songgukri Site. Thus this idea cannot be simply dismissed as an impressionistic judgment.

Excavations at the Hapjeongri site revealed only two houses at the margins of the community (Figure 4.23), so that the information from the excavations is not enough for depicting the overall features of this primary center.

4.3.2.2. Secondary Centers Among the seven communities classified as secondary centers, some parts of four have been excavated and designated as the Hanseongri, Dangjeongri, Dosamri, and Rabokri sites, respectively. Although excavations at all three sites has been completed, detailed information on various residential and burial features and artifacts is available just for the Dangjeongri site, for which the excavation final report has already been published. Nevertheless, some information provided by the preliminary reports of two other sites can be of supplementary use.

Although three seasons' excavations at the Hanseongri site, a part of Polity A's biggest secondary center, were limited to a small area-0.2 ha-they seemed concentrated in the core part of the settlement and surrounding landscape. The excavated area is located on the top of a 63.3 m-high residual hill, which is located 1 km away from the coastline, contacting with the plain area, and thus has quite a distant view. In addition, the site is in the central locale of the community, as a primary center of Polity A, which is constituted of four separate settlements (Figure 4.24).

The excavations unearthed five Songgukri-type houses including one which is not only the biggest-around 45 m^2-among houses of the same sort found in Chungnam Province, but

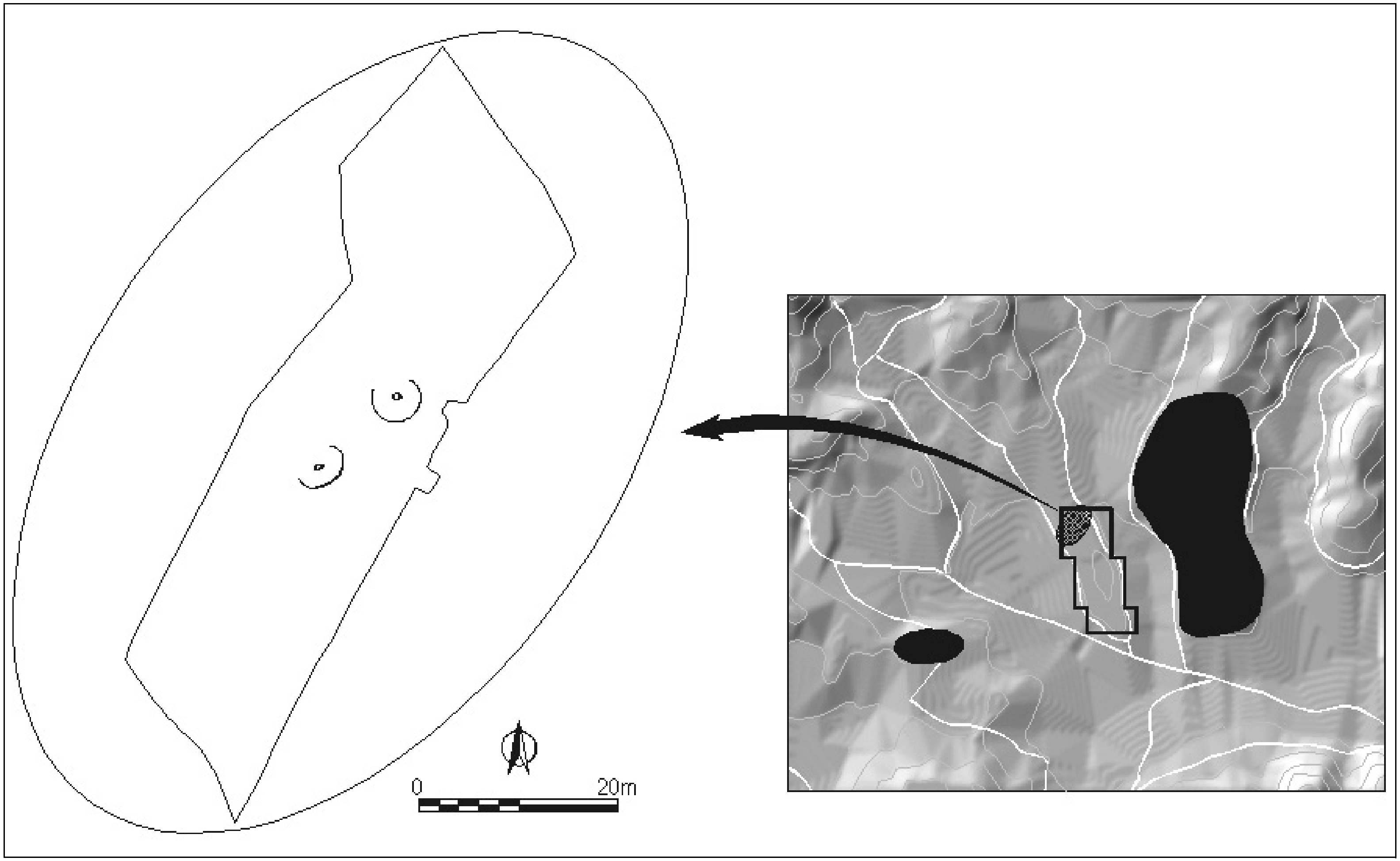

Figure 4.23: Hapjeonri Site

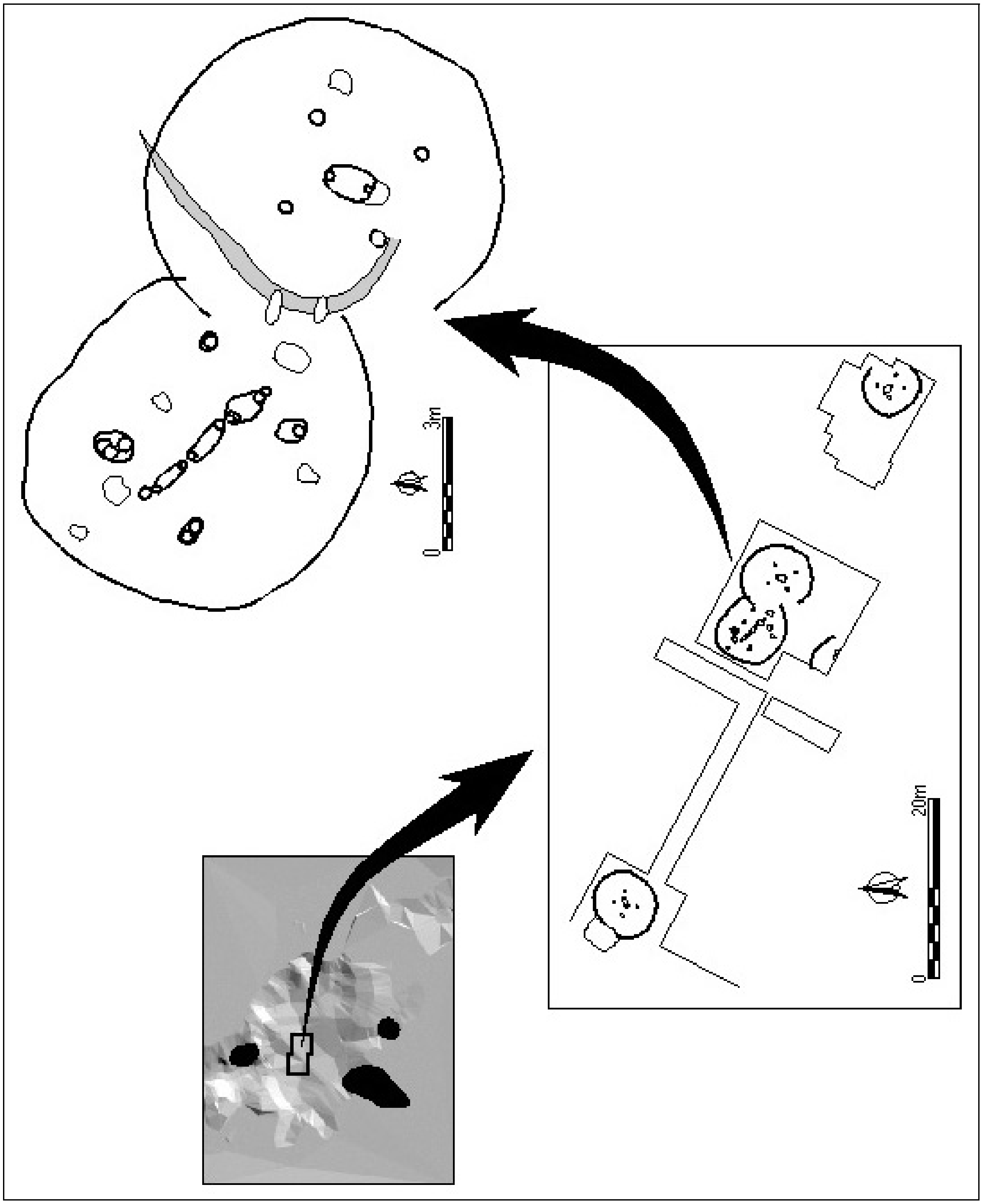

Figure 4.24: Hanseongri Site

also has a unique ground plan with a row of three central pits surrounded by four postholes (Figure 4.24).

Before excavation, the site was known by several artifact-find reports of amateur archaeologists and residents, one of which was a set of burial goods from a stone slab tomb that was destroyed by modern land use. The set, including a ground stone dagger and 24 arrowheads, shows considerable similarity with Tomb No. 1 of the Songgukri site in terms of elaboration and stylistic characteristics, lacking bronze daggers and tubular jade (Figure 4.25).

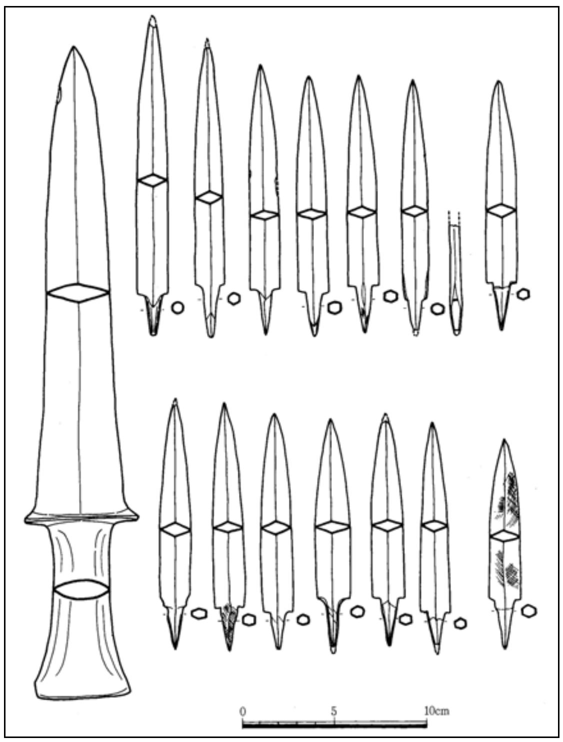

Figure 4.25: Burial Goods from Destructed Stone Slab Tombs near Hanseongri Site

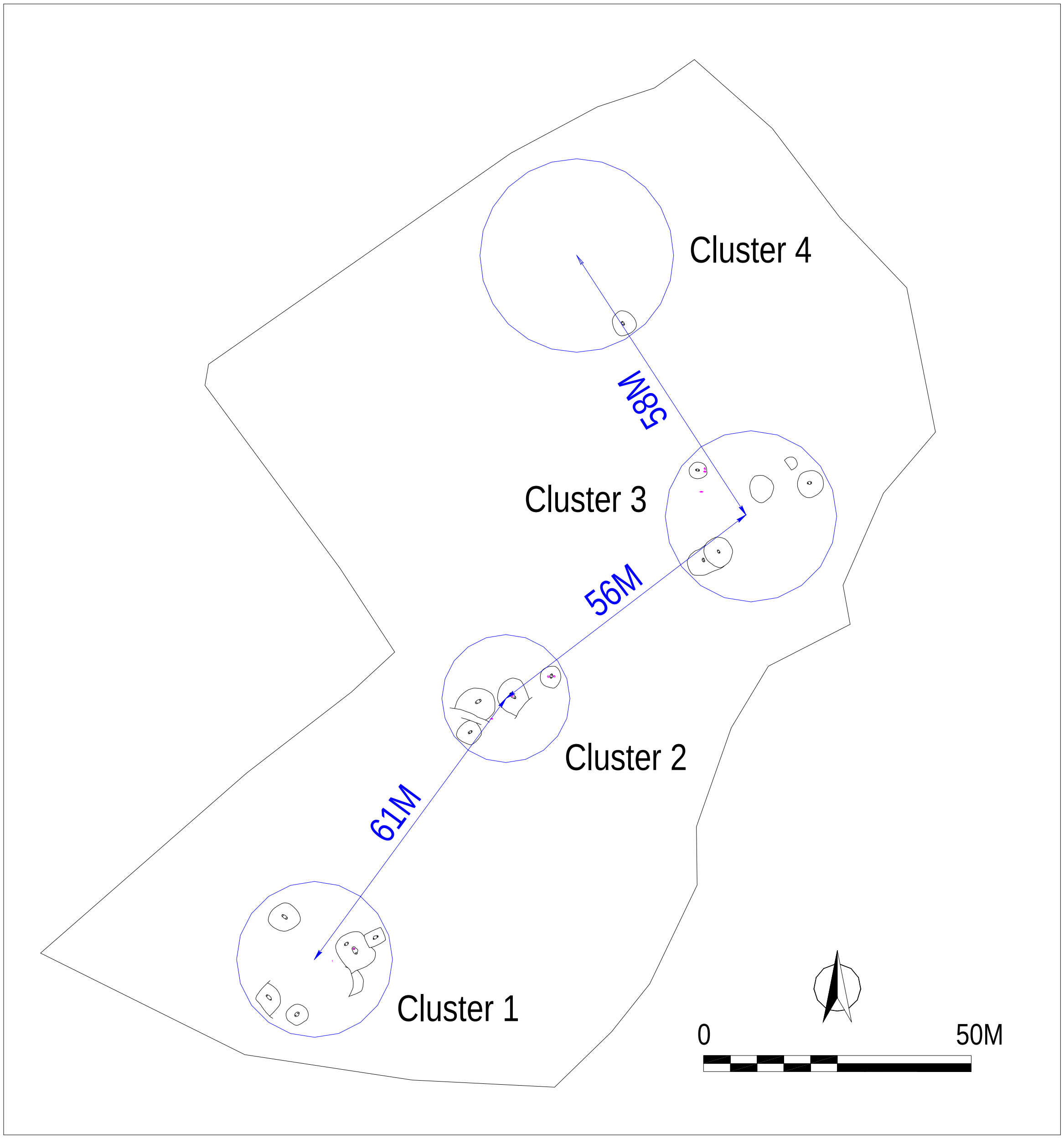

Figure 4.26: Clusters of Dwellings at the Dangjeonri Site

The community including the Dangjeongri site consists of two discrete but closely located settlements. One is located on the hill and the other corresponds to the site on the lower plain. One of the most conspicuous aspects observed at the site is clear clustering of several houses, with a gap in between of only several tens of meters (Figure 4.26). It has been considered that clustering of this sort, as mentioned in a previous chapter in passing, represented changes in intra-village social organization in MBA and also that it is very commonly shared in all MBA villages (Ahn, J.H. 1996; Kwon O.Y. 1997). In fact, this kind of house clustering has repeatedly been identified at excavations of MBA sites in central-western Korea.

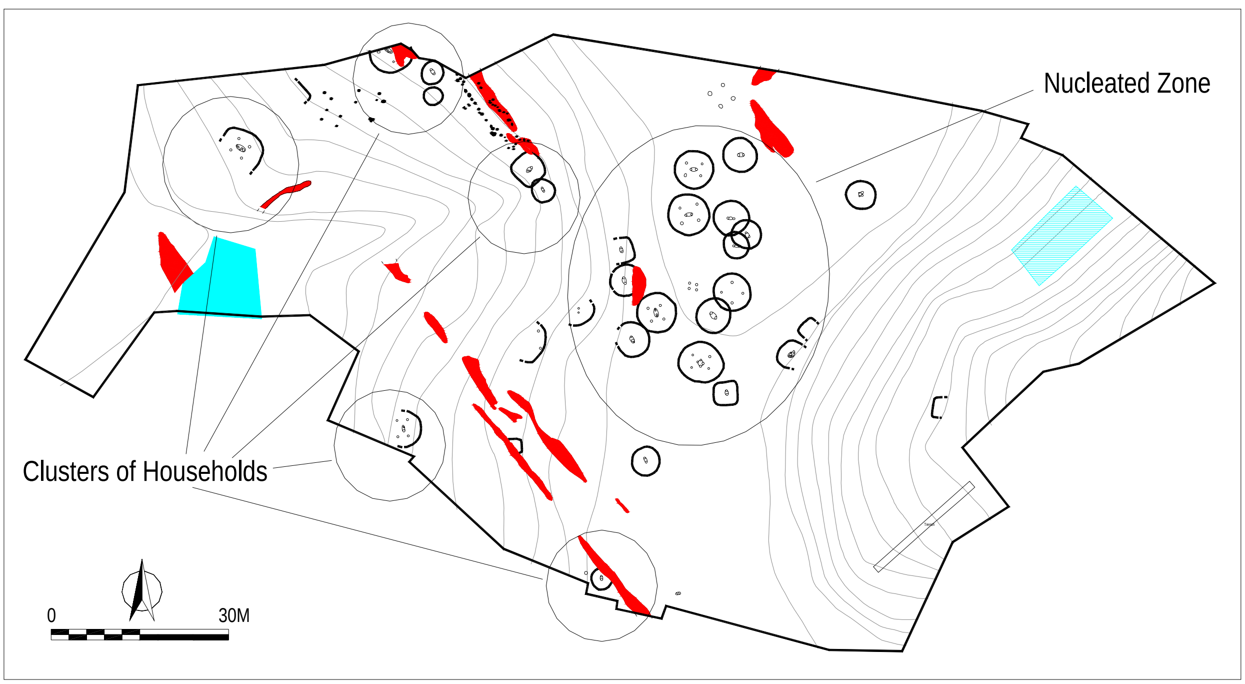

Figure 4.27: The Dosamri Site

However, dispersed clustering of houses might not have always been a dominant organizational principle of the site plan of MBA villages or communities. Rather, as shown in the site plan of the Dosamri site, it is likely that the clustering is more clearly observed outside the nucleated residential zone on the hilltop or hillside close to the top (Figure 4.27). Like the Songgukri site, the nucleated residential zone of the Dosamri site is loosely surrounded by ditches and a palisade, although it is much smaller than the one at the Songgukri site. The nucleated zone *de facto* is too crowded to find discrete groupings of houses. Moreover, the Dangjeogri site, itself, is likely to have belonged to the area outside the nucleated or central zone of the whole community, judging from the two constituent settlements' size.

4.3.2.3. Rural Villages A total of 35 communities can be classified as rural villages. Besides several communities located outside three higher-order groups, more than three-fourths of all communities belong to this category. The excavations at three sites-Oseokri (Seocheon) and Wonbukri and Jeongjiri (Nonsan)-provide detailed information on the archaeological features and artifacts. Although the Wonbukri and Jeongjiri sites have been designated as two separate sites, due to differing administrative affiliation, the two sites are quite close and really belong to the same community (Figure 4.28).

As shown in Figures 4.28 and 4.29, at these sites there is clustering of several houses, as observed in residential zones at secondary centers.. However, the rural villages share some characteristics not identified in primary and/or secondary centers.

First, they rarely have archaeological features that can be considered defensive facilities, such as palisades, moats, or ditches. In spite of substantial excavated areas, including hilltop and hillside at these sites, no trace of such features has been found.

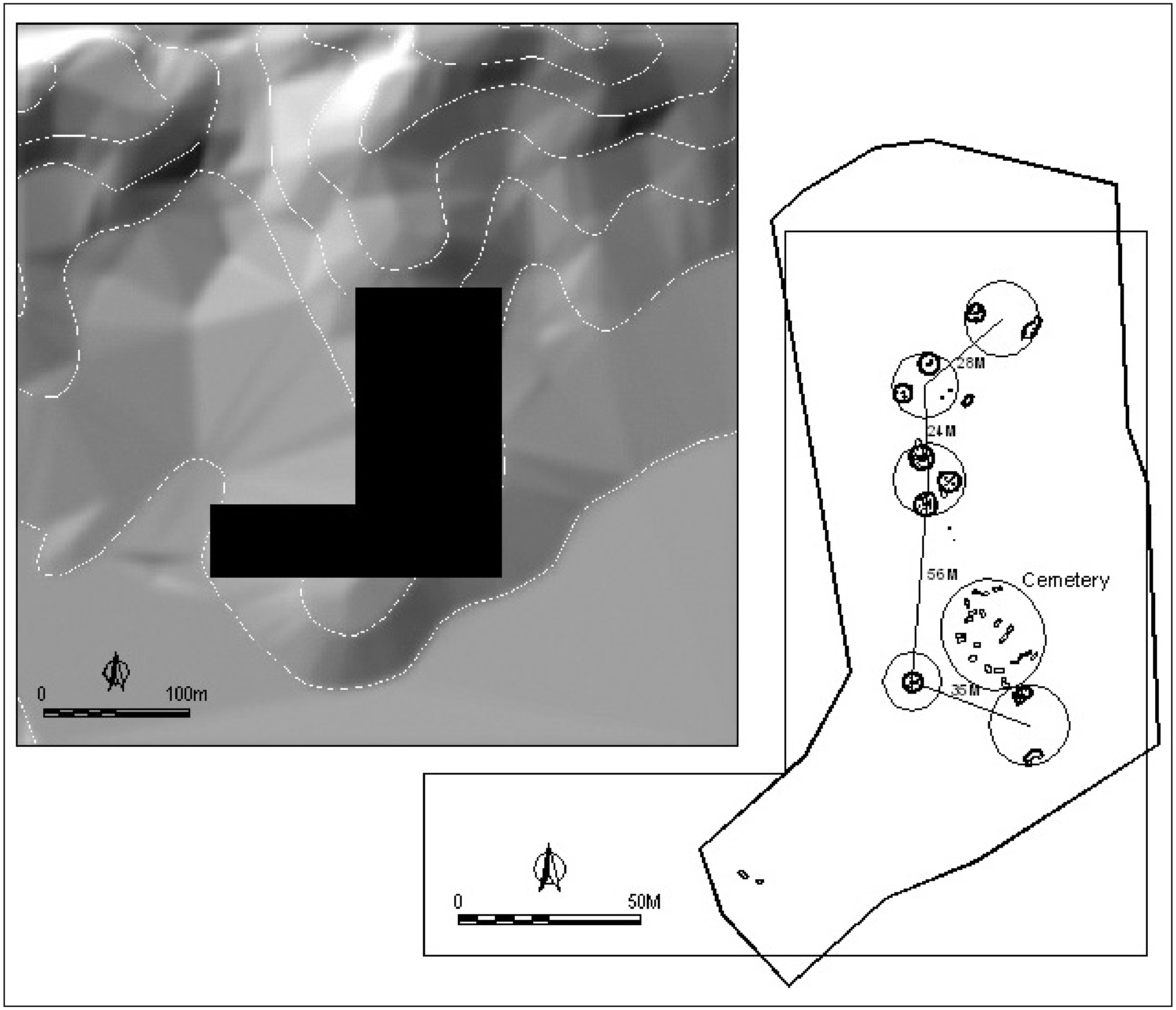

Figure 4.28: Oseokri Site

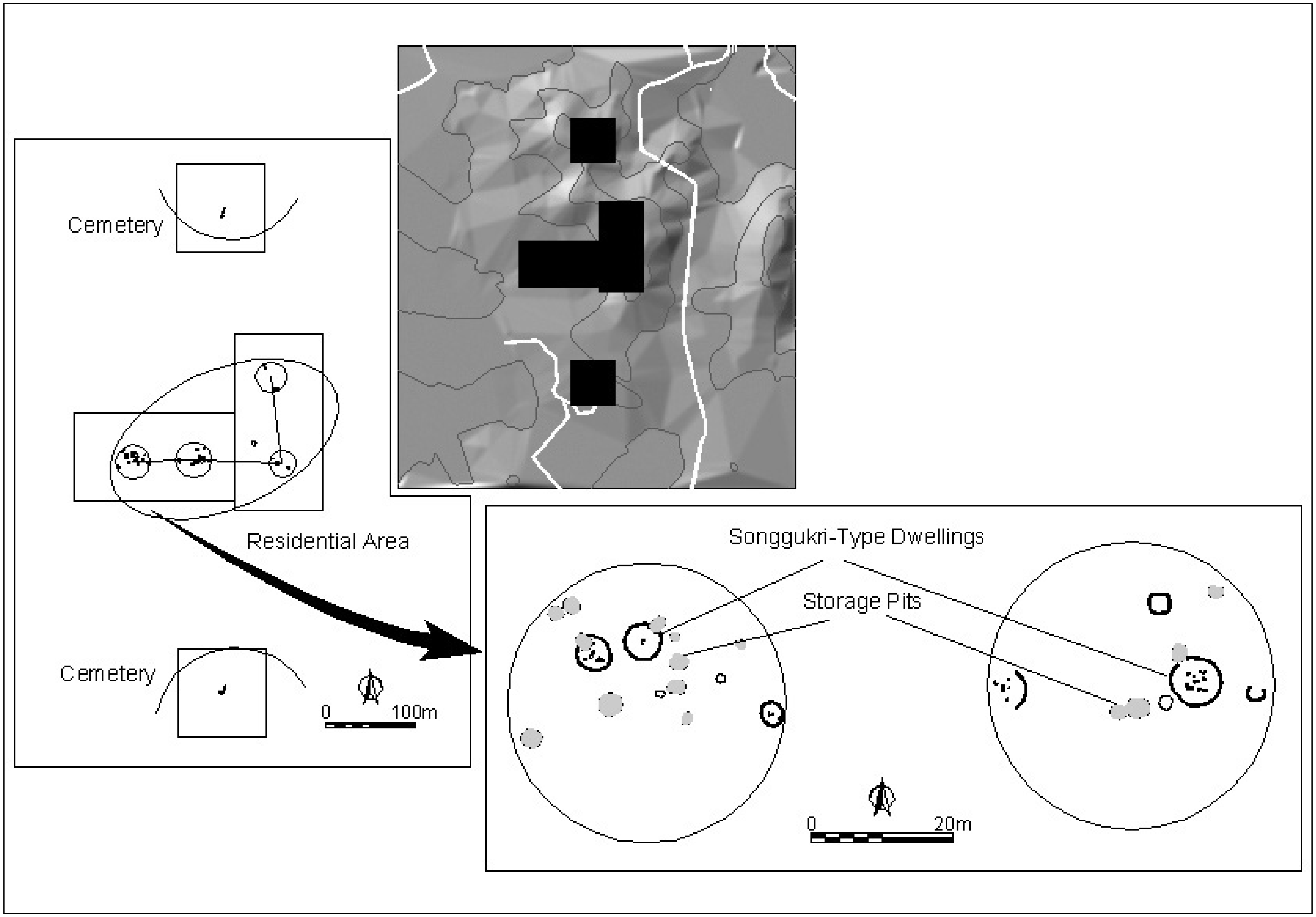

Figure 4.29: The Wonbukri and Jeongjiri Sites

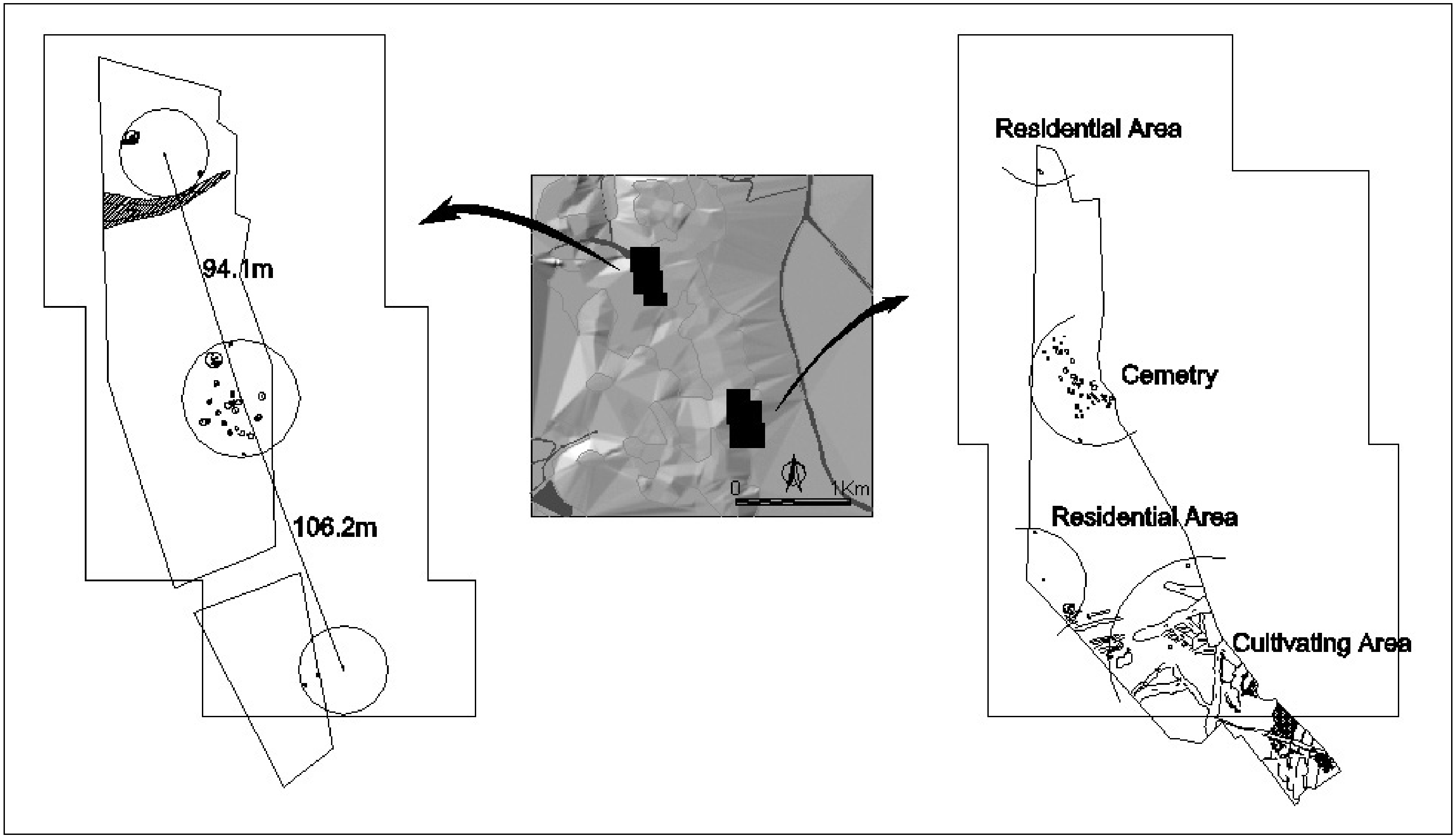

Figure 4.30: The Majoenri Site

Second, the ratio of outdoor storage pits to houses is impressively high in comparison to primary and secondary centers. As observed at the Wonbuk site, 15 outdoor storage pits with three different shapes of profiles are concentrated around seven houses, and thus the ratio turns out to be 2.1:1 (Figure 4.29). In fact, the concentration of outdoor storage pits at specific locales within a settlement, accompanied by a high ratio to houses has been repeatedly identified at MBA sites in central western Korea, for example, at the Majeonri A site in the research area (Figure 4.30), which is not included in the three higher-order communities, and at some small sites outside the research area, such as Saneuiri (Lee, N.S. 1999), Jangseonri (CDI 2003), Anyoungri (Lee N.S. and Lee H.S. 2002), various sites in Gongju County, and Daeheungri, Cheonan City (Lim S.T. 1998).

This chapter has briefly described how the regional settlement data produced by this study's own regional survey and previous projects could be incorporated into a single analysis and discussed hierarchical aspects of the MBA regional settlement patterns in the research area, based on the rank size analysis of 50 possible local communities, most of which are grouped into three separate polities.

The polities show similarities and dissimilarities in the degree of centralization and integration. Polities B and C represent well-integrated settlement systems composed of primary center, secondary centers, and rural villages, while Polity A shows a less centralized system at the polity level, in which several secondary centers might have been independent and competing with each other.

As many regional studies have identified, the primary centers are larger than any other communities and have more conspicuous features that are not found at the lower-tier communities, such as the well-equipped tombs of the possible regional elite and defensive settings. Secondary centers have characteristics similar to those of the primary centers, but their elaboration and scale are inferior to primary centers. Each of these centers is constituted of a nucleated zone and a dispersed zone-outside the nucleated zone-differing in the density of dwellings. In the centers' dispersed zones as well as in rural villages, we can find clusters of several individual dwellings.

5. DYNAMICS OF REGIONAL SETTLEMENT PATTERNS

This chapter explores how the hierarchical aspects of MBA regional settlement patterns that have been discussed in Chapter IV are dynamically related to several kinds of information related to the production and consumption of wet-rice. The information includes the soil suitability for wet-rice cultivation, the capacity of water management to drain the potential fields estimated based on the distribution of wet-rice soils, and the important junctions of ancient transportation routes. These reflect, respectively: 1) the potential productivity of wet-rice cultivation, 2) the necessity of corporate water management, and 3) the flow of surplus produced by utilization of intensive rice agricultural technology and the sociopolitical centers' accessibility to it.

5.1. SETTLEMENT PATTERNS WITH REFERENCE TO SOIL SUITABILITY FOR WET-RICE CULTIVATION

Keen attention to soil productivity is frequently found in the archaeological literature, especially concerning the control over prime agricultural resources and the development of regional scale complex social organization (Steponaitis 1981; Drennan and Quattrin 1995). Except for some complex hunter-gatherer societies, in the Old and New Worlds, newly emerged complex political institutions were usually supported economically by agricultural products, and the elites who had recently come into power tried to mobilize these products. Since agricultural potential depends heavily on soilscapes (Earle 1991, 1997), the analysis of soil productivity in conjunction with regional settlement data has been an important part of archaeological research on the development of socioeconomic complexity.

However, the research questions and the nature of settlement patterns are as varied as the strategy, procedure and scale of actual analysis are. For example, Steponaitis analyzes the agricultural productivity of Formative settlements in the Valley of Mexico, within catchment circles of 1.5 km radius, measured from the settlements' edges. His principal concern is measuring the necessity of tribute collection by various levels of centers, because the differences in actual amounts of tribute controlled by centers at different administrative levels reflect the degree of centralization in his model (Steponaitis 1981: 322-323).

On the other hand, in the context of the Regional Classic Alto Magdalena, it is very difficult to delineate clear small local communities (Drennan and Quattrin 1995; Peterson and Drennan 2005), due to long-lasting dispersed distributions of households. This is quite different from the regional settlement patterns of the Formative Period of the Valley of Mexico, so Drennan and Quattrin take a relatively macroscopic strategy in analyzing soilscapes. They compare the distribution of settlements, especially their concentration around several central places, with regional soilscapes rather than comparing the catchment productivity of individual settlements or communities to each other, in order to assess whether the regional elites pursued the management of agricultural production or not.

With reference to the scale of analyzing soilscapes, in comparison to Drennan and Quattrin's work, this study takes a relatively microscopic strategy similar to Steponaitis' work. That is, this study focuses on the distribution of soils within specific areas around the communities, rather than on the regional-scale trends of soil productivity.

5.1.1. Defining the Analysis Area

The area to be analyzed around each community in regard to the distribution of soils suitable for wet-rice cultivation in this study is a function of the distance which farmers are willing to travel for cultivating the land. It is designated here as ‘analysis area,’ and is largely compatible with the well-known concept of ‘site catchment area.’ That is, the area is defined by a specific radius from the individual settlements (or sites).

However, the ‘catchment area’ that matters here explicitly departs, in several respects, from Vita-Finzi and Higgs’ seminal work (1970) and other works inspired by it. First, this study does not try to reconstruct the overall productivity potential within each MBA community’s analysis area, or explore whether it is sufficient to meet their residents’ yearly minimum nutritional needs or not. Rather, this study focuses on a specific crop, wet rice and suitable land for its production. Moreover, it views inter-community and/or inter-polity variation in the distribution of wet-rice soils as a dimension determining the relative patterns of production and consumption of wet rice. It thus ultimately concerns the basis of the relative preference of a specific community.

Second, this study takes a much smaller analysis area than Vita-Finzi and Higgs did. In fact, reducing the radius of the ‘catchment area’ has previously been urged in the context of highly sedentary agriculturalist complex societies (Steponaitis 1981; Todd 1978). For example, Steponaitis chooses one kilometer or two as radii of catchment area for assessment of the productive potential of individual Formative settlements in the Valley of Mexico, pointing out that some previous work-for example, Brumfiel’s estimation of catchmment productivity-has overextended the analytical territory for an agriculturalist complex society (Steponaitis 1981:

336). Furthermore, when the crops cultivated must be tended intensively, producer households are more likely to reside near the fields in a dispersed distributional patterns rather than travelling from more distant settlements (Drennan 1988).

According to Chisholm, who is often cited in such research in archaeology, without the assistance of modern technology of transportation, “the costs of movement become sufficiently great to warrant” limiting intensive cultivation to distance no more than one kilometer from dwellings (Chisholm 1970: 131). We have very little direct information on how far traditional Korean farmers heavily engaged in wet-rice cultivation were commonly willing to travel for the daily care of their paddies. Nevertheless, some ethnological or ethnographic studies of traditional Korean peasant society devoted to rice farming inform us indirectly that the farmers are not willing to travel more than around one kilometer (Bae Y.D. 2000; Choi J.S. 1975). Although, in order to maintain ‘*bo* (洑),’ small damming facility for controlling the discharge of a stream channel, they might be willing to walk a little farther than 1km-up to around 1.3km-this is for the purpose of irrigating paddy fields closer to the residential area. A longer distance of this sort is necessary only in the case of a very small difference in altitude between the cultivated fields and nearby water sources, and thus is not a concern when fields can be adequately watered from the small gullies near the villages (Bae, Y.D. 2000: 199-218). For wet-rice cultivation, which is quite intensive during the growing period, the MBA farmers, who were not assisted by any modern transportation technology, also might not have been willing to travel farther than about 1 km.

In this light, this study defines a specific community’s ‘analysis area’ as the area within a 1-km radius from its constituent individual settlement(s). When the community at issue is a single settlement, a single circle, with its center at the community’s center, is the analysis area without any modification. However, a multi-settlement community needs special treatment, in order not to double-count the areas of overlap of multiple circles drawn from the centers of individual settlements. In fact, such special treatment is required to calculate an appropriate analysis area for a number of MBA communities, since a number of groupings of the 79 individual sites have been made in the process of designating local communities (Chapter 4).

Closeness between the sites sometimes generates the necessity of another kind of modification. When multiple communities are close enough to each other that their analysis areas overlap, the overlapped areas are not counted in the analysis areas of multiple communities, but are divided between communities along the middle line between the communities' centers. These modifications to deal with the overlapped parts of analysis areas are performed in practice by creating buffer zones from the centers of individual sites and dividing overlapped areas by Thiessen polygon lines. Then individual communities' analysis areas are redelineated and recalculated (Figure 5.01).

Due to these modifications related to the closeness between constituent individual settlements within a community, and between communities, the shapes and sizes of individual analysis areas come to vary across the communities, sometimes regardless to their sizes or ranks (Figure 5.02 and Figure 5.03).

5.1.2. Analyzing Wet-Rice Soilscapes within Analysis Areas

The total amount and the proportion of soils suitable for wet-rice cultivation within each analysis area can be easily measured and calculated using digitized soil maps. The National Institute of Agricultural Science and Technology (NIAST) of the Korean government provides

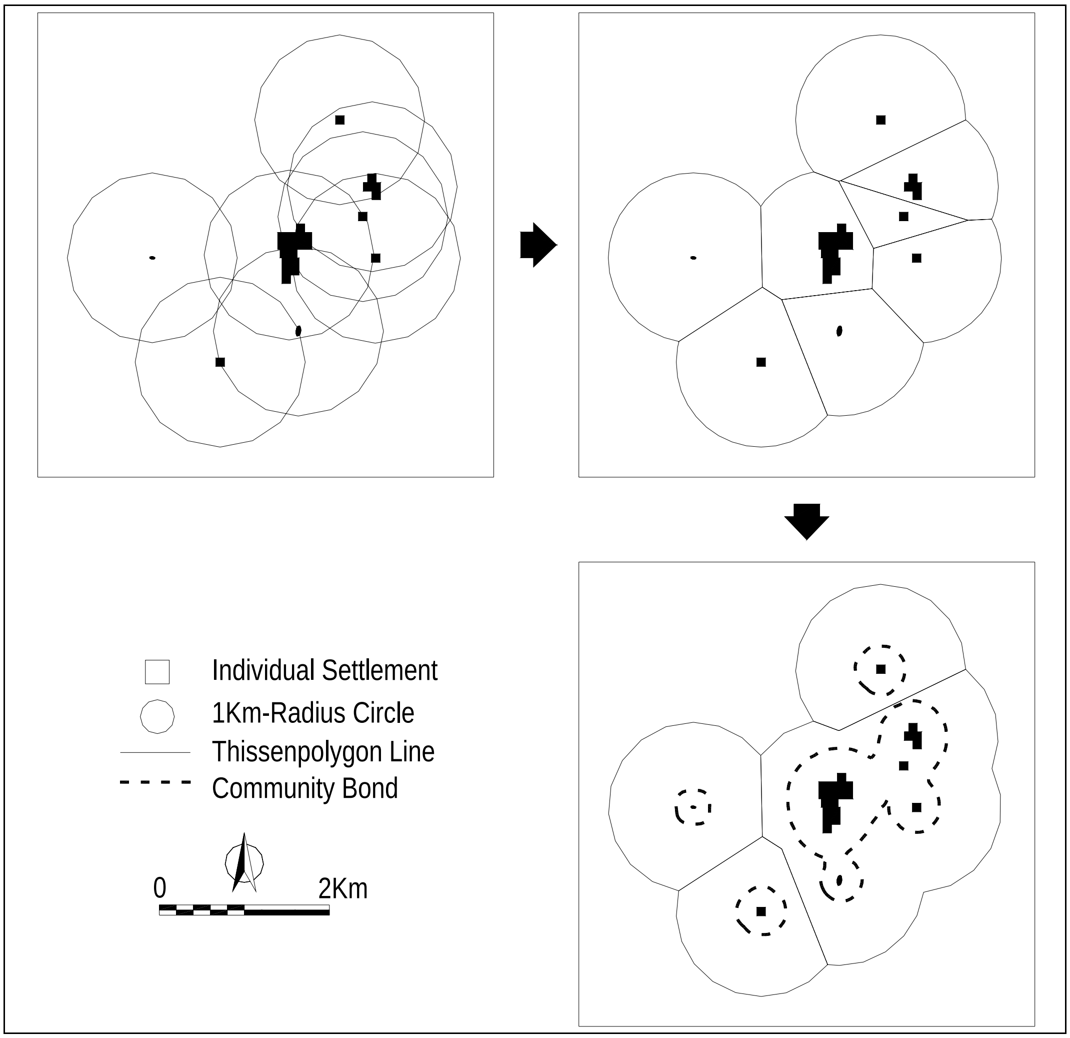

Figure 5.1: Process of Defining Individual Communities' Analysis Areas. The example represents the primary center of Polity C and its neighboring three communities.

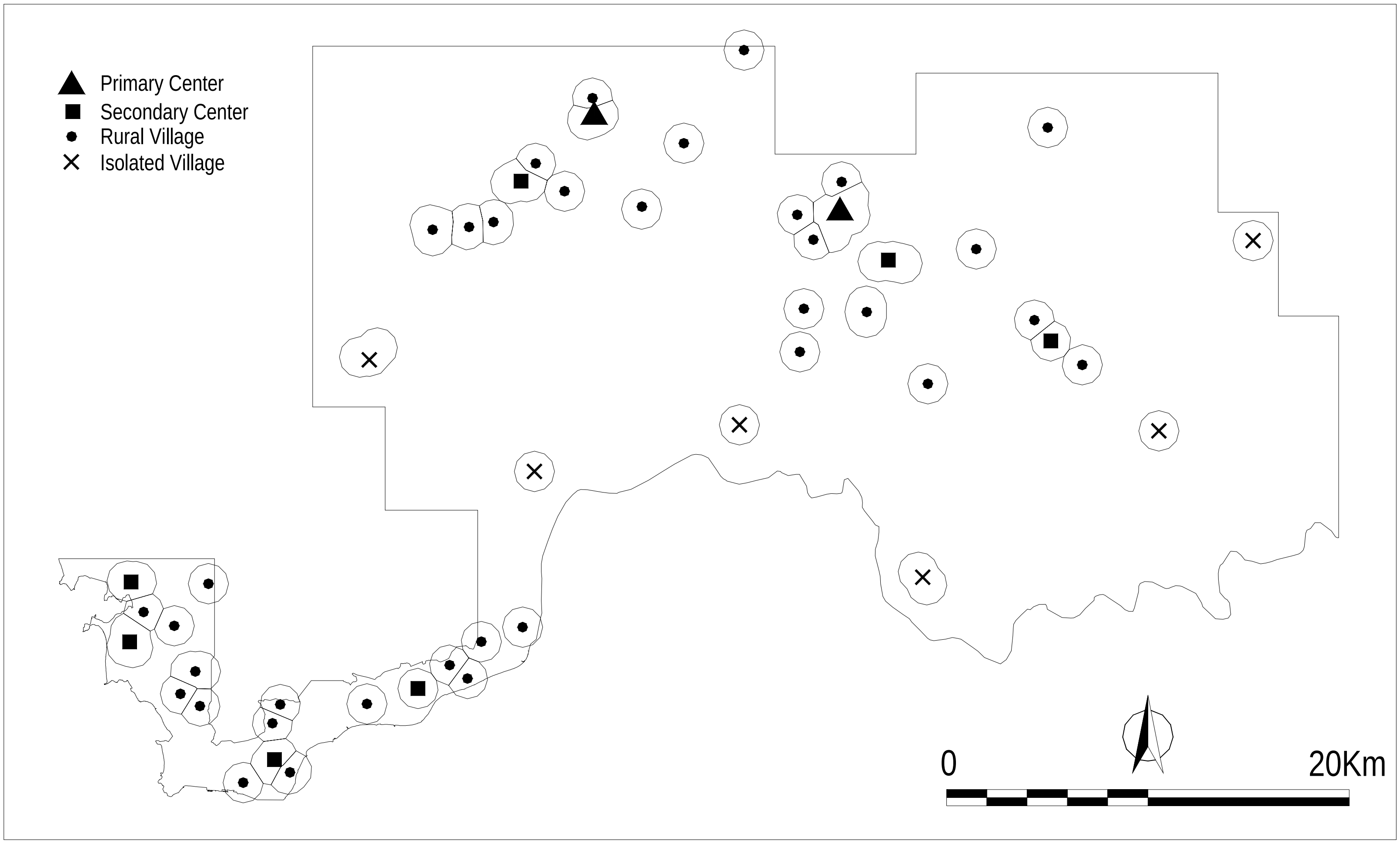

Figure 5.2: Analysis Areas of 50 Individual MBA Communities

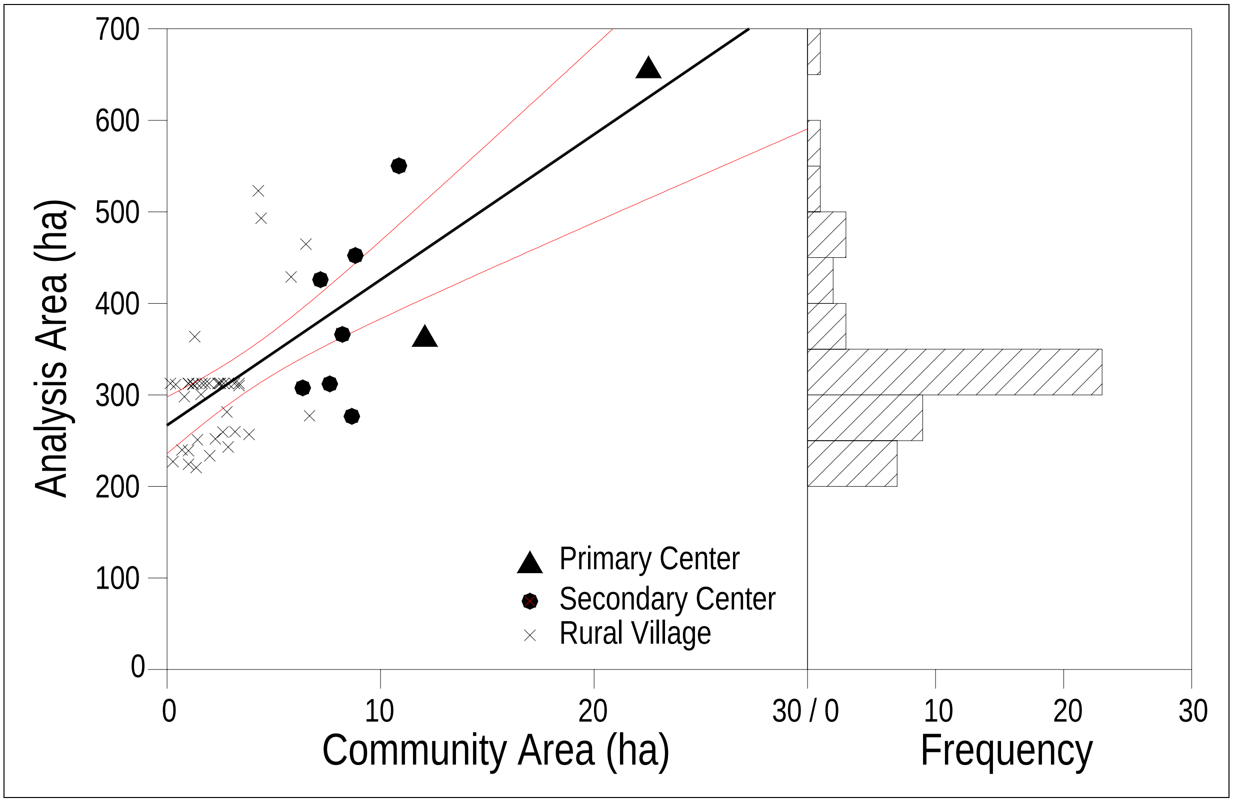

Figure 5.3: Scatter-Plot of Community Area versus Analysis Area. The ‘best-fit straight line’ with its 95% confidence region is obtained by regression analysis ($r=0.710$, $Y=15.89X+ 266.85$, $p<0.0005$).

digitized soils maps at the scale of 1:25,000. The soil maps include information on specific soils that are classified based on their geochemical and soil-scientific characteristics. The institute also provides recommendations for land use that will produce the highest yields from the categories of soils. The recommendations primarily are for five types of land use: paddy field, dry field, fruit garden, pasture, and forest. Each type is classified into several ordinal groups. The group of soils classified as paddy soils, which is of most interest in this study, has five ordinal groups, from first to fifth. Among these, first- and second-order paddy soils are taken here as soils suitable for wet-rice cultivation (hereafter wet-rice soils), because the institute's recommendation implies that paddy soils with lower ratings cannot be profitable, in economic terms. They are also recommended for other types of land use.

Based on modern (1970s) agronomic technology, first-order paddy soils can produce around 110 kg or more per ha (450 kg per 10 acres), and second-order ones have about 80% of the productivity of first-order ones. Therefore, 80% of the total area of second-order soils would be considered as wet-rice soils, since the first-order ones are fully counted.

Figure 5.04 shows how the wet-rice soils distribute within individual communities' analysis areas. The area of wet-rice soils assigned to individual communities varies and likewise its proportion of an analysis area does (Figure 5.05). Inter-community variation in soil suitability for wet-rice cultivation will be explored with a focus on these two variables, mostly emphasizing the former and complementing it with the latter, because the productive potential is most relevant when thought of in terms of the potential amount of wet rice produced.

However, the variety seems not to be simply related to the hierarchical aspects of regional settlement patterns. Community area and area or proportion of wet-rice soils do not show any strong linear relationship (area of wet rice soils versus community area: r=0.341, Y=0.024X+1.596, p= 0.015, proportion of wet rice soils versus community area: r=0.005, Y=-0.001X+3.674, p=0.973). Thus, neither the top-down nor the bottom-up approach's expectations (implications TD1 and BU1 of Chapter 2) are simply supported at the level of all 50 MBA communities in the research area: the larger communities, which normally have larger analysis areas (Figure 5.5), do not regularly have the bigger areas of wet-rice soils. Nor is the reverse true (Figure 5.6).

As discussed in the previous chapter, the overall dataset includes three separable polities, representing different sociopolitical organization in terms of centralization and integration, and located in more or less different geographical settings. These differences could have masked interesting and relevant patterns, so in the next section, the variations in wet-rice soil productivity will be investigated at the level of the individual polity.

5.1.3. Intercommunity and Interpolity Variation in Suitability for Wet-Rice Cultivation

A look at each individual polity separately does reveal some correlations between these two variables, although each polity shows a different pattern from the others. That is, the three polities varied in terms of the relationship between community area and area of paddy soils.

In Polity A, as a whole, no statistically significant linear relationship between community size and the area or proportion of wet-rice soils could be found (Figure 5.07). A large variation in the two independent variables among four centers with similar sizes seems largely responsible for this complicated pattern. Moreover, the centers do not get high scores for the two independent variables. Two of them, in particular, are well below the average.

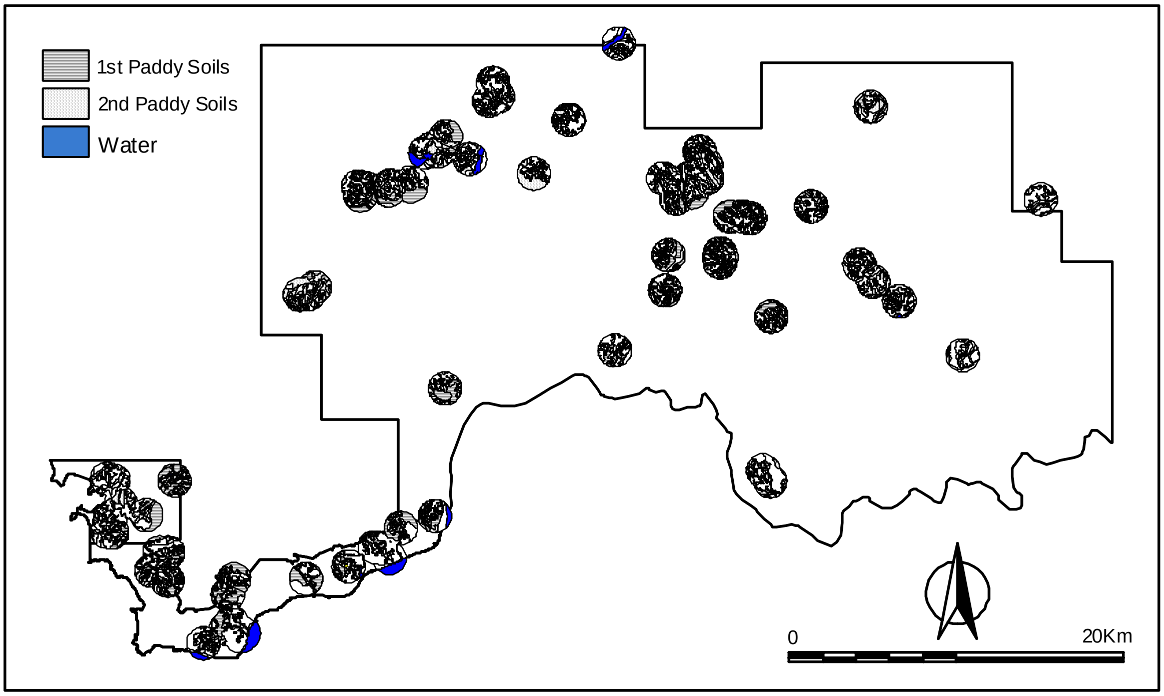

Figure 5.4: Distribution of Wet-Rice Soils within 50 MBA Communities' Analysis Areas

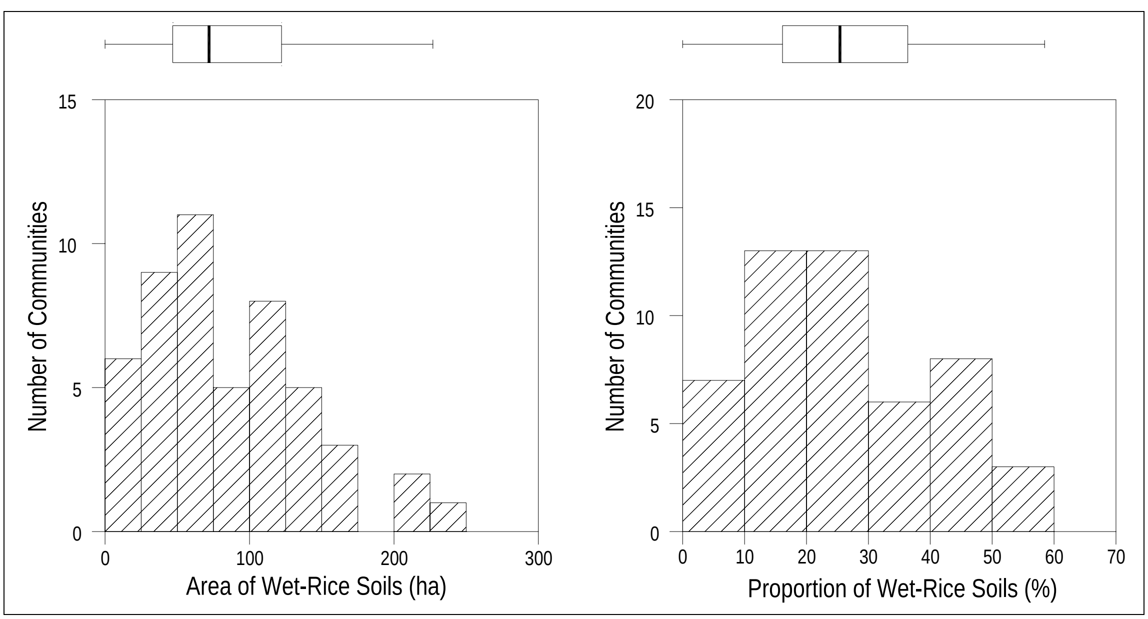

Figure 5.5: Histograms and Box-Plots of Area and Proportion of Wet-Rice Soils within 50 MBA Communities' Analysis Areas

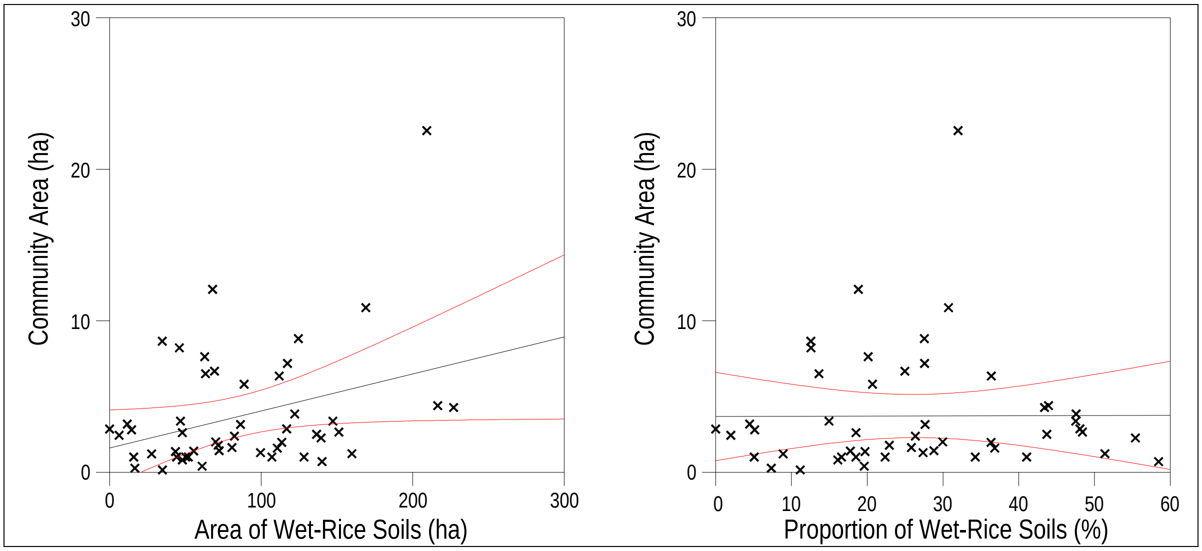

Figure 5.6: Scatter-Plot of Area or Proportion of Wet-Rice Soils versus Community Area

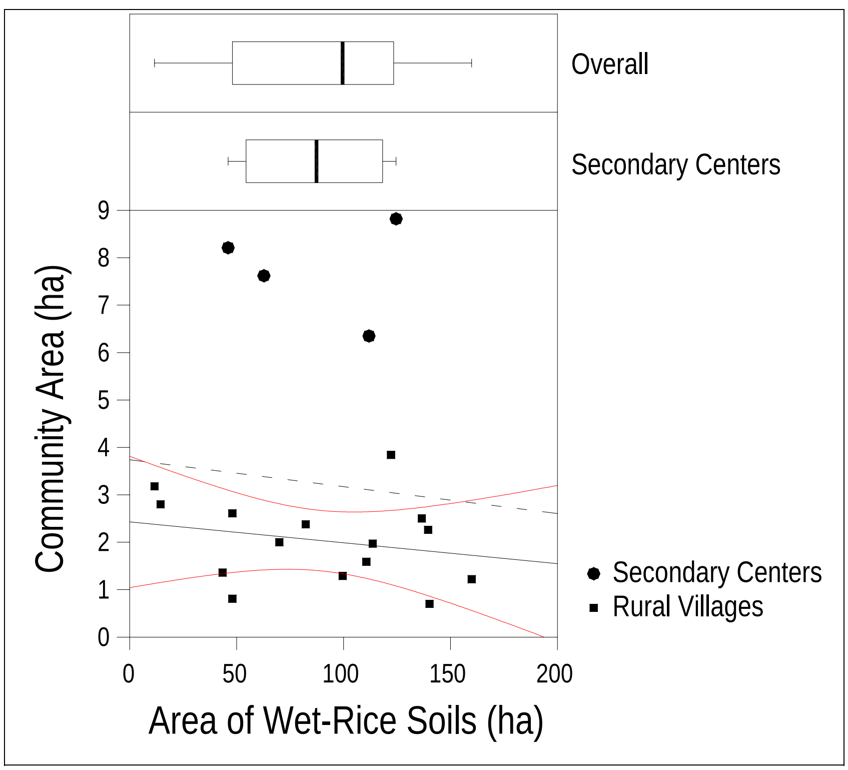

Figure 5.7: Scatter-Plot of Community Area versus Area of Wet-Rice Soils (Polity A). The best-fit lines with its 95% confidence region.

Although, for the rural villages, there is a slightly stronger correlation, though negative, between the area or proportion of paddy soils (X), and community size (Y) (r= -0.238, Y=-0.004X+2.428, p= 0.393), it does not have enough statistical significance to provide support for either the top-down or bottom-up approaches' expectations.

Even the relationship between distance from centers and productivity that indicates a little more significance than any other results discussed above (Table 5.01; X^2=0.269, .90>p>.80) is not enough to reach statistically significant conclusions. That is, it is not accurate to say that the rural villages with more productive potential were located farther from the centers, pursuing relatively high productive potential, rather than aggregating near sociopolitical centers (Figure 5.8 and Table 5.1).

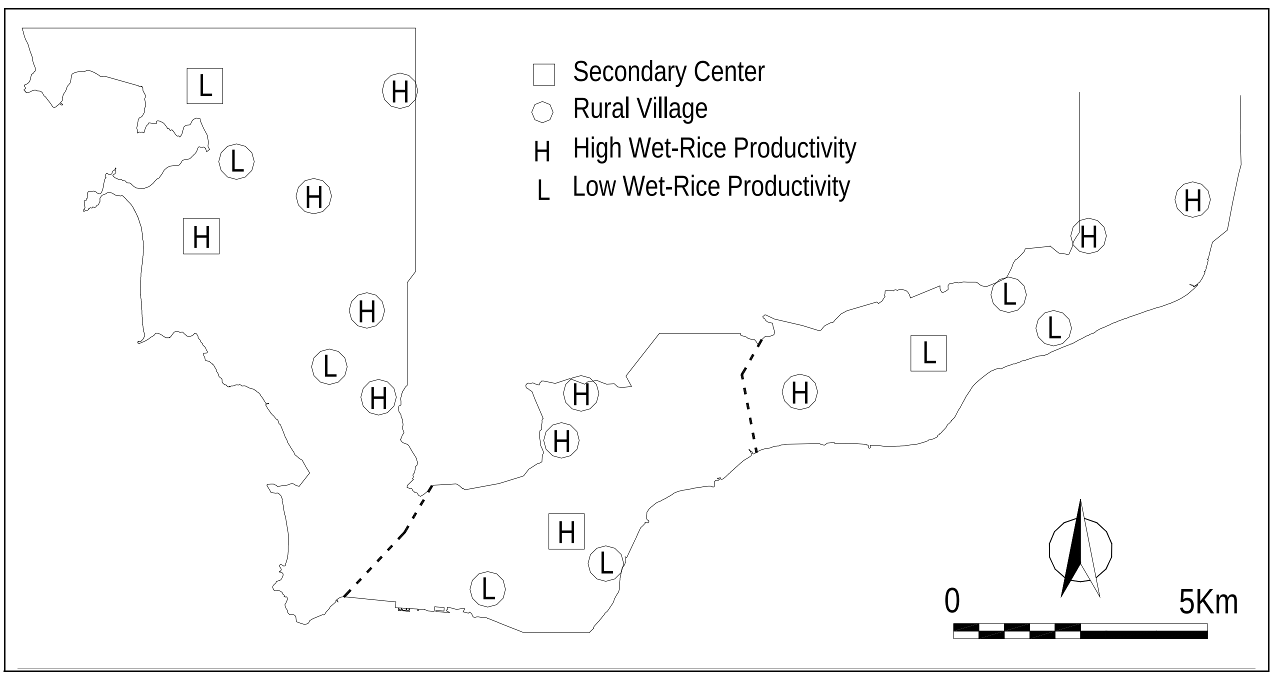

Figure 5.8: Location of Communities Classified through the Wet-Rice Productivity

Table 5.1: Contingency Table of Wet-Rice Productivity versus Rural Villages' Distance from Centers

	Far	*Near*	*Total*
High	5 (3.6)	4 (5.4)	9
Low	1 (2.4)	5 (3.6)	6
Total	6	9	15

For Polity B, no direct proportional relationship between community size and area of paddy soils could be found (Figure 5.09; r= 0.282, Y= 0.017X+1.629, p=0.400). Sociopolitical centers are not systematically located in areas with higher productivity than rural villages or not. Specially, the primary center ranks below the average in both actual area and proportion of paddy soils.

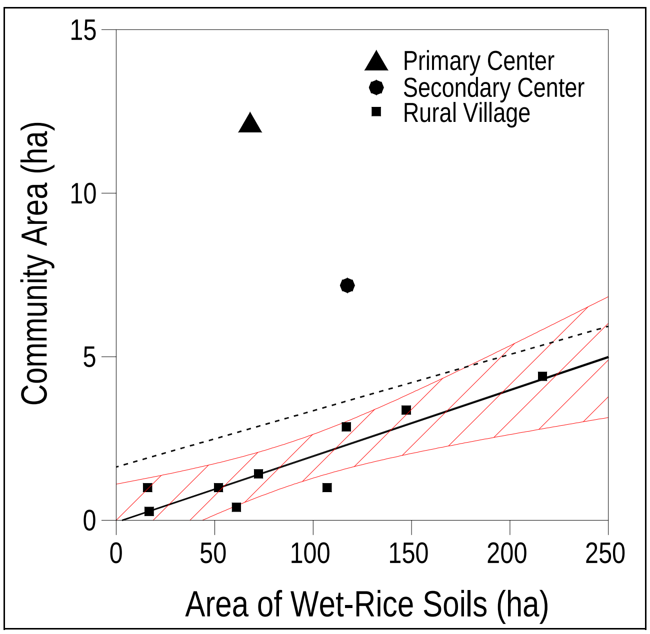

Figure 5.9: Scatter-Plot of Community Area versus Area of Wet-Rice Soils (Polity B). The best-fit lines: dotted line is for all communities, while solid one with its 95% confidence region is for rural villages alone.

However, another look at the scatter plot reveals a direct proportional relationship between these measurements for rural villages. In fact, as indicated by regression analysis on patterns of the rural villages, there is a strong and significant correlation between the two variables, community area (Y) and area of wet-rice soils (X) ($r=0.909$, $Y=0.02X-0.602$, $p=0.001$). Thus, for the Polity B rural villages, more populous villages were formed at the locales with more cultivable lands. Neither the primary nor the secondary center follows this trend; both fall far from the best-fit lines.

With reference to wet-rice productivity or suitability, it can be concluded that Polity B, as a whole, largely meets the archaeological expectations suggested by bottom-up models.

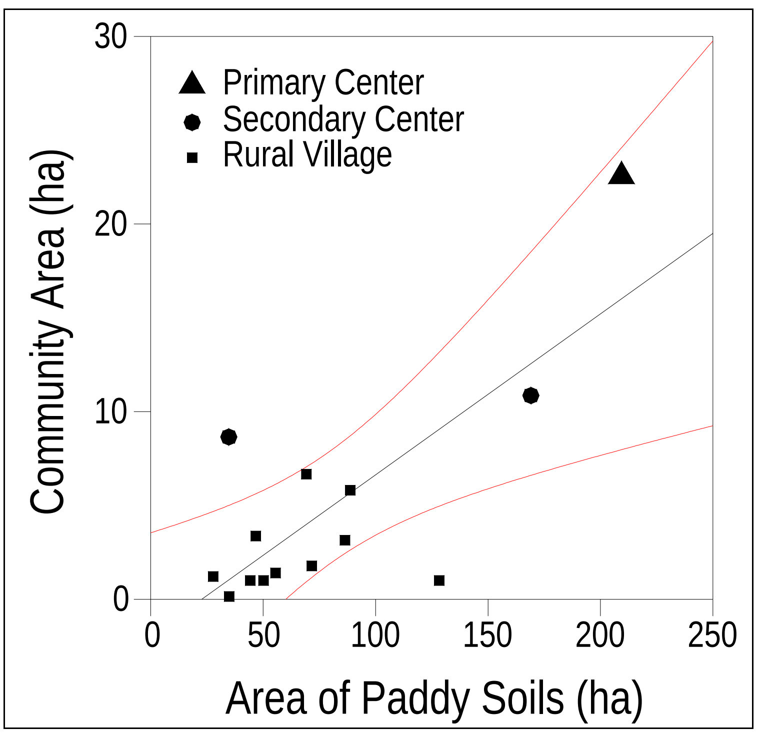

Figure 5.10: Scatter-Plot of Community Area versus Area of Paddy Soils (Polity C). The best-fit line with its 95% confidence region.

For Polity C, there is, in statistical terms, a moderately strong and significant correlation between community area (Y) and area of paddy soils (X) ($r = 0.768$, $Y = 0.086X - 1.944$, $p = 0.001$). Thus, we can have substantial statistical confidence that bigger communities central within the polity-especially the primary center-were located in pursuit of greater amounts of land suitable for wet-rice cultivation (Figure 5.10). This sort of pattern is not found in the other two polities. In fact, for Polity C, the relationship between the two variables is less statistically significant when looked at just within the group of rural villages.

Especially, the primary center has not only the biggest analysis area, but also the largest amount of wet-rice land and the second highest proportion of wet-rice land.

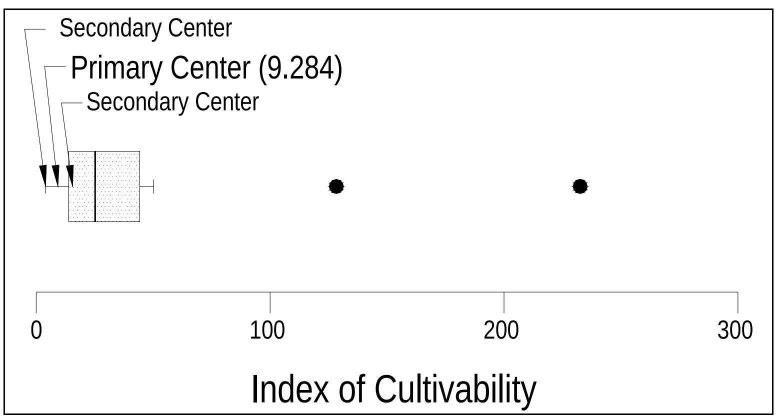

Figure 5.11: Box-Plot of Polity C's Index of Cultivability

Moreover, the wet-rice lands around the primary center, in relative terms, seem to have been more fully cultivated by its residents than most other component communities of the polity. This inference is supported by an index of cultivation intensity-the area of paddy soils divided by the community area, which represent the potential amount of cultivable land for wet-rice and the population size, respectively. Thus a lower index value indicates less cultivable land surplus, and simultaneously that more of the land assigned to a specific community are being intensively cultivated. The primary center represents the second-lowest value of this index (Figure 5.11). Two secondary centers also represent quite low values, although one of them has the second-largest amount of wet-rice land and the third-highest proportion.

Table 5.2: Summary of Inter-Polity Variation in Distribution of Wet-Rice Soils

Polity	1	2	3	4	5	6
A	61.51	19	5652.50	1685.66	0.298	27.40
B	34.97	11	3560.14	991.11	0.278	28.34
C	68.60	14	4838.23	1116.83	0.231	16.28

* Column 1: Sum of Communities' Areas (ha)
Column 2: Number of Constituent Communities
Column 3: Sum of Communities' Analysis Areas (ha)
Column 4: Sum of Areas of Paddy Soils (ha)
Column 5: Total Ratio of Paddy Soils to Analysis Area (ha) = Column 3 / Column 2
Column 6: Area of Paddy Soils per Unit Community Area (ha) = Column 3 / Column 1

With reference to the ratio of wet-rice land in a community's analysis area to area of community, Polity C has much lower values than the other two polities (Column 5 of Table 5.2), even though the soil productivity around the communities is similar through the polities (Column 4). This seems to have resulted from the concentration of more population, in Polity C than in the other two polities, on specific locales pursuing the limited resource of wet-rice soils, and this trend might have been fostered by sociopolitical centers, especially the primary centers.

In this light, with reference to wet-rice productivity or suitability, Polity C, as a whole, supports typical top-down models.

5.2. SETTLEMENT PATTERNS WITH REFERENCE TO WATER MANAGEMENT

5.2.1. Three Dimensions of Water Management and the Necessity of Cooperation

Water management includes three categories of activities: drainage, flood control and irrigation. For irrigation, whether supra-household level cooperation and centralized coordination of labor pooling is needed or not, depends entirely on the size of the streams exploited by households or communities as a water resource. Drainage necessary for large-scale terracing to build paddy fields on the flood plain, and flood control in the area near the big streams inherently require much bigger-scale cooperation and labor-pooling (Bray 1986). Needless to say, these three dimensions of water management are quite critical not only for success in wet-rice farming but also for the survival of households and communities that were becoming more dependent on rice products. Flood control is especially influential on households' or communities' survival, beyond the protection of agricultural products and facilities.

Although all three dimensions of water management are closely related to each other, the latter two are especially tightly connected, because both are strongly influenced by the same stream activity, flooding. The flood plain, constituted of natural levees and back marshes, is an alluvial landform formed by stream overflow in the form of flooding (Kwon H.J. 1986), and thus the elevation of the flood plain directly reflects the area subject to inundation.

In this light, the necessity of cooperation beyond a household's capacity in the two important dimensions of water management can be assessed by the same analysis, and might not have been required, if the settlements and cultivated fields are high enough to avoid the risk of flooding. Geographical research in Buyeo County suggests that the elevation of inundation is 5 m above sea level, on the basis of analysis of the elevation and distribution of flood plain recorded in maps made in 1925. These maps reflect the landscape prior to massive transformation since the 1970s, and the flood plain is indicated as unfarmed swamps (Kwon H.J. 1986). The area represented in the 1925 maps includes the northeastern part of the research area. Although there would be some variation through other parts of the research area, the elevation of inundation is not likely to exceed at most 10 m above sea level. Figure 5.12 presents the distributions of areas below 10 m in elevation and of MBA communities and their analysis areas. The individual MBA settlements in the research area seem completely free from the risk of inundation. Even their analysis areas are rarely included within the zone below 10 m in elevation.

It can be largely concluded that MBA communities in the research area did not need supra-household level cooperation and centralized coordination of labor-pooling for drainage and flood control. A closer look at another aspect of Figure 5.12 even more strongly supports this conclusion. No primary or secondary center in any of polities has any part of its analysis area below 10 m. Instead, it is only a few small rural villages' potential cultivation fields that might have been exposed to risk of flooding. However, the inundation level used here is almost certainly an overestimate, and the Geum River shows less likelihood of inundation than any other major river, as mentioned in the previous chapter in passing, so even those small rural villages might really have faced very little risk of flooding.

Regardless of rank in the regional settlement hierarchy, then, the MBA communities in the research area do not seem to have been much exposed to the risk of flooding or to have needed any cooperative earthworks to prepare diked paddy fields on the flood plain.

Cooperative water management related to drainage and flood control has been analyzed by general comparison of the distribution of communities and their potential paddy fields, to that

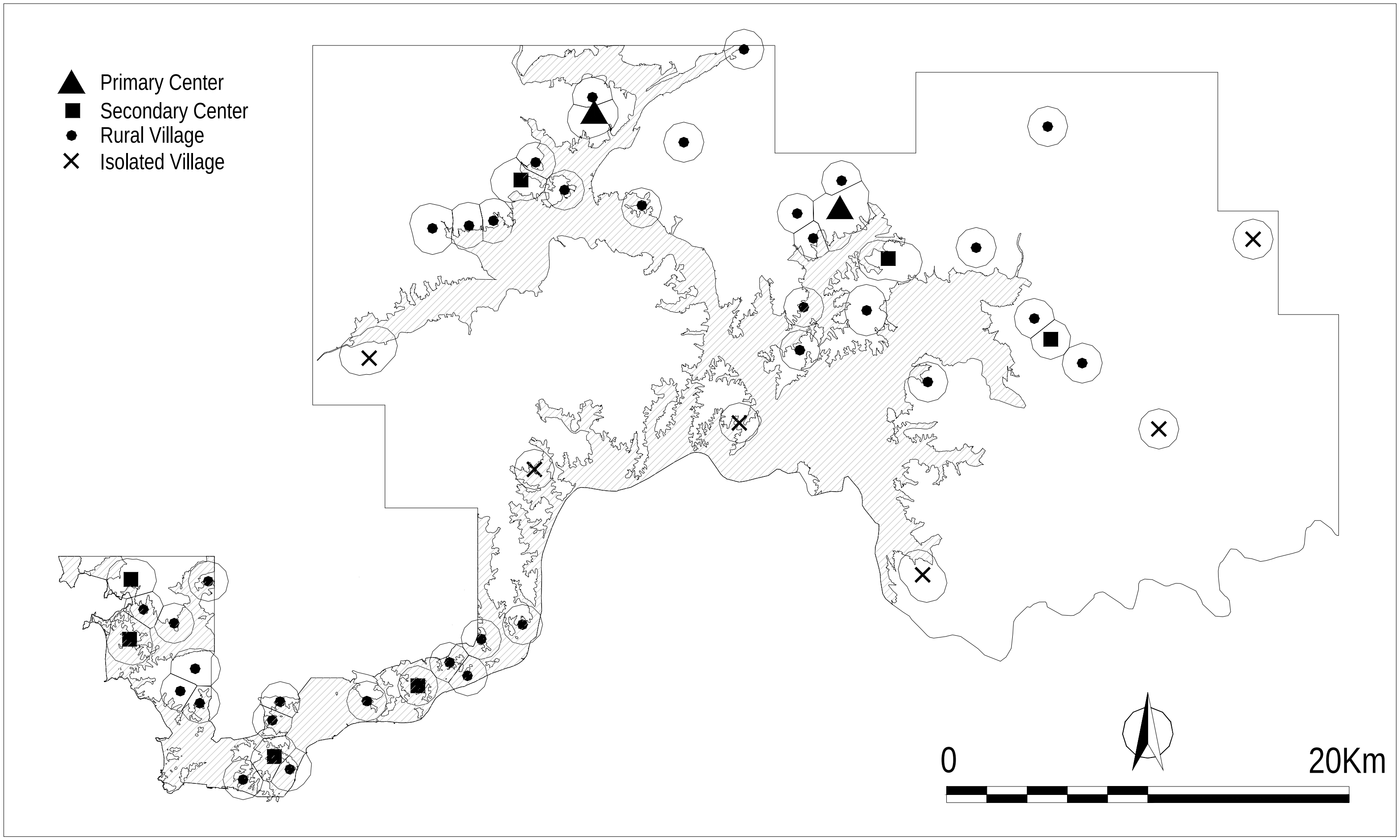

Figure 5.12: Area below 10 m above the sea level

of the area below 10 m above the sea level, but the necessity of supra-household level cooperation and centralized coordination of labor pooling for initiating and maintaining irrigation systems must take a quite different approach. The necessity of cooperative irrigation is a function of how adequate are lower-order streams to drain and water wet-rice land within analysis areas, because small-scale irrigation depending on lower-order streams does not necessarily require labor-pooling. If this were possible, it would have relieved individual MBA farming households from the need to exploit risky, higher-order streams.

It is not always clear what order streams should be taken as ‘small streams’ not requiring even individual households to participate in collective labor-pooling. The excavated paddy fields were usually irrigated with a first- or second-order stream originating in the upper parts of small gullies (Kwak J.C. 2000). Preference for using small streams for agricultural water has been identified until quite late historical periods, such as the early Chosun Dynasty (around the 16th century).

Determination of the order of a specific stream can vary, depending on what scale of map is chosen for the analysis. That is, the small streams recorded on the map at 1:5,000 may not appear on the smaller scale ones. Moreover, on the map at 1:5,000, the lower-order-especially first-order-streams are frequently dry. The largest-scale map indicating first-order streams that constantly flow is 1:25,000.

In this light, ‘small streams’ for purposes of this study are defined as first- and second-order ones marked on topographic maps at a scale of 1:25,000. The order of a specific stream is determined following the drainage classification scheme devised by Strahler (1963: 468-516; also see Figure 5.13), which is most used among earth scientists, due to its broad applicability.

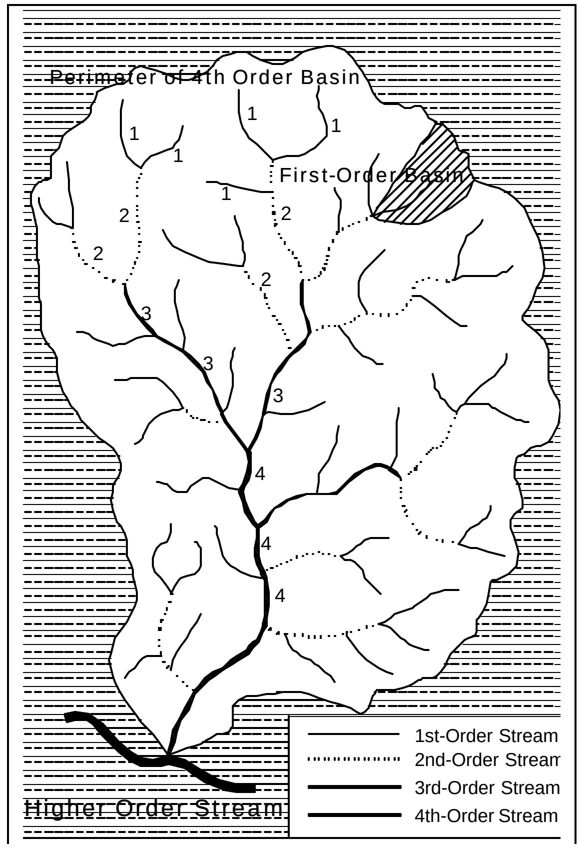

Figure 5.13: Stream Order within Schematic Fourth-Order Drainage Area. After Strahler 1963. It has been slightly modified and redrawn.

For measuring the development of small streams around each community, the 'analysis area' defined for the analysis of soilscapes is used again, for two reasons. On the one hand, the small streams developed as agricultural water sources and intensively worked during the farming season might not have been beyond the distance which the farmers were willing to travel daily. On the other hand, the irrigation, itself, is for draining the potential paddy fields, which is taken to be equivalent to the area of wet-rice soils within the analysis areas defined for this study, rather than beyond this range.

The drainage networks within the 50 communities' analysis areas that are reconstructed through detailed observations of stream order look like the typical low-density dendritic ones usually observed in granitic areas (Chapter 2) (Figure 5.14).

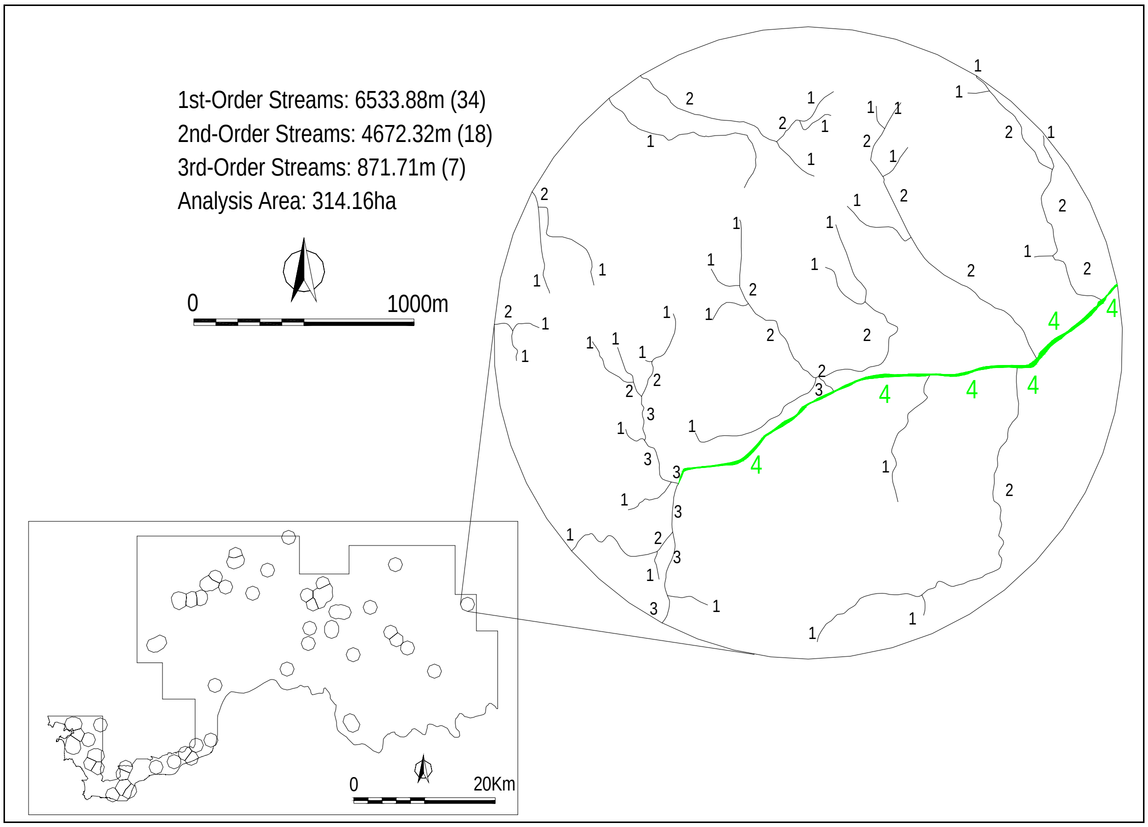

Figure 5.14: An Example of Drainage Networks in the Research Area. The analysis area represents fourth-order stream's drainage basin

5.2.2. Inter-Community Variation in Possible Cooperative Irrigation

Each community's developmental potential for small streams is measured and compared based on two attributes frequently used in hydraulic studies: 1) the total of the lengths of first- or second-order streams, and 2) the density of streams, that is, the total length of the streams divided by the area of the analysis area. The density of small streams used here is similar to the concept of drainage density, expressed as a fraction consisting of the total length of specific order streams over drainage area.

As shown in Figure 5.15, with reference to the total length of small streams and their density, the 50 individual communities represent noticeable variety. However, there is no simple, direct or reciprocal relation between either variable and area of community or analysis area. The complicated relations are unlikely to give simple support to either of expectations of the top-down or bottom-up approaches.

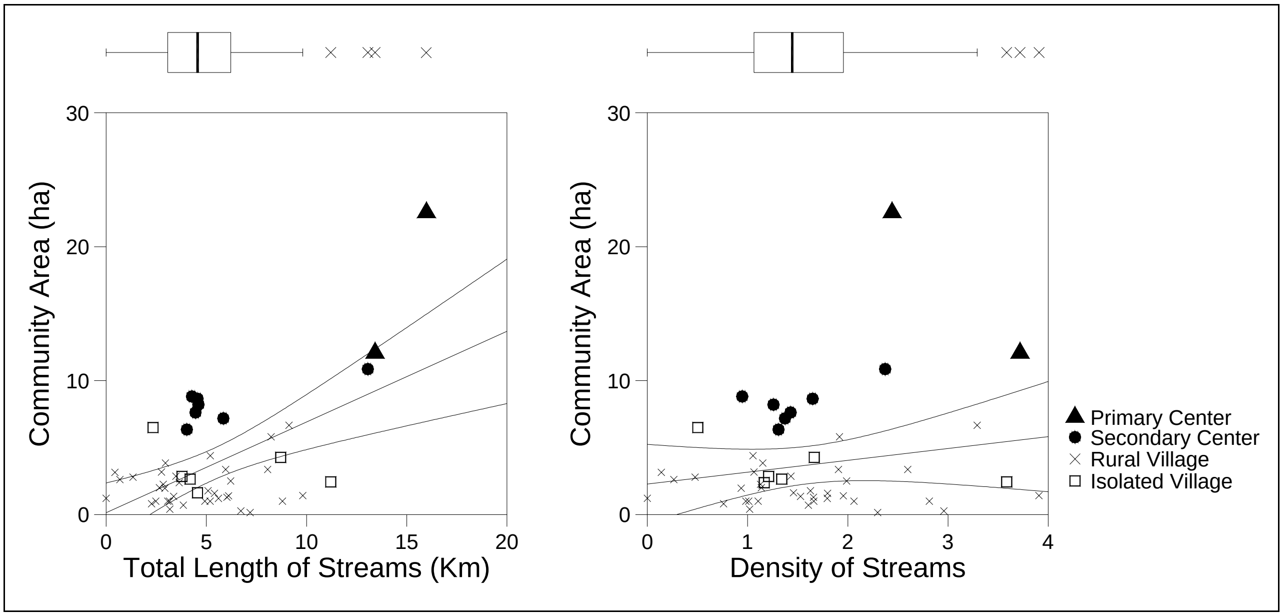

Figure 5.15: The Relationships between Community Area or Analysis Area and Total Lengths and Density of Small Streams

Nevertheless, a close look inside each polity reveals that bottom-up models seems likely to be supported by this study's data more than top-down approaches. In fact, within some primary/secondary centers' analysis areas, small streams are well developed. Especially, the two primary centers of Polities B and C are located in an area of well-developed small streams. These results seem to contradict any expectation that the large communities were formed for cooperation in irrigation using risky big streams as a water source and requiring managerial leadership for organizing labor-pooling.

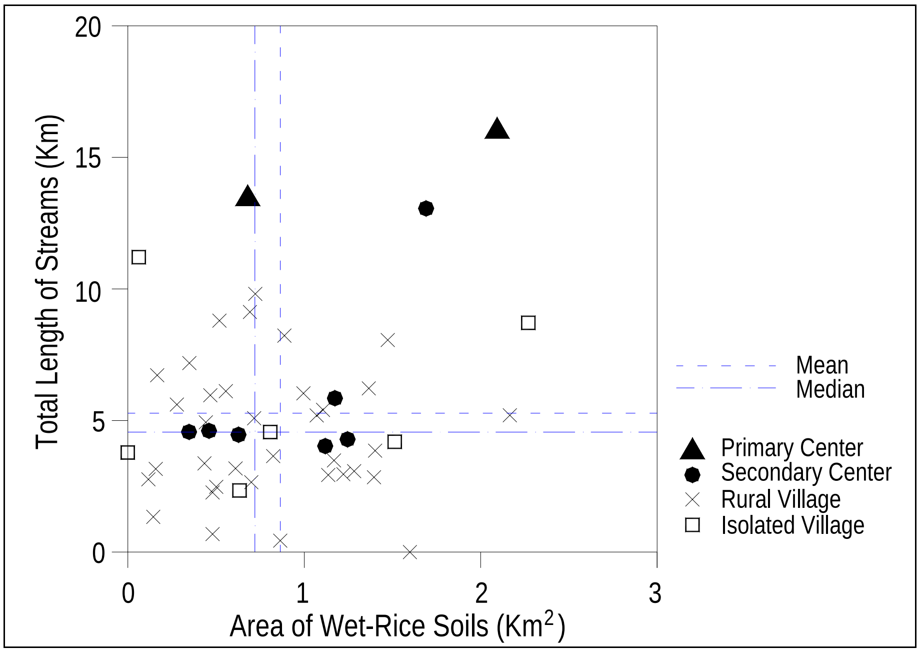

Figure 5.16: Relationships between Total Lengths of Small Streams and Area of Wet-Rice Soils

A further analysis on intra- and inter-community variation in the development of small streams in relation to soil suitability will make this clearer. Moreover, considering irrigation, not just in the sense of flood protection and drainage, but also for watering the potential paddy fields, we can reach more solid conclusions (Figure 5.16).

A schematized explanation helps enhance the resolution of our understanding. If we divide the scatter plot area into quadrants with lines representing the mean or median of each variable, then 1) the upper-right quadrant represents analysis areas with abundant wet-rice land and well-developed small-stream systems, 2) the upper-left represents scarce wet-rice land and well-developed small-stream systems, 3) the lower right represents abundant wet-rice land and poorly-developed small-stream systems, 4) the lower-left represents scarce wet-rice land and poorly-developed small-stream systems.

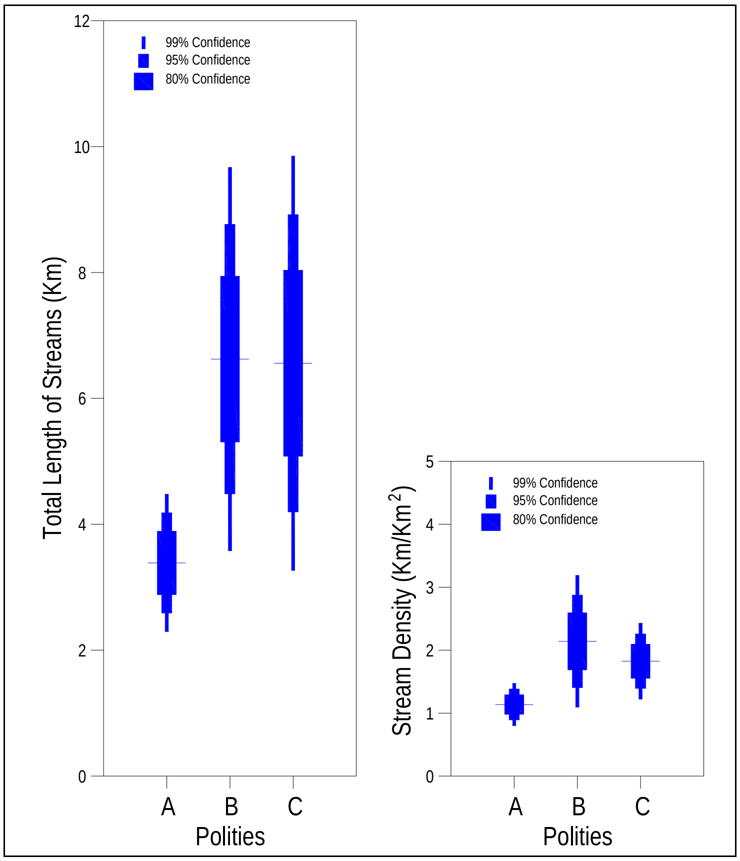

Figure 5.17: Comparisons of Total Lengths and Density of Small Streams by Polities

The communities that belong to groups 1), 2), and 4), do not need to exploit risky big streams or engage in cooperative irrigation, but these practices are needed by the communities in group 3). However, all the communities that fall in group 3) belong to Polity A, which witness less regional-scale centralization than the other two polities do. This is directly attributed to the poor development of small streams near Polity A's communities in comparison to others' (Figure 5.17).

5.3. SETTLEMENT PATTERNS WITH REFERENCE TO SURPLUS FLOW

As mentioned in Chapter 2, if a specific community's locational preference depends on taking advantage of access to the flow of rice surplus, it should be located near the junctions of transportation routes. However, analyzing modern route systems seems not very relevant to reconstructing prehistoric ones. A more plausible approach is to focus on ancient transportation networks that might have been more strongly influenced by natural environment and little assisted by modern technology of transportation.

Some Korean historical maps provide information on the ancient transportation networks. Among them, the most reliable is Daedongyeojido (大東輿地圖), the 'Synthesized Map of Korea.' This map was designed by Kim Jeong-ho in the early 19th century Chosun Dynasty. It covers the whole area of the Korean Peninsula at a scale of about 1:160,000. As implied by the title, it is mostly based on editing maps made by local governments, with some additional actual survey. However, its accuracy, at the overall peninsular level, has been recognized by many sources (Han Y.W. 2003); it has frequently been named as a historical treasure for nationalistic pride. Moreover, the map is less fanciful, compared to many contemporaneous local maps, and provides much information on major transportation routes, ancient administrative centers, and important junctions.

The information has been cross-checked and complemented by reviewing Yeojidoseo (輿地圖書), a synthesized version of maps and chronicles of individual towns compiled during the reign of King Yeongjo (A.D. 1769, Yeongjo's 36th year).

5.3.1. Analysis of Ancient Transportation Routes

Nevertheless, as experienced in any GIS analysis of historical maps, direct incorporation of geographic information provided by the map, without any modification, into the analysis of ancient transportation routes is not reliable. First georeferencing and rectifying the scan of the map must be accomplished (Rumsey and Williams 2002).

For georeferencing, aligning specific spots on the map with their actual geographical locations, this study chose administrative or military centers that were usually fortified by stone walls as 'control points,' since these have been surveyed and mapped as a part of cultural heritage management work. By digitizing the cultural heritage maps or survey reports, the control points on the ancient maps have been linked to their equivalents on the modern digital maps. Considering that the administration centers were important junctions, a substantial part of georeferencing of the road networks has been done. However, too many junctions are still clearly not properly placed in the modern coordinate system. For proper placing of the remaining junctions, further rectification of scanned maps on the basis of additional control points based on topography has been performed.

The processes discussed above were accomplished by 'rubber sheeting' prior to reconstructing ancient transportation routes. Scans of eight sections of the map, which represents the whole region of the central western Korean Peninsula, extending well beyond the research area, were used to minimize errors by including more extensive information (Figure 5.18).

5.3.2. Inter-Polity Variation in Centers' Accessibility to Surplus Flow

Surplus flow, or more specifically, tribute collection centering on rice produced in the paddies, the interest of this study, is basically an intra-polity affair. Thus this study analyzes the transportation networks within each of the three polities, focusing on what the intra-polity route network patterns look like and where their centers are located (Figure 5.19).

A characteristic of Polity A's route system is its underdevelopment (Figure 5.20). On the one hand, the lack of regional sociopolitical centralization may be related to this, but on the other hand, there is a high possibility of alternative, casual paths that do not appear on the map at such low elevation on the coast in the vicinity of the mouth of a big river. In fact, during the fieldwork, I have occasionally observed people carrying tools walking casually along the coastline and river banks without benefit of roads.

Polity B's transportation network system is of radial shape, with major routes passing through all its constituent communities' vicinities and concentrating on a junction at which six routes join (Figure 5.21). That shape is frequently observed in imperial route systems so that all material and information can be efficiently delivered to capital cities. The primary center of Polity B is located quite near this major junction, at the distance of 2.7 km that can be covered by 30 or 40 minutes' walking.

Moreover, Polity B is located in a more mountainous zone than Polity A, so there is less possibility of alternative paths, and another look reveals that the main junction might have connected even more than six routes. These observations strengthen the argument for importance

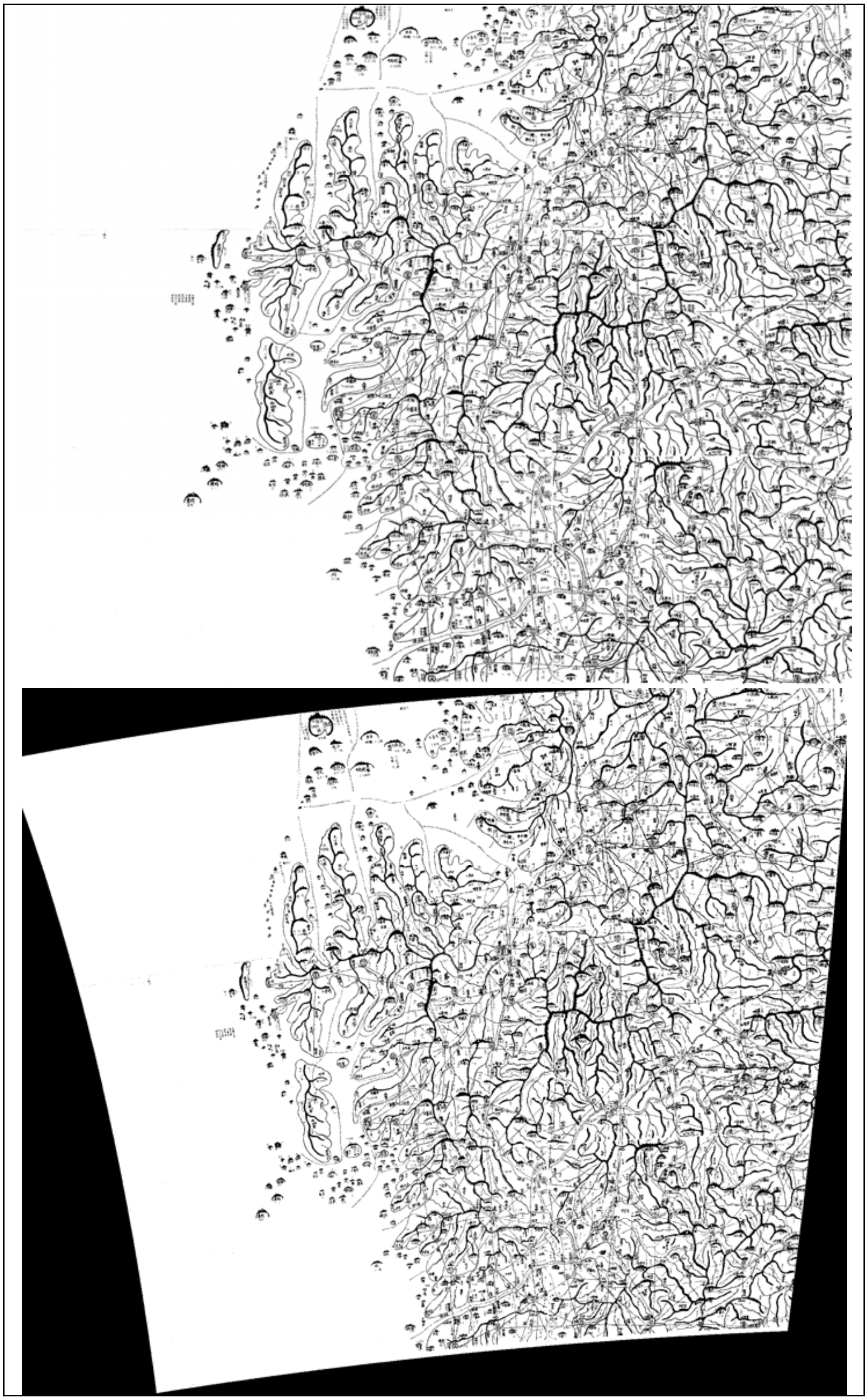

Figure 5.18: Original (Upper) and Rectified (Lower) Images of 8 Sections of Daedongyeojido (大東輿地圖)

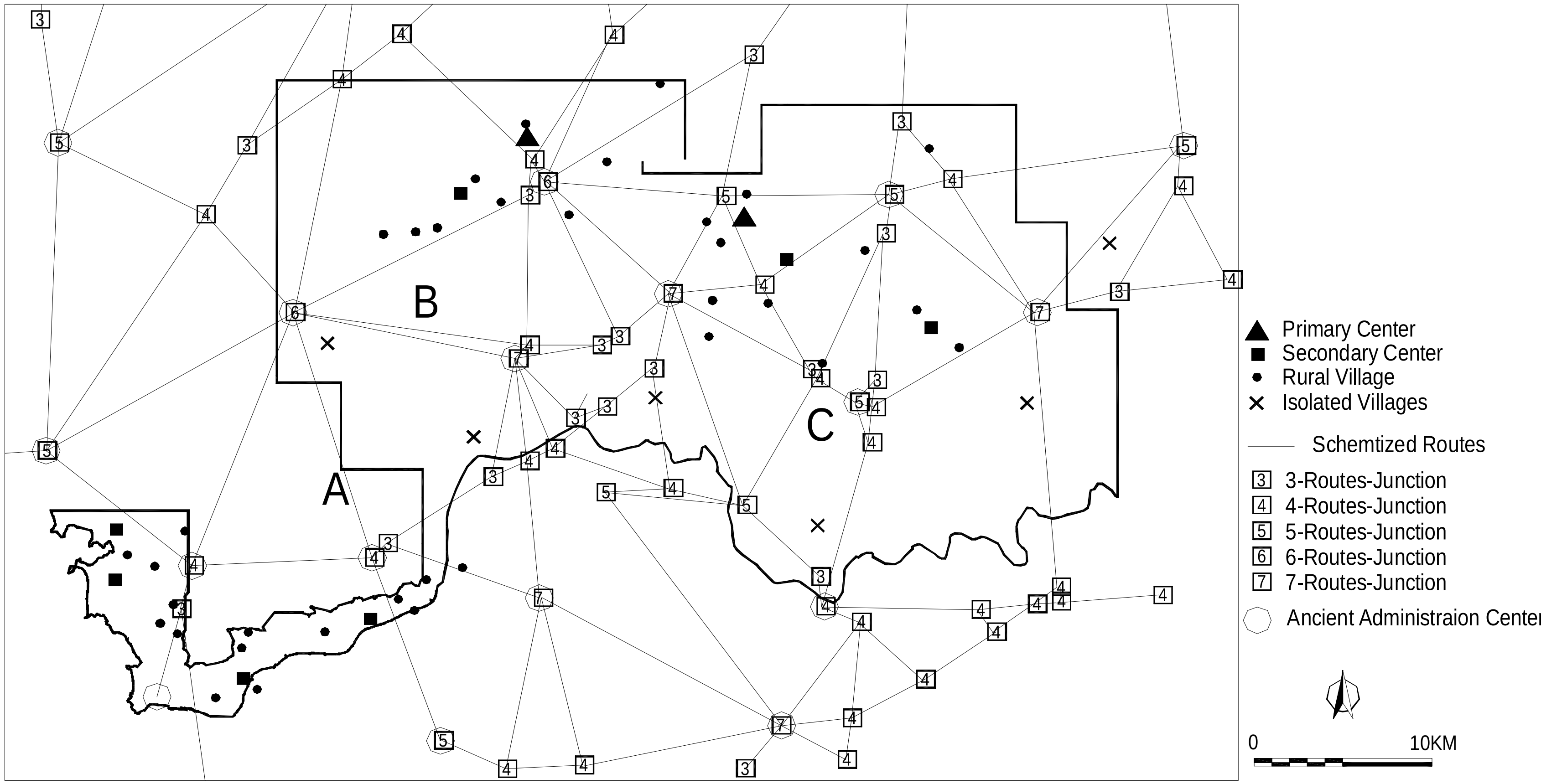

Figure 5.19: Ancient Transportation Routes and Theirs Junctions in the Research Area

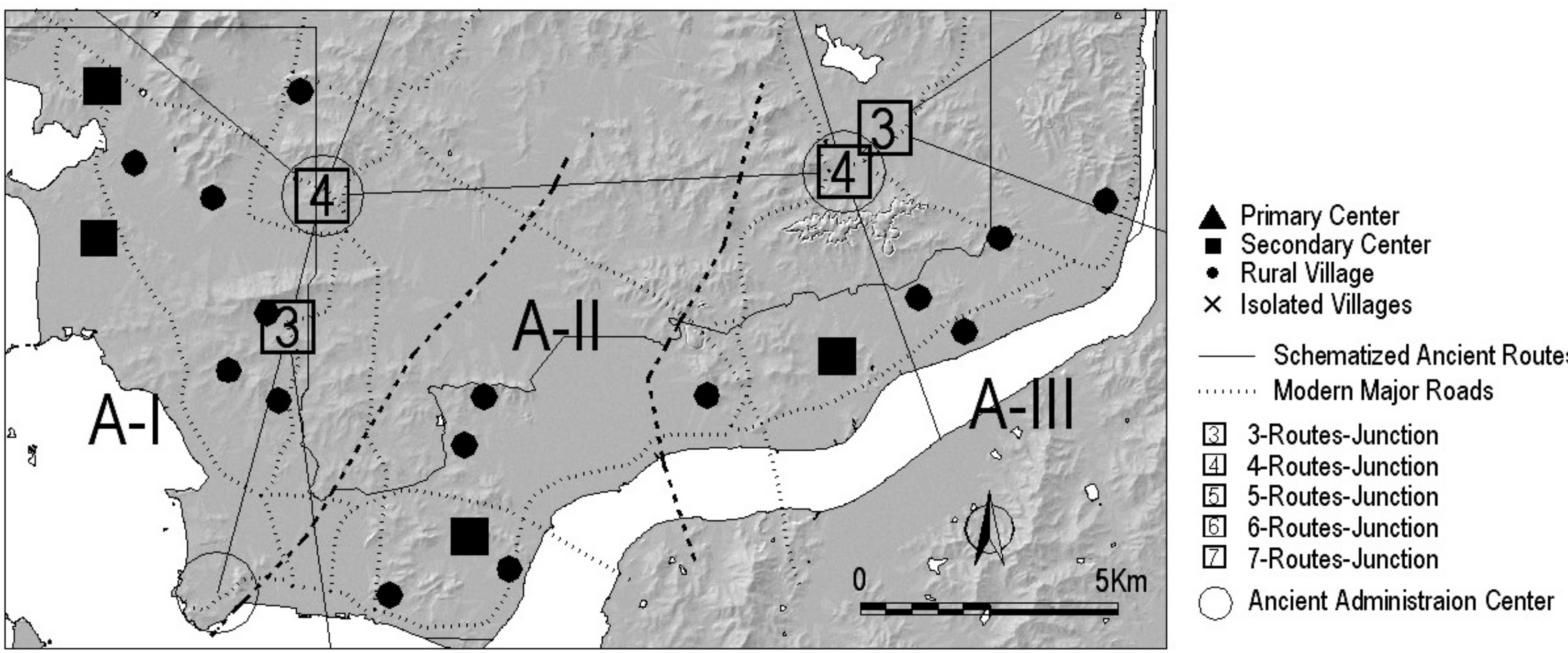

Figure 5.20: Reconstructed Transportation Networks of Polity A

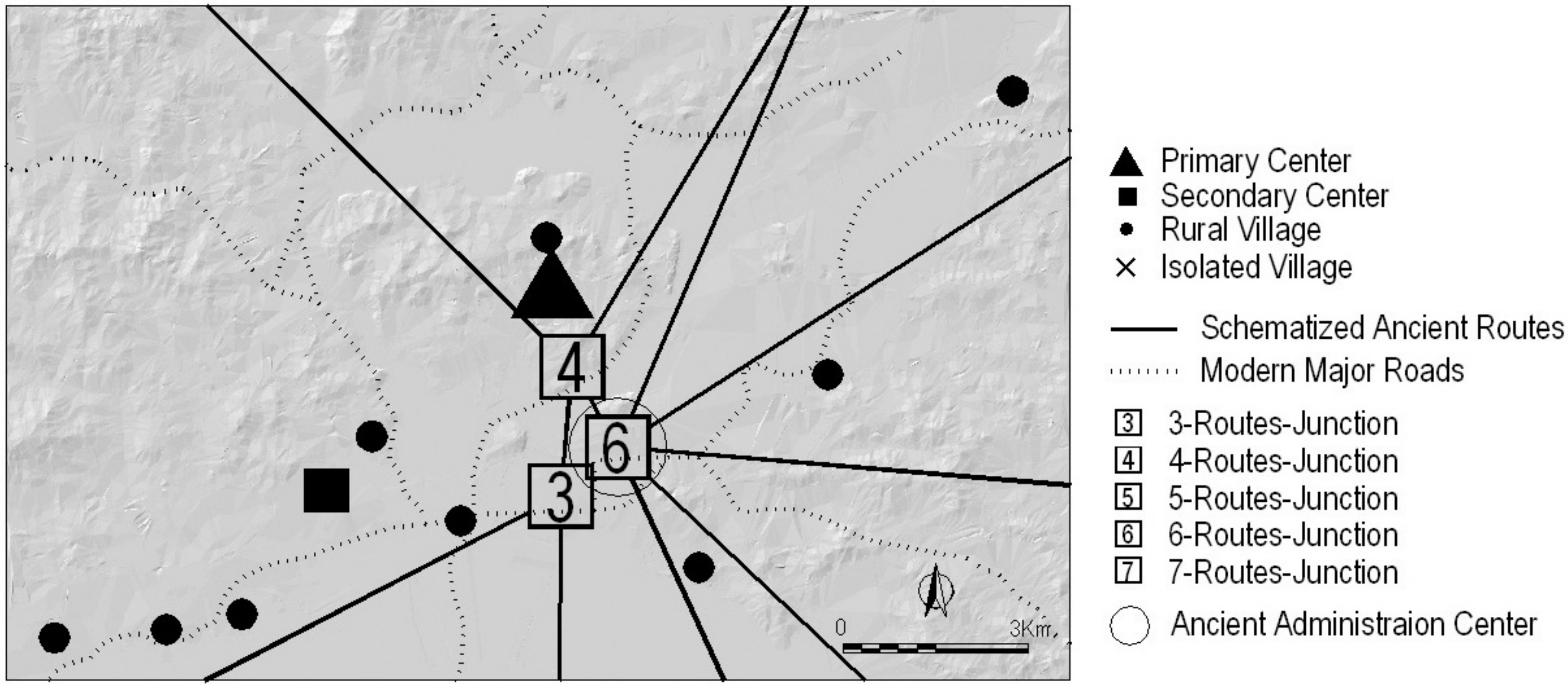

Figure 5.21: Reconstructed Transportation Networks of Polity B

of the junction of transportation networks in the center's location, and consequently for the importance of accessibility to tribute collection.

In comparison to the other two polities' transportation networks, Polity C's can be characterized by well-developed junction systems. Although the centers, including the primary center, are located in the vicinity of major junctions, there are other equivalents or even more important junctions in the overall transportation network reaching to all constituent communities (Figure 5.22). Therefore, Polity C's centers do not dominate transportation networks to the extent that Polity B's primary center does.

Each polity represents quite a different transportation network and pattern of centers' accessibility to important junctions. This could reflect differences in the centers' locational and simultaneously socioeconomic preferences, at least, in regard to tribute collection. The primary center of Polity B might well have taken advantage of accessibility to tribute collection, and Polity C's centers show moderate advantages for such activity. This is not true for Polity A's secondary centers.

Easy accessibility to the important junctions in transportation networks might have been favored by centers not only for tribute collections. Plenty of other reasons can be named, and, in fact, favoring easy access to strategic points in transportation networks can have multiple purposes simultaneously. Thus, in order to connect location near important junctions to tribute collection, it is necessary to look for complementary information to combine with the transportation network analysis.

As indicated by the first pair of archaeological expectations, each of which represents top-down or bottom-up, respectively (Chapter 2), easy accessibility to tribute collection is

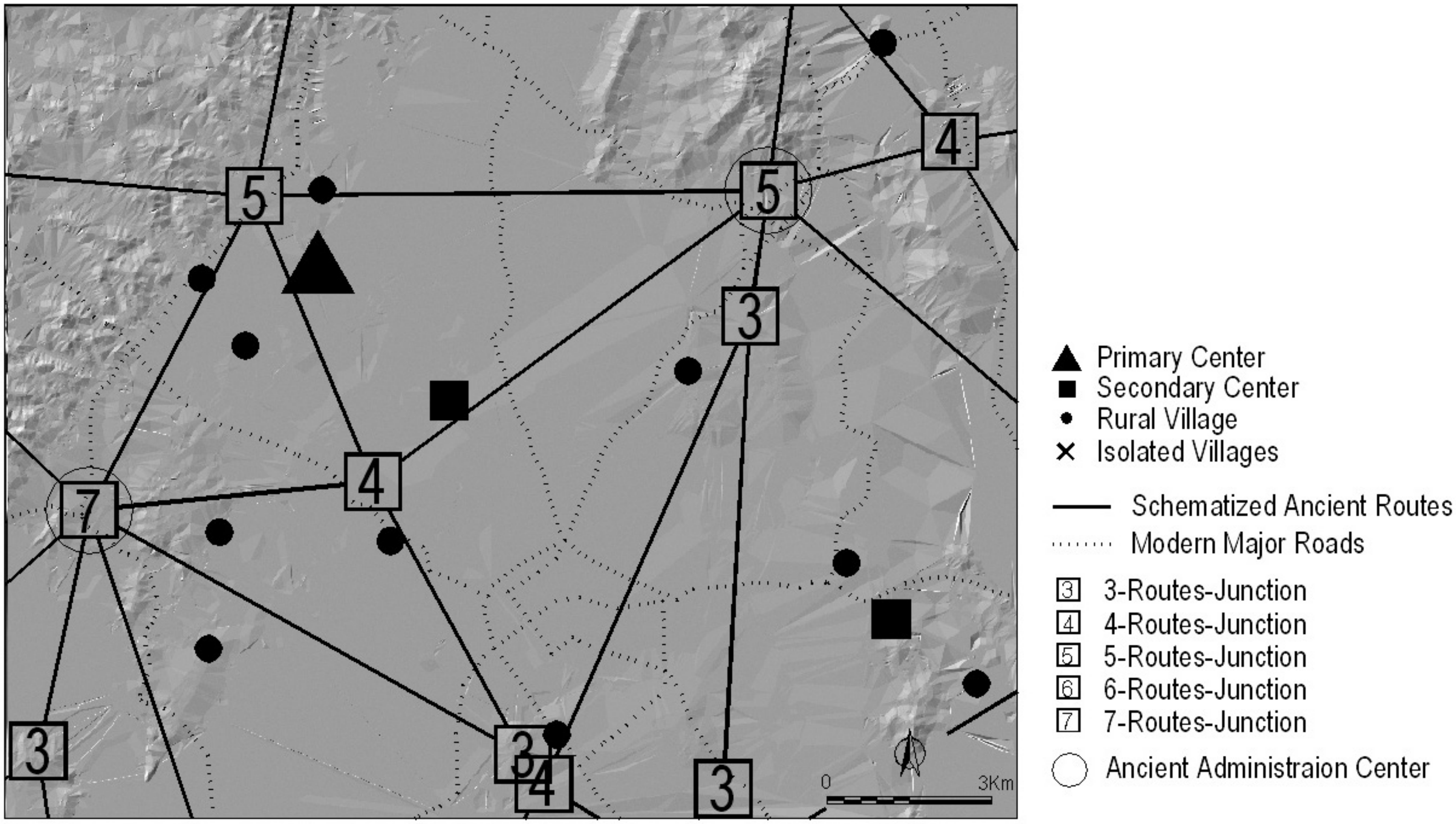

Figure 5.22: Reconstructed Transportation Networks of Polity C

favored by central communities in a typical bottom-up system, despite low soil productivity in contrast to the expected pattern for a top-down system.

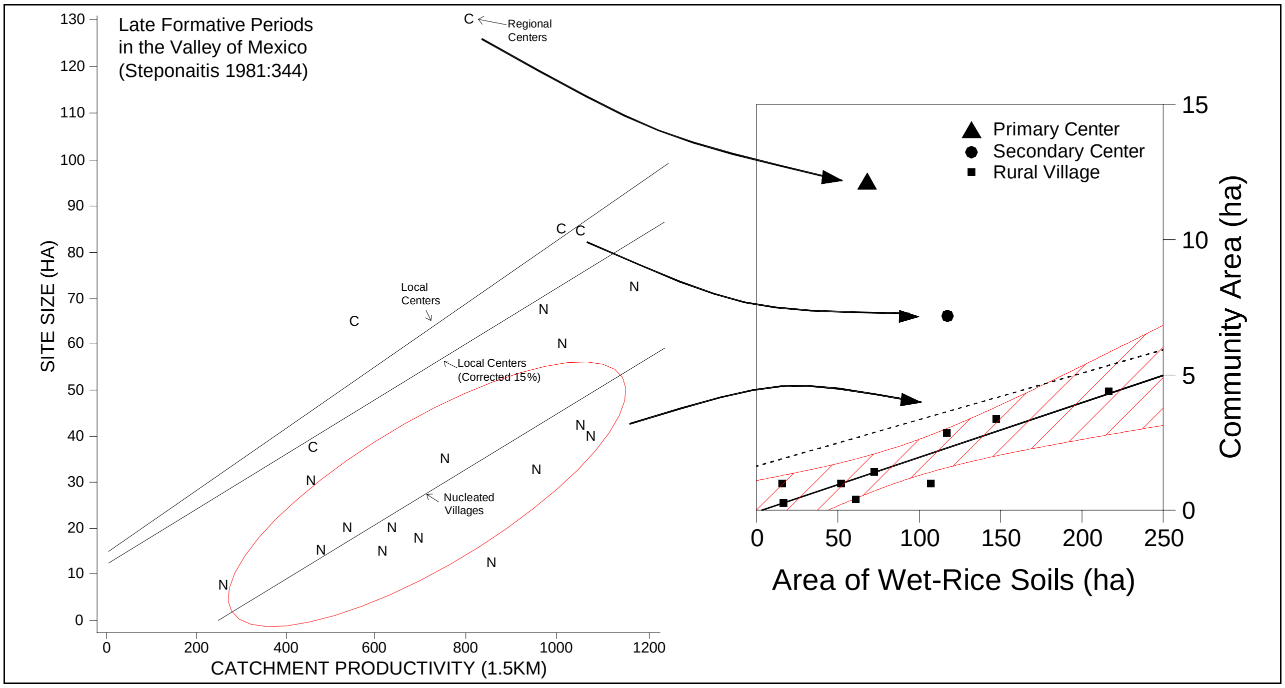

Figure 5.23: Comparison between Polity B and Late Formative Periods, the Valley of Mexico

In this light, Polity B shows remarkable compatibility a with typical bottom-up system, in which tribute imported to its centers would have been emphasized, and a noticeable similarity with patterns presented by the tribute-flow model applied in the Formative of the Valley of Mexico (Steponaitis 1981:344; Figure 5.23).

On the contrary, Polity A, despite its centers' poor association with wet-rice soil productivity, does not show any preference for accessibility to tribute collection. Polity C, despite its centers' quite high association with wet-rice soil productivity, also strongly favors accessibility to the important junction of the ancient transportation routes, so that these two polities do not consistently support either top-down or bottom-up perspectives.

5.4. SUMMARY: INTERCOMMUNITY AND INTERPOLITY VARIATIONS IN PRODUCTION AND DISTRIBUTATION OF WET RICE

So far, inter-polity and inter-community level variation in three socioeconomic aspects specifically relevant to wet-rice cultivation and consumption have been explored individually and then in combination. All analyses have ultimately focused on testing the first two pairs of archaeological implications supporting top-down or bottom-up perspectives on the relationship between sociopolitical organization and intensive agriculture.

As a whole, there is no clear tendency to support either of the two approaches, except for water management. However, some further investigation at the level of the individual polity reveals interesting differences among them.

In wet-rice soil productivity, the patterns of Polities A and B are largely compatible with the bottom-up perspective. There is little association between centers and high productivity in intensive wet-rice cultivation. However, in relation to accessibility to tribute collection, treated as counter to wet-rice soil productivity, these two polities showed some differences. While Polity B's centers, especially its primary center, are located for ease of tribute collection in the vicinity of major junctures of ancient transportation routes, this is not found for Polity A's centers. Nevertheless, Polities A and B do share a pattern of rural villages dispersed through wet-soils rather than being concentrated near the primary center.

The pattern of Polity C, in terms of wet-rice soil productivity, is clearly compatible with top-down approaches, in sharp contrast to the other two polities. This tendency might have been fostered by centers, but they seem not to have given up the advantage of easy assess to important locations on transportation networks, even though this might not have been for tribute collection.

On the other hand, analysis of three dimensions of water management reveals that the overall patterns of the 50 MBA communities are quite contrary to, not only the traditional "hydraulic hypothesis," but also, consequently, to top-down perspectives in general.

In the research area, in three socioeconomic aspects related to wet-rice production and mobilization, as a whole, no consistent patterns supporting either top-down or bottom-up perspectives have been found. This is likely to be attributable to pooling of the multiple systems whose constituent communities, especially the central ones, might have pursued different locational preferences.

6. HOUSEHOLD WEALTH VARIABILITY, COMMUNAL ACTIVITY, AND MORTUARY PRACTICES

In the last two chapters, I discussed inter-polity and inter-community differences in archaeological implications relevant to production and distribution of wet-rice through regional-scale approaches. As this study proposes, and many bottom-up approaches suggest, at this point, the consideration of regional-scale patterns or processes needs to be complemented by exploration at the household scale (Bermann 1994; Falconer 1995; Whalen 1983).

More specifically, the investigation at the household level here attempts to document household wealth variability within individual communities that differ in soil suitability, need for cooperative water management, accessibility to tribute collection, and position in the regional settlement hierarchy. As presented in the series of archaeological expectations (Chapter II), if the intra-community distributional patterns show substantial compatibility with the top-down approach, the analysis will reveal a conspicuous concentration of wealth into a small number of elite households, as opposed to the more continuous distribution of wealth more consistent with a bottom-up approach.

In this light, the analysis mostly concentrates on how individual household wealth is distributed along the scale from the poorest commoner to the richest elite households within a specific community that belongs to a specific polity and plays a role as a primary center or a secondary center or a rural village. Each analysis tests a pair of archaeological expectations representing top-down or bottom-up systems, respectively (Chapter 2).

Measuring the wealth and/or status of individual households depends primarily on the published data collected by other archaeological projects rather than this study. Those include substantial information on exposed domestic features from which artifacts come from.

In a broad sense, what is to be discussed here is closely related to one of the important issues that anthropological archaeology has repeatedly introduced: how both private and public spheres, corresponding to Sahlins' domestic modes of production II and I (Sahlins 1972), interact in the formation of a regional political economy? In a regional perspective, the key factor for the development of complex political organization is the transformation of domestic labor into communal (Hirth 1993). Thus it is critical for an emergent regional elite to alienate domestic labor from individual households and introduce it into the communal agenda successfully.

In this light, this study also explores how inter-household distributional patterns of wealth were interrelated with changes in communal labor investment, variations in community-level wealth accumulation, and regional sociopolitical development that fundamentally includes intercommunity differentiation in possession of wealth and status. The exploration further involves suggestions about the interrelations between patterns at varying scales.

6.1. HOUSEHOLD WEALTH VARIABILITY

6.1.1. Identifying MBA Households

As has frequently been pointed out in anthropological research, the concept of household is defined differently across societies and time periods (Netting et al. 1984). The complexity of defining 'household' is attributable to the lack of consistency in cross-cultural perspective between thesocial and residence patterns of households. As some ethnographic work shows, the social relationship among the household's constituent members varies cross-culturally and sometimes is not based on co-residency (Bender 1967; Goody 1958).

However, co-residency has been, at least for the archaeologists, one of the most reliable criteria to identify households from material remains, rather than in living human groups, and therefore many archaeologists feel comfortable with morphological definitions of households which focus on spatial patterning, domestic architecture and artifact assemblages (Kent 1984, 1990).

Along such lines, this study defines MBA households as co-residential groups residing in a single architectural structure-in this case, a single subterranean dwelling with round or square floor shape. In this definition, the constituent members of a single household mostly represent a nuclear family. In fact, most individual dwellings' floor sizes are smaller than $30m^2$, probably for around 5 persons or fewer (Figure 6.1). Some households contain attached outdoor facilities, such as storage pits, outdoor hearths, and so on.

In this light, for the actual analysis, I find useful the concept of 'household unit' (Bermann 1993; Flannery 1983: 44-45) as an analytical unit of household wealth/status variability. In fact, unlike the EBA, MBA dwellings, especially ones with Songgukri-type central pits, lack indoor hearths or storage facilities. These changes might be attributable to organizational and/or functional changes in household patterns as adaptations to changing socioeconomic and/or natural environments. Adopting the concept of 'household unit' in this case allows us to systematically explore MBA household patterns from a behavioral perspective.

In the archaeological literature, the household has long been considered a basic unit of socioeconomic activities such as production, consumption, and transmission in most societies (Ashmore and Wilk 1984; Netting 1982; Wilk and Netting 1984). Based on these behavioral approaches to the household, it has been commonly accepted that in most past agrarian societies, individual peasant households were the fundamental unit of agricultural production and thus the household has been also been taken as a basic analytical unit of domestic patterns.

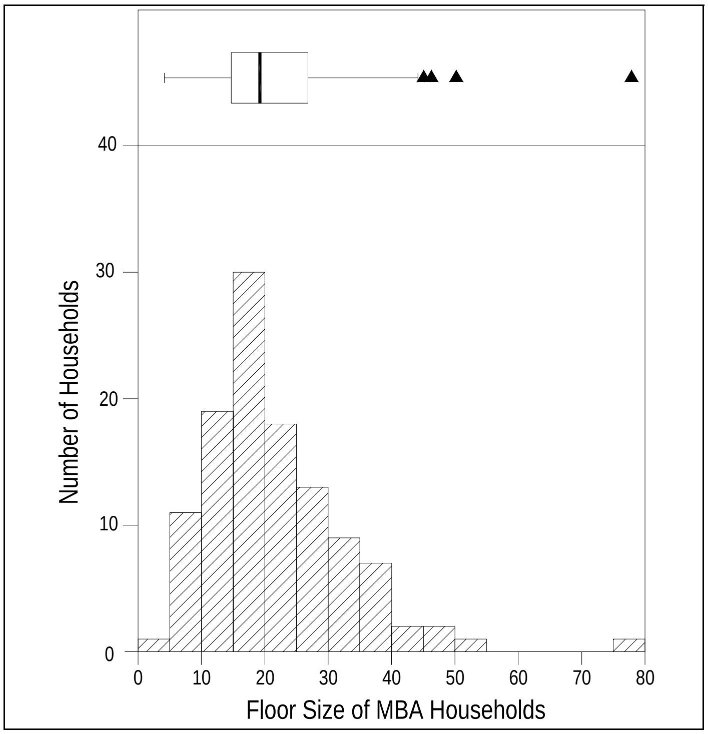

Figure 6.1: Floor Size of Excavated MBA Dwellings. 83% of all dwellings have smaller floor than 30m2

6.1.2. Analyzing Distributional Patterns of Household Wealth

Although the estimation of household wealth starts from the premise that elite households have possession of more valuables, which are rare, elaborate and sometimes non-local items, than non-elite households do (Hirth 1993; Smith 1987), it is not always straightforward to decide which kind of information works best for measuring household wealth and/or status in a specific case, especially without any support from ethnohistory or ethnography based on the direct observation of living society. The complication is that the nature of valuables can vary across trajectories and even in different periods in a single trajectory (Hodder 1991: 107-120; Stark and Hall 1993).

In addition, simply identifying whether a household is elite's or not is not this study's main concern in exploring household socioeconomic patterns. Rather, it focuses on distributional patterns of total wealth along the continuum between the richest elite household and the poorest commoner one, respectively, within a specific community. In this light, intra-community wealth variability must be approached with respect to the total wealth possessed by a community's constituent households.

Therefore, this study deals inclusively with multiple kinds of information rather than concentrating on the presence or absence of a specific diagnostic indicator or two. Moreover, preservation conditions after abandonment make us hesitate to depend primarily on a single indicator. The preservation of material remains reflecting household activities could be quite vulnerable under the conditions of a long history of intensive land-use shown in the research area. In this case, the presence or absence of any single item is likely to produce misleading results or lead us discard potentially useful information.

In order to handle these multiple variables simultaneously, I use multidimensional scaling (hereafter MDS) analysis, finding its graphical output an advantage, despite the fact that it is less frequently used than other multivariate statistical analyses. MDS fundamentally focuses on the similarity or dissimilarity among cases-in this case, individual dwellings or households-through the relevant variables-household wealth indicators.

The variables included in the analysis are floor size and stylistic elaboration of individual dwelling, spatial relationships between dwellings, stylistic and functional diversity of productive and non-productive domestic equipment, and presence or absence of ornamental or ritual objects. Moreover, the actual analysis uses standardized values of the variables to make their scales of measurement more comparable. When we use unstandardized values for a variable that shows great variation among cases, such as floor size, the measurement of (dis)similarity will be strongly affected by a single variable or two. The result is not much different from determining household wealth based on a single indicator, and undermines this study's attempt to explore distributional patterns of inter-household wealth variability in a systemic and synthetic manner, avoiding the complication of deciding which single indicator to use. Moreover, estimating the stylistic diversity of artifact assemblages based on the presence or absence of artifactual types from dwellings under conditions of bad preservation also could be problematic. Thus the following analysis also uses standardized scores rather than true values for some variables related to the stylistic diversity of artifact assemblages.

6.1.2.1. Floor Size and Stylistic Elaboration of Dwellings Domestic space, equivalent to floor area of the individual dwelling in this study has been thought one of the most important wealth/status indicators for households (Hirth 1993; Smith 1987), based on the premise, derived from empirical data, that wealthier households need more space for more household members or a bigger family to reside (Clark and Blake 1994; McAnany 1992; Webster 1990) and to store more utensils and valuables. In addition, the large space itself could represent a sort of superiority (McGuire 1983). However, in order to avoid a disproportionately strong effect from any single variable, which can happen when we use actual values, this study uses the standardized score of floor size (Drennan 1996):

$$\frac{\textit{(individual dwelling's floor size - mean of all dwellings' floor sizes)}}{\textit{standard deviation of all households' floor sizes}}$$

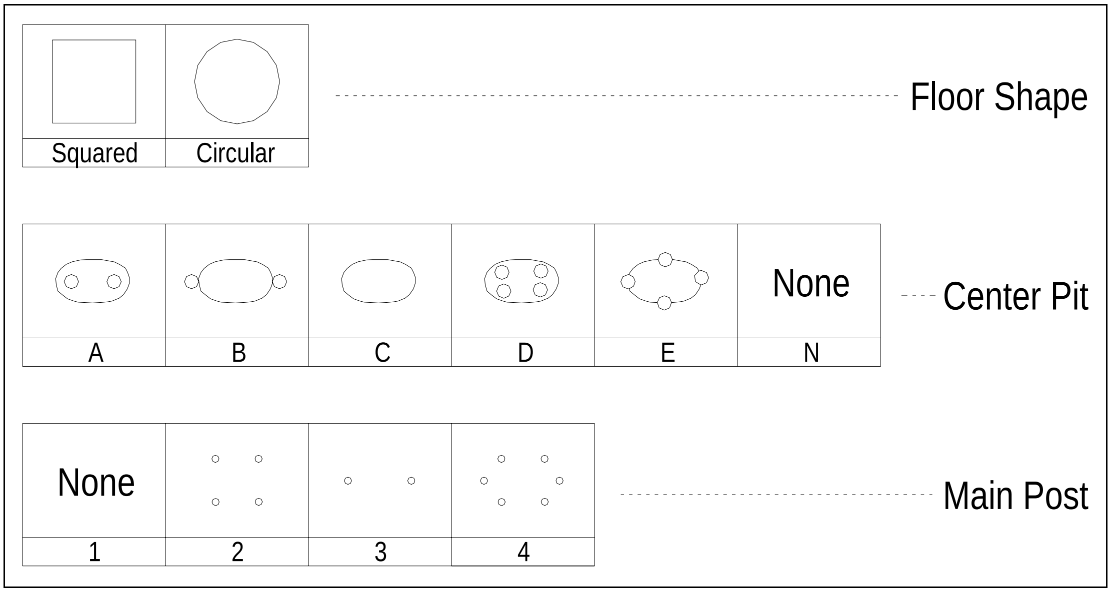

Figure 6.2: Classification of MBA Subterranean Dwellings

Stylistic elaboration of domestic architecture has been thought a very important criterion in measuring household wealth (Hirth 1993; Smith 1987). MBA dwellings in the central-westrn Korea have been classified according to the various combinations of floor shape (squared versus round), the varying types of center-pit and deploy of main postholes (Lee G.M. 1992; Lee H.J. 1998; Woo J.Y. 2002). This study's classificatory scheme is not much different from the researches cited. All possible combinations of center pit and main postholes could reach 24, but the types that have bee empirically identified in are 9: A1, A2 A3 A4, C1, C2, D1, E1, E2 and N1.

6.1.2.2. The Proportion and Stylistic Diversity of Elaborated Ceramic Vessels As mentioned in passing in the previous chapters, pottery assemblages that have been identified at MBA sites in the research area include, in terms of paste and surface treatment, two kinds of pottery, fine red burnished and plain coarse (*mumun*), each of which is constituted of several kinds of vessel forms (Figure 6.03). Red burnished pottery vessels mostly consist of serving ones, such as small Songgukri-type jars, flask-shaped bottles, bowls, and pocket-shaped jars. These have been thought of as more valuable than *mumun* vessels, due to their elaboration and relative rarity (Song M.Y. 1995; Wu J.Y. 2002).

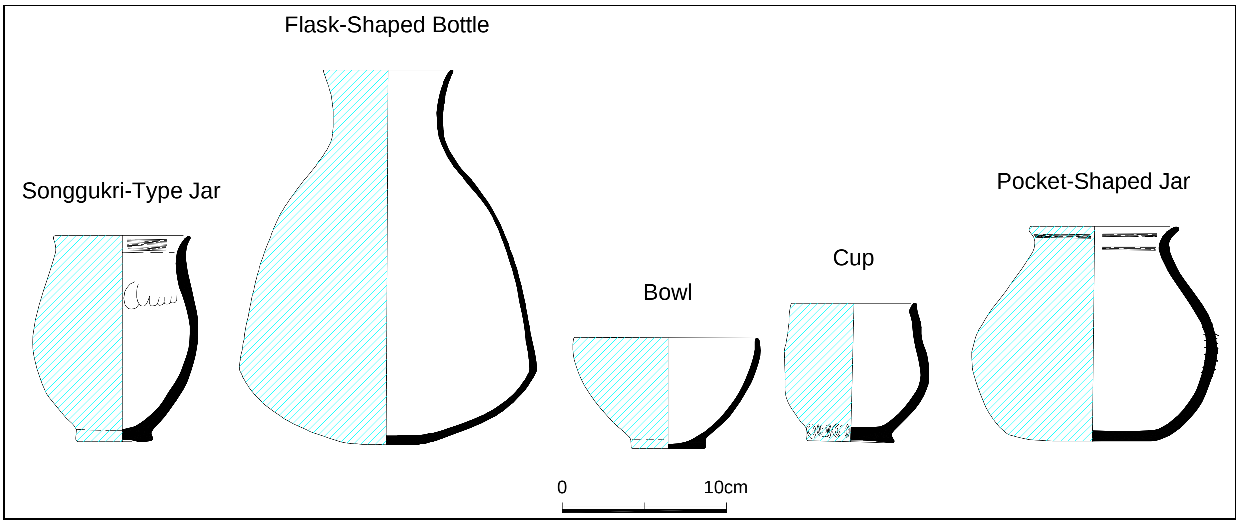

Figure 6.3: MBA Red Burnished Pottery Assemblage

Variation in fine ceramic vessels among households has been considered an indicator of household wealth or status variability in other such studies (Hirth 1993; Smith 1987). In this analysis the proportion of these vessels is simply defined as the ratio of MNV (minimum number of vessels) of red burnished pottery to MNV of all pottery (Millet 1979: 77-78; Rice 1987: 290-293).

On the other hand, for calculating the stylistic diversity (*D*) of vessel form, I use the standardized score of the number of categories of vessels which individual households possess:

$$D = \frac{n_j - \overline{X}}{sd}$$

where,

$nj = j$ th household's number of vessel categories

$\overline{X}$ = mean of all households' number of vessel categories

sd = standard deviation of all households' number of vessel categories

6.1.2.3. The Stylistic Diversity of Mumun Vessels The *mumun* pottery assemblages are composed of several vessel forms, including Songgukri-type urns-which can be broken into three groups (large, medium, and small) according to rim diameter which is quite proportional to the vessel's volumetric size (Woo J.Y. 2002)-urns, and handled jars (Figure 6.04). With reference to the domestic realm, the *mumun* vessels could be treated as humble and mundane vessels for various purposes, such as cooking, serving and storage, while red burnished ones were just for serving.

6.1.2.4. The Functional and Stylistic Diversity of Stone Tool Assemblages The lithic artifact assemblage recovered from MBA dwellings in the research area includes 19 types of tools, each of which of course shows minor stylistic variation, besides raw materials (Figure 6.05). For the estimation of stylistic diversity of stone tool assemblages, like that of pottery assemblages, this study uses standardized scores rather than the original number of stone tools in individual dwellings.

On the other hand, all stone tools can be regrouped into nine categories, according to their functional similarity (Chi G.G. and Ahn S.M. 1983; Lee G.S. 2000; Table 6.01; Figure 6.05) and there are substantial differences in the portion of each functional group between sites (Figure 6.06)

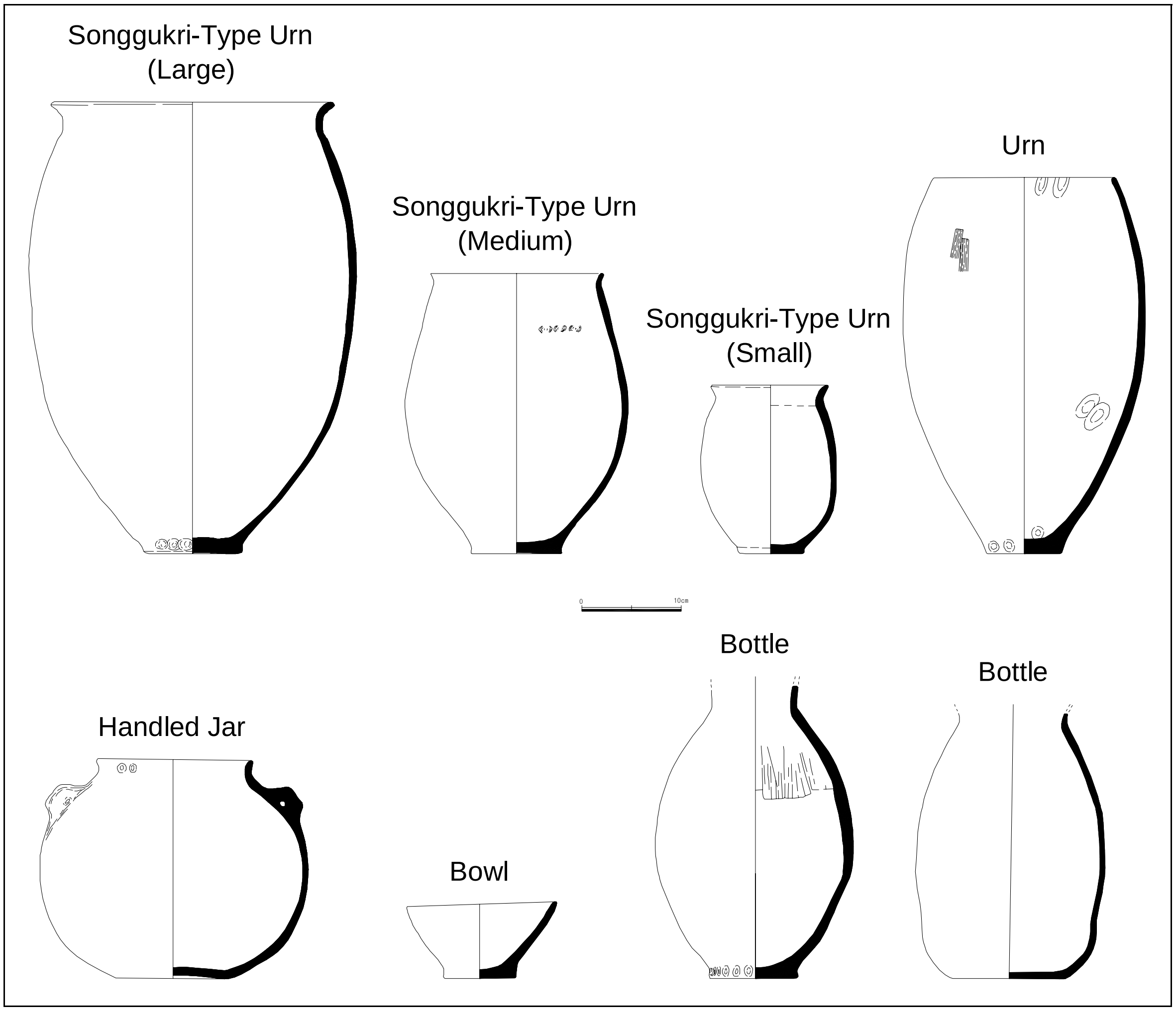

Figure 6.4: MBA Plain Coarse Pottery Assemblage

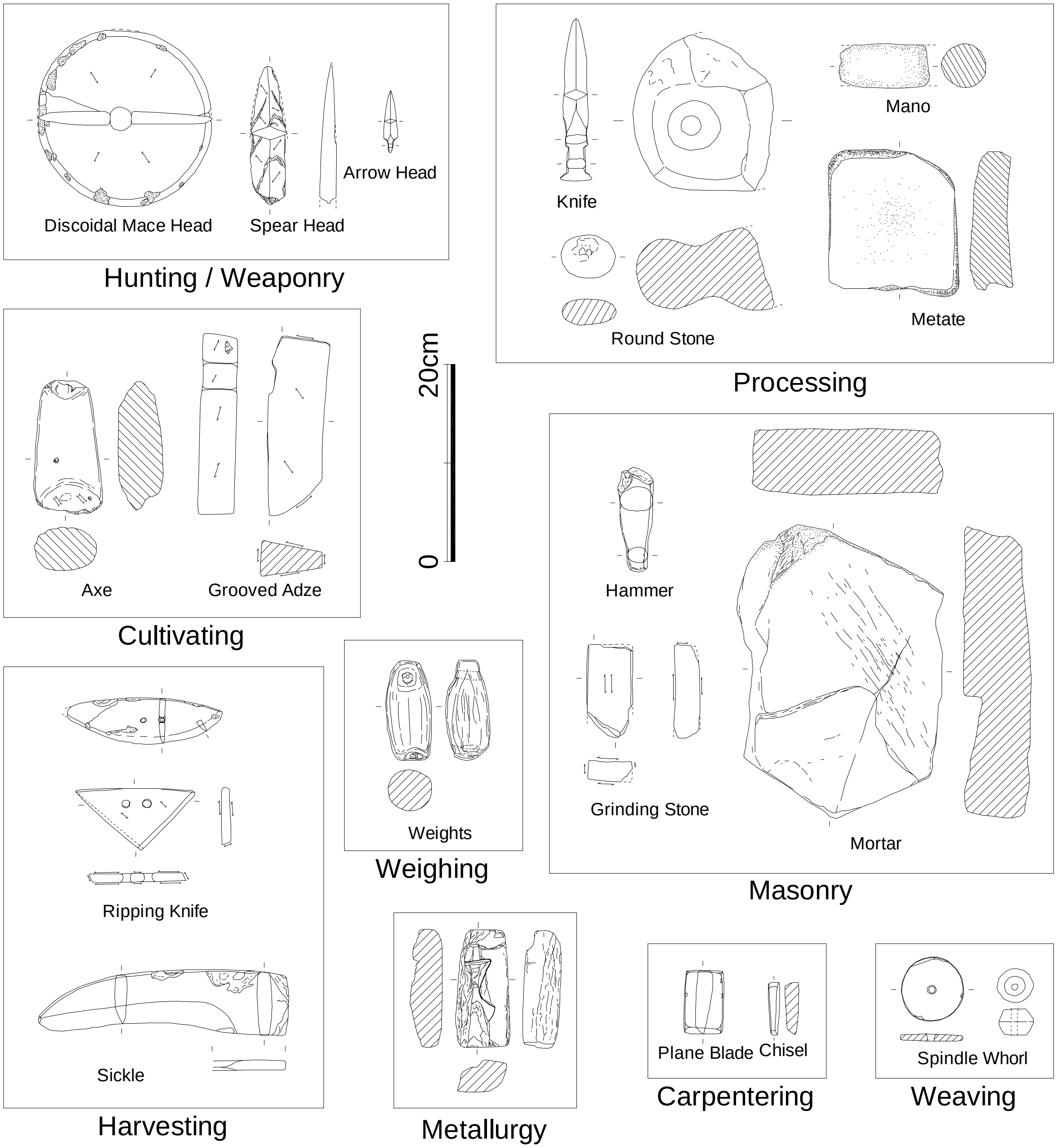

Figure 6.5: MBA Lithic Artifact Assemblage

Table 6.1: Functional Classification of MBA Stone Tool Assemblages

Functional Groups	*Stylistic Tool Categories*
Cultivating Tools	Axe, Grooved Adze
Harvesting Tools	Lunar-Shape or Triangular Ripping Knife, Sickle
Processing Tools	Knife, Round Stone, Mano, Metate
Hunting Tools / Weaponry	Arrow Head, Spear Head, Discoidal Mace
Carpentering Tools	Plane Blade, Chisel
Masonry Tools	Grinding Stone, Hammer, Mortar
Bronze-Metallurgy Tools	Cast
Weaving Tools	Spindle Whorl
Weighing Tools	Weights

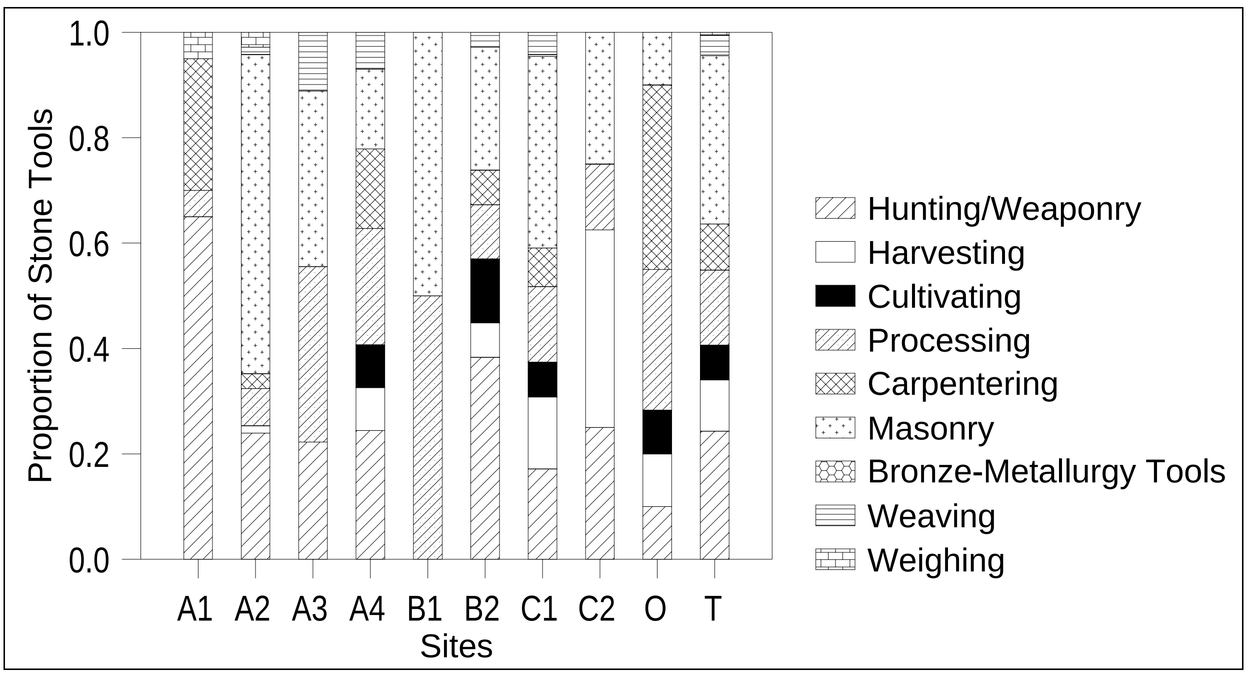

Figure 6.6: Portion of Functional Types of Stone Tools at 9 Excavated Sites. A1: Dangjeongri, A2: Dosamri, A3: Hanseongri, A4: Oseokri, B1: Hapjeongri, B2: Rabokri, C1: Songgukri, C2: Wonbukri, O: Majeonri, T: Total.

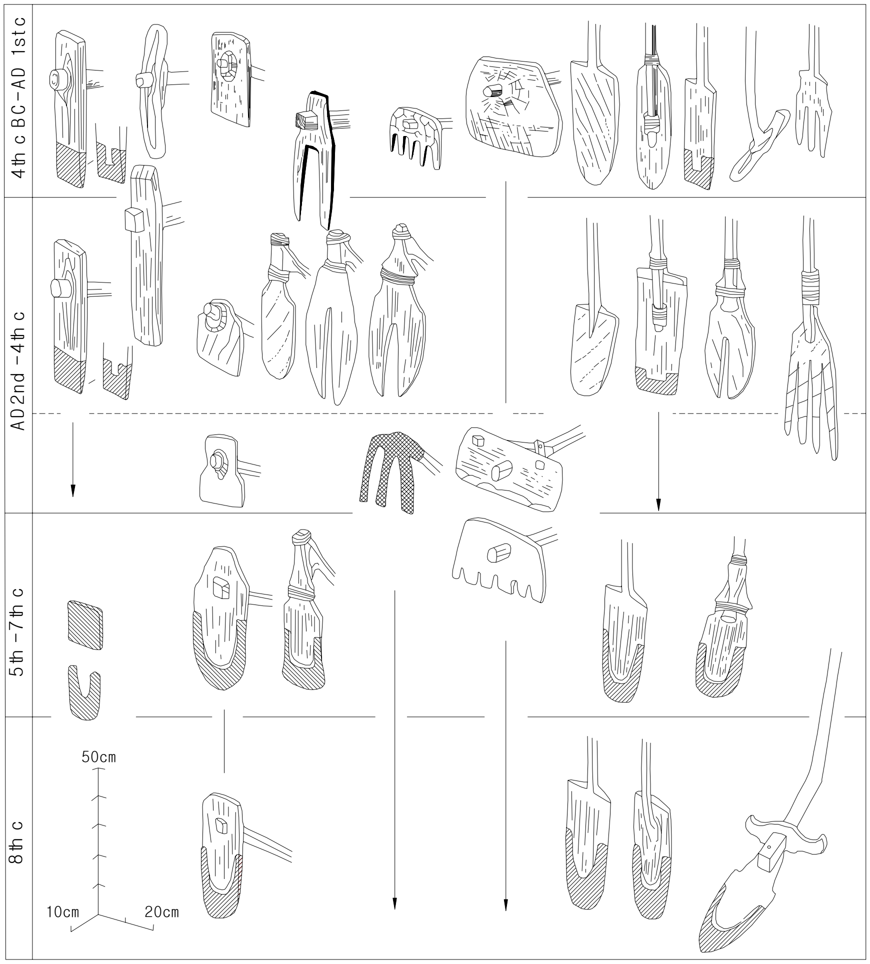

Figure 6.7: Ancient Wet-Rice Agricultural Tools. After Barnes (1993: 187).It has been redrawn. This demonstrates the way in which iron blades were added to original wooden tools.

Among functional groups of stone tools, there are cultivating and harvesting ones related to rice agriculture. In addition, considering that many sources indicate that tools for wet-rice cultivation in premodern times were made of wood (Figure 6.07), carpentry tools are also included in this category. In fact, excavations in swamps have discovered various kinds of wooden tools for cultivation of, presumably, rice.

The calculation of functional diversity of stone tool assemblages depends on Simpson's Diversity Index (1-L). The index provides a value from 1 for maximum diversity to 0 for the minimum:

$$L = \frac{\sum \left(n_j \left[n_j - 1 \right] \right)}{N \left(N - 1 \right)}$$

where,

nj = number of items in category *j* and,

N = total number of individuals at all categories.

6.1.2.5. Presence of Ornamental and/or Ritual Objects Some, but quite a small number, of excavated MBA dwellings contain ornamental or ritual objects, mostly tubular jades (Figure 6.08). Tubular stones have long been considered as burial good which indicates high status of the buried (Kim Y.B. and An S.J. 1975; Kim G.S. 1994). Considering their rarity and burial contexts, it seems not an exaggeration to take such objects as ornamental and/or ritual, indicating the high socioeconomic position of the possessor household.

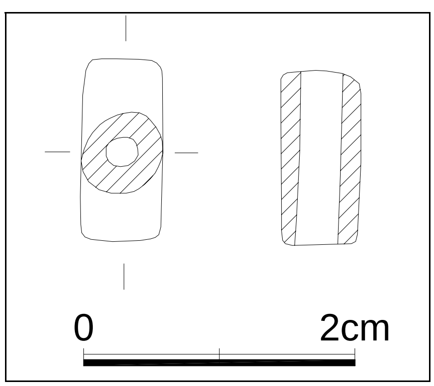

Figure 6.8: Tubular Stone

Among the variables mentioned above, some are (standardized) measurements, some are presence/absence variables, and some are non-ordinal categorical ones. Although in most variables the similarities and differences between cases can be calculated by Euclidean Distance, some of them could not be calculated properly. Gower's Coefficient (Gower 1971) and Anderberg's Coefficient (Anderberg 1973) have been devised for this situation and therefore, this study uses the coefficient for mixed variables set that is suggested by these authors for measuring similarity or dissimilarity between cases-in this case, individual households.

For the actual calculation of similarity scores, I used a specialized program named *SIMS* (Drennan 1992), in which several kinds of similarity/dissimilarity coefficients can be chosen. Using this program, we can make a similarity or dissimilarity matrix for MDS analysis by a general statistics package-for this study *Systat 10*.

6.1.3. Intra-Community Distributional Patterns of Wealth along the Community Ranks

For evaluating the third pair of archaeological expectations presented in Chapter II, exploring intra-community distributional patterns concerns how distinctive and discontinuous household wealth and/or status variability were within communities of differing positions in the intra-polity settlement hierarchy. . However, it is not sufficient to explore how the intra-community patterns were interrelated with ones at the level of individual polities, since each represents a different pattern of organizational integration, utilization of intensive technology of rice production, and mobilization of surplus.

Thus, I will begin by looking at household wealth/status variability along the hierarchical scheme and then will successively discuss how intra-polity variation in the distributional patterns of household wealth within a community might have been interrelated with the regional process forming the complex organization of rice agricultural intensification.

6.1.3.1. Primary Centers Polities B and C each have primary centers. Some parts of both polities' primary centers have been excavated and designated as the Hapjeongri and Songgukri sites.

The Hapjeongri site is a part of Polity B's primary center that is constituted of three separate settlements. However, the excavation has been conducted in a quite small area that represents a very marginal part of the second-largest settlement. Just two dwellings were exposed, so that any meaningful exploration of inter-household wealth/status variability is impossible.

The well-known Songgukri site represents the core part of the community equivalent to the primary center of Polity C. Seven seasons' excavations have discovered 61 MBA dwellings, but the interior investigations for 23 have not been completed. Thus, 38 dwellings are analyzed here. Among them, some dwellings are typical round Songgukri-type ones, while others are long rectangular ones without center pits.

According to the density of dwellings, the whole site can be divided into a nucleated zone, and a dispersed zone (see also Chapter 4). In the nucleated zone, on the narrow flat top of a hill, 23 dwellings, most of which have rectangular floors, are densely placed. On the other hand, the dwellings that mostly have round floors and center pits are located outside the nucleated zone, forming dispersed clusters. Although there is no critical stylistic difference between artifacts from the dwellings inside and outside the nucleated zone, such as could represent temporal gaps, we can see a quite clear distinction in house plan. Concerning the zonal distinction in house plan types at the site, many researchers seem to agree that it is a reflection of cultural or functional differences rather than lack of synchronicity (Lee H.J. 2002; Woo J.Y. 2002). For this reason, the floor shape of dwellings is not included for the actual analysis. In fact, when floor shape is included in the analysis, the pattern of household wealth/status differences is almost the same as the zonal distinction of dwellings (Figure 6.09). Thus inclusion of floor shape is not appropriate for estimating overall distributional patterns of household wealth and/or status at the site in synthesized scheme.

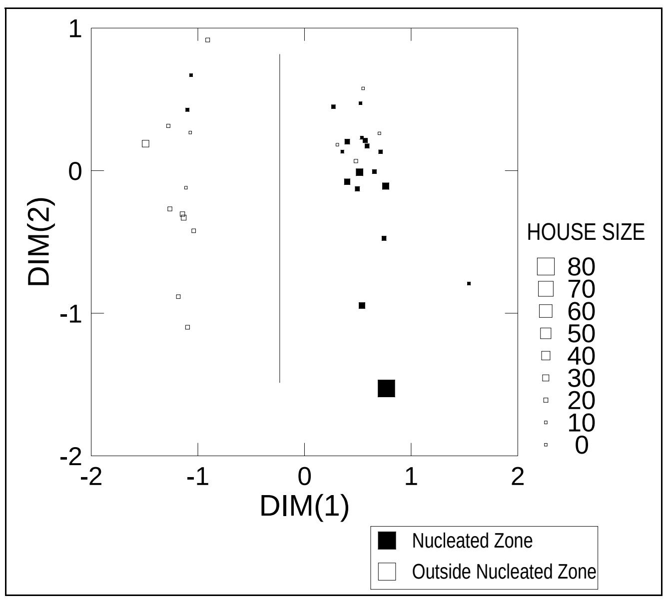

Figure 6.9: MDS Graphs for Songgukri Site (Polity C's Primary Center). Stylistic factors, such as floor shape and typological groups of center-pit and main postholes are included in the analysis

From the results of the MDS analysis, we can see some households-at the left side of the graphs-clearly separated from loose clusters of the majority (Figure 6.10). In general, these several households display consistently higher scores for most variables. On the other hand, we cannot find a clear discontinuous pattern of wealth distribution in the cluster of the majority (Figure 6.10).

The wealthier households are mostly located in the nucleated zone. Among them, especially the one at the far left side of the graphs, which represents the biggest dissimilarity from the majority, is equivalent to the biggest rectangular dwelling, not only in the community or polity, but also in the whole research area. It could possibly be the regional supreme elite household one of whose members might have been buried in the tomb of the bronze dagger (Chapter 4). However, it does not show high scores for all items. Rather, in proportion and stylistic diversity of elaborated vessels, it scores just moderate numbers. Nevertheless, there is additional evidence of its monopolization of wealth and high status. Among eight outdoor storage pits found in the whole excavated area, four are concentrated in its vicinity. Moreover, this household contains a tubular jade and a discoidal mace head, a unique artifact in the research area.

In addition, the smaller poorer households of the dense cluster in the middle part of the graphs consistently present quite high scores in functional/stylistic diversity of lithic artifact assemblages and in the proportion of agriculture-related tools, whereas the wealthy households, dissimilar to the majority, have relatively low scores in functional/stylistic diversity of lithic artifact assemblages and quite low proportions of agriculture-related tools. From this, a couple of inferences are possible. On the one hand, the majority of households showing similarities in their domestic possessions might have been intensively involved in direct productive activities, especially agriculture, but intensity of involvement in agriculture is unlikely to be related to household wealth. On the other hand, the possible wealthy elite households might have extracted

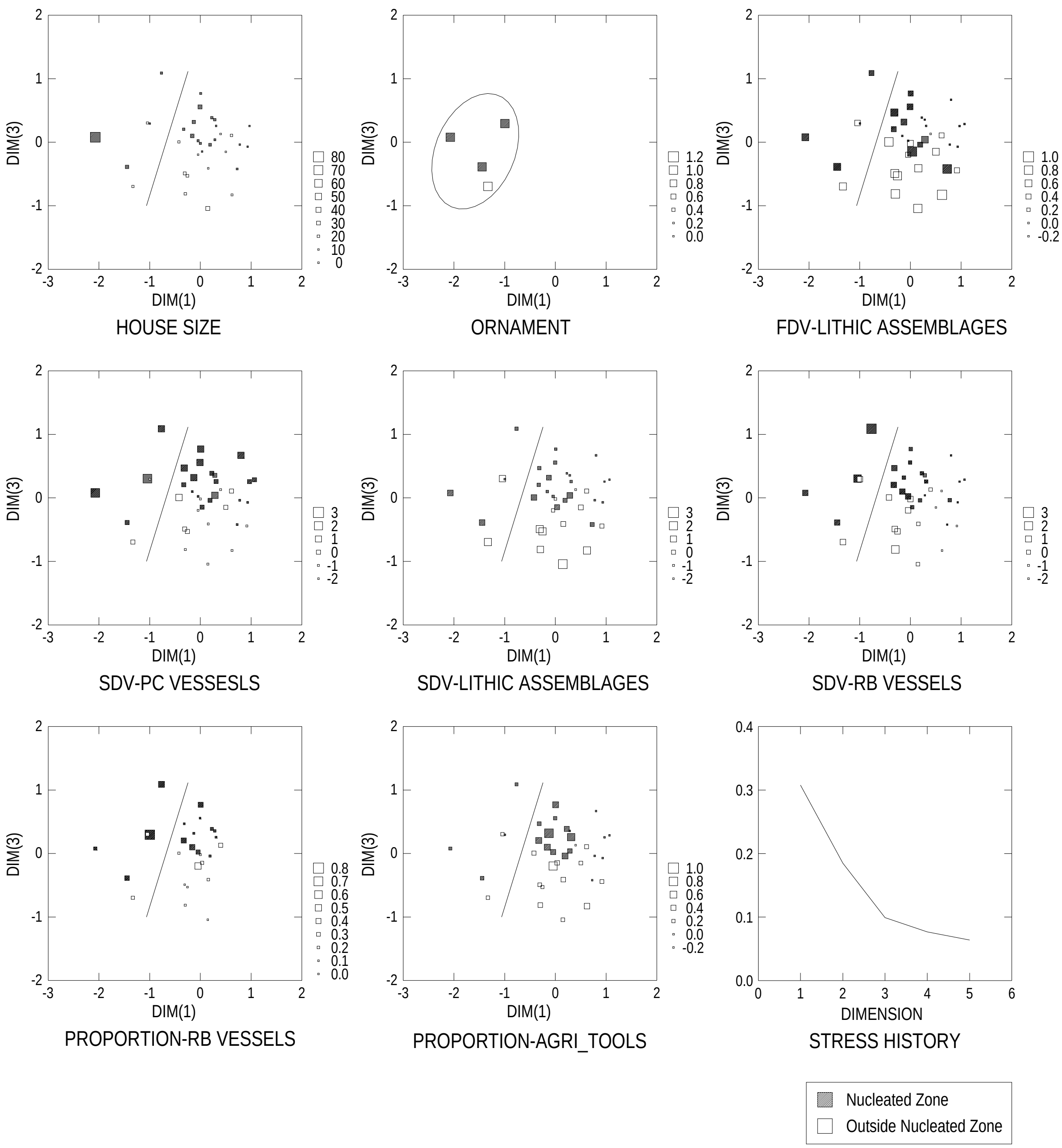

Figure 6.10: MDS Graphs for Songgukri Site (Polity C's Primary Center-Overall)

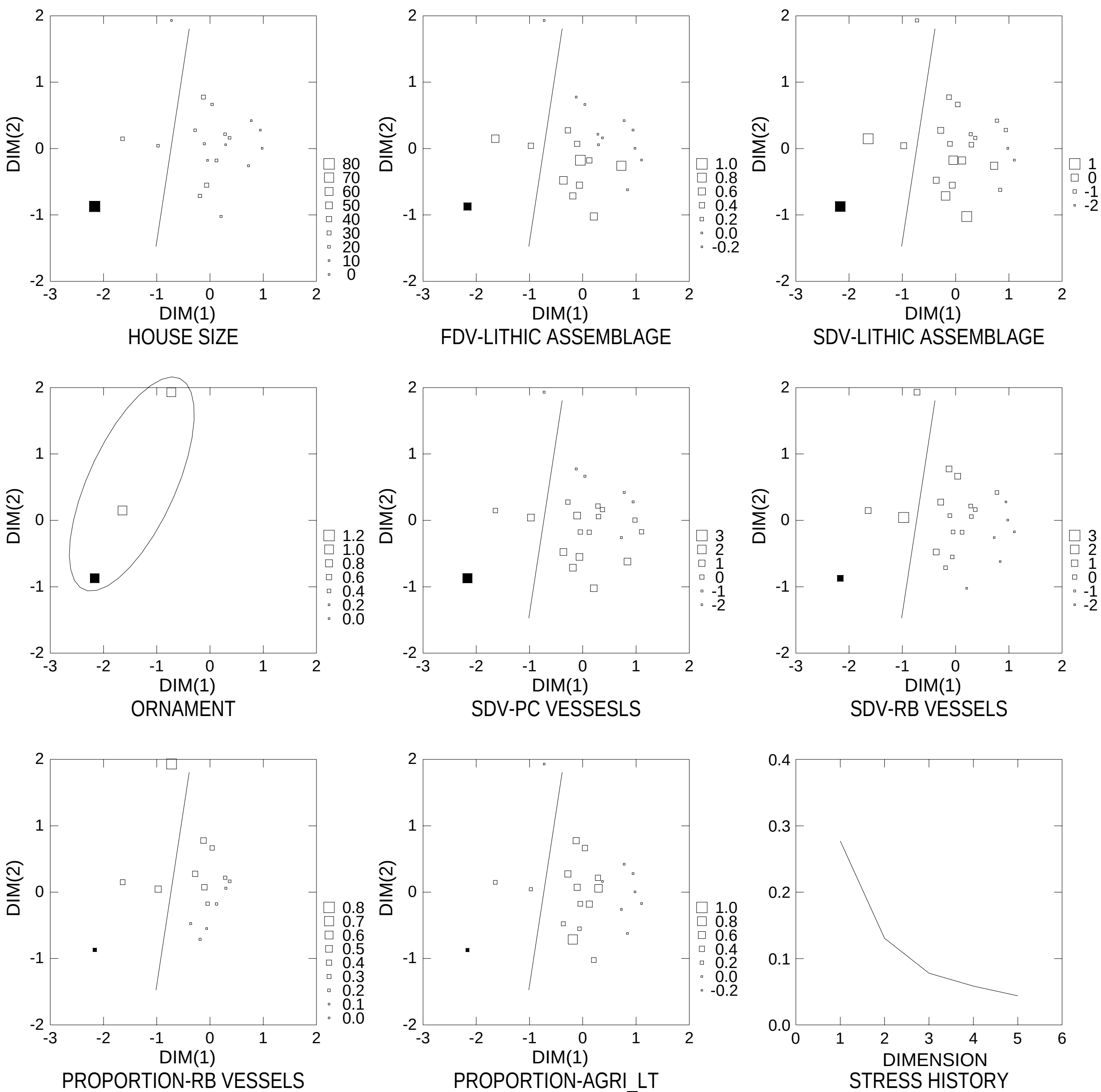

Figure 6.11: MDS Graphs for Songgukri Site (Polity C's Primary Center-Nucleated Zone)

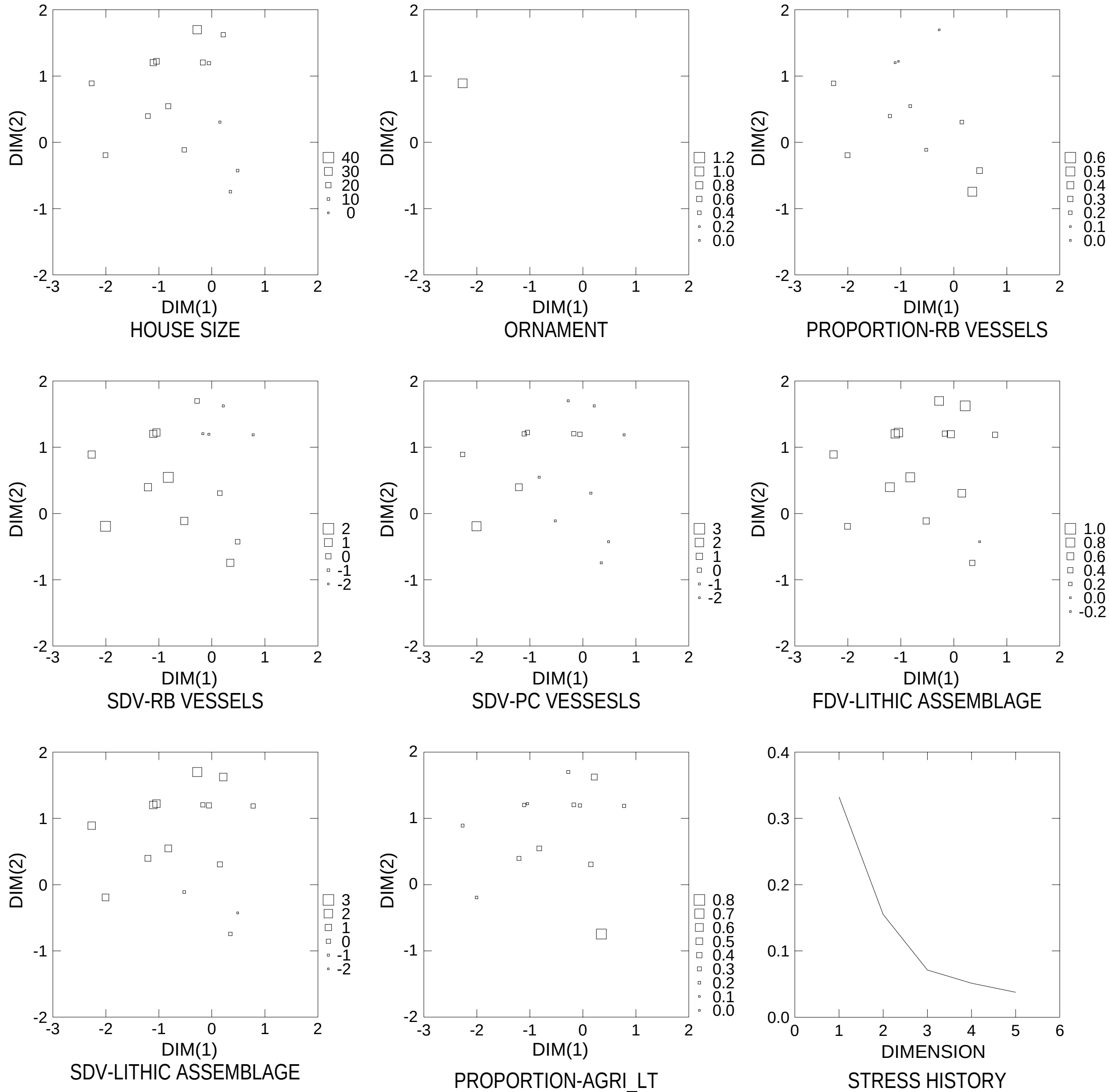

Figure 6.12: MDS Graphs for Songgukri Site (Polity C's Primary Center-Dispersed Zone)

wealth from the producer household, by whatever mechanism, or obtained wealth from other sources outside the community or village through activities other than agricultural production.

Similar patterns can be observed in the MDS analysis pertaining to the households of just the nucleated zone (Figure 6.11). However, the analysis just of the households outside the nucleated zone shows quite different patterns from those of the nucleated zone. We cannot find any consistent patterns in terms of wealth concentration into a small number of households or its discontinuous distribution (Figure 6.12). This is quite convincingly attributable to the fact that the possible elite households identified in the overall analysis are located in the nucleated zone.

6.1.3.2. Secondary Centers As discussed in Chapter 4, Polity A is composed of four secondary centers and 15 rural villages, and divided into three sub-polities, each of which has a secondary center or two and several rural villages. Final reports of excavations at four MBA sites provide detailed information on the discovered features and artifacts. Among them, three sites, named Hanseongri, Danjeongri, and Dosamri, are secondary centers. However, all excavations do not provide appropriate information for MDS analysis, due to their limitations in regard to exposed area.

The Hanseongri site represents a very central part of a whole community constituted of four separate settlements, which together form the biggest of the four secondary centers. However, the excavation exposed such a limited area that no meaningful statistical analysis can be carried out. Nevertheless, we can see what the core part of the community looks like, because the excavation fortunately exposed a couple of possible elite houses. In fact, the two dwellings are, not only the second- and third-biggest ones in the whole research area, but also show more or less idiosyncratic house plans.

The excavation of the Dangjeogri site exposed the whole residential area outside the nucleated or central zone of Polity A's secondary center (Chapter 4) and discovered 17 dwellings. All 17 dwellings and their artifacts are the subject of analysis. Most dwellings have typical Songgukri-type center pits. Although disturbances by other dwellings are not observed, the preservation conditions are not very good, due to long-term natural erosion and, more seriously, modern cultural intervention, such as extraction of earth and sand. This may account for a general poverty of material remains in all dwellings, but it does seem that all households in this marginal zone might have originally been poor (Starks and Hall 1993). In fact, some variables that usually provide strong indications of wealth and/or status, such as red burnished vessels and ornaments, are completely lacking from all households.

In this light, although we find moderately discontinuous patterns of wealth distribution in the MDS graphs, this finding is not very convincing. Nevertheless, moderately distinctive patterns are consistent in most graphs. In addition, the accumulation of wealth might have depended on some productive activity, but it is hard to say the productive activity was rice agriculture (Figure 6.13).

The Dosamri site represents part of a community that is a secondary center in Polity A. A season's excavation at the site has exposed 30 subterranean round and square dwellings. Except for two, all dwellings have typical Songgukri-type center pits, and ditches roughly surround the nucleated areas that are dated to MBA. Some dwellings are located on the top of the hill where a relatively nucleated zone can be defined, while others form clusters dispersed on the hill slope (Chapter IV). At large, the dwellings located on the top of hill indicate better preservation than the ones on the hillside. Some dwellings overlap, so that in all 25 dwellings have been analyzed, excluding five.

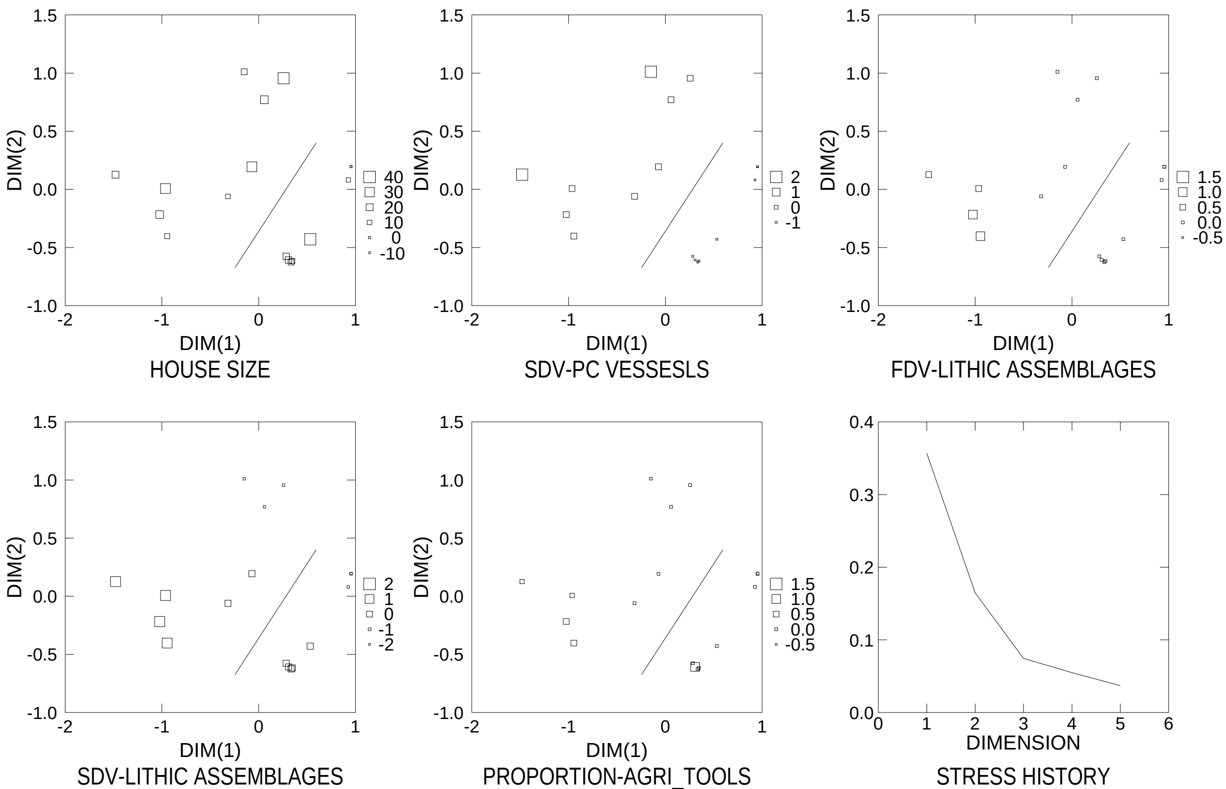

Figure 6.13: MDS Graphs for Dangjeongri Site (Polity A's Secondary Center: Dispersed Zone)

The result of MDS analysis indicates a pattern in which several households are clearly separated from the main cluster of others and those outsiders-possible elite households-possess, in various respects, more wealth items than the ones in the main cluster. However, the possible elite households do not consistently show high values for all the variables (Figure 6.14).

The Rabokri site is a part of the Polity B's secondary center, composed of three individual settlements, and the biggest constituent settlement has been excavated. The excavation exposed 22 houses accompanied by three outdoor storage pits, and 11 burials-stone slab tombs (CDI 2004; Figure 6.15). No overlap is found between any individual houses, so all dwellings are analyzed.

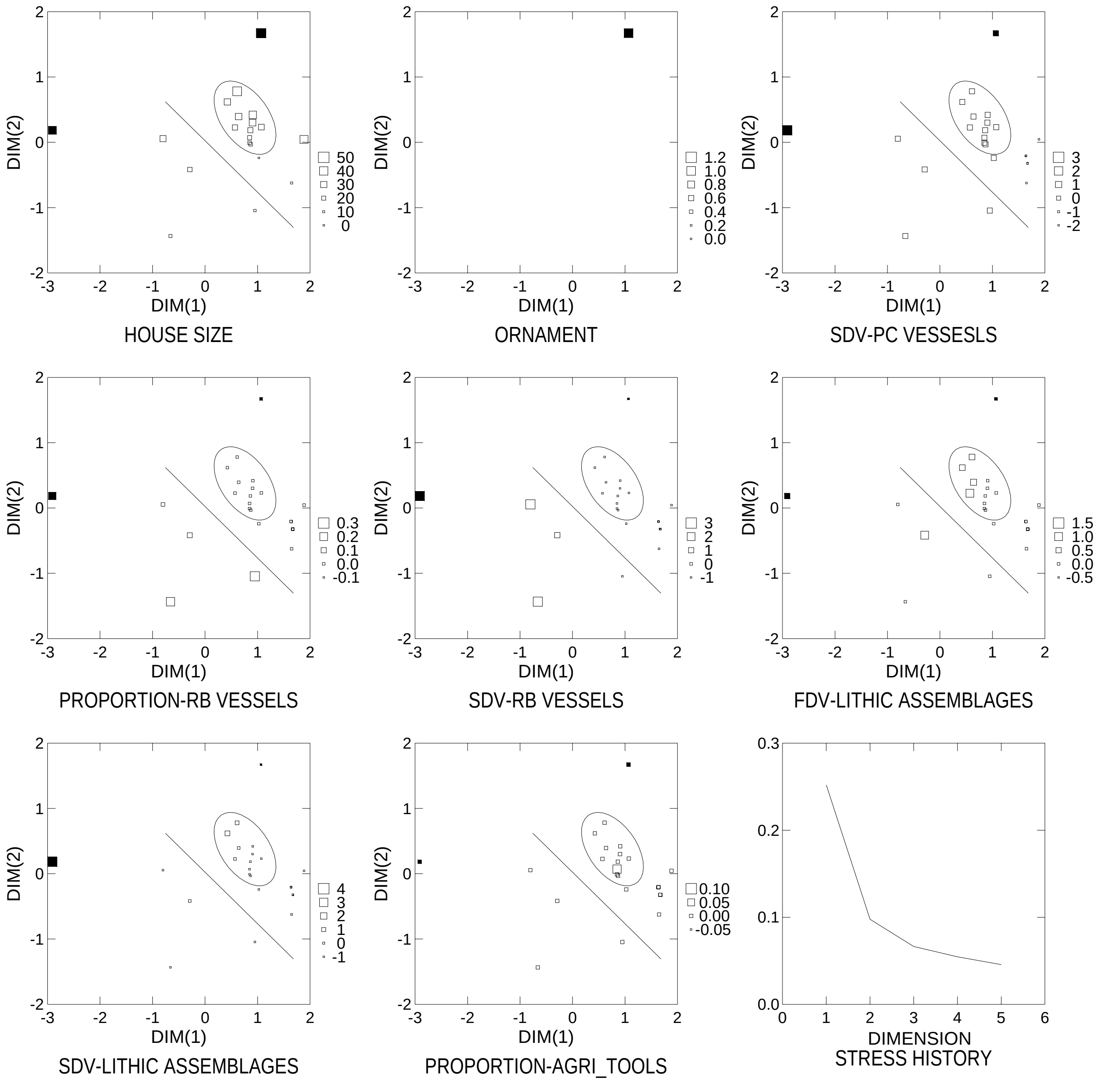

Figure 6.14: MDS Graphs for Dosamri Site (Polity A's Secondary Center)

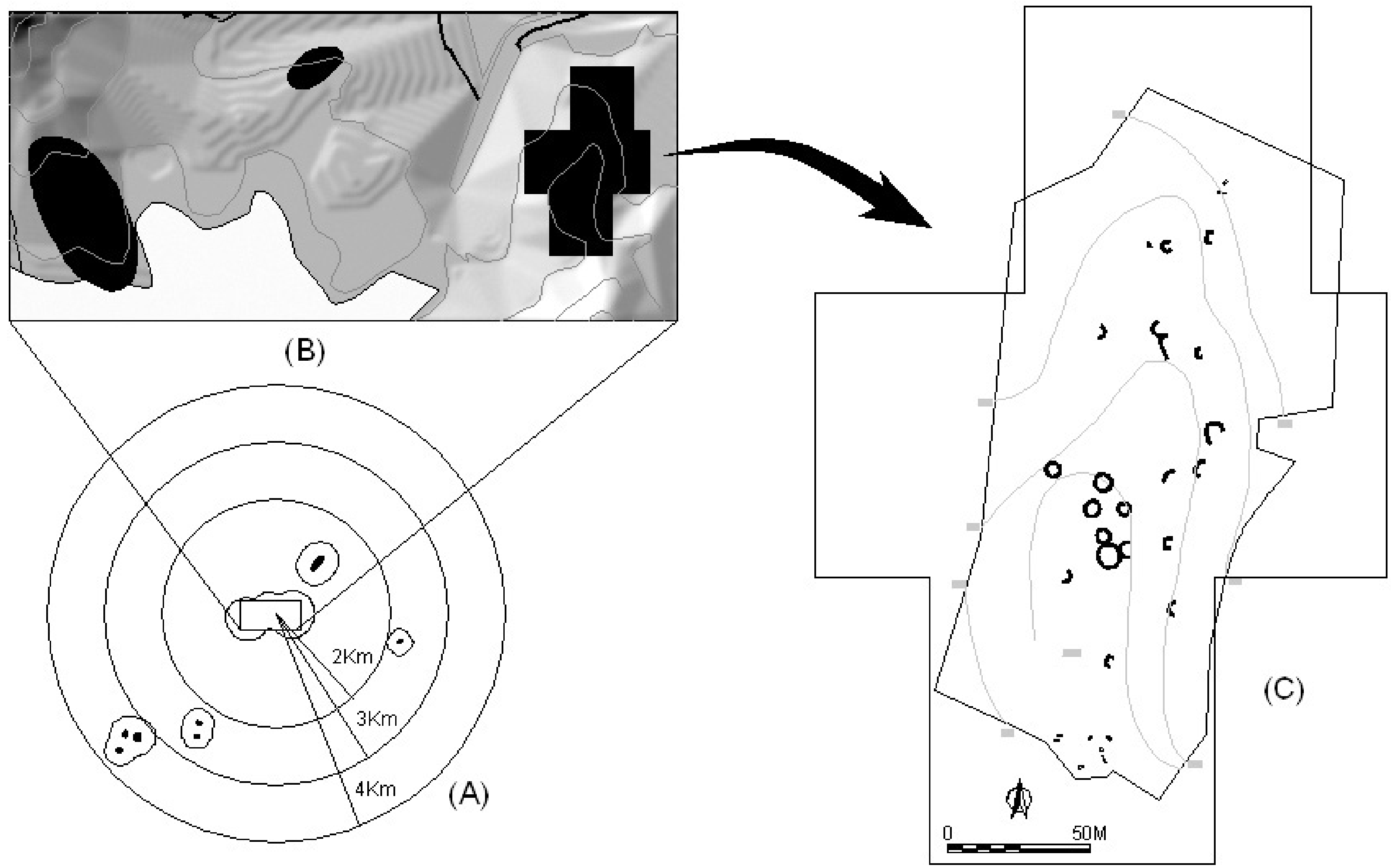

Figure 6.15: Rabokri Site. (A) Polity B’s Secondary Center and Adjacent Rural Villages, (B) Polity B’s Secondary Center Constituted of 3 Separate Settlements, (C) Excavated Rabokri Stie)

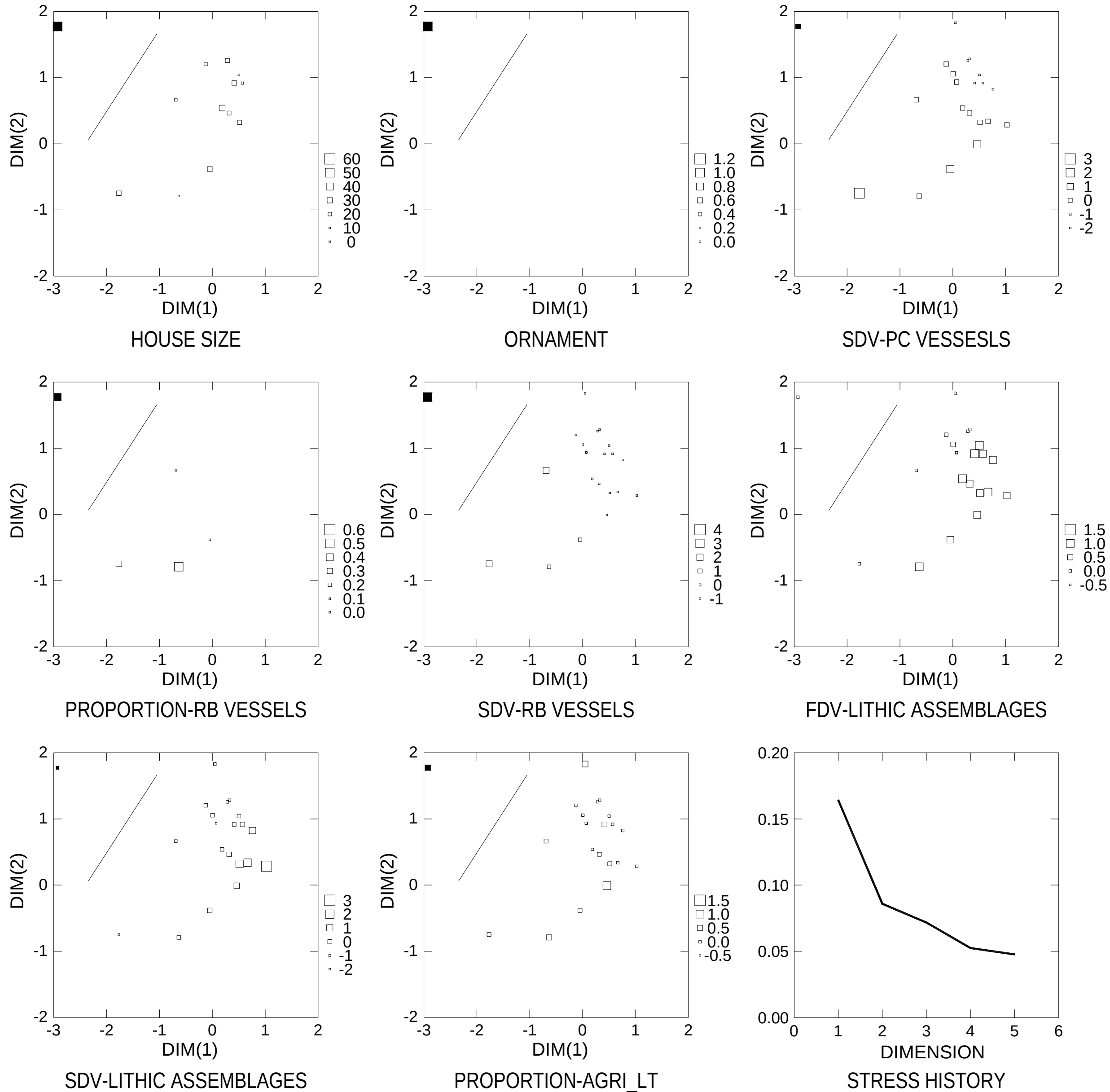

Figure 6.16: MDS Graphs for Rabokri Site (Polity B's Secondary Center)

Individual household wealth as a whole does not distribute evenly or continuously along the continuum mentioned above, as can be seen in the MDS graphs (Figure 6.16). Many households form a loose cluster in the graphs, while a couple of possible elite households, especially a big house at the upper left (black dot), are clearly separated from the cluster and show consistently more wealth than others. The household with the biggest house area shows high values for possession of items relevant to high status and/or valuables, such as ornaments and elaborated vessels, but quite low values in production-relevant items such as functional and stylistic diversity of stone tool assemblages and proportion of agriculture-related tools. In this light, it can be inferred that the possible elite household might not have been involved in direct production.

However, a group of smaller houses that form a strong cluster in the middle right part of the graphs show high values in functional/stylistic diversity of stone tool assemblages and proportion of agriculture-related tools. It thus seems that the majority of households showing similarities in their domestic possessions were involved in direct agricultural production, but intense involvement in agriculture does not seem related to household wealth.

Polity C includes a primary center, two secondary centers and 12 rural villages. Among all constituent communities of Polity C, we have excavation data for only two-the primary center and a rural village. Unfortunately we still do not have excavation data about any secondary center.

6.1.3.2. Rural Villages For the communities designated as rural villages, two excavations provide detailed information on exposed archaeological features and artifacts.

The excavation at the Oseokri site has exposed the whole area of a community classified as a rural village in Polity A and discovered 13 subterranean round and square dwellings, most of which have typical Songgukri-type center pits, and several types of burials that are dated to MBA. All 13 households and their possessions are analyzed here.

All households completely lack the ornamental objects that have been identified without exception in the nucleated zones of the centers. The result of MDS analysis indicates that although moderate distinction in household wealth between big and small houses can be observed, the discontinuity is not as strong as identified in the centers (Figure 6.17). The distinction is more or less consistent in all variables, even functional/stylistic diversity of stone tools, unlike the centers. In this light, it can be suggested that the wealthier, big households might have been involved in more diverse productive activities than poorer, small ones. However, as can be seen the graphs for proportion of agriculture-related tools, those activities are not likely to have been agricultural activities.

The Wonbukri site represents part of a community classified as a rural village in Polity C. This rural village community also includes the quite nearby Jeongjiri site, for which the excavation report is not published yet so that we do not have access to detailed information on discovered features or artifacts. At the Wonbukri site five MBA houses and 15 storage pits of various depths were excavated.

From the MDS graphs, we can see substantial concentration of wealth into one household in the lower left corner (Figure 6.18). As a whole, this pattern represents some similarity to the Oseokri site, a rural village of Polity A. Therefore, it can be inferred that the wealthier, big household might have been involved in more diverse productive activities than poorer, small ones, while those activities are not likely to have been agricultural activities.

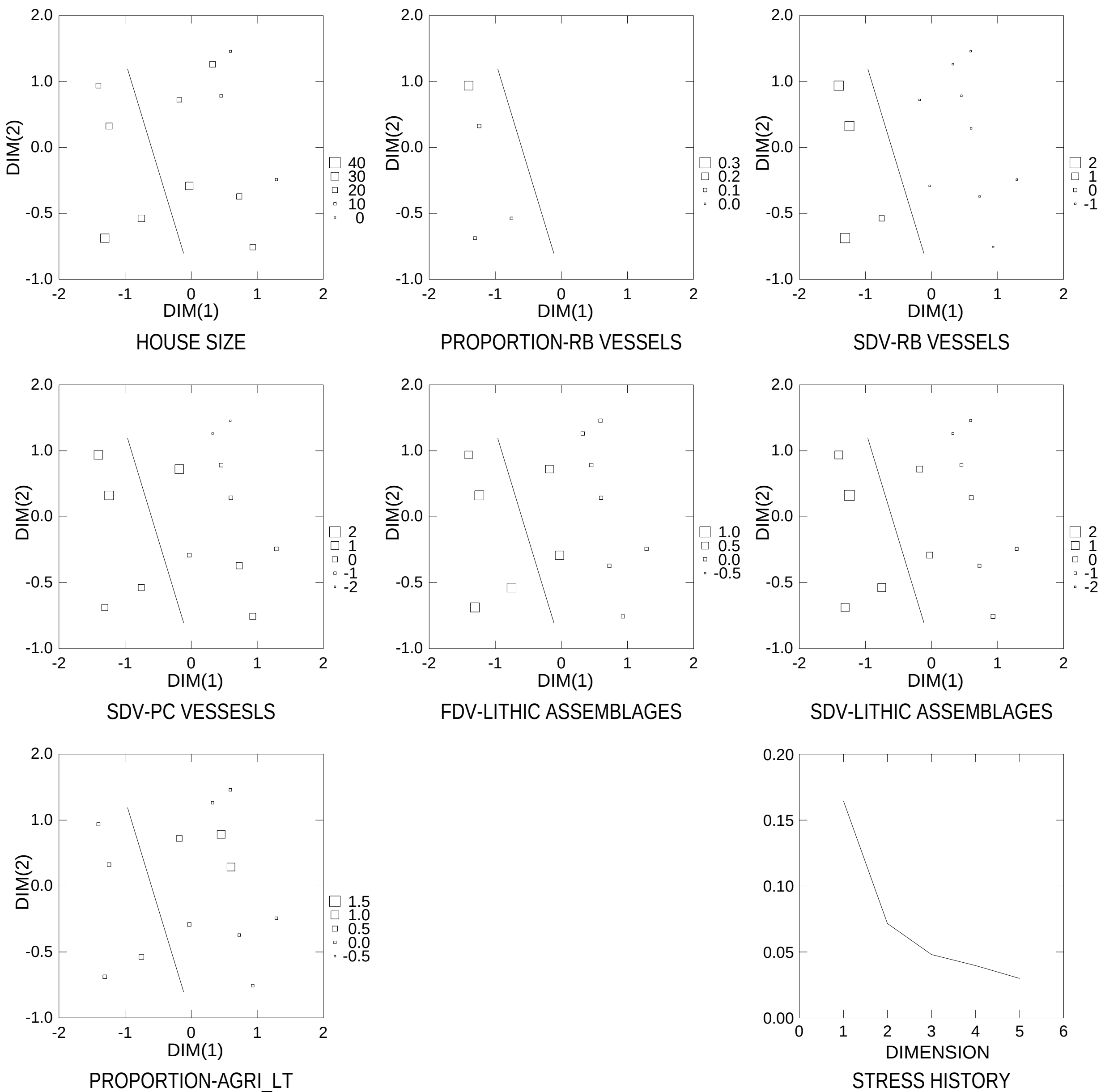

Figure 6.17: MDS Graphs for Oseokri Site (Polity A's Rural Village)

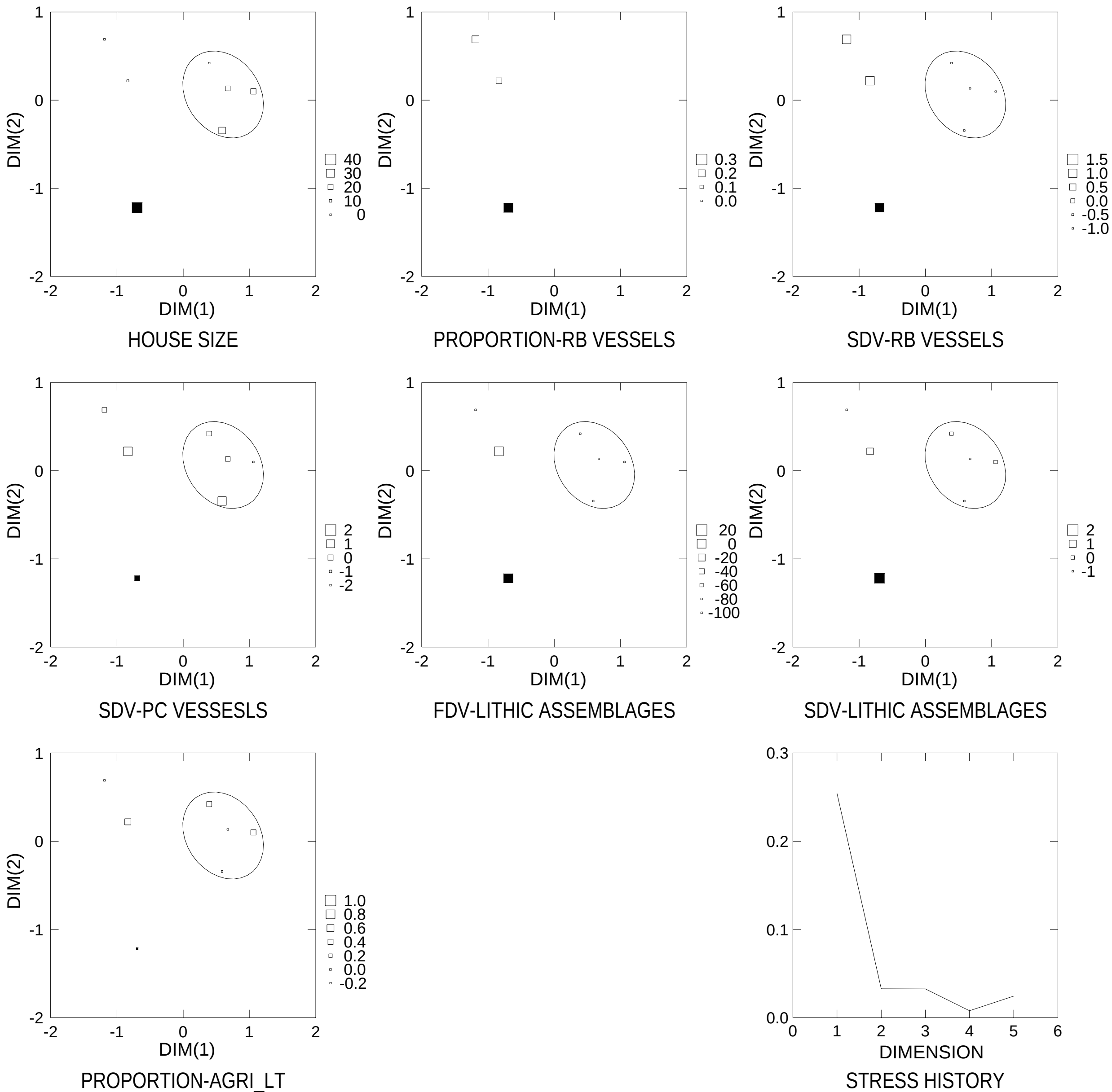

Figure 6.18: MDS Graphs for Wonbukri Site (Polity C's Rural Village)

6.1.4. Intra-community Wealth Variability and Regional Patterns of Rice Production and Distribution

From the analysis of distributional patterns of intra-community wealth, we can reach some conclusions. First, in the centers, regardless of ranking, uneven and/or discontinuous distribution of household wealth and some concentration of wealth into a small number of possible elite households (which mostly have ornamental items) has been observed. However, outside the nucleated zone of centers, we cannot see any clear wealth distinction among constituent households.

Second, even in rural villages there might have been some wealth distinction and wealth concentration among households, but even wealthy households of these rural villages did not possess any ornamental objects.

Third, wealthy households, even in the rural villages, like the possible elite households of the primary and secondary centers, might not have participated in direct agricultural production.

As many archaeological investigations all around the world have long revealed, regional-scale social complexity, even from its initial stage, witnessed wealth/status differentiation within and between constituent communities. In this light, recognizing clearcut economic differentiation and concentration of wealth in all communities is not surprising. In a broad sense, MBA society in central western Korea might have passed the stage in which bigger households with bigger domestic spaces accumulated more wealth to use for self-aggrandizement prior to the emergent complexity (Clarke and Blake 1994).

However, considering that the third set of archaeological implications expected different patterns in household wealth variability according to whether the polity at issue was more bottom-up or top-down (Chapter 2), it is strange that all the centers show such substantial similarity to each other, despite the fact that they belong to polities that represent different degrees of organizational integrity and of compatibility with top-down or bottom-up systems in part or in whole. We might even wonder whether the third pair of archaeological expectations is appropriate for testing these two models.

Nevertheless, a closer look at intra-polity organizational patterns makes another interpretation possible of the patterns revealed by household level analysis. It also provides an opportunity to interrelate the household patterns with the regional-scale ones.

Polity B represents, as a whole, good compatibility with a very bottom-up system, in terms of intercommunity variability in distribution of rice soils, and need for cooperative water management. Especially, a primary center is located for easy accessibility to tribute collection rather than for intensive production of rice. This might have resulted from an elite primarily concerned with mobilization of finished products rather than direct management of wet-rice production.

In contrast to these patterns, the secondary center of Polity B shows substantial compatibility with a top-down system, in regard to the small amount of intra-community wealth variability among the majority of households, but with a small number of households of sharply higher status showing much greater concentration of wealth. This contradiction might be explained by the very high productive potential of the secondary center's area, perhaps exploited in top-down fashion by the local elite. Although this secondary center shows only the third-highest value for area of rice soils, there are three communities classified as rural villages (two of which represent the highest and fourth-highest values) inside a 2.5 km radius (a 30-minute walk) from the secondary center. Moreover, the total area of rice-soils available to be cultivated by these three communities, including the secondary center and other two rural villages of high productivity, amount to 46% of the enitre polity's cultivable land for wet rice. The elite who resided at this secondary center, then, might well have been especially interested in the direct management of wet-rice production, and could well have encouraged producer households to participate in rice-agricultural intensification.

Within a well-integrated polity with a multi-level settlement hierarchy (Chapter 4), the regional elite of the primary centers might have not been deeply involved in agriculture, but relied on the stable extraction of staple finance made possible by the secondary elite's intensive involvement in the direct management of agricultural production, especially of wet rice.

As discussed in Chapter 5, some kinds of information pertaining to production and distribution of wet rice in Polity C, especially the distribution of wet-rice soils where the primary center is located, are compatible with a polity-wide top-down system, unlike the other two polities. This seems to be substantially reflected in the distributional patterns of household wealth, although the possible supreme elite household does not show very consistently the concentration of wealth.

Based on the several kinds of archaeological information used in this study, it was suggested in previous chapters that Polity C's primary center might have become the most powerful center in the entire region. It was the largest of all the primary centers and contained the biggest possible elite household, whose members might have been buried in the bronze dagger tomb that represents a unique example in the research area. Its sociopolitical growth might have been accompanied by remarkable accumulation and display of wealth. For example, as can be seen in Figure 6.19, the Songgukri site's proportion of elaborated vessels is, in statistical terms, substantially higher than that of other sites, each of which corresponds to part of a secondary center or rural village.

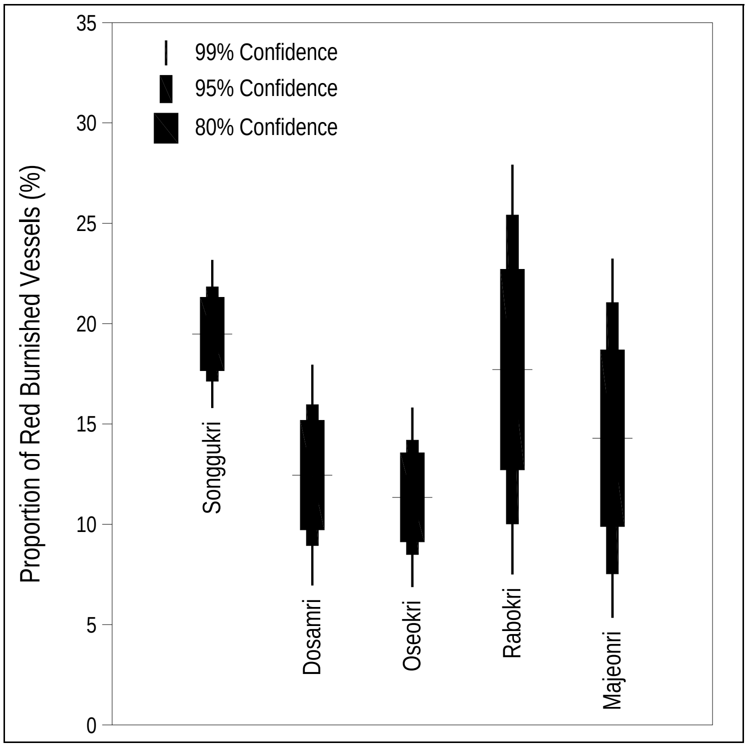

Figure 6.19: Comparison of the Proportion of Elaborate Vessels for 5 Excavated Sites

Among the others, the Rabokri site (Polity B's secondary center) more or less approaches the Songgukri site: strictly, there is little statistical significance to the difference between the sites. As discussed above, Polity B's secondary center represents high productivity of wet-rice, and the residing elite are likely to have been involved in direct management of wet-rice production. The similarity in display of wealth between the two centers could be attributed to the similar patterns of wet-rice production and elite involvement.

The sociopolitical growth and wealth accumulation shown in Polity C's primary center might have been, in some respects, dependent on more rigorous rice-agricultural production through relatively massive labor input. As discussed in chapters IV and V, it represents the biggest area of wet-rice soils, the biggest population size, and quite a low cultivability index. As can be seen in Figure 6.20, it scores the highest in amount of agriculture-related tools and the secondhighest in number of agriculture-related tools. This could reflect biggest population cultivating more intensively a larger amount of arable land than most other communities with less productive potential.

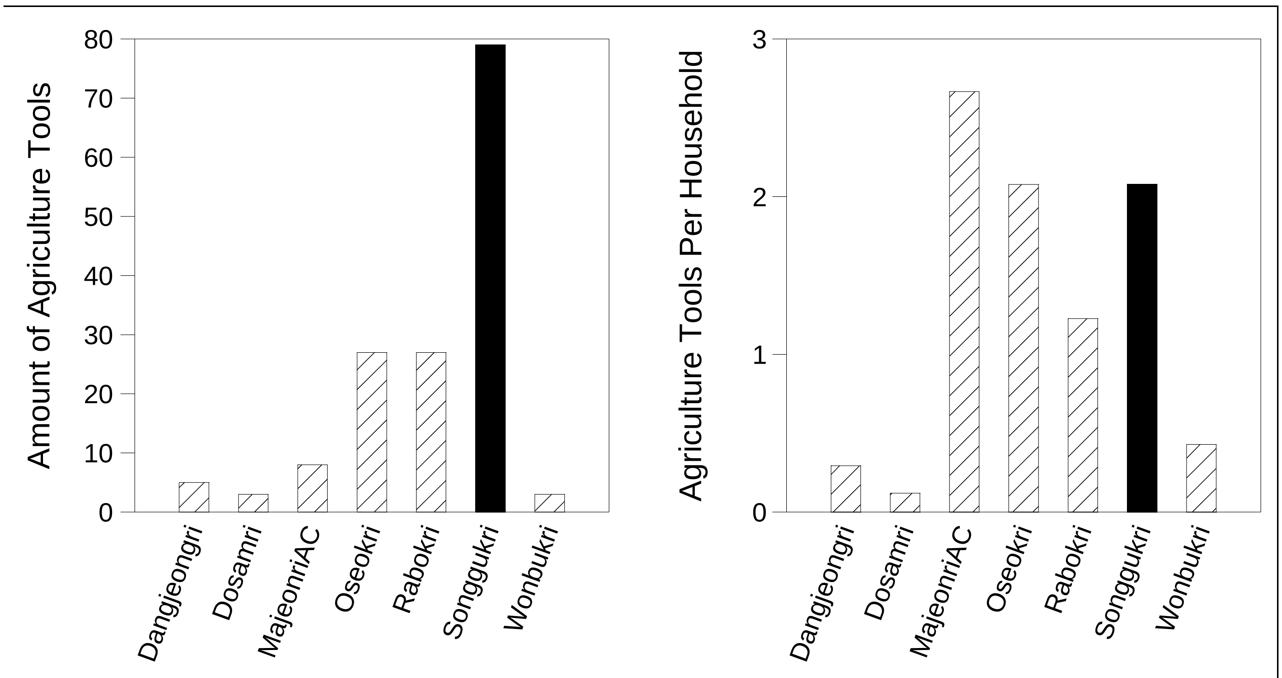

Figure 6.20: Indices of Agriculture-Related Tools for 7 Sites

On the other hand, the intra-community distributional patterns of wealth that are recognized in Polity A's secondary centers, especially at the Dosamri site, are moderately compatible with the expectations of top-down models. The patterns of the Dangjeongri site, corresponding to the marginal zone of the overall community, can also be understood in similar light. However, Polity A's pattern can be better understood in a different way from those of the other two polities that relate to high agricultural productivity. For example, the Dosamri site, as the original report points out, shows a remarkable rarity of lithic artifacts related to cultivating wet rice, and especially a lack of axes and grooved adzes, which have been found at MBA sites in the research area, without exception (Cho E.J. 2004). Even commoner households might not have been involved in agricultural production.

One of the activities in which this community might have been strongly involved is exchange. Like other MBA sites located in the coastal area, the Dosamri site contains scale weights for weighing goods. Despite three decades of investigation, no weights of this sort have been found at other sites in the research area. This might support the inference of involvement in exchange.

6.2. COMMUNAL ACTIVITITY, MORTUARY PRACTICES AND THE PRODUCTION OF WET RICE

6.2.1. Communal Activity: Changes in Labor Investment and Feasting

During the EBA, the most salient communal activity that needs supra-household labor investment might have been building megalithic tombs, or dolmens. As discussed in the previous chapter, building huge dolmens sometimes needs supra-village-scale labor input, but the mobilization of the labor force might not have been based on complex and/or chiefly social organization. Nevertheless, the monumentality of EBA tomb construction is relevant to the discussion of sociopolitical development during the MBA, because it might have been the initial foundation for labor pooling at the supra-village level or of the ideological materialization invested in by elites-to-be during the MBA (Earle 1991; Nelson 1999). Moreover, as a possible mechanism of supra-village-level labor pooling, mortuary rituals and feasting for voluntary participants for building huge dolmens has been suggested (Nelson 1999). However, there is not sufficient information to relate these communal activities with the production of crops.

The transition from EBA to MBA, as some research suggests, witnessed a drastic decrease in monumentality (Park S.B. 1993; Rhee S.N. 1999) and thus decreasing communal labor input for building megalithic tombs. In fact, no MBA tomb of the various types known (Chapter IV; Kim S.O. 2001) represents the degree of monumentality displayed in dolmens. Instead, the focus of social investment of labor might have been shifted to other dimensions, for example, the production of rice.

As discussed above, the centers compatible with a top-down system in regard to the distribution of wet-rice soils and intra-community distributional patterns of wealth show more abundant display of wealth than other communities: for example, in the proportion of red burnished serving vessels (Woo J.Y. 2002; Song M.Y. 1996). These centers also imply commoner households' fuller participation in wet-rice production than other centers or rural villages, judging from their low scores for the index of cultivability and their amounts of agriculture-related tools.

On the other hand, the larger amounts of fine serving vessels can also be interpreted as more frequent feasting (Clark and Blake 1994), besides display of greater wealth. The possible elite households in these centers show a high proportion of red burnished vessels, but a low proportion of agriculture-related stone tools. Possibly the newly emerged elite led commoners to invest their labor in preparing facilities for wet-rice cultivation as well as production of rice itself sometimes through the feasting, as a working parties.

Another possible activity that could require communal labor is the construction of defensive works. As described in the previous chapters, the nucleated zone of Polity C's primary center is surrounded by a palisade. Individual postholes of the palisade are 74-126 cm in diameter and 50-80 cm of remaining depth. Although the remaining total length of the palisade reaches 375 m, it might have been as long as about 1.5 km to enclose the area of 5 ha or so, if the whole nucleated zone was surrounded by the palisade. Based on this estimate a substantial amount of labor would have been needed.

Building defensive works, such as deep moats beside palisades has been observed repeatedly at big MBA settlements all around South Korea. Besides the increase of communal labor for constructing defensive works, some research envisions competition between communities over arable land, which ultimately might have ignited warfare or raids. This is sometimes seen as the prevailing sociopolitical atmosphere, based on the discovery of houses that were suddenly destroyed by fire. However, examples of this sort of evidence are extremely rare and, like defensive works, have not been identified in most communities designated as rural village or even secondary centers. If there was frequent inter-community warfare, it likely was between primary center-like communities, as in the Hawaiian case (Earle 1991).

6.2.2. Mortuary Practices and Reality in the Domestic Agenda

As discussed in Chapter 4, MBA cemeteries located in the vicinity of residential areas include several types of burials at the same time. Since the bronze dagger tomb was discovered at the Songgukri site in the 1970s, the MBA burials have gotten some attention from the archaeologists who work on the Korean Bronze Age. However, the systemic synthesis of individual cases looking at the intercommunity and/or intra-community socioeconomic differentiation has not been attempted until quite recently.

Observing substantial differences between the EBA dolmens and the MBA burials, in regard to location, distributional patterns within a single cemetery, and interment patterns of burial goods, Kim S.O. (2000) proposes to designate the burials-stone slab tombs, stepped pit tombs with stone covers, and urns (Figure 4.00)-found at the 36 cemeteries in the Geum River basin that is focal in this research, as Songgukri-type burials. From these Songgukri-type cemeteries, he sees some explicit inter-community differentiation and relatively implicit intra-community differentiation. Despite weak internal status variability, he also finds relatively strong distinctions according to the sex and age of the individuals buried.

His analysis and conclusions, in broad perspective, make sense and I find substantial compatibility with this study. As the analysis of domestic objects above indicates, the majority of households might have been quite similar in their degree of wealth or status, and we have seen substantial inter-community variability in wealth accumulation according to rice agricultural productivity.

In some respects, however he does not take full note of the fact that there is often one or a few tombs within a specific cemetery, for example at the Songgukri site, which show much greater concentration of wealth and/or high-status items than the majority of the others. This pattern is not consistent with the well-integrated three- or four-tiered status systems that have been frequently observed in highly-developed complex societies. It is, however, consistent with a domestic agenda involving substantial concentration of wealth and/or status into a single sector of society, the newly aggrandizing elite households.

In comparison to the mortuary practices of the preceding EBA, the MBA in the research area shows a substantial increase in interpersonal variation in the interment of burial goods－especially we can find substantial increases of prestige goods such as bronze dagger, well-shaped stone daggers and arrow heads and tubular jade in elite tombs (Kim S.O. 2000)－ along with a drastic decrease of construction labor investment. As discussed in the previous chapter, the dolmens have remarkably small amounts of burial goods, regardless of the capstone size, which is proportional to the amount of labor input required. Changes in mortuary practice from EBA to MBA can be summarized as an increase of interpersonal variability or prestige-related expression and a decrease of communal labor in building tombs and in egalitarian ethos, expressed as relatively consistent rarity of burial goods. This contrast may have been overemphasized but the differences seem compatible with the ones between group-oriented and individualized societies (Renfrew 1974). Along lines similar to those suggested for early complex societies other world regions, the change from EBA to MBA in central western Koran can be seen as a shift from a more group-oriented to a more individualizing one.

In the previous part of this chapter, I discussed household wealth/status variability based on the results of MDS analysis, focusing on the distributional patterns of wealth. Some aspects of the patterns can be positively related to the regional-scale observations from the previous chapters. Especially, some centers compatible with a top-down system in regard to regional patterns of soil productivity also show substantial concentration of wealth in further support of top-down models. However, as discussed in Chapter V, most communities, especially centers, represent remarkable compatibility with bottom-up systems.

As a whole, a prevalent pattern might have been a mixture of both bottom-up and top-down strategies in complementary manner, taking the form of opportunistic leadership in tribute collection and restricted management of irrigation and paddy field cultivation at centers, especially combined with moderate wealth variability among non-elite households even at rural villages.

7. CONCLUSIONS: MBA POLITICAL ECONOMCY AND RICE AGRICULTURAL INTENSIFICATION

As indicated in all previous chapters, this research sought to understand the characteristics of the regional and local political economy utilizing intensive forms of rice agricultural technology during the Middle Bronze Age (800-400 B.C.E.) in the central western Korean Peninsula.

One of its main concerns was in reconstructing the way in which the MBA regional settlement system was organized in relation to production and distribution of wet rice. Evaluating the relationship required methods for recognizing the spatial correlations between the hierarchical aspects of the regional settlement system and two dimensions of rice economics, production and distribution. In order to reconstruct the patterns of production and distribution of rice, this study focused on the richness of resources for rice agriculture that is converted into productive potential, on the necessity of cooperation, and on the accessibility of centers to tribute collection. Each of these has been reconstructed on the basis of different lines of evidence, including the distribution of the soils most suitable for wet-rice cultivation, the development and distribution of water resources to be managed for irrigation, drainage, and flood control, and the accessibility of centers to important junctions on the ancient transportation routes. The patterns revealed by the regional-scale analysis of these lines of evidence have then been compared with and interpreted in relation to the household socioeconomic patterns of individual communities whose roles in the regional settlement system are known.

All the information has been used to place MBA and its intensification of rice agriculture in the sociopolitical continuum between top-down and bottom-up systems, respectively. The top-down models assume suprahousehold-level organization and management of labor-pooling to utilize intensive agricultural technology, while bottom-up ones emphasize the individual households' and/or small kin-based groups' role in the initiation and maintenance of intensive agricultural system.

7.1. SOCIOPOLITICAL ORGANIZATION WITH VARYING INTEGRATION

The first step in evaluating the spatial correlations among the separate but probably interrelated kinds of information was defining the analytical unit. Like other regional settlement studies, this research defines a local community as an analytical unit, finding it conceptually and operationally useful in the investigation of intra-regional patterns of utilizing intensive technology in wet-rice cultivation, and the distribution of the final products. In actual analysis, this study suggests 50 possible local communities in the research area, which were included in three possible independent polities (Chapter 4).

Each polity represents a different organizational pattern. Two of the three polities contain three-tiered settlement hierarchies, consisting of primary centers, secondary centers and rural villages. These two polities also represent well-integrated regional settlement systems, whereas the third one shows less regional-level centralization or integration, and the coexistence of four competing and/or independent secondary centers (Chapter 4).

7.2. INTER-COMMUNITY VARIATION IN PRODUCTION AND DISTRIBUTION OF RICE

Along to the underlying structure contrasting the top-down and bottom-up models, in which elites and non-elites are expected to have played roles differently in shaping the chiefly socioeconomic system utilizing the intensive technology of rice production, I arranged three pairs of archaeological expectations (Chapter II). The first two pairs had to do with the way in which differing levels of sociopolitical organization, especially at the polity and community levels, organize themselves in utilizing the intensive technology of wet-rice production and in mobilizing the outcomes. This aspect of the expectations was assessed with regional approaches focusing on inter-polity and inter-community-level variation in the distribution of soils most suitable for wet-rice cultiivation, and on the need for management or communal labor in the development irrigation systems making paddy cultivation possible.

All lines of evidence were not always compatitible with either system. As a whole, more kinds of data indicate a bottom-up system, especially in all three dimensions of water management. All communities, regardless to rank, are likely to have been free from the risk of flooding, and from the necessity of major drainage works. Even irrigation seems not to have needed substantial supra-household cooperation, since small streams were usually available as water sources, and higher-ranking communities show no association with utilization of larger streams (Chapter 5). As many studies critical of the original hydraulic hypothesis have pointed out, intensive agricultural technology was not always supported by huge-scale irrigation systems requiring massive short-term input of labor.

Lack of a large-scale paddy-plot strategy in the MBA in central western Korea, is also compatible with the absence of a centralized, top-down system in which the administrative authority mobilizes and organizes a labor force to build agricultural facilities.

On the other side, the distribution of wet-rice soils varies substantially through the communities, and some centers are located in especially highly productive areas, compatible with a top-down system. The patterns of Polity C's primary center and Polity B's secondary center were especially clear examples. These centers by themselves and in combination with adjacent rural villages include large amounts of wet-rice land, and represent low indexes of cultivability.

At the polity level, the relationship between soil productivity and centers' easy accessibility to tribute collection show quite consistent patterns in regards to the first pair of archaeological expectations. Polity B's primary center, located in land of quite low productivity for wet-rice, for example, is very well located for tribute collection, while Polity C's primary center, with the highest productivity among all communities, does not have easy access to important junctions of transportation routes. In Polity B, centralized, top-down strategies may be operating at level of the secondary, rather than the primary, center.

Some research (Delgado-Espinoza 2002) has argued that, lacking powerful means of coercion, the only way for an emergent elite to insure the production needed to finance newly established sociopolitical institutions might have been direct management of agricultural production. For this reason, it is not hard to understand the appearance of some elements of top-down systems in the MBA. However, such direct management of agricultural production seems not to involve need for large-scale irrigation to cultivate land along the risky, big rivers.

7.3. INTRA-COMMUNITY WEALTH VARIBILITY AND COMMUNALITY IN MBA CENTRAL WESTERN KOREA

Since exploring regional patterns in producing and distributing wet rice concerns inter-community variation in shaping the sociopolitical organization of intensive forms of rice-farming, looking at wealth variability at the level of the household helps evaluate how regional agricultural intensification was reflected in intra-community socioeconomic patterns and vice versa.

From a household perspective, we have seen a prevalent tendency toward discontinuous patterns of intra-community wealth distribution, at communities of all ranks. That is, substantial concentration of wealth in the hands of small numbers of elite or wealthy households and modest wealth differences between commoners was identified at all ranks of communities, primary centers, secondary centers, and even rural villages. These patterns as a whole do not exactly support top-down systems, where wealth should concentrate in small numbers of elite households at centers, especially primary centers, while commoner households always have much poorer possession, Nor do they exactly fulfill the expectations of bottom-up systems in which there should be more continuous wealth distribution through all the households.

Rather, elements of both patterns, top-down and bottom-up, seem to be present. The concentration of wealth or status into small numbers of households has been identified at most communities, even rural villages. However, even in rural villages, the wealthier households' wealth seems not to have been generated as a function of intensity of participating in agricultural production (Chapter 6). The poorer commoner households that form the majority shows similarity in wealth possession and might have more rigorously participated in actual wet-rice production.

Intercommunity wealth differentiation largely goes along with total productive potential. The centers with large amounts of productive land drained by well-developed small channel systems show a larger amount of wealth indicators than any other communities.

7.4. TOP-DOWN OR BOTTOM-UP?

After evaluating inter-community variation in productive potential, patterns of water management, and accessibility to tribute collection, and intra-community distributional patterns of wealth, this study came to some conclusions. There seems to have been a mixture of two strategies, top-down and bottom-up, rather than consistent dominance of one system. However, that does not mean all three polities' patterns were similarly just in the middle of the continuum. Rather, individual polities, each of which represents a different degree of integration, indicate different forms of compatibility with the two kinds of system.

Polities B and C are located in quite similar environmental settings, but their organization shows quite different patterns of political economy related to the production and distribution of wet-rice. Rather than simply positioning them in the continuum between extreme top-down and bottom-up systems, we can make such a reconstruction more dynamic by emphasizing the possible strategies pursued by different social actors, especially elites who are likely to get more benefit from an intensive agricultural system.

7.5. MBA POLITICAL ECONOMY AND LEADERSHIP STRATEGY: BEYOND THE DICOTOMY

Recently, Janusek and Kolata (2004), conclude that the dichotomized interpretations of past organization of intensive farming, which have been labeled top-down and bottom-up, have been overdrawn. They evaluate the relationship between the long-term trajectory of sociopolitical change and local communities' utilization of raised field technology. According to their analysis, intensification and finally return to more extensive cultivation in the Lake Titicaca Basin of the Andean altiplano in Bolivia were keyed to the consolidation and decline of the Tiwanaku state.

Their work makes clearer what this study tries to say. First of all, our real subject is political economy-the production and mobilization of the resources that supported the activities of an overarching politico-economic institution or an emergent elite-rather than the subsistence economy in which individual households' nutritional needs are primarily satisfied. Thus, small local communities or kin-based groups might have been forced to respond to the demands of a system beyond their minimum nutritional needs. The real question concerns not the intensification itself, but rather, how it is related to the development of sociopolitical complexity or regional-scale political economy.

Second, the extremes of the two models are too oversimplified to describe a real system and therefore, as mentioned at the beginning of this study, can be conceived as the ends of a continuum along which a particular society can be positioned. Nevertheless, various natural and cultural factors might have influenced the formation of specific trajectories' sociopolitical organization of agricultural intensification in different ways. As in MBA society in central western Korea, even adjacent areas could have been organized in substantially different ways.

Third, intensification itself is not likely to depend on totally new technology or the introduction of novel cultigens. Rather, it focuses on a specific part of a systems that is intensifiable or useful for mobilizing resources in the context of a range of technologies or cultigens that were traditional and familiar to all producer households. In fact, there were several alternative cultigens during the MBA, but rice has been more seriously intensified than the others, since the Bronze Age (Lee G.A. 2003). Determining which cultigens would be intensified, and even initiating the intensification itself, might have depended on how different social actors involved in the process pursued their own interests. Nevertheless, in the case of MBA, the active role of the elite must be emphasized. Since this study has found little real need in the research area to develop the large rivers as irrigation sources, the especially intensive rice cultivation carried out around the high-ranking communities cannot be explained in mangerial terms as a benefit to the majority of the residents. The aggregation of population into large central communities thus might not have involved the necessity of cooperative production of wet rice for subsistence. Without need of cooperation, the producer households involved in intensive agricultural production would presumably have preferred to distribute their residence across the landscape in a dispersed manner, facilitating more intensive and frequent care of crops as well as avoiding unnecessary competition over lands (Drennan 1988).

At the outset, this paper challenged an adaptationalist model (Brumfiel and Earle 1987; Billman 1996) favored by some Korean Bronze Age archaeologists in which simultaneously and spontaneously MBA households intensified rice agriculture resulting in the emergence of (more or less voluntary and unselfish) managerial leadership (Kim J.S. 2004; NMK 2000). The analyses presented here finally conclude that the emergence of elites during the MBA in central western Korea cannot be explained by the models of this sort, in which managerial leadership develops to solve pending social problems such as population pressure, need for irrigation, long-distance exchange, and so on. Rather, it is more plausible that the newly emerging elites aggregated populations that ultimately were persuaded and/or forced to participate in wet-rice production. This would be a strategy of elites' pursuing their own benefit in ways that also ordinarily met the commoners' nutritional needs.

The centers mostly represent low indexes of cultivability, and their constituent producer households witnessed fuller involvement in wet-rice farming, while the areas of most rural villages must have remained underexploited, as a low cultivability index shows. For elites in the centers, the bigger labor pool than in rural villages provided a bigger source for financing newly emerged institutions. This is consistent with Drennan's observation that the scarce resource for surplus mobilization seems not to have been land, but instead labor (Drennan 1987b, 1995a).

If so, how could the elite induce the majority of social actors-commoners and at the same time the producer households-to aggregate and participate in intensive production of rice? Feasting could be an answer. In fact, the centers representing vigorous production of wet rice possessed significantly larger amounts and higher proportions of elaborate serving vessels than rural villages or even the centers where less intensification of rice cultivation is in evidence.

Feasting activities that took place at the centers would take the form of work parties that Dietler (2001) recognizes as part of strategies for obtaining labor. Even though the construction and maintenance of rice-agricultural facilitiies sustaining higher productivity might not have needed communal labor in the MBA in central western Korea, as discussed in previous chapters, the rigorous participation of commoner households in the intensive production of wet rice might have been encouraged by and compensated by feasting in a context without coercion. In addition, the investments in agricultural facilities, that were by encourageed and manipulated by elites, contributed to the well-being of the community, even though the greatest benefits would accrue to the newly emerged elite.

7.6. FUTURE RESEARCH

I have sketched the dynamics of the sociopolitical organization of intensive rice production in the MBA of central western Korea. Although approaches of this kind to the development of Bronze Age political economy have rarely been attempted, the conclusions reached by this research are by no means the only plausible interpretation. New data could, of course, substantially change our view. In this light, the conclusions of this work are not the final word, but the beginning of inquiry focused directly on the many social phenomena of the area. Further inquiry requires a research program that, among other things, should include the following:

First of all, we need to incoporate into the analysis the settlement data from a larger zone around the researh area, especially at its western end, so that we can reconstruct more securely the regional settlement system in the area including Polity A. This could be accomplished by a larger-scale survey project than this study's.

Additional survey needs to be complemented, as well, by additional excavation, especially at Polity B's primary center and Polity C's secondary centers, so as to explain more dynamically interpolity differences in regional patterns.

With a series of detailed analyses focused on the range of specific activities that took place at the differing level of social organiztion, we can be better prepared to reconstruct specific events such as feasting, redistribution circuits, competition, etc. With more systematic archaeobotanical analysis, for example, of inter-household variation in consumption of wet rice, even simply questioning whether drastic concentration for the purpose of preparing feasting foods (beaverages, rice cakes etc. [Nelson 1999]) occurred in elite households, we could reach more dynamic conclusions about such activities. Analyses of that sort also would provide information on how sociopolitical inequality was related to the unequal consumption of staple and sometimes luxury crops.

If more detaliled and varied analyses of burials are added to this study, we can more plausibly interpret the variation between communities and polities in intra-community organization and investigate the relationship between mortuary practices and the remains of residences and activities.

Finally, such research needs to be expanded diachnonically onwards, so that we can more dynamically explain why and how even more complex social organization developed following the MBA, including more individualizing morturary practices and then state-level societies in the whole region of the central and southern Korean Peninsula.

Recently many archaeologists appear to be interested in the processes by which the regional political economy emerged and developed in the central and southern Korean Peninsula. Nevertheless, it is rare in Korean archaeology so far, to find approaches to early complexity that systematically explore regional settlement patterns, analyze the spatial correlations among socioeconomic dimensions based on analytical units systematically defined in human social terms, use GIS techniques, and, most importantly, synthesize analyses at different levels of sociopolitical integration in the framework of regional studies. In this light, I hope this study will contribute to better understanding of the development of regional political economy and complex sociopolitical organization in central western Korea.

APPENDIX A

Glossary

Bidangri (site)	碑堂里(遺蹟)
bo	洑
Buyeo County	夫餘郡
Chulmun	櫛文
—— Period	櫛文土器時代 (or 新石器時代)
—— pottery	櫛文土器 (or 빗살무늬토기): comb-patterned pottery
Chungnam Province	忠淸南道
Daedongyeojido	大東輿地圖
Dangjeongri (site)	堂丁里(遺蹟)
dansaseon	短斜線: incised short slanted lines
dolmen	支石墓 (or 고인돌)
Dosamri (site)	道三里(遺蹟)
Gajeungri (site)	가증리(遺蹟)
Garakdong	可樂洞
—— site	—— 遺蹟
—— style	—— 類型
gongyeol	孔列: line of perforated holes
Gubongri (site)	九鳳里(遺蹟)
Gusungakmok	口脣刻目: notches on the edge of the rim
Hanseongri (site)	漢城里(遺蹟)

Hapjeongri (site)	合井里(遺蹟)
Heunamri	欣岩里
—— site	—— 遺蹟
—— style	—— 類型
iejoongguyoun	二重口緣: doubled rim with clay strip
jeomtodaetogi	粘土帶土器: rolled rim pottery
Jeongjiri (site)	定止里 (遺蹟)
Jeoseokri (site)	楮石里 (遺蹟)
Jungjeongri (site)	중정리 (遺蹟)
Majeonri (site)	麻田里 (遺蹟)
Mumun	無文 (or 無紋)
—— Period	無文土器時代 (or 靑銅器時代)
—— pottery	無文土器 (or 민무늬토기): plain-coarsepottery
Nonsan City	論山市
Oseokri (site)	烏石里 (遺蹟)
Pal Do	八道: Eight Province
Rabokri (site)	羅福里 (遺蹟)
Seocheon County	舒川郡
Songgukri	松菊里
—— site	—— 遺蹟
—— type	—— 類型
Wonbukri (site)	院北里 (遺蹟)
Yeojidoseo	輿地圖書
Yeoksamdong	驛三洞
—— site	—— 遺蹟
—— style	—— 類型

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