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Early Iron Age Community Organization in Southern Africa: Social and Symbolic Dimensions of Ceramic Production, Use, and Discard at Ndondondwane

by

Kent Douglas Fowler ©

A thesis submitted to the Faculty of Graduate Studies and Research in partial fulfillment of the requirements for the degree of Doctor of Philosophy

Department of Anthropology

Edmonton, Alberta

Fall 2002

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For
Karen and Erika

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ABSTRACT

This dissertation investigates the organization and use of space in settlements to better understand the social and symbolic dimensions of community organization during the Early Iron Age (AD 250-1100) in southeastern Africa. Existing models of Early Iron Age farming societies propose very different and often contradictory views of community lifeways. Proponents of one model suggest that communities were organized at the household or co-resident extended family level, the Domestic Mode of Production, and have argued for a non-hierarchical socio-political system grounded in an egalitarian sphere of agricultural and craft production. An alternative model known as the Central Cattle Pattern proposes that the principles used to regulate society may also be expressed in the organization of space. It is argued that similarities in the layout of Early Iron Age, Late Iron Age (AD 1100-1820s) and historically recent settlements indicate that similar beliefs about hereditary leadership, kinship, marriage and the ancestors also governed the organization and use of space.

These contradictory interpretations begin from different premises and scales of analysis. Yet, support for either model must be based on a substantive body of mid-range generalizations that link the dynamics of daily practices to broader patterns of cultural norms values and beliefs. In this dissertation, the claims made about community organization are investigated through a study of the practices involved in making, using and discarding ceramic objects at the ninth century AD village of Ndondondwane in eastern South Africa.

This analysis supports only certain aspects of the models. Neither model is completely refuted or validated. It was not always possible to establish or link

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predictable mid-range generalizations to the high-level interpretive models using this approach and data set. These results call for similar analyses of other Iron Age ceramic data and the use of ethnoarchaeological research designed to strengthen interpretations of the relationships between ceramic practice and the use of space. The results also question the ability of archaeologists to pursue further research into the dynamic interplay between everyday life and broader cultural norms and values that characterize EIA society by framing archaeological questions only in terms of these models.

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ACKNOWLEDGEMENTS

In this thesis, I have examined the lifecycle of ceramics artifacts commonly found at early farming settlements in southeaster Africa as a window into the way people lived their daily lives. All artifact lifecycles are composed of a series of steps and stages that bring raw materials to usable cultural objects through to their eventual entry into the archaeological record. During the course of this lifecycle, a host of people and circumstances influence those who make and use the objects. Researching and writing a dissertation is not unlike the production of any kind of material culture, and that process is influenced by a great number of people. Whether that influence is great or small does not matter. The finished product and how it is perceived and used is a testament to the complicated web of people and events surrounding its making.

My complicated web begins and ends at home with the two people to whom this thesis is dedicated. My wife Karen and my daughter Erika are the reasons this work began and ended in its present form, and will continue into the future. Over the past twelve years, my family has been convinced or at least convinced me that what I do is interesting, and my parents, Doug and Buella, and my sister Aujah are to be commended and deeply thanked for helping to push me through the thick and thin of this long road. It is quite ridiculous to say this could not have been accomplished without my kin, but I say it anyway.

The research presented here took form out of the diverse interests and expertise of my committee, my extended web, each of whom brought a firm belief that a dissertation could be built around what would otherwise have been a lengthy and largely atheoretical ceramic report. I am indebted to Andrzej Weber, David Lubell, Pamela Willoughby, Nic David, Frank Kense and Ann McDougall, for their patience and guidance pushed me to think in new ways about data, methods, theory and the people whose lives this dissertation attempts to comprehend.

The directors of the Ndondondwane excavations, Haskel Greenfield, Len van Schalkwyk, and Tina Jongsma, have graciously provided me with free access to the records of their excavations, have stimulated my thinking about early farming communities in southern Africa, and have offered continuous encouragement and

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CHAPTER 1

INTRODUCTION

To understand the past we must understand places.

Lewis Binford (1980: 6)

This dissertation investigates community organization in early southern African farming societies through a study of the organization of activities in settlements. Researchers in many disciplines agree that the organization and use of space is a primary means through which society is constituted, understood and reproduced by its members (e.g., Bourdieu 1973, 1977; Chang 1958; Clarke 1977; Giddens 1984; Hillier and Hanson 1984; Hodder 1978; Kent 1990; Lévi-Strauss 1963; Rapoport 1990; Renfrew 1977; Ucko *et al.* 1972; Wantanabe 1986). Dwellings and other areas in human settlements act as dynamic physical nodes where social relations and symbolic cues are played out in everyday life. It is in these places were meals were taken, tools were made and repaired, wars planned, alliances negotiated, marriages contemplated, and new generations conceived and born. Whether in a Natufian house in southwest Asia (Belfer-Cohen 1991; Byrd 1994; Flannery 1972), a *Linienbandkeramik* homestead in western Europe (Farruggia *et al.* 1973; Kuper *et al.* 1977) or an early Mesoamerican village (Flannery 1976), these interactions structure everyday social life and reinforce cultural values.

For over half a century, archaeologists working in southwest Asia, Europe, and the Americas have collected a broad spectrum of archaeological evidence at household, community and regional scales to infer the economic, social and symbolic aspects of past farming societies (e.g., Belfer-Cohen 1991; Byrd 1994; Cauvin 1994; Champion *et al.* 1984; Flannery 1976; Hodder 1990; Kroll and Price 1991; Kuijt 1996, 2000; Moore 1985; Renfrew 1972). During the same time, the literature on the origins and spread of agriculture in sub-Saharan Africa has increased substantially (e.g. Shaw *et al.* 1993a). However, there are few detailed studies of the internal organization of early farming communities in eastern and southern Africa. This issue is of central concern to Africanist scholars because there is a consensus that social transformations in early agropastoral

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(mixed-farming) societies were instrumental in shaping the later prehistory and history of sub-Saharan Africa (Ehret 1998; Hall 1990; Clark 1970; Connah 1987; McIntosh 1999a; Phillipson 1993; Shaw *et al.* 1993a). More detailed studies of life at household and community scales would greatly increase our understanding of the immediate social, economic and symbolic contexts of these transformations.

Lack of evidence for the function and physical relationships between features and activity areas in early African farming settlements is the primary reason for this problem. While numerous sites have yielded clear evidence for grain storage pits, livestock enclosures, remnants of domestic architecture, and traces of house floors, the internal arrangement of houses or settlements are rarely apparent. The paucity of structural remains and studies of their spatial arrangement may be due to the use of perishable building materials, the conditions prevailing on sites, or a lack of extensive sampling and retrieval programs (e.g., Eggert 1993; MacLean 1994/95, 1996; Reid 1994/95; Schmidt and Childs 1985; Van Noten 1979: 69).[1] Whatever the reason, the available information on the spatial distribution of artifacts and features within settlements is minimal and analyses of intra-settlement spatial and activity organization are rare. Without these data, archaeologists are denied valuable insights into the social and symbolic dimensions of life in early African farming communities and why they changed.

While the kinds of evidence most desired by archaeologists interested in community organization may not normally be recoverable from sites in certain parts of the African subcontinent, this does not mean they can ignore the problem of "missing" settlements. Instead, alternative techniques and analytical frameworks for making inferences about the internal spatial and social organization of early farming societies need to be utilized. For example, multiple surface and subsurface reconnaissance techniques may be implemented in the field, and research designs may benefit from the application of analytical methods to both new and old data that are guided by anthropological theory. For instance, it may be impractical in a sub-Saharan African

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[1] Funding, student training, and unstable political conditions (see papers in Robertshaw 1990), as well as the theoretical underpinnings of research agendas (Stahl 1999) are also factors that have seriously affected the quantity and quality of research in some regions of the African subcontinent. However, I restrict my comments here to the most significant field research and preservation conditions that have affected the current state of the archaeological record.

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context to develop approaches entirely dependant upon the spatial arrangement of the built environment to ground archaeological inferences about site-wide activity patterns. In addition, it is incumbent upon archaeologists working at sites with exceptional preservation to institute major research programs targeting various aspects of early settlement organization.

With these challenges set, archaeological research on early African community organization must take a direction that seeks to understand more fully cultural lifeways at smaller spatial scales. The intention of this dissertation is to begin developing the analytical and interpretive tools needed to meet these challenges and to assess their implications for advancing the present understanding of early agropastoral societies in sub-equatorial regions of Africa. I approach this issue by investigating the social and symbolic dimensions of activities in an early farming settlement of the first millennium AD located in southeastern Africa.

There are several reasons why I have chosen to focus upon the most historically recent farming communities in sub-Saharan Africa. Foremost is that agropastoral settlements in the eastern lowlands and transitional foothills south of the Zambezi River have yielded better preserved artifactual and botanical remains (Denbow 1990; Hall 1990; Huffman 1982, 1986a,b, 1989, 1990, 1993; Lane 1994/95, 1998; Lindahl and Matenga 1995; MacLean 1996; Maggs 1980a, 1984b, 1994/95; Maggs and Whitelaw 1991; Reid and Young 2000). Thus, the comparative database is larger and of better quality than many other subequatorial regions. Also of potential benefit to archaeological research is the short time-span between the introduction of agriculture and the historical record in this region. While complicated in their use, the accounts of early traders and travelers, oral tradition, and ethnographic fieldwork can provide valuable resources with which to develop archaeological research questions about early agropastoral societies in the region. Further, the early farming communities in southern Africa are descended from pioneer farming groups who migrated southwards from the western and eastern reaches of sub-equatorial Africa (Denbow 1990; Ehret 1998; Huffman 1989; Maggs 1980a, 1984b; Phillipson 1977, 1993). On these grounds, case material from southern Africa offers a valuable starting point for developing and testing models, methodologies, and analytical techniques that will not only serve to increase our understanding of

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settlement and society in southern Africa, but that may also be applicable to earlier dated settlements further north.

Previous research has produced two models about the organization of early farming communities in southern Africa. The models focus on two important issues for understanding the organization and development of early farming societies: the role of economic specialization in emerging socio-political complexity (Hall 1987, 1990) and how ideology and political economy are materialized—given form and substance—through ritual, the manufacture of symbolic objects, the organization of settlement space, and construction of the built environment (Huffman 1982, 1986a,b, 1990, 1993, 2000). These models continue to structure debate about the nature and extent of change in early southern African farming societies because they propose contradictory organizing principles. Archaeologists maintain that many issues raised by these models remain unresolved because neither interpretive framework appears to account for all of the events, processes, and changes that took place since farmers came to this region 2000 years ago (e.g., Denbow 1999; Hall 1998; Lane 1994/95, 1998; Reid and Segobye 2000; Segobye 1998; van Schalkwyk 1994/95).

It is my contention that a more detailed study of the organization of activities in early agropastoral settlements will serve to clarify certain contradictory aspects of these models. In the process, I hope to generate a methodological framework that may make testing these and similar models developed for other regions of the subcontinent more amenable for archaeologists working in areas that suffer from poorer preservation conditions or less extensive sampling and retrieval programs.

Charles (1992: 905) has observed that the problem of reconciling competing or alternative views of the past has been addressed in three ways: (1) by seeking out the "best explanation" using reconstructions, interpretations and explanations of small scenarios that are then woven together into larger-scale documentaries of the past, (2) by developing grand theories to reveal the prehistory of a site or region, or (3) by "testing" theories in particular contexts to examine their validity and general utility. In this thesis, I amalgamate these approaches, and evaluate whether the organizing principles proposed by current models of community organization best explain patterns of activity organization within an early agropastoral settlement. To accomplish this objective, I develop a methodology aimed at modeling the practices involved in the

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production, use and discard of ceramic objects in an early farming settlement to reconstruct patterns of activity organization. Ceramics are useful for such an analysis because they are durable, abundant and tend to be used in many activities.

This thesis is arranged into four parts: Part I discusses the cultural context of early farming societies in southeastern Africa, Part II describes the theoretical perspective, analytical approach and data utilized in the thesis, Part III presents the analysis and interpretation of the archaeological data, and the thesis concludes in Part IV with an evaluation of current models of community organization.

Part I discusses the archaeology of early iron-using agropastoral societies in southern Africa. The thesis opens in Chapter 2 with a brief history of research into early agropastoral societies in southern Africa, the environmental context of research and the cultural historical framework developed for the region. I then discuss in more detail current models of community organization, critically evaluating their claims, problems and assumptions in Chapter 3, and outline five aspects of these models that require further testing against archaeological data.

Part II outlines the theoretical and methodological approach taken to the archaeological, ethnographic and ethnohistorical data utilized in the thesis. In Chapter 4, I present a theoretical framework and methodology for analyzing ceramic production, use and discard practices in archaeological contexts that may be used to evaluate the organizing principles proposed by the models of community organization. In Chapter 5, I describe new research at the ninth century AD settlement of Ndondondwane that was designed to yield detailed information about the spatial and socioeconomic organization of early farming settlements.

The analysis and interpretation of the ceramic data from Ndondondwane is presented in Part III. Multiple classifications of the ceramic data are presented first in Chapter 6, which are used in the three subsequent chapters to address issues surrounding site formation and ceramic discard practices (Chapter 7), ceramic production (Chapter 8) and ceramic use (Chapter 9) at the settlement of Ndondondwane. Site formation and ceramic discard practices are addressed first because it cannot be assumed the locations of artifact discard and use are the same. Such relationships must be demonstrated as they provide a basis for inferring patterns of ceramic production and use.

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Part IV examines the expectations of current models of early agropastoral community organization in southern Africa in light of the activity-based interpretations of village organization presented in Part III. In the final chapter, Chapter 10, I assess the claims of current models of early agropastoral community organization against the activity-based model from Ndondondwane, evaluate the benefits and problems associated with the analytical approach developed in this study, and conclude the thesis with a discussion of several substantive issues future research on early African agropastoral community organization must address.

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PART I

THE CULTURAL CONTEXT

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CHAPTER 2

HISTORY OF RESEARCH ON THE IRON AGE OF SOUTHERN AFRICA

> The archaeology of iron-using agriculturalists is essentially the archaeology of Bantu-speaking people.
>
> *Gavin Whitelaw (1997: 444)*

> One of the illusions of Southern African archaeology is that the past can be neutral.
>
> *Martin Hall (1990b: 59).*

The later prehistory of southern Africa includes the conventional cultural-historical divisions of the Iron Age and the latest developments of the Later Stone Age. The Later Stone Age (hereafter, LSA) and Iron Age are widely accepted technological divisions in the broader culture-history of sub-Saharan Africa. The LSA covers the past 20 to 40 thousand years and refers broadly to both foragers and herders, some of whom utilized microlithic technologies. The Iron Age is mainly limited to the past 2,500 years. As a cultural-historical term, it refers to agropastoralists (or mixed-farmers) with ceramic and metal technologies who specialized in cultivating root crops (such as yams, beans, and gourds) and dry-land cultigens (millets and sorghum), and the husbandry of large and small livestock (Vansina 1990). The Iron Age of southern Africa covers the period between *c.* AD 250—1820. While the term "Iron Age" has attracted serious debate as a technological division for the later prehistory of sub-Saharan Africa as a whole (e.g., Sinclair *et al.* 1993: 8-9; Stahl 1999), the term is strongly embedded in the cultural historical lexicon of southern Africa.

These broad LSA and Iron Age labels are somewhat misleading because they overlap in time, blending into the period of European colonization (Deacon and Deacon 1999; Denbow 1990; Hall 1990; Maggs 1980a, 1984b). Nevertheless, they still provide useful heuristic devices. In this thesis, I will use the Later Stone Age and Iron Age as chronological divisions, while certain economic labels will be used interchangeably: foragers/hunter-gatherers do not practice cultivation or livestock husbandry, herders/pastoralists predominantly rely upon livestock-keeping and rarely, if ever,

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practice cultivation, while farmers/agropastoralists rely on a more diverse subsistence strategy in which carbohydrate and protein intake is predominantly derived from cultivated crops and domesticated stock, respectively.

The Iron Age of southern Africa is commonly divided into two main phases, the Early Iron Age (AD 250–1025; hereafter EIA) and the Late Iron Age (AD 1025–1820s; hereafter LIA). The initial expansion of agropastoralists into southern Africa occurred during the EIA, while the LIA saw the intensification of the agropastoral economy, the maturation of socio-economic institutions, and the rise of state-level societies in the Limpopo-Shashe basin, eastern Botswana and southern Zimbabwe beginning around AD 1250 (see Figure 2.1 for regions and current political boundaries). The LIA also blends into the historical reckoning of modern Bantu speaking populations in the region, who are documented through oral tradition, the historical records of Portuguese traders in the fifteenth century, British colonists and travelers in the eighteenth century, and ethnographic research (Hall 1990; Phillipson 1977, 1993; Whitelaw 1997).

Opinions differ about the organization of early farming societies and the changes that occurred within them over the past two millennia. But unlike other regions of post-colonial Africa, archaeologists working in southern Africa developed an understanding of proto-historic farming societies under oppressive government policies based on a "short" chronology of indigenous occupation concurrent with the first European colonial settlement of the region. It is within this contradiction that professional archaeological research developed in the extreme south of Africa. In this chapter, I review the history of research on Iron Age societies before outlining the environmental and cultural historical setting of the introduction of farming to southern Africa.

HISTORY OF RESEARCH

Reviews of Iron Age research conducted after the Second World War outline a growing interest in the archaeology of early iron-using mixed farmers north of the Limpopo River, but a considerable dearth of research to the south before the 1960s (e.g., Fagan 1965; Fagan *et al.* 1969; Phillipson 1977, 1993; Robertshaw 1990). The reasons for this interest were far from academic. Instead, concern with proto-historic "Bantu" history lay in the political and economic interests of colonial administrations.

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The ruins of Great Zimbabwe, the first state-level society attested in southern Africa in what is now modern-day Zimbabwe, have been surrounded by controversy since Karl Mauch first described them in 1872 (Bernhard 1971). Soon after establishing Southern Rhodesia, now part of Zimbabwe, Cecil Rhodes saw great political value in proving the speculations of earlier antiquarians by showing that Phoenicians built Great Zimbabwe (Hall 1990b). For Rhodes, the presence of an earlier non-African civilization in this new territory provided a precedent for his vision of an African empire under British rule. In 1899, Rhodes commissioned R.N. Hall—a journalist employed by Rhodes' British South Africa Company—to investigate the ruins with the help of a local prospector, W.G. Neal. The subsequent publication of Hall's damaging excavations divided the occupation into four phases: the first by Sabaeans, the second by Phoenicians, the third a "transitional" phase, and the last by a "bastard race" linked to the local population (Hall and Neal 1904). This suited Rhodes vision well, but because of Hall's lack of training, the British Association for the Advancement of Science doubted the results.

The Association sponsored two expeditions, the first by D.R. MacIver (1906) and the second by Gertrude Caton-Thompson (1931) to settle the matter. Both concluded that Great Zimbabwe was of African origin. However, a chronology based on stratigraphy and careful analyses of trade items proposed by Caton-Thompson provided a more secure footing for the conclusion. This did not please Rhodes or the settler society in the area, who through early travelers accounts and limited excavation, established a belief "that African societies were incapable of change and that the continent had a glorious, and long-lost, history of colonisation by earlier civilisations" (Hall 1990a: 6). Caton-Thompson's systematic excavations did more than shake the foundation of colonial mythology surrounding the settlement of southeastern Africa—what has become known as the "settler paradigm"—but also established archaeology as a valuable tool for understanding the more recent southern African past. More importantly, the two central issues in the Great Zimbabwe debate—colonization and change in African societies—have proved durable themes that link early and present archaeological research in the region.

The "settler paradigm" was to remain topical for many years, supported in part by amateur archaeologists such as John Schofield (1926, 1937, 1948) and P.W. Laidler

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(Laidler and Scot 1938). This changed by 1947 with the appointment of two professional archaeologists, Keith Robinson and Roger Summers, by the Southern Rhodesian government. The new positions coincided with a change in colonial government policy. After the Second World War, Iron Age research was promoted under the United Federal Party's mandate to promote "racial partnership." Foreign investment quadrupled in Southern Rhodesia between 1947 and 1951 (Hall 1990b: 66). However, a lack of consumers stifled the potential capital growth during the post-war economic boom. "Racial partnership" was meant to reform policies on education, unions and agriculture to create an African middle class that could afford to purchase what the manufacturing sector was producing. Although rooted in a capitalistic drive geared towards the modernization of Africa, this somewhat promising path collapsed with election of the Rhodesian Front in 1962, whose policies more closely reflected the "separate development" (apartheid) mandate then current in the Republic of South Africa.

Despite a political ideology based on the principles of apartheid instituted after the election of the National Party in 1948, the South African government sought to increase spending on developing the appropriate "'cultural apparatus' necessary to present the image of a 'modern state'" (Hall 1990b: 68). In the 1960s, archaeology benefited from this influx of capital. New technical facilities, such as the Pretoria radiocarbon laboratory, research units, and archaeology departments at liberal universities and museums were instituted across the country. The result was an incredible growth of knowledge about the indigenous cultural past in the region, most of it coming in a decade spanning the early 1960s to the early 1970s. Radiocarbon dating revolutionized the study of the Iron Age by upending ceramic typological schemes (Schofield 1948) and establishing with certainty a Bantu presence in southern Africa centuries before European settlers colonized the Cape in 1652. With the exception of Ray Inskeep's *The Peopling of Southern Africa* (1978), the machinations of apartheid managed to suppress popular printing of research results, while the highly technical archaeological works were hardly intelligible to a lay public. Despite misgivings about the dissemination of research findings to the public (Hall 1990a,b; Shepard 2002), by the late 1970s the stage was set for new syntheses of the proto-historic record in southern Africa. Interestingly, these syntheses came to focus on two themes that have been of interest since the beginnings of systematic research the region. The colonization of southern

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Africa refocused on the peopling of the southeast by Iron Age farmers (Huffman 1989; Phillipson 1977, 1985), and issues surrounding change and conservatism in African societies were recast as a debate about whether an irreversible ideological break—a sort of cognitive rubicon—characterizes the division between early and later Iron Age societies (Hall 1987, 1990a; Huffman 1982; Maggs 1980a, 1984c, 1994/95).

THE INTRODUCTION OF AGRICULTURE

Iron Age farmers in sub-Saharan Africa fall within a broad agropastoral complex termed the *Chifumbaze Complex* (Phillipson 1985, 1993: 188-189), which has been described as an economic and cultural "package" that included cereal crops, sheep, goat and cattle, distinctive ceramics, the use of iron and copper for tools, ornaments and weapons, and settled village life (Hall 1990; Huffman 1970, 1975, 1978, 1979, 1982, 1989; Maggs 1980a, 1980b; 1984b: 331; Phillipson 1977, 1985, 1993). Phillipson (1977) originally proposed a two-stream migration model for the introduction of farming to eastern and southern Africa (Figure 2.2). The first set of migrations are defined spatially by the Lowland and Highland facies of an *Eastern Stream* from the Great Lakes region in East Africa, while a second set of migrations came along a *Western Stream* originating in south-central Africa.[1]

Based on a reanalysis of ceramics, radiocarbon dates and linguistic evidence from south-central and southeastern Africa, Huffman (1989) challenged Phillipson's model for the introduction of agriculture into southern Africa (Figure 2.2). He instead proposed a three-stream model. Applying concepts used in American archaeology, Huffman designated the facies of the Eastern Stream into two branches of the Urewe Tradition: the *Nkope Branch* (i.e., Highland facies) and the *Kwale Branch* (i.e., Lowland facies),

[1] Due to an imbalance in the research done in western and eastern sub-Saharan Africa (Eggert 1983, 1992, 1993; Oslisly 1993; Oslisly and Peyrot 1992), the Eastern Stream has been studied far more intensely than its western counterpart. Most of what is known about the Western Stream has resulted from work in Zambia (Huffman 1989; Phillipson 1977, 1985, 1993). Phillipson initially proposed that several ceramic facies, including Chondwe, Luaba, Kalundu, and Kapwirimbwe, developed in Zambia by Western Bantu speakers who moved to the area from the Congo and Angola around AD 400. After this date, pottery of this stream is identified in northeastern then coastal areas in South Africa.

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after the two ceramic traditions with the greatest affinity to Urewe pottery (Huffman 1970, 1978, 1980, 1989).[2] Huffman proposed a very close connection between the pottery found around the Great Lakes and that along the eastern seaboard in southern Africa. Unlike Phillipson, Huffman has argued that the makers of Kwale ceramics moved from southeastern Kenya down into southern Africa forming the first migration of agropastoralists into the region. Kwale farmers were therefore the first to introduce the so-called Iron Age "package" of cultural and economic traits into southern Africa as they established small villages along the eastern littoral of Mozambique and South Africa around AD 250–300 (Huffman 1989). A subsequent immigration of similarly equipped farmers of the Kalundu ceramic tradition moved from south-central Africa to settle the lowlands near lakes and rivers in eastern Botswana, Zimbabwe, southern Mozambique, Swaziland, and eastern South Africa between AD 350–400 (Huffman 1989; Klapwijk and Huffman 1996; Maggs 1980c, 1984b).

Each of these traditions is derived from relationships between regional Iron Age ceramic sequences in southern Africa and earlier-dated sequences further north. These sequences, summarized in Figure 2.3, are not without their problems, and by no means are the relationships between them entirely clear. In particular, there appear to be many "fuzzy" areas in these classifications, which may be a consequence of several factors. For example, the fluted rims characteristic of Kwale pottery become less pronounced and less frequent in the younger sequences (Phillipson 1977). If the samples examined are small, pottery may not be classified into the appropriate tradition (sites with components that have a high culture-trait symmetry), phase (chronological divisions of a tradition) or facies (spatial divisions of a tradition). Another problem lies in the inability of archaeologists to distinguish ceramics that accumulated during different stages of a site's occupation. The post-depositional mixing of ceramics in certain deposits has recently led to placing pottery from the Lyndenburg Heads group of sites to a more recent phase in the South African sequence (e.g., Maggs 1994/95; Whitelaw 1996). Another issue is that the approaches to ceramic classification used in constructing these sequences may be

[2] Urewe tradition sites first appear west of Lake Victoria around 2500 BP, and east and south of the lake three hundred years later (Phillipson 1993: 189-190). The current series of radiocarbon dates place the Urewe tradition ranging from 2800 BP (*c.*750 BC) to 1500 BP (Van Grunderbeek 1992), but there is some controversy over the early dates (Kiriama 1993: 485).

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largely incompatible (Hall 1990a: 70). The British approach, based on Childe's concept of culture (Hall 1990b), generates "boxes" in time and space. In contrast, the concept of ceramic traditions introduced from Americanist archaeology by Huffman (1978) instead attempts to identify degrees of similarity and difference in ceramic style across time and space by examining the persistence of many stylistic attributes. Further, while Huffman's approach is methodologically superior to earlier efforts (e.g., Huffman 1980), the analyses on which his regional synthesis is based have not been replicated, and some wonder if this is indeed possible (Denbow 1991).

While assigning cultural identity to Iron Age ceramic "entities" is far from straightforward, the geographical distribution of EIA sites is clear. Settlement is restricted to the coastlands and slopes peripheral to a shield-shaped plateau that defines the three major geomorphological zones in southern Africa (Figure 2.4): the Kalahari Basin of the interior plateau, the extensive central plateau, and its peripheral lowlands which include the transitional foothills and lowlands that slope from the central plateau to the western, southern and eastern coastlands (Wellington 1955; King 1963, 1972, 1978). This distribution of farming settlement in the river valleys of the central plateau and the eastern lowlands appears to be related to the environmental and ecological conditions within each zone. The soils, flora and fauna represented in these different zones are distinct (MacVicar and de Villiers 1977).

EIA settlements are predominantly found within major river valleys and along their tributaries. The geomorphology of the region dictates the drainage pattern, with river systems running from the interior and marginal mountains and cutting through the plateau slopes. The landscape in the plateau slopes is characterized by parallel, often deep, river valleys separated by interfluves capped by dolerite sills. Each of these river valleys is ecologically similar, though not identical, from source to delta. Two soil types of varying composition and density are associated with coastal, riverine, and savanna-grassland areas (Hall 1981, 1984). Riverine soils are in different stages of formation, but tend to have relatively high clay content, somewhere between 15-35%. Coastal deposits are medium grained sandy soils that are lower in clay (Hall 1984). Both ecozones have likely supported a savanna-woodland ecosystem for most of the Holocene (Hall 1981, 1984; Feely 1987).

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The archaeofauna from these zones support such a conclusion. There are numerous species from coastal and riverine EIA sites, such as bushpig (*Potamochoerus porcus*), nyala antelope (*Tragelaphus angasi*), red-necked francolin (*Pternistis afer*) and land snail (*Metacatina kraussi*), which favor closed woodland and canopy forests, attesting to the presence of forest conditions 2000 years ago (Horwitz *et al.* 1991; Maggs and Ward 1984; Plog 2000; Voigt 1984; Voight and von den Driesch 1984; Voigt and Peters 1991; Whitelaw 1993, 1994). In contrast, the savanna-grasslands between the river valleys and across the central plateau have soils with less clay content and have less woody vegetation than riverine or coastal ecozones. Work by Feely (1987) has shown that grasslands during the Iron Age accord well with the present distribution of grasslands. We would therefore expect grassland fauna, such as ostrich (*Struthio camelus*), giraffe (*Giraffa camelopardalis*), elephant (*Loxodonta africana*), rhinoceros (*Ceratotherium/Diceros*) and numerous other grazing and browsing species, to have favored these conditions on the central plateau and the Kalahari margins during the agropastoral expansion into southeastern Africa. The presence of these species in EIA assemblages suggests they were acquired from the grasslands by hunting, collecting (e.g., scavenging elephant ivory) or through trade with hunter-gatherer groups.

The topography of the region exerts a strong influence on climate. There is a high annual total of orographic rainfall in the peripheral mountains and in the watershed areas, while there is considerably less rainfall in the river valleys. Rainfall is seasonal, with wet summers and dry winters. Patterns in temperature are largely determined by altitude. More influential on ecological patterns, and thus the distribution of EIA farming settlement, was the combination of precipitation and temperature. Indices combining temperature, rainfall (mean annual precipitation), and evaporation rates (annual potential evaporation) have been used to distinguish subtropical regions located along parts of the coastal plain and the river valleys (Hall 1981). EIA farmers stayed within a subtropical zone where annual precipitation between 400 mm to over 1000 mm provided adequate moisture for grain production. Sorghum and the two millets (*Eleusine* and *Pennisetum*) preferred by early farmers require at least 500 mm of rainfall a year and night-time temperatures must not drop below 15°C (Doggett 1976; Purseglove 1976).

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Given these ecological needs, archaeologists working in southern Africa have demonstrated some correlation between changes in climate and the location and density of early farming settlement (e.g., Hall 1981; Feely 1987; Prins 1994/95). However, at this stage, the climatic fluctuations are not well correlated to historical events, and there appears to be no uniform pan-southern African links between climatic episodes and regional historical sequences. Nevertheless, important connections between the settlement patterns reported by archaeologists (Feely 1987; Huffman 1996a; Maggs 1980c, 1984a; Prins 1994/95; Sinclair *et al.* 1993) and the palaeoecological and palaeoenvironmental data summarized by Tyson and Lindesay (1992) can be made. These correlations are summarized in Table 2.1.

Initial settlement of southeastern Africa during the EIA occurred along coastal areas and the northern slopes of the Southern Highveld (see Figure 2.4). This distribution corresponds to a cool dry period at the beginning of the first millennium AD. Subsequent settlement of the eastern lowlands and Limpopo-Shashi basin occurred during an amelioration of climate around AD 500, resulting warm, wet conditions for some 200 years. A subsequent period of cooler temperatures and less rainfall appears to have affected agriculture practice in the northeast, leading to the spread of Zhizo peoples north and west into the Kalahari margins (Denbow 1982; Huffman 1996a, 2000). There is little evidence for the same effect in the southeast. The close of the EIA roughly corresponds to the Mediaeval Warm Epoch when there was a resettling of the Limpopo-Shashe basin in the northeast (Huffman 1996a, 2000) and a period of settlement expansion in the lower Thukela basin (van Schalkwyk 1994/95). The impact of the Little Ice Age between AD 1300–1500 was felt throughout the region as the areas occupied by EIA farmers were depopulated.

Another important factor influencing the distribution of early farming communities was the location of mineral resources. Pastoralists and agropastoralists exploited a variety of copper, iron and gold deposits interspersed within the complex geophysical and climatic mosaic of southern Africa. Iron ore deposits and outcrops of varying quality are found throughout southeastern Africa. While metal objects are rare in the archaeological record, these ore sources appear to have been heavily exploited by early farmers for making tools, ornaments and weapons (Hall 1990: 36–37, 67–69; Miller 2002). Farmers also utilized large copper deposits south of the Zambezi in

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northeastern Zimbabwe and northeast South Africa. Sporadic deposits were also mined in eastern Botswana by farmers, while those in Namaqualand in southwestern South Africa and in northern Namibia were likely mined by pastoralists beginning about 2,000 years ago (Bisson 2000; Miller 2002). Gold deposits exploited in antiquity are more limited in their distribution. Spectacular gold and gold-plated grave goods are first known from sites like Mapungubwe dating to the thirteenth century AD (Eloff and Meyer 1981; Meyer 2000; Miller 2002), but the use of gold is limited and the metal appears to have been mined primarily for foreign trade linked to Swahili coastal societies during the florescence of the Zimbabwe Culture Period in the fourteenth and early fifteenth centuries AD (Hall 1990: 96-102).

While there is general agreement that agropastoralism arrived as a cultural and economic "package" of traits in southern Africa, studies of forager and pastoral groups in central and western areas of southern Africa indicate that certain traits, such as ceramics, metallurgy, and the tending of small stock preceded the introduction of agropastoralism into the region (Bouseman 1998; Henshilwood 1996; Sadir 1998; Sampson *et al.* 1989; Sealy and Yates 1994, 1996; Smith 1998). There continues to be disagreement over the timing and distribution of cultural traits, and the alignment of regional Iron Age sequences. Nevertheless, research has identified eight general trends during the EIA of southern Africa:

(1) A true farming economy, based on dry land cultigens (sorghum and millets), exogenous domestic species (sheep, goat, cattle, dog, chicken), combined with the use of locally available wild fauna and flora.

(2) Permanent villages of relatively long duration (although there are exceptions), developing as flat, expansive settlements in coastal and riverine locations between AD 250-1025.

(3) A shift in settlement architecture from pole and *daga* (a clay-dung mixture) structures during the EIA to a more widespread use of stone masonry after AD 1025 (coinciding with a shift in settlement location and available building materials).

(4) Limited local trade in utilitarian goods, raw materials such as iron ore, pottery, salt, and shell, and circumstantial evidence for early craft specialization.

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(5) A high proportion of decorated ceramic wares before *c.* AD 1100, after which they decline dramatically in number.

(6) Limited signs of social inequality or hierarchical organization inferred from studies of settlement organization and ethnographic parallels with modern Bantu-speaking groups in southern Africa.

(7) An absence of monumental funerary or ritual architecture until the florescence of the Great Zimbabwe Period between AD 1290 to 1450.

(8) By AD 1030, indirect long-distance exchange connects groups within northern and southern areas of the region, and both to the broader Islamic east coast trade routes. However, the regional dynamics and impact of trade experienced by EIA and LIA groups are different in each case.

Within this culture-historical framework, researchers in southern Africa have formulated different conceptions of the internal organization of EIA farming communities. In the following chapter, I evaluate the theoretical, methodological, empirical and historical basis of these models.

CHAPTER SUMMARY

This chapter briefly discussed the history of Iron Age archaeological studies in southern Africa and the environmental and culture historical framework that has resulted from nearly fifty years of research. Although archaeology has played a part in debunking a European settler mythology that denied the early presence of Bantu speaking peoples in the region, the colonization of southern Africa and change and conservatism in African societies have been two persistent themes in archaeological research since the 1920s. The cultural historical sequences constructed in each geophysical region reflect these interests, as archaeologist continue to seek the timing, duration and mechanisms of the spread of agriculture into the region and the nature and extent of culture change in farming societies over the past two millennia. As a whole, the Iron Age in southern Africa is unique. The introduction of farming into this region involved a complex series of migrations of different farming groups with similar material culture and subsistence strategies. There appears to be a certain degree of continuity in

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the technology and subsistence practices of EIA farming groups. They chose to adjust their settlements to the best places on a landscape ill designed for agriculture, rather than alter the technological and economic core of their desired lifeway. Yet, the preference for coastal and riverine settlement appears to have become problematic during the Little Ice Age. At this time, we see the rise of the Great Zimbabwe state in an area where subsistence agriculture could best be pursued, while large settlements or clusters of smaller settlements become common on the marginal agricultural areas in the region. It is against this intellectual and cultural historical background that the conceptions of early farming communities in southeastern Africa have been conceived, and it is to this subject I now turn.

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Table 2.1. Climatic fluctuations in southern Africa over the past 2000 years revised against the southern African Iron Age cultural historical sequence. See Figure 2.4 for location of physiographic regions.

Dates and Climatic Summary According to Tyson and Lindesay (1992)			Climatic Conditions Corresponding to the Iron Age Cultural Sequence of Southern Africa			
Age (AD)	Fluctuations	Regional Conditions and Global Climatic Events	Phase	Revised Age (AD)[a]	Northeast[a]	Southeast[b]
1790-1810	Warm	Warm, wet period	Late Iron Age	Same	Difiquane (Mfecane) Settlement aggregation and northward migrations	
1675-1780	Cool	Cool, dry? Period	Late Iron Age	Same		Maize introduced, increase in settlement density
1500-1675	Warm	Warm, wet period	Late Iron Age	1425-1675	Late Iron Age Warm Pulse	Settling of Southern Highveld
1300-1500	Cool	Little Ice Age	Late Iron Age	1290-1425	Depopulation of Limpopo-Shashi basin and Kalahari margins	Depopulation (?) of valleys; settling of grasslands
900-1300	Warm	Mediaeval Warm Epoch		900-1290	Middle Iron Age Wet Period Re-settling of Limpopo-Shashe basin (c. AD 1000)	Settlement fissioning in eastern lowlands (e.g., Thukela basin)
600-900	Cool	Cool, dry? period	Early Iron Age	No data	Zhizo (Toutswe) expansion to Kalahari margins	Long-term habitation of settlements in eastern lowlands
250-600	Warm	Warm, wet period	Early Iron Age	500-700	Early Iron Age Wet Period	Settling of riverine locales; depopulation of coastal areas
100-200	Cool	Cool, dry? period	Early Iron Age	No data	Settling of northern Southern Highveld slopes	Settling of coastal areas

[a] Huffman (1996a).
[b] Feely (1987); Maggs (1980c, 1984a); Prins (1994/95); Sinclair *et al.* 1993; van Schalkwyk (1994/95).

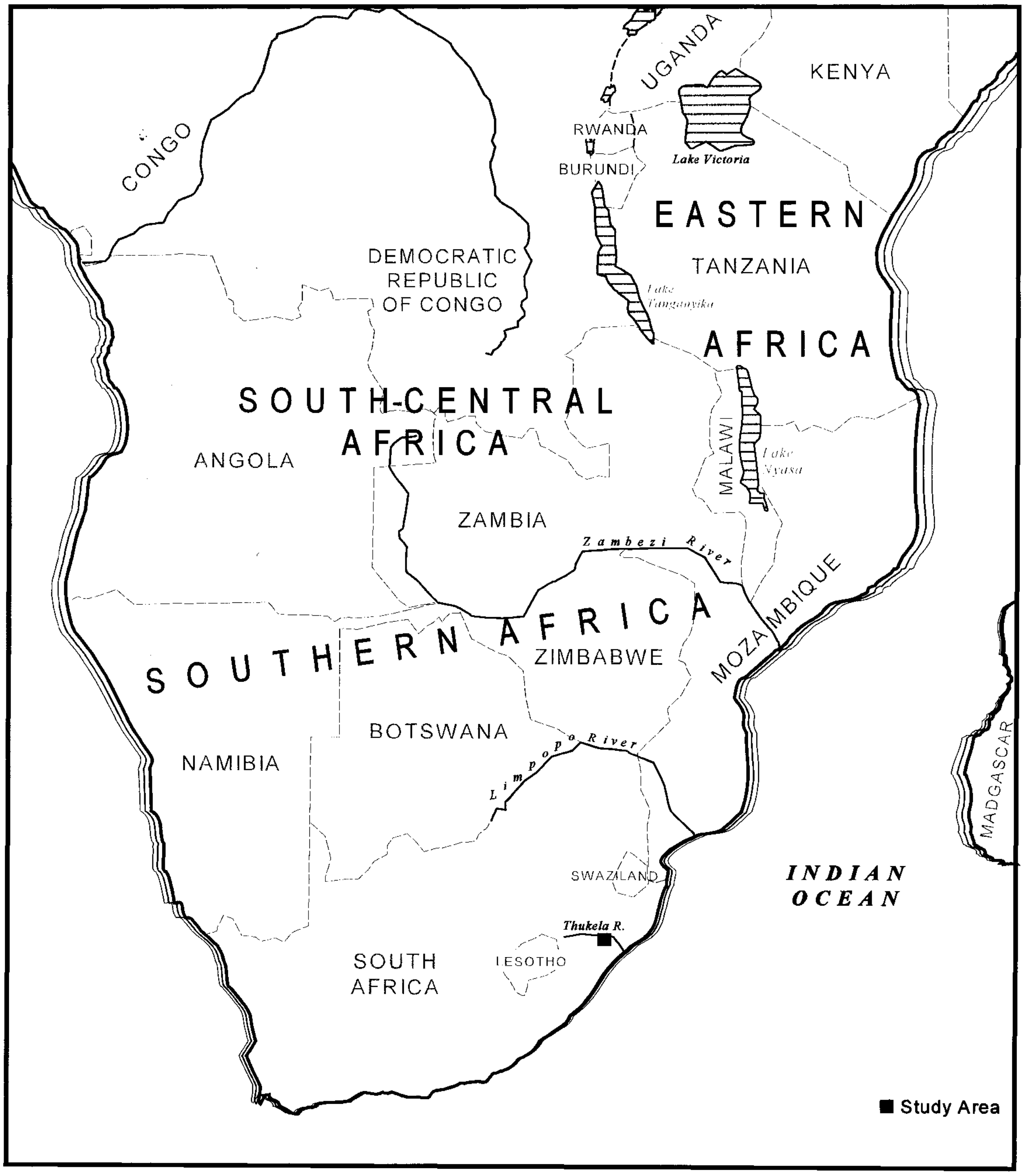

Figure 2.1. Regions and current political boundaries of sub-equatorial Africa.

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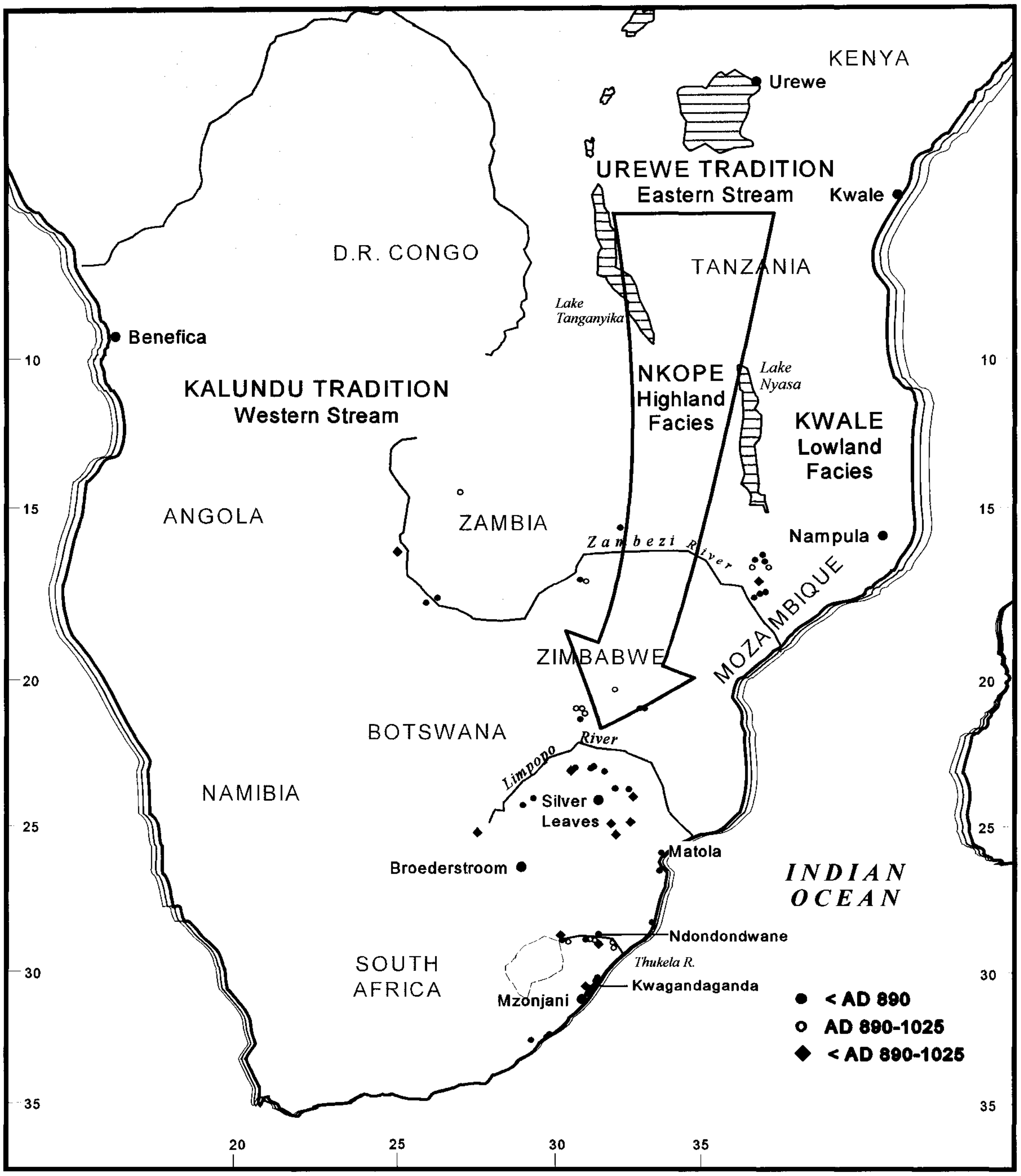

Figure 2.2. Distribution of major Early Iron Age settlements with radiocarbon dates in sub-equatorial Africa and proposed migration routes of farming groups belonging to the Urewe and Kalundu ceramic traditions. Migration streams after Phillipson (1977, 1985). Ceramic traditions after Huffman (1989). Radiocarbon data from Vogel and Fuls (1999).

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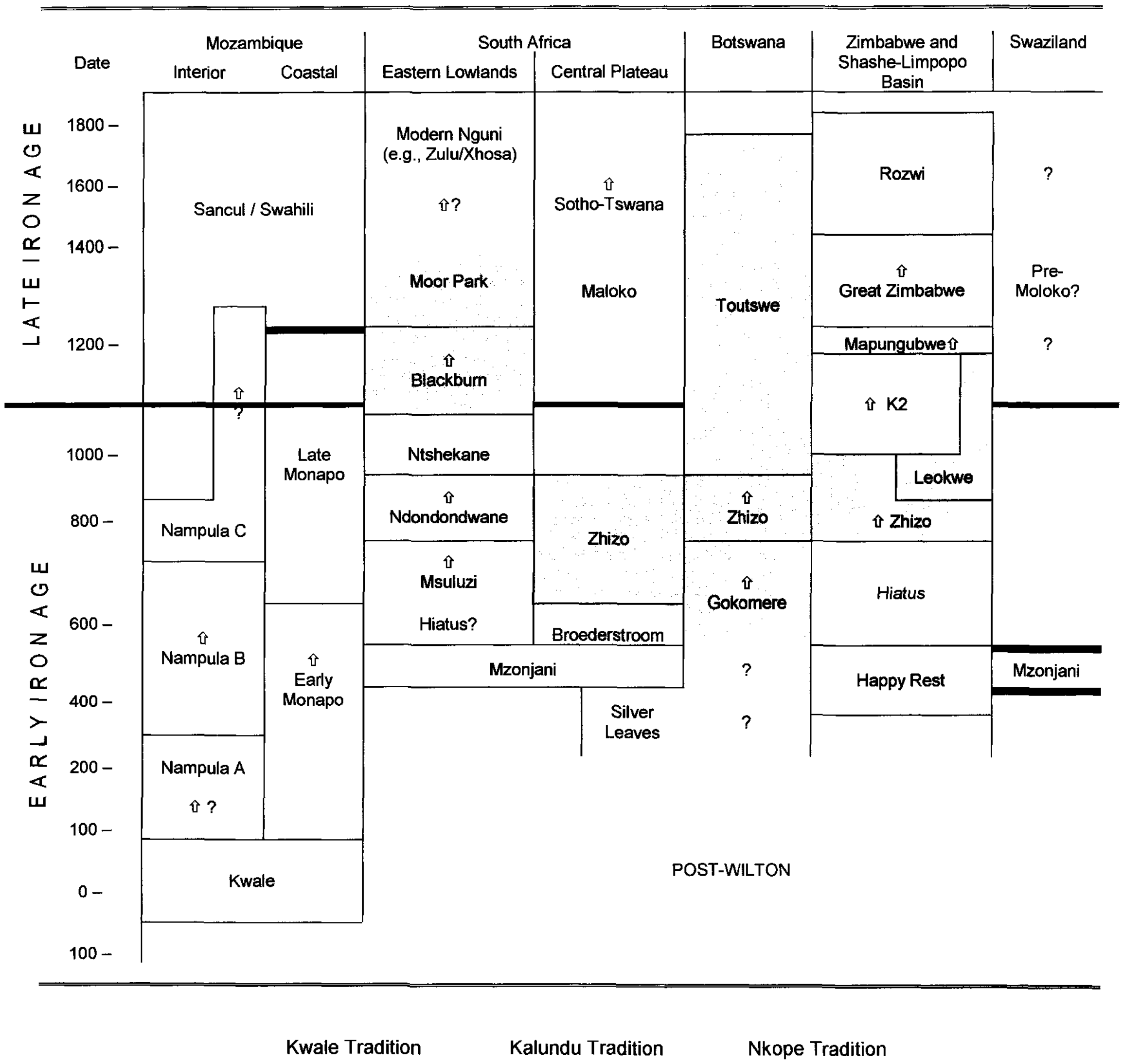

Sources: General: Huffman 1989; Phillipson 1977, 1985, 1990. Mozambique: Sinclair et al. 1993. South Africa, Eastern Lowlands: Whitelaw and Moon 1996. South Africa, Central Plateau and Shashe-Limpopo Basin: Calabrese 2000a; Klapwijk and Huffman 1996; Whitelaw 1996. Eastern Botswana: Denbow 1982, 1983, 1990. Zimbabwe: Campbell *et al.* 1996; Denbow 1982; Hanisch 1980; Huffman 1973, 1974, 1987, 2000; Garlake 1966, 1967; Kyaga-Mulindwa 1992; Van Waarden 1989. Swaziland: Ohinata 2000.

Figure 2.3 Chronological divisions for the regional Iron Age sequences in southern Africa.

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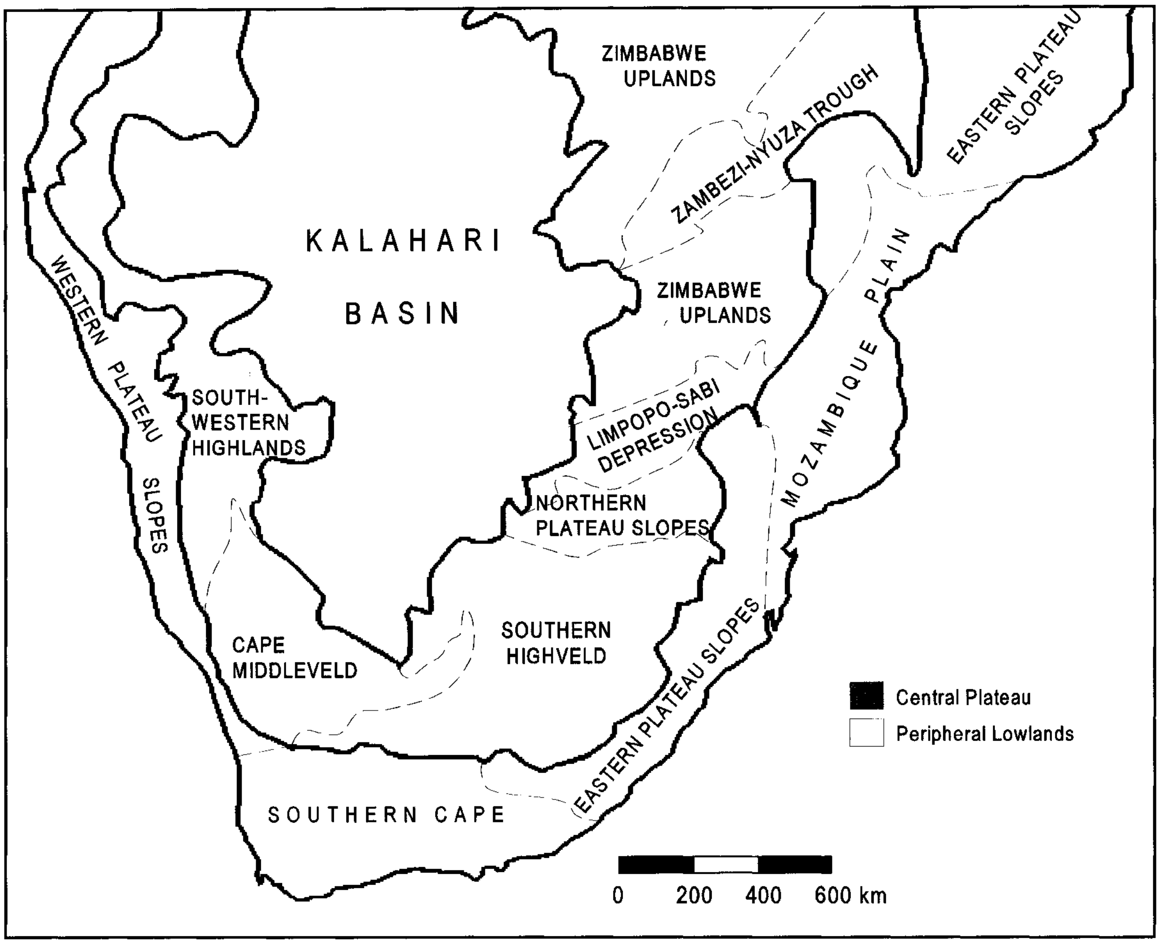

Figure 2.4. Physiographic regions of southern Africa. (Modified after Wellington 1955, King 1953, Hall 1981:fig. 2, table 1).

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CHAPTER 3

EARLY IRON AGE COMMUNITY ORGANIZATION

> Theories, reconstructions, and explanations can only serve to illuminate portions of that past; it is too much to expect that one theory or one reconstruction or one explanation will be sufficient. The task of the archaeologist then becomes, not choosing the best single model, but finding the several frameworks that increase our understanding of events and processes in the past.
>
> *Douglas Charles (1992: 905)*

Archaeologists working in southern Africa have developed several models about the economic, social and ideational organization of EIA farming societies and the changes that occurred within them. In this chapter, I review these models and critically evaluate their methods, main premises and assumptions. While these models are often presented as contradictory explanations of the southern African past (Maggs and Whitelaw 1991), in the course of this discussion, I demonstrate how each model provides only a partial explanation of the economic, social, and symbolic foundations of early farming societies. I conclude the discussion by drawing out fundamental points about the organization of activities within early farming settlements emphasized in these models that require further testing against archaeological data.

MODELS OF EARLY IRON AGE COMMUNITY ORGANIZATION

Although ceramic typologies provided the footing for advancing chronological and cultural interpretations of the Iron Age sequence in southern Africa, the study of early farming settlements has also provided important insights into EIA lifeways. The study of EIA settlements has been examined from two perspectives. The first sought to explain settlement distribution in terms of environmental and ecological factors. A concern with environmental context of EIA settlement began with Summers' work in the 1960s in Zimbabwe. Summers (1967) explored how the disease trypanosomiasis (which causes sleeping sickness in cattle) may have influenced settlement distribution by reducing the amount of land available to Iron Age farmers. Subsequent studies of settlement patterns in southeastern South Africa by Maggs (1976, 1984a) examined Iron

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Age settlement against the backdrop of environment and local ecological conditions in the highveld and eastern lowlands. He later argued that soil fertility, rainfall and temperature limited where crops could be successful grown, and these constraints strongly contributed to the distribution of Iron Age settlement on a sub-continental scale (Maggs 1980a, 1984b). Hall (1981) expanded upon Maggs's research program, but instead examined coastal, valley, and interfluvial settings in KwaZulu-Natal to investigate correlations between settlement and resources.

The second approach developed out of the theoretical perspective being pursued in ceramic studies at the University of the Witwatersrand. Huffman's work on Iron Age ceramics focused on the structural relationships between ceramic decoration and language. Structuralist analyses of southern African rock art by Lewis-William's (1981) and Kuper's (1980, 1982) analysis of southern Bantu settlement organization provided further theoretical footing for examining how structures may be expressed in other areas of Iron Age material culture and its distribution in space and time. The result was an approach that views the internal organization of settlements as a reflection of the "cognitive system" that gives order to the organization and use of space. In the following sections, I describe and evaluate the models of community organization produced by these two approaches to the study of settlement organization.

Settlement and Environment

Early researchers studying EIA communities in southern Africa generally assumed they were small, socially and economically independent entities that had irregular interaction with other farming villages and hunter-gatherers in the area. Each community relied on the produce from their fields, meat and milk from their cattle, sheep and goats, wild game from hunting, and the technological skills of villagers to make the goods they needed.

Throughout the EIA, settlements between 8 and 10 hectares in size were located on good arable land in ecological niches favorable to agricultural production (Cronin 1982; Hall 1981; Derricout 1977; Mason 1962, 1965, 1986; Mason *et al.* 1975; Maggs 1980a,b,c, 1984b, 1989). In early syntheses, Maggs (1980b,c, 1984b, 1989) proposed that early farming populations sought out highly productive locales in the savanna

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woodland or its margins that provided rich, unleached soils for cultivation, year-round sweet veldt (grass) for grazing, abundant woody vegetation to provide for building and fuel, and nearby ore sources to exploit for iron production (see also Maggs and Michael 1976; Maggs and Ward 1984; van Schalkwyk 1991, 1994a,b; Whitelaw 1991; Whitelaw and Moon 1996). Contact between farmers and hunter-gatherers brought marine shell, ostrich eggshell beads, stone artifacts, and bone points into the hands of farmers in exchange for pottery, iron implements, ivory, and other goods (e.g., Maggs 1980c, 1984b, 1989; Maggs and Ward 1984; Mazel 1989a, 1989b). Early villages were likely occupied by several hundred people, had a low level of specialized production, and a degree of economic and political self-sufficiency that remained essentially unchanged throughout the first millennium (Maggs 1980a, 1984a: 199, 1989). With the settling of the savanna-grasslands of the southeastern plateau around AD 1000, animal herding and exploitation strategies changed to accommodate the management of herds grazing on the nutrient-deficient *sourveld* of the highlands (Maggs and Ward 1984).

More recent research on EIA settlement dynamics has modified this view. The same changes in settlement pattern are not found in all areas of the region, such as the interior lowlands and the eastern margins of the Kalahari (Denbow 1983; Reid and Segobye 2000). Survey and excavation by van Schalkwyk (1991, 1994a, 1994b, 1994/95) in the lower Thukela Basin of the eastern lowlands proposes several phases of community fission marked by differences in settlement size and increases in the production of goods such as iron and talc. Villages were therefore linked through the exchange of "valuable" goods, implying an increase in economic dependency between villages in the valley. Disparities in settlement size have also been related to an unequal distribution of wealth in regional political hierarchies (Huffman 1986a). Settlement size hierarchies occur in the Limpopo-Shashe basin beginning about AD 900 (e.g., Hanish 1980; Huffman and Hanish 1987). This has prompted researchers to argue that similar political and economic hierarchies also existed during the EIA in the eastern lowlands (Whitelaw 1994).

While new archaeological evidence has questioned early contentions about the scale and interconnectedness of EIA settlements, subsequent research has not fully explored the occupational history of single settlements or changes in population size and density. Understanding these conditions is important for inferring social and symbolic

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behavior in settlements because the number of people occupying a place over time influences how space is used as well as the complexity of social relations in villages. Changes in villages related to demographic factors require adjustments in behavior at the individual, household and community levels. With an increase in the scale of communities, people must deal in new ways with interpersonal tensions that develop between kin and non-kin. Such tensions are linked to the physical congestion of space, scheduling conflicts, decreasing privacy, and the construction of physical boundaries that impede movement, access to different spaces, and place new barriers on interpersonal interactions (Altman 1977; Cohen 1985: 106).

The pioneering research of the 1970s and early 1980s defined the Iron Age as a distinct and formative era in the prehistory of southern Africa and set the stage for two new syntheses of EIA communities. One developed in a series of works by Martin Hall (1981, 1986, 1987, 1990), argued that in early chiefdom-level farming societies, community leaders exercised control over people and domestic animal and plant resources according to some "egalitarian" organizing principles akin to the *Domestic Mode of Production* (*sensu* Sahlins 1972). Another ethnographically derived model of intra-settlement spatial organization developed by Tom Huffman (1981, 1982, 1984, 1986a, b, c, 1990, 1996) proposed other "hierarchical" organizing principles that contradicted the tenets of the domestic mode of production. Known as the *Central Cattle Pattern*, this model draws connections between the physical arrangement of settlement features and conceptions of hereditary male leadership, patrilineal rhetoric, bridewealth in cattle, and the role ancestors play in daily life (Huffman 1982, 1986a,b; cf. Kuper 1980, 1982). In each model, we find very different images of the EIA village rooted in different intellectual and theoretical traditions: one based on an eclectic combination of ecology, Marxism, and Gidden's (1984) theory of structuration; the other rooted firmly in structuralism, stimulated by Adam Kuper's work (1980, 1982) on the social and symbolic significance of Bantu village spatial organization. These approaches took archaeology in southern Africa in new directions, and throughout the later 1980s and 1990s, the premises, assumptions, and contradictory conclusions reached by each synthesis have served as a platform for current debate.

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Iron Age Economics

In contrast to earlier descriptive assessments of Iron Age technology and subsistence organization, Hall's (1981, 1986, 1987, 1990) syntheses of the ecological and archaeological evidence in the 1980s marked an effort to identify key relationships and processes to understand historical sequences by addressing contradictions between household authority and kin-ordered social forms. Hall (1987: 3; 1990: 63-65) drew on three concepts to construct his model. First, the concept of the chiefdom was utilized as a broad category of reference to situate EIA societies between foraging bands and internally differentiated states in social evolutionary terms. Second, Hall (1987, 1990) drew on historical materialist theory "operationalised as a set of modes of production," to postulate how people deployed social labor in EIA societies.[3] Lastly, realizing the "pigeon-hole" effect of classifying societies into different production modes, Hall sought to infuse traditional materialist theory with a consideration of power strategies. To do this, Hall drew upon Giddens's (1984) concepts of allocative and authoritative resources, which respectively refer to how people exercise power over resources and other material conditions of life and power over people and their actions. In combining these theoretical elements, Hall's socioeconomic model predicts a certain form of social relations surrounding the organization and control over production during the EIA.

Based on the ecological data from the eastern lowlands, Hall argued that the accessibility to fertile patches of soil for cultivation and grazing, cyclical occurrences of drought, and risks of predation and disease placed serious constraints on agricultural production. These factors made animal husbandry as risk-laden as cereal production and placed limits on the ability of farmers to generate and control agricultural surplus. Denied an avenue to sequestering wealth in agricultural surplus, EIA farmers offset

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[3] This approach is based on the distinction Marx made between work as "the activities of individuals, singly or in groups, expending energy to produce energy" (Wolf 1982: 74), and labor as a social phenomenon, "mobilized and deployed by an organized social plurality" (Wolf 1982: 74). Thus, work is "what people do" and labor is the process of organizing work and sharing out its products within the framework of human social relationships. Marx used the term *production* to describe the complex mutually dependent interactions between nature, work, social labor, and social organization, and *modes of production* to refer to "a specific, historically occurring set of social relations through which labor is deployed to rest energy from nature by means of tools, skills, organization, and knowledge" (Wolf 1982: 75).

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potential crop failure or harvest loss by developing reciprocity networks between villages. By lending out seed-grain, or sharing a successful harvest with those in misfortune from other households or villages, farmers set up allegiances in a system of social insurance. Repeated assistance on different scales (e.g., individuals, groups, households, villages, etc.) would have placed recipients in a situation of mutual obligation. Thus, to mitigate the risks inherent in pastoralism and horticulture, grain was exchanged between households in decorated ceramic vessels that reaffirmed and signified their "mutual connectedness." These exchanges created a network of inter-household reciprocity based upon mutual long-term obligations (Hall 1990: 71). By the end of the first millennium, increasing herd sizes changed the nature of the forces of production. Hall argued that this changed the fabric of EIA society, and involved a restructuring of the previous kin-ordered relations of production. This ushered in a "new economic order" where individuals accumulated surplus products in the form of cattle, and their redistribution through bridewealth payments became controlled and managed by prominent members of local lineages (Hall 1987:11). Thus, the transition from the EIA to the LIA in southern Africa was characterized by a shift in how social labor was deployed. This involved a change from one type of kin-ordered mode of governance, the Domestic Mode of Production, to another, the Lineage Mode of Production.

Criticisms of the Model

A number of criticisms have been leveled against this model. Debate surrounds three points: (1) the capacity for long-term grain storage, (2) the ownership and social value of livestock, especially cattle, and (3) Hall's argument for "egalitarian" organizing principles in EIA society.

In the first place, Huffman (1990) argued that there is no reason to assume EIA farmers had difficulty producing agricultural surplus or storing grain. Grain storage pits and granaries are regularly found at EIA sites. Grain may be stored effectively in dung-lined storage pits for three years, and up to ten years in granaries (Huffman 1990).

Second, a key aspect of Hall's model was the significance of changes in livestock numbers between the EIA and LIA. Both Hall (1987, 1988) and Garlake (1978) suggested that the scarcity of cattle remains at early sites in relation to other domestic

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stock (i.e., sheep and goat) indicated that cattle did not hold the same economic or symbolic value as documented ethnographically throughout eastern and southern Africa (e.g., Herskovits 1923; Kuper 1980, 1982). From this position, an increase in the size of individual herds through time marked a shift from collective to private management and ownership of herds, and a concomitant change in the cultural value placed on livestock. Huffman (1990, 1993) challenged this position, arguing that Hall and Garlake conflated the subsistence and social value of cattle. Huffman pointed out that the subsistence value of cattle inferred from frequency of cattle remains in EIA sites is not indicative of their social or symbolic value, for Bantu speakers in southern African have been known to practice bridewealth without large cattle herds (Huffman 1990, 1993).

Another important argument in Hall's thesis is that control over the production and distribution of grain and livestock during the EIA was organized at the household level and was primarily geared towards community maintenance. This point has been thoroughly misunderstood in the criticisms of the model. Hall intended to demonstrate that hunter-gatherers and agriculturists may share similar patterns of production and exchange: generalized or positive (i.e., generosity) and balanced reciprocity can characterize exchanges of food and other goods in foraging and food producing economies (e.g., Polyani *et al.* 1957; Sahlins 1965: 145-149, 1972), and probably also between hunter-gatherers and farmers as well (e.g., Gregg 1991). In southern Africa, this situation is not unlike the mutually beneficial exchanges between the San and Tswana noted by Marshall (1961: 242). This notion of "egalitarian" organization principles during the EIA has not been well received. On principle, Huffman (1990: 1) has argued for a clear separation between hunter-gatherer and agropastoral economics and ideology because "a commitment to agropastoralism demands a different set of social relations from hunting and gathering."

In the critical wake of Hall's model, a number of studies have focused on the organization of animal and craft production during the EIA. Research on domesticated and wild fauna has documented several trends (e.g., Plug 1996; Plug and Voigt 1985): (1) the relative abundance of domesticated versus wild species varies considerably at different settlements, although there is a general increase in domesticated species over time, (2) small stock consistently outnumber cattle at EIA sites; (3) there is an increasing amount of evidence that cattle were used as pack animals, possibly to pull sleds (Plug

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2000: 122); and (4) the range of wild fauna indicate farmers were skilled hunters during the EIA, but it is likely that elephant and hippopotamus ivory was frequently scavenged and the animals rarely hunted for this purpose. There also exists the possibility that hunter-gatherers traded meat from wild game with farmers for other goods (Mazel 1989a).

Research on craft production has been more limited, and most studies have examined the scale of iron production and distribution (e.g., Calabrese 2000; Maggs 1992; van Schalkwyk 1994a; Whitelaw 1991). Few studies have explicitly considered the social implications of certain production arrangements, but van Schalkwyk (1994/95) suggested that increases in the production of iron objects in the lower Thukela basin may have involved changes in the social relations of production by AD 900. However, it is well documented that the scale of production alone is a poor indicator of the social relations of production (Costin 1991). For instance, increases in the scale of production do not necessarily mean that the composition of work groups changed, or that the relations between producers and consumers were significantly altered. While these advances have reformulated parts of Hall's original model, research on the social strategies pursued by farmers in different ecological niches has seen continued interest only in areas outside the eastern lowlands, such as the Kalahari margins (e.g., Denbow 1999; Reid and Segobye 2000) and the northern plateau (e.g., Meyer 1998; Plug 1997a,b).

The Central Cattle Pattern

Another model that has significantly influenced the conception of EIA communities is based on research into ethnographic patterns of intra-settlement spatial organization. In his analysis of bridewealth and marriage patterns amongst Sotho-Tswana and Nguni speakers in southern Africa, Adam Kuper (1980, 1982) was primarily concerned with a comparative study of societies with cattle-based economies, wherein men establish control over cattle as a means to access power, status, and the potency of sacred forces by obtaining women's labor and reproductive potential through bridewealth (cf. Herskovits 1928). Kuper (1980, 1982) observed certain regularities in the spatial expression of kinship and residence. His analysis proposed a complex segmentation of people (e.g., gender, status, wealth), activities, material culture, politics,

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and a general view of the universe, in spatial terms. While the actual appearance of Nguni and Sotho-Tswana settlements differ, Kuper (1980, 1982) argued that the structure of settlement layouts were transformations of a common set of binary oppositions, which Kuper termed the *Bantu Cattle Pattern*.

Based on these oppositions, settlements are arranged into inner and outer (central:peripheral) spatial zones (Figure 3.1 (a)). All settlements are characterized by a central (public) area of livestock byres (pens or kraals), storage facilities controlled by a central political authority, high status burials, and a court, surrounded by an outer private zone of huts, private grain bins, and low status burials arranged in an arc or a circle around the central livestock byre. Male practices are linked conceptually to cattle ownership and are located in or near livestock byres. Women's activities (e.g., food and domestic production) are conceptually opposite to cattle ownership and are situated away from byres. Residences are arranged according to seniority to the left and right and downslope of the highest-ranking family (or family member) that lives in a large hut directly upslope of the livestock byre (Figure 3.1(b)). These same oppositions are replicated within each house where a left/female : right/male dichotomy is oriented at right angles to a front/secular : back/sacred one.

Recognizing the potential of Kuper's model for archaeological research, Thomas Huffman (1982) argued that the Bantu Cattle Pattern captured the main organizing principles of Bantu society. He argued that both the layout and use of space in settlements are founded in common conceptions of male leadership, patrilineal rhetoric, bridewealth in cattle (*labola*), and the role of ancestors in daily life. Huffman (1982; 1986a,b, 1989) showed that Kuper's model could provide a way to explain and interpret the meaning of settlement space during the LIA. Since renamed the *Central Cattle Pattern* (hereafter, CCP), researchers have sought the antiquity of the CCP using the direct historical approach. The direct historical approach has been used for two interrelated purposes, each of which has direct parallels to the use of the method in Americanist archaeology (Lyman and O'Brien 2001). The first purpose is to identify the ethno-linguistic identity of the inhabitants (Huffman 1989), and the second is to gain insight into the human behaviors that were thought to produce particular portions of settlement layouts (Huffman 1990, 1993, 1996).

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In the first use, Huffman (1989) linked very limited evidence for EIA "settlement pattern" to patrilineal "Eastern Bantu" speakers in both the Western (Kalundu) and Eastern (Urewe) streams. The logic underpinning this approach is straightforward. As Huffman (2001: 23) explains: "Since social and settlement organisation are different aspects of the same thing [culture] and products of the same view of the world, a continuity in settlement pattern is evidence for continuity in social organization and worldview at the scale of the model." The model is therefore a hypothesis about social organization and cosmology (worldview) in the past. Theoretically, the approach is based on the notion of cultural continuity during the period in question, or heritable continuity (i.e., cultural transmission) between an ancestral and descendant population (Lyman and O'Brien 2001: 310). Methodologically, the approach aims at identifying *homologous traits*, or cultural traits that are attributable to shared ancestry. The identification of settlement layouts that are both superficially as well as structurally similar—that is, they have *homologous similarity*—demonstrates that other aspects of the culture that produced them are also likely to be homologous:

> if the ethnographically-derived model, rather than any other, is supported by the archaeological evidence, then the same principles, or variations of the same principles, of social organisation that were linked to the spatial model in the ethnographic period (and the same, or essentially the same, worldview that generated them both) in all likelihood was present in the older period (Huffman 2001: 22).

In the second use, *analogs* are drawn from ethnography to explain, or offer hypotheses, for the genesis of settlement layouts and nature of deposits at sites, as well as the types and condition of artifacts. Because settlement patterns are homologous (i.e., they are both superficially and structurally similar), it is reasonable to assume that behaviors documented in the descendant population are likely to be at least superficially similar, and may therefore help explain those that occurred in the past. The analogs used in southern Africa are of two types: *general analogs* and *specific historical analogs* (Wylie 1985). As an example of the first kind, Huffman (1990) described the practice of extracting marrow from the bones of domesticated animals amongst Shona speakers in southern Africa. In the process, the bones themselves are pulverized leaving no discernable material residue of their existence. As this practice differentially preserves the bones of small stock, such as sheep and goat, Huffman argued that this might have

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contributed to the low frequency of cattle versus sheep and goat during the EIA. Specific analogs are also used to explain cultural practices. One example is Loubser's (1993) argument that a rectangular structure near the center of the EIA site of Ndondondwane may have been used for initiation ceremonies, because its location and some its contents parallel those used in initiation ceremonies amongst some modern Bantu-speaking groups in southern Africa.

Over the past decade, the CCP has been used to interpret the very earliest agropastoral settlements in the region (Huffman 1982, 1986a,b, 1989, 1990, 1993, 1998; Whitelaw 1993, 1994, 1994/95). Huffman (1989, 1990, 1993, 1998) has argued that when a spatial pattern similar to expectations of the CCP is identified, the entire cultural system is necessarily associated with it. Several elements of the layout have convincingly been identified at the EIA sites of Broederstroom (Huffman 1990, 1993) and Kwagandaganda (Whitelaw 1993, 1994). This implied that bridewealth in cattle was present during the EIA and that the other socio-political, economic, and ideological structures underpinning the organization of recent Bantu speaking societies in the region also existed during the EIA (Huffman 1990, 1993).

Criticisms of the Model

The CCP has been a welcome advance in the study of the Iron Age because it has placed greater emphasis on the ideological basis and symbolic practices in these societies. However, it remains an empirical question whether the antiquity of the pattern and the cultural system associated with it can be traced though the archaeological sequence of the past 2,000 years. This question is of interest and significance to Africanists in general because of the cultural, linguistic and historical connections that link Bantu speaking agropastoralists in Africa. However, many archaeologists have expressed skepticism and great reservations about using the CCP to interpret EIA settlements. These criticisms have raised several important empirical, methodological and theoretical issues.

Some researchers have questioned the quantity and quality of empirical data on intra-settlement spatial organization available to validate the model. While early farming settlements in southern Africa may be better understood than in other regions of sub-

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Saharan Africa, artifacts and features at excavated settlements have not always been examined or reported in ways that would permit inferences on spatial patterning (Greenfield *et al.* 1997; Huffman 2001: 30; Lane 1994/95; van Schalkwyk et al 1997). In some cases, archaeologists have had to rely on a composite picture, combining data from several related sites, many of which remain unpublished (Huffman 1990, 1993, 1998, 2002). Further, the prolonged use of most early farming settlements has produced sites with mixed cultural debris dating to more than one phase in the regional ceramic sequences (Maggs 1980, 1984b, 1989, 1994/95). This situation has complicated the study of intra-settlement organization by making it difficult to discern the spatial and temporal relationships amongst features and activity areas. At Kwagandaganda, for instance, spatial patterns from more than one ceramic phase are used to make an argument for the presence of the CCP (Whitelaw 1993, 1994), although the precise temporal relationships between features and activity areas are not apparent. Another complication is that the building materials used by EIA farmers leave ephemeral traces of structures. For this reason, there are few examples for the internal organization of houses during the EIA, which would help demonstrate the binary oppositions predicted by the CCP.

On a methodological level, Huffman (1996: 15; 1997: 150) has argued that using the direct historical approach to test models of intra-settlement organization minimizes the temporal gap between the ethnographic data (the source) and archaeological residues (subject) of interest to Iron Age archaeologists. Yet, temporal limitation is only one of the problems attending the use of specific historical analogs. The identification of homologous traits (as defined above) and mosaic evolution are others (Lyman and O'Brien 2001: 317-323). As Lyman and O'Brien (2001: 319) explain, mosaic evolution is a term used by paleobiologists to refer to the evolutionary process whereby "different characters (traits) in a lineage [in this case, a cultural lineage] can evolve independently of one another and that each lineage can also evolve independently of every other lineage (Elderedge, 1989)." It is therefore "unreasonable to assume that all traits of the subject culture evolved at equal and consistent rates."

Although not expressed in the terms just presented, several writers have suggested that the CCP assumes direct historical continuity from the present to the past in southern Africa (Lane 1994/1995; Segobye 1998; cf. also Kent 1998; Stahl 1993).

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Even in cases where historical continuity can be reasonably assumed, such as during the LIA, archaeologists have questioned the use of certain ethnographic data—that is, specific *analogs*—to justify why the organizing principles captured in the CCP best explain the spatial distribution of settlement features (e.g., Kent 1998; Lane 1994/95, 1998; Segobye 1998).

While these methodological concerns, the CCP has probably received the greatest criticism at a theoretical level. Some researchers have questioned the general utility of the CCP, observing that it is more descriptive than explanatory. Hall (1984, 1987) noted that the model is ahistorical and incapable of explaining culture change, since it assumes cultural continuity during the Iron Age, while Lane (1998) has noted that the model cannot explain the wide variability in settlement layouts or how the pattern originated. It has also been argued that the CCP, like all other structural models, emphasizes form over content (Lane 1994/95, 1998). Clearly, in adopting structuralism and couching it as a "cognitive approach" to human behavior, Huffman is more concerned with the intellectual basis underlying human action and views use of space as a product of deep cognitive structure held in "the mind." Although this thesis is poorly developed, implicitly the model emphasizes how the cultural rules people draw on to live in the world structure the organization of settlements and the activities that take place within them.

Huffman has responded to several of these criticisms. In the first place, he sees the quantity of empirical data for the CCP an irrelevant point of debate. To identify the CCP, archaeologists rely exclusively on the identification of structural features and their spatial arrangement within settlements to ground inferences about early agropastoral community organization. Huffman argues that "diagnostic" features of the CCP, such as "the presence of central cattle byres with burials and storage facilities," are "sufficient evidence for the entire spatial pattern and corresponding cultural system" (Huffman (1986b: 302). In other cases, "the central byre, burial and dung-lined pit are sufficient evidence for *labola*" (Huffman 1998: 58), which implies the entire cultural system is present since "attitudes about procreation, leadership, ancestors and bridewealth [*labola*] are necessarily interrelated and…the Central Cattle Pattern is necessarily associated with them" (Huffman 1998: 57). Therefore, the *identification* of the pattern is not an empirical issue. Instead, at issue is whether (1) the organizing principles are in

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place during the EIA, or (2) whether the CCP was brought to southern Africa or developed internally.

An early date for the pattern closes debate on the second issue. In this respect, the site of Broederstroom has been central in tracing the antiquity of the CCP. Recently, Huffman (Klapwijk and Huffman 1996) has placed Broederstroom as the third phase of the Kwale sequence in South Africa, after the Mzonjani and Silver Leaves phases (see Figure 2.3). This means the earliest levels at Broederstroom date to the Kwale branch of the Urewe tradition. Since Kwale farmers originate in eastern Africa, Huffman proposed that the worldview associated with the CCP was brought to the region from eastern Africa (Huffman 1998). The first issue, however, remains open because of methodological and theoretical problems.

If we accept Huffman's rather bold position that the CCP and the associated cultural system can be identified by a select group of architectural features, then the methodological argument becomes moot because the CCP is in and of itself evidence for historical continuity in the region (Huffman 1998, 2000). However, this reasoning neglects two other important methodological problems.

The first concerns how the behavioral claims of the model are assessed using ethnographic data. To be of any use to archaeological research, ethnographically derived models *must* specify the kinds, quantity and distribution of artifacts and features expected in the course of archaeological fieldwork (e.g., Kramer 1985; Krause 1985). Behavioral claims about past economic, social, political or ideational organization are founded on these material correlates. Because the CCP only bases its claims on the distribution of a select group of architectural features, and not the kinds, quantity, and distribution of artifacts, its utility as an interpretive model is extremely limited. No middle-range correlates relating the spatial patterning of cultural debris to the cultural behavior claimed by the model have been made explicit.

The second methodological issue that weakens the interpretive power of the CCP involves the lack of attention paid to the formation processes affecting the archaeological record. The cultural behaviors or post-depositional processes that may mask or enhance spatial patterns have never been systemically examined. There have been very few studies of the depositional process affecting EIA settlements (e.g., Feely 1987; Fowler *et al.* 2000; Hall 1981, 1984; Marker and Evers 1976), although cultural factors, involving

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bone processing, have been called upon to explain the paucity of faunal remains at EIA settlements (Huffman 1990). A knowledge of disturbance processes and cultural practices of settlement maintenance and abandonment directly impact the identification of the CCP because it is based on two "tenets" of human behavior in settlements: (1) the spatial distributions of cultural materials are patterned or structured (i.e., non-random), and (2) these patterns reflect the loci of patterned behavior that existed in the past because "human societies everywhere divide their physical environment into discrete locations in each of which only a limited range of activity is permitted" (Huffman 1997: 150). Thus, inferences based on the identification of the pattern form "an argument about sameness [i.e., homology], not an argument by analogy" (Huffman 1997: 150, 1996: 6). In Schiffer's (1972) terms, there is direct correspondence between the *archaeological context*, in which artifacts interact only with the environment after a site is abandoned, and the *systemic context*, or when artifacts were participating in a cultural system. It cannot be assumed that there are direct links between human behavior and the patterning of artifact and feature distributions in settlements. These must be demonstrated.

Huffman has responded to the theoretical criticisms by emphasizing two points. The first is that the CCP must be ahistorical because a successful structural overview cannot be linked to a specific time, place or ethnic group. The other point is that the model targets "the underlying principles that give structure to society" (1997: 150). As such, it is "not designed to investigate daily behavior and dynamics" (Huffman 1996: 5). However, he has also noted that, "Most daily behavior…can only be fully understood in terms of broader cultural patterns. Structural overviews and historical analyses are both necessary to understand the past (Huffman 1997: 150). Indeed, structural overviews are valuable. However, we need to be clear that social structure and social organization is not the same thing. Social structure is the network of social relations in a society; it is the total pattern or repertoire of social positions, or statuses, a society offers its members (Gibb 1965: 164). Social organization, in contrast, is the constraints placed on the range of behaviors that may be pursued by the members of a social system, which are defined by the roles and responsibilities society expects an individual to display in a given relationship (Goodenough 1965; Rothstein 1958: 34-36). Although Huffman claims to be addressing only the "structural" aspects of Iron Age societies, the approach he uses is a

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clear attempt to identify aspects of past social organization through the spatial expression of the structure of social arrangements. Relating spatial structure to social organization does have its pitfalls. Dietler and Herbich's (1994, 1998) studies of Luo spatial organization in Kenya have demonstrated how mere changes in the use of building materials, let alone changes in the structure and use of settlement space, can drastically alter the organization of social relationships (the organization of work groups) without affecting the existing social structure in any way.

The final point of a theoretical nature I would like to make concerns Kuper's Bantu Cattle Pattern and not its archaeological version, the CCP. At the most fundamental level, Kuper's (1982) model proposed physical and symbolic boundaries that serve to regulate interactions between people in settlements and, in turn, these boundaries were viewed as analogs for a wider social and ideational order (Douglas 1995: 3; Hillier and Hanson 1984). The model emphasizes how the cultural rules people draw on to live in the world structure the organization of settlements and the activities that take place within them. Kuper's point that *activities* are structured—the actual practices and movements of people within settlements—and not just "settlements," has been neglected in the translation of the Bantu Cattle Pattern from ethnographic to archaeological model. The notion of practice is important to debates over the antiquity of the CCP because the meaning ascribed to space does not reside in the material world, but is invoked through practice—by how people engage the world through their bodies, with artifacts, and in relation to other individuals (Bourdieu 1977; Moore 1986, 1994). People, space, or objects can only gain identity through their social existence in the material world. Social expressions of culture are defined by practice in reference to cultural "templates" or "blueprints." Huffman's claim that the model cannot be used to investigate daily behavior and dynamics is theoretically unwarranted. Structures are expressed in daily practice, so the conclusions reached at either scale should be compatible. The main problem is that few archaeologists in southern Africa have balanced the structural model against smaller-scale historical analyses of events and processes that occurred during the Iron Age (e.g., Hall 1998).

From this perspective, structural analysis is best used as a *stage in research*—a point of departure rather than an endpoint—and it must be aligned in some fashion with social analyses of particular historical contexts (Hodder 1982, 1989; also Preucel and

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Hodder 1996: 302-308). Only in this way can archaeologists situate abstractions, such as male/female, left/right, and public/private, in their proper historical and cultural context. As Preucel and Hodder (1996: 304) have recently observed: "We do not have to assume that the [structural] codes are 'in the mind'. Rather, they are 'in society' and are subject to material and social constraint." Through the study of material and social strategies, it may be possible to understand why codes for behavior "held in the mind" change. This is not an "historical particularist" argument (Huffman 1996: 5), but one that simply acknowledges we must develop a deeper understanding of long- and short-term patterns of change and continuity in African lifeways.

This issue must be dealt with at two levels. Methodologically, archaeologists must develop a better understanding of the material and social strategies of EIA farmers. This must involve some attempt to understand the social origin and significance of material culture, and this necessarily requires a "dynamic, diachronic perspective founded upon an appreciation of differences in the contexts of both production and consumption" (Dietler and Herbich 1998: 244). We cannot infer the factors regulating the organization of past activities without first developing a very detailed understanding of the activities themselves. At the same time, we cannot analyze activities in such fantastic detail without then considering how they relate to the organization of other activities or how they are integrated into cultural systems.

Second, a consideration of the social functioning of space must be integrated in some way with current social theory. A fundamental challenge is to understand how regularities in social and technical behavior and the structures and principles underlying the social and ideational organization of society influence and govern each other. A theoretical perspective that relates social practices to broader cultural structures is therefore an appropriate way to investigate how the morphological characteristics of the CCP are *generated* on the ground. Such a perspective also places people as active agents in creating their social world, rather than being passive recipients of cultural rules and norms. If archaeologists want to understand the interrelationships between material culture and social processes, they must be prepared to develop a deeper understanding of social processes. Analyses must therefore move beyond the study of structured sets of differences in *material culture* and its spatial distribution towards evaluating how these patterns reflect structured sets of differences in *social practice*. Only at this point can we

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ask if the organizing principles proposed by the CCP adequately explain the spatial organization of behaviors in EIA settlements.

REVISITING THE MODELS

The social implications of the organization of production and the social and symbolic significance of settlement organization have become central issues in the study of the organization and development of early farming societies in southern Africa (e.g., Hall 1987, 1990; Huffman 1982, 1986, 1996, 2000). Archaeological models built around these research issues have approached the study of EIA society from two different perspectives, and much debate has concentrated on the contradictory conclusions reached by each line of research.

The identification of the CCP at several EIA sites directly challenged Hall's proposal that "egalitarian" organizing principles were part of EIA society. The evidence for the CCP and the hierarchical social system associated with it made the two models incompatible. Huffman (1993, 1998) argued that Hall's "egalitarian" mode of production could not have existed alongside a patrilineal, hierarchical system of governance grounded in competitive system of prestige goods exchange involving the use of cattle as bridewealth payments. Further, Huffman (1990: 2) argued that certain characteristics of agricultural societies, such as differential access to resources, conceptions of private property and ownership, and the ability to accumulate surplus, present a fundamentally different socioeconomic situation from hunter-gatherers.

However, not all of these characteristics are exclusive to farmers (Bettinger 1991). Matters are further complicated by an increasing amount of archaeological evidence for the partial or wholesale adoption and elimination of foraging, herding, and farming subsistence strategies by various groups at different times and places throughout sub-Saharan Africa (Deacon and Deacon 1999; Denbow 1990; Hall 1990; Maggs 1980a, 1984b; Vansina 1995, 1994/1995). As such, Hall and Huffman do not account for a great deal of archaeological and anthropological research that has demonstrated how hierarchy and egalitarianism are fundamentally interrelated and may coexist in many, if not most, social systems (Berreman 1981; Flanagan 1989; McKinnon 1991; Myers 1985; Schiller 1997). For instance, Feinman (1995: 256) and Flanagan (1989) have discussed

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how inequality based on gender, age, ability, and temperament exists even in the most egalitarian social systems. Like many other archaeologists who feel these contradictory economic and ideological spheres are "likely to be temporally or spatially separated" (Blanton et al 1996: 7), Hall separates them into different "production modes," while Huffman separates them into different "worldviews."

The validity of either model is not solely an epistemological debate about how foragers, herders, and farmers organize their societies. Rather, methodological and evidential problems are also at issue. If we accept the substance of Douglas' insights cited at the beginning of this chapter, at the most general level it can be argued that each model has only illuminated portions of the events and processes operating in EIA societies. We must therefore ask whether the contradictory organizing principles proposed by both models are *compatible*. Simply stated, *is a domestic mode of production incompatible with the CCP*?

OBJECTIVE AND RESEARCH QUESTIONS

The objective of this study is to evaluate whether the behavioral claims of the domestic mode of production *and* CCP models explain patterns of activity organization in an EIA settlement. I will address this general research question by evaluating several key organizing principles offered by current models of EIA community organization that require further testing against archaeological data. I have derived several testable hypotheses from these claims, which are presented in Table 3.1. In this thesis I will focus on five unresolved questions:

(1) Does the organization of production arrangements during the EIA match the expectations of the Domestic Mode of Production model?

(2) Are activities within settlements spatially segmented according to gender and task function?

(3) Are function-specific areas, such as "male assembly areas," are discernable in the archaeological record?

(4) Is social differentiation between households in communities reflected in the spatial positioning households and their associated debris?

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(5) Do the ideational principles and symbolic proscriptions predicted by the CCP best explain the *use* of space in EIA settlements?

To examine these issues, I propose an alternative approach that investigates the organization of activities in EIA settlements. To monitor activity organization in an EIA settlement, I focus upon an analysis of the movement of portable equipment—such as ornaments, tools and instruments—through a cultural system to model behavioral patterns at different locations in settlements. I limit the scope of this dissertation to the study of ceramic data from a single, well-preserved archaeological settlement. Ceramics are useful for such an analysis for several reasons. They are abundant, durable, and are used in a wide range of activities in African societies, from mundane daily activities to institutionalized ceremonies like weddings, initiations, funerals and harvest celebrations (Barley 1994). One may also specify the kinds, quantities and distribution of ceramic artifacts resulting from different activities. For instance, aspects of political organization can be addressed by identifying the material signatures of a centralized men's assembly area documented ethnographically, while the social and symbolic dimensions of life in villages may be evaluated by testing claims made about the spatial organization of male- and female-related crafts (e.g., iron and ceramic production) and the ritual uses of pottery (e.g., Huffman 1990, 1993; Whitelaw 1994, 1994/95). In Table 3.1, I also summarize a series of operationalized hypotheses that may be used to address specific aspects of the models using ceramic data.

How ceramic data may be used to monitor activity organization in archaeological settlements is a methodological issue. Thus, a considerable portion of this dissertation is devoted to developing a methodology and typological systems that will allow archaeologists to monitor the flow of ceramic artifacts through EIA village settings from their establishment to their abandonment. The goal in using this methodology is to develop a model of the production and use of ceramic objects in an early agropastoral context.

I apply the methodology to ceramic data from the ninth century AD settlement of Ndondondwane situated in the lower Thukela River basin in the eastern lowlands of South Africa. This case study has been selected for three principal reasons.

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First, Ndondondwane was occupied for a short span of time not likely exceeding the ninth century AD (Maggs 1984c; Loubser 1993; Greenfield *et al.* 1997, 2000). Consequently, it has well-preserved artifactual and botanical remains and has experienced limited settlement drift during its occupation (Maggs 1984c; Loubser 1993; Greenfield *et al.* 1997). The site is therefore rather different from other early farming settlements in this area, most of which were occupied for several centuries (Maggs 1980a, 1984b, 1989, 1994/95; Maggs and Ward 1984). Focusing on Ndondondwane therefore overcomes a major analytical problem adversely affecting the archaeological interpretation of intra-settlement spatial organization in southern Africa.

Second, renewed research at Ndondondwane between 1995 and 1997 implemented a series of surface and subsurface reconnaissance techniques and vast horizontal excavations to discern the spatial distribution and association of EIA deposits at the site (Greenfield *et al.* 1997, 2000; van Schalkwyk *et al.* 1997). The excavators have also recently been able to discern microstratigraphic relationships between different activity areas within the settlement (Greenfield *et al.* 2000). Thus, analyses of activity organization at Ndondondwane benefit from a spatial and temporal resolution which is currently unparalleled elsewhere in southern Africa. At present, data from the excavations at Ndondondwane provide one of the best case studies for examining competing models about EIA community organization.

Lastly, Ndondondwane is a type-site in the regional ceramic sequence of the eastern lowlands that falls within the second phase of Kalundu ceramic tradition in southern Africa (see Figure 3). The Ndondondwane phase ranges from *c.* AD 780–970. As the economic and spatial evidence for the CCP is claimed at earlier-dated settlements in southern Africa, Ndondondwane should manifest all of the physical and behavioral attributes associated with the CCP, and these should be expressed in the structure of settlement features and the organization of activities that occurred in the village.

CHAPTER SUMMARY

This chapter has provided a critical assessment of current approaches to the study of early farming communities in southern Africa. The domestic mode of production model has been rejected on ecological and theoretical grounds, but there is little

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empirical evidence for the organization of production arrangements during the EIA. Likewise, researchers have criticized the CCP model for its normative approach to socio-spatial relations, but have not attempted to relate archaeological patterns to analogous social processes documented ethnohistorically. The difficulty is not that the models are necessarily *wrong*. Rather, a poor understanding of short- and long-term patterns of activity organization in EIA settlements does not allow archaeologists to predict when such interpretations will be *right*. I have argued that many of the current methods and criteria used in the analysis of EIA community organization are too ambiguous to provide reliable interpretations of activity organization at the settlement level. This had led to unresolved questions regarding the scale of EIA society, the organization of production, social inequality, political organization, and the nature of ritual and symbolic practices in EIA communities. To evaluate these questions, I will investigate the economic, social and spatial dimensions of artifact production, use, and discard in a southern Africa EIA farming settlement. In the following chapter, I outline a body of theory and set of analytic methods that may be used to model different stages in the ceramic production-consumption life cycle. When used in conjunction with other data on regional and intra-settlement organization, the activity life-cycle model provides an alternative perspective to evaluate current archaeological and ethnographic claims about life in early southern African farming villages.

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Table 3.1. Hypotheses derived from the behavioral claims of the Domestic Mode of Production and Central Cattle Pattern models that may be tested against ceramic data.

Claim	Derived Hypotheses	Operationalized Hypotheses
Domestic self-sufficiency	Production is a domestic replacement activity	Scale of production is low
		Ceramics made primarily for utilitarian use
		Pottery styles are exclusive to households in a village
Household scheduling	Production is seasonal and part-time	Pottery production is part-time and seasonal
Certain activities are restricted to domestic (private) and central (public) areas of settlements	Domestic and public activities are spatially discrete	Functional areas correspond to those documented ethnographically
	Male- and female-related production activities are respectively restricted to central and peripheral areas of settlements	Pottery production is restricted to peripheral areas of settlements
		Ceramic production loci occur outside central areas
Settlement head or central authority has control over the production and distribution of goods/foodstuffs	Central grain storage	Grain pits and/or storage containers will occur in livestock enclosure
Social differentiation	Principle household is located upslope of livestock enclosure	The location of households will distinguish status differences status in the settlement
		The contents of households will distinguish status differences status in the settlement
Political organization	Male "assembly areas" occur within or near the central livestock enclosure	"Assembly areas" will have an absence of cooking vessels and an abundance of serving/short-term storage vessels.
Initiation rituals	Public puberty rituals occur within central areas of settlements	Bottomless pots, figurines, and ceramic heads found at EIA sites were used in public initiation ceremonies.
	Certain pit fillings related to objects used during a period of seclusion during girls initiation	Pits will be filled at various stages during the occupation of a settlement.

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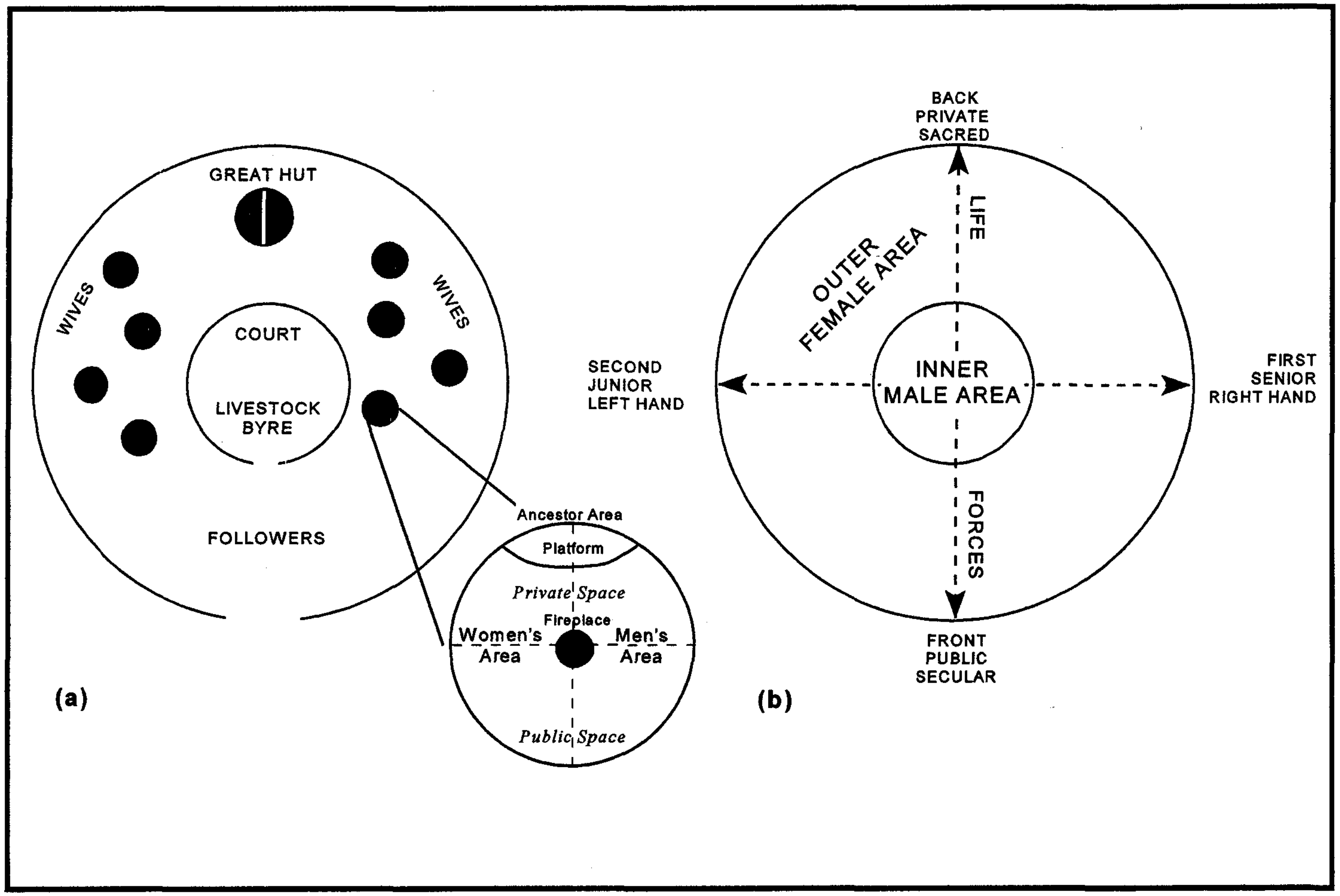

Figure 3.1. Spatial characteristics of the Central Cattle Pattern (after Huffman 1982, 1989; Kuper 1982): (a) idealized village layout and house plan, (b) key organizational principles.

PART II

THEORY, METHODS AND DATA

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CHAPTER 4

THE APPROACH: MONITORING CERAMIC PRACTICE

> Material culture is nowhere as simple as it once seemed to be.
>
> *Dean Arnold (1991: 341)*

If archaeologists are to have any commitment to understanding the past in terms of the activities and movements of people across landscapes, in settlements, or within houses, we must develop the means to describe practices and then attempt to understand the social implications of them. In archaeology, description involves the production of statements about the physical properties of objects and features of past activities and their spatial relationships to each other. Archaeological description is confined to contemporary phenomena, the *archaeological context,* wherein artifacts interact only with the natural environment (Schiffer 1972). Understanding the social implications of practices based on data from the archaeological context involves making inferences about how artifacts were participating in a past behavioral system, the *systemic context* (Schiffer 1972). In moving from the present to the past, archaeologists ascribes meaning to material culture patterning by shifting attention from the realm of observation (description of the archaeological context) to the realm of inference (interpretation of the systemic context). Kaplan (1964) suggests that meaning may be given to *acts,* a "succession of biophysical events," in which interpretation aims at understanding "the actor's purpose, or in the goal to which the actor is directed" (Kaplan 1964: 139). Since acts do not have an inherent meaning, Kaplan (1964: 139) suggests we may interpret *actions,* which is "an act considered from the perspective in which it has meaning for the actor," that is explained from "the perspective of a particular theory or explanation of the action" (1964: 359).

Giving meaning to acts is a methodological exercise—a set of analytical tools used to describe how and where artifacts were made and used in the past. Giving meaning to actions, in contrast, and is an exercise of explanation, which requires a theoretical framework to suggest who did what, where, including or excluding whom, and why. These two components of archaeological inquiry demand that practices must

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first be described and then placed within a conceptual framework so they may be interpreted in terms of the structures, rules, and norms they act to reproduce.

In this chapter, I outline a methodology for the study of the movement of portable ceramic objects through a cultural system. This approach is based on the notion that prehistoric activities must be grounded in an understanding of social practice, for all artifacts are utilized in a framework of human social relations. Indeed, it is difficult to think of a situation in which artifacts do not play some direct or indirect role in human interactions (Schiffer 1999). In the following discussion, I first address certain theoretical considerations that must be made about the relationship between technology and society. I then detail analytical methods that may be used to describe ceramic practice in terms of production and consumption. This methodology will then be applied to the ceramic assemblage from Ndondondwane to evaluate the organization principles offered by current models of early agropastoral community organization in southern Africa.

THE SOCIAL DIMENSIONS OF TECHNOLOGICAL PRACTICE: A THEORETICAL OVERVIEW

Only very recently has the anthropological study of technology, a field of study once considered "dry, even intellectually arid and boring" (Sillitoe 1988: 5), been infused with a theoretical depth "that refuses to deny the *sociality* of human technological activity" (Pfaffenberger 1992: 493). Central to this endeavor has been the notion that technology gains social significance through its production and use (Dobres and Hoffman 1999; Lemonnier 1993; Pfaffenberger 1992). Recent developments in the areas of social theory, anthropology and archaeology have emphasized that material culture is as much a social production as it is a technical one (e.g., Bloor 1991; Dobres and Hoffman 1994, 1999a,b; Lemonnier 1986, 1992; Pfaffenberger 1992). In particular, it has been made clear that to gain any critical understanding of the social dimensions of technology and material culture in general we must also focus our attention on how things are made and how they are used.

In hindsight, this argument would appear rather obvious given that it has long been anticipated in the anthropological literature (Miller 2000). It is difficult to imagine a material world created by humans that did not come about by choices that were as much social as they were technical. It has also been recognized for some time that goods

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are produced within a system of meaning, which defines the array of products generated in a society, the actions and choices governing their production and use, and their value. Objects "materialize" the social, symbolic and ideational context in which they were created, and in turn are "needed for making visible and stable the categories of culture" (Douglas and Isherwood 1979: 59). The idea that technology is a *product* of culture and is used to *reproduce* culture is not new.

Despite the long standing notion in anthropology that technology is a social phenomenon, the resurgence of interest in this topic has challenged archaeology to develop a better understanding of how technological systems and practices are integrated into society (Pfaffenberger 1992). As a result, an earlier emphasis on the social significance of *artifacts* has refocused on the *actions* involved in making and using artifacts and how these are influenced and/or governed by social processes. Analytically, it is through the minute study of techniques and artifacts that the economic, social, and symbolic processes underpinning the production and use of technology has reemerged as a valuable approach to the study of culture (Dobres and Hoffman 1992a).

Since the early architects of anthropology predicted the doom of material culture studies there have been great advances in the analytical methods used to examine artifacts at the microscopic and chemical levels. These methods are now accompanied by concerns with the material culture patterning at different spatial and temporal scales and the broader cultural context of its production and use. In the face of a massive amount of technological data, archaeologists interested in the social dimensions of technology have more recently been confronted on a theoretical level with a need to incorporate advances in social theory into archaeological interpretations, particularly those analyses that take households or settlements as basic units of study. As Dobres and Hoffman (1994: 213) have argued, the objective of understanding the past at smaller spatial scales, in terms of the activities and movements of people in settlements or within houses, "is not to describe microscale prehistoric *activities*, but to understand microscale social *processes*."

The archaeologist is faced with several problems. Social theory deals with abstractions and ideological constructs, such as kinship, status, and gender, none of which are easily accessible to archaeological analyses. Ever present is the danger of reifying these abstract concepts into objects or universal patterns of behavior: certain

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objects are "men's" and "women's" tools (Gero and Conkey 1991); the distribution of ceramic styles is indicative of marriage and residence patterns (Deetz 1965; Hill 1970; Longacre 1970; Whallon 1968, 1969); the complexity of mortuary treatment is indicative of social standing in a community (Tainter 1978; O'Shea 1984; McGuire 1992; Parker Pearson 1982). Complicating matters is the realization that identity is recognized by people differently situated in society, based on how people perceive their own identity, their interests, and the social contexts and material media through which they express them (e.g., Moore 1986).

In recent years, practice theory (Ortner 1984), including Giddens's (1984) structuration theory and Bourdieu's (1977) concept of *habitus* have been used by some archaeologists to understand the dynamic interaction between people'sbehaviors, their activities,, and the ideational aspects of culture (ideology, religion, and cosmology). At the core of these theories is the view that social systems are constructed out of particular social practices, and these practices take place within the specific cultural and historical conditions they maintain. In this respect, practice theory is of particular interest to archaeologists because it is designed to comprehend the articulation between cultural structures and human behavior.

Giddens' (1984) structuration theory is designed to understand day-to-day activity in relation to broader cultural structures. This theory attempts to sketch out the ways in which the domestic routine and its material aspects relate to social structure and how changes in one may influence changes in the other. Bourdieu's (1977, 1980) account of practice theory is more applicable to archaeology because he developed his theory in relation to material culture and the use of space. Unlike Giddens, Bourdieu has applied his theory of practice to many empirical domains. Key to Bourdieu's theory is the notion of *habitus*, which are durable "dispositions" for acting in particular ways (practice) transferred from generation to generation. These dispositions are composed of an unconscious practical logic and knowledge that cannot be reduced to mere rules; what Giddens terms "practical consciousness." Regular patterns of behavior are a result of practices generated through *habitus*. Viewed over the long term, these regular behavioral patterns, or *tendencies*, give the appearance of being organized according to a rigid set of cultural rules. However, in the course of social action, practices may be

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altered, which in turn alter the deep cultural structures where practical logical and knowledge are held.

Essentially, practice theory is an attempt to integrate the study of culture by implicating both the intellectual (cognition or mind) and behavioral (exchanges of matter and energy) facets of cultural systems in analysis. What is emphasized in practice theory is the notion that humans are agents of change in altering cultural structures through their daily practices, rather than being passive recipients of cultural rules. Practice theory differs from other behavioral (e.g., materialism) or cognitive (e.g., semiotics, structuralism) approaches because there is an explicit attempt to understand and explain the bi-conditional (dialectic or recursive) nature of human activity; that is, how it both conditions and is conditioned by broader culture norms and structures.

These ideas have two important implications for archaeological studies of practices involving portable artifacts. First, practical knowledge is structured by people's experiences of the world. These in turn structure people's actions, which structure the conditions in which they live. By knowing the conditions and objectives of their actions (practical knowledge) people continually construct social and cultural existence, incrementally altering it from its previous form. In studying the effects of human action in the physical, spatial world, archaeology is well suited to detect changes at different scales and rates: both the small, incremental changes and the broader large scale changes that are a product (or production) of people living under different conditions of social and cultural existence. Second, particular types of objects and archaeological deposit do not necessarily reflect the occurrence of certain social practices. Daily activities are organized according to many different categories of reference simultaneously: expediency, practical knowledge, social categories or the ancestors. The organization of archaeological sites and deposits are therefore likely to be structured according to particular cultural values expressed through the material residues of social practice. However, we cannot simply proceed by analyzing the kinds, quantities and distribution of material culture to reveal the form of the social system. It is first necessary to ground our social inferences in a detailed understanding of the formation of the archaeological record we seek to explicate (Schiffer 1972, 1987).

Bourdieu's (1977, 1980) concept of *habitus* provides a powerful framework for situating the reproduction of material culture in social life because it relates actions, or

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practices, to the cultural "dispositions" people draw upon as boundaries for the possible patterns and choices made in the production and reproduction of cultural life. While patterned actions may appear regulated by "rules", many cultural practices "operate without reference to, or any symbolic mastery of, rules" (Dietler and Herbich 1999: 246). For instance, most crafts are learned through observation and emulation without a formal set of rules (Herbich 1987). Practice is therefore not predetermined, bound by a "mental template," but is constantly being altered as it adjusts to new demands. When practical demands conflict too greatly with organizational system of dispositions, they must be altered. This perspective would shift the focus of analysis of activities as being "regulated" by society to seeing the process of performing activities as being coeval with "regulating" society.

This being the case, there is also little room for archaeologists to demand that only a limited range of factors will influence the organization of activities across site space. A number of archaeologists have proposed several key factors affecting the organization of activities in settlement settings (Arnold 1991: 105-109; Binford 1978; Kent 1984), including (1) the types of activities that occur in a place, (2) who undertakes them, (3) the frequency of the activities, (4) the spatial requirements needed to perform activities, (5) the duration of activities, (6) the regularity or consistency of scheduling activity episodes, (7) the amount of residue generated during activity episodes, and (8) whether the activities undertaken require high participation (continuous presence) or low participation (little or no presence of participants is required). In archaeological cases, these parameters may be inferred by examining such variables as the size of activity areas, the residues generated and a comparison of the kinds and distribution of material culture in multiple settings. Conclusions reached at this level of analysis provide a means to evaluate the organizational rationales behind the spatial organization of technical practices.

While analytical methods exist for identifying such patterning, there is a poor theoretical understanding of the relationships between daily routines and the broader rationales for conducting daily routines in certain ways. For example, there is an implicit assumption in many activity-area models, such as the one described above, that activities are managed and scheduled according to the *types* of activities undertaken in different areas of settlements. However, such a law-like generalization does not consider that all

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the factors influencing the use of space listed above are socially determined. The spatial structuring of settlements and activities within settlements constitutes a powerful symbolic representation of social relations because it forms the physical environment in which the *habitus* is expressed. Through *habitus* are produced the perceptions of the "natural order" of social relations formed in the course of daily life. Frequency, spatial requirements, duration, participation, and the regularity of activities are all governed by this "natural order," yet profound changes in any one of these factors can question and challenge the very "naturalness" of the broader social order. The value of practice theory is that it does not disarticulate any human behavior from its place within human sociality (Ingold 1993). As such, it does not set up a priori structural dichotomies between technical, social, or ideational behaviors. These are all facets of human action in the world that require our attention.

Bourdieu's theory of social practice is particularly helpful in this regard because it relates actions to *habitus*, or how people may take different paths toward action within a common framework of structurally conditioned behaviors (Bourdieu's *tendencies*). Theoretically, we may relate actions to *habitus*, but there still exists the methodological problem of relating acts to actions in order to understand the social consequences of biophysical performances and the significance of changes in them over time. Therefore, the problem remains of how to link daily practice to the broader social and psychological factors people draw upon to orient themselves spatially and use space to define themselves socially. As a step towards addressing this problem, in the following section I discuss an analytical approach that can be used to describe technological practices involving the production and use of ceramics. The express purpose of offering this approach is to evaluate the models of EIA community organization in southern Africa, which posit different structures, rules and norms regarding the context in which the technical actions addressed in this study took place.

METHODOLOGY: MONITORING THE CERAMIC LIFECYCLE

A starting point for examining the relationships between microscale activities and the cultural processes influencing them involves investigating the life cycle of artifacts produced in the past. The notion of an artifact life cycle is in many ways similar to the

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behavioral chain or flow model proposed by Schiffer (1972, 1976: 46-48) and the *chaîne opératoire* proposed by Leroi-Gourhan (1963). Both the flow model of the American tradition and the *chaîne opératoire* approach of the French *technologie* school[1] are primarily analytic frameworks for identifying and describing the life history of artifacts, but differ in a number of important respects.

The behavioral or flow model framework developed by Schiffer (1972: 157) proposes that durables ("tools, machines and facilities – in short, transformers and preservers of energy") and consumables ("food, fuels, and other similar elements whose consumption results in the liberation of energy") make up a complete inventory of a cultural system. During its life use within a cultural system, elements may proceed through five processes: procurement, manufacture, use, maintenance and discard. The flow model is basically a step-wise breakdown of the production-consumption cycle: production involves the transformation of raw materials or components into usable objects, distribution involves moving finished goods or components from producers to consumers, and consumption is how the finished products are put to use and ultimately discarded (Costin 1991: 4). Flow models were most often employed to model durables and consumables through their respective life cycles to generate hypotheses (Schiffer 1972, 1976), cautionary conclusions and law-like generalizations (e.g., Gould 1978).

In contrast, a similar framework developed by French anthropologists is founded on the notion that entire technological systems are embedded in social processes and relationships (Creswell 1972; Lemonnier 1976, 1983, 1989, 1991, 1992; Leroi-Gourhan 1943, 1945; Mauss 1935). The argument developed in the French *technologie* school is that the technical actions that make up all five processes of the production-consumption cycle are not solely the result of "natural" constraints or pressures, but are grounded in cultural systems. Economic, political, religious and symbolic considerations also govern the materials, tools, techniques, and people involved in the production, distribution, and

[1] The term *technologie* in the French literature cannot be equated to and does not have the same meaning as "technology" as it is used in the Anglophone anthropological or archaeological community. It is defined as a social science of technical facts (Sigaut 1985, 1987, 1991) or as the "anthropology of techniques" (Lemonnier 1983, 1986, 1989, 1990, 1992, 1993). The French terminology is retained in place of translated equivalents in English, primarily because there exists no Anglophone anthropological research in this area specifically denoted by the French study of *technologie*.

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use of both traditional and modern technology (e.g., Childs and Killick 1993; Dietler and Herbich 1994; Dobres and Hoffman 1994; Ingold 1990; Lechtman 1977; Lemonnier 1986, 1992, 1993; Pfaffenberger 1988, 1992). Neither social nor material necessities alone determine technical actions or the products that result from them. They instead result from a complex mingling of both material and cultural considerations.

The French school of *technologie* may be considered as an alternative way to frame the archaeological study of activity organization. First, it emphasizes that archaeologists must pay greater attention to the processes involved in and governing the creation of technologies. Second, it has made clear that in focusing on how technologies are used and distributed, archaeologists have often divorced technological phenomena from the social contexts in which they are made. Instead, much attention has been placed on (1) the predictable and controllable physical and chemical processes surrounding how objects are made to infer their utilitarian use(s) (function) or (2) the non-utilitarian attributes of artifacts thought to have served a communicative function in past societies (style) (Lemonnier 1992).

At the heart of the *technologie* school is the notion that activities involve five heuristically separated elements, which include matter, energy, objects, gestures in sequence, and knowledge (Lemonnier 1989, 1992). These last two elements derive from Marcel Mauss's (1935) concept of *enchaînement organique*, or the way in which natural resources are sequentially formed through bodily gestures carried out in social milieus. This emphasis on the knowledge required to execute bodily practices in the performance of activities provides an important link between the physical actions that make up activities and the cultural context in which they occur. Another important aspect of this concept is Mauss's notion that through daily activities cultural traditions are maintained and passed on to the next generation through daily activities. It is this notion that links daily activities to the broader processes of cultural transmission.

However, for archaeology, the influential ideas of Mauss lacked methodological rigor. Leroi-Gourhan (1943, 1945, 1964a, 1964b) was the first to operationalize the connections between technical gestures that result in artifacts. Leroi-Gourhan's (1963) main interest was in discerning the sequential technical operations used to manufacture objects. The *chaîne opératoire* (or "operational sequence") refers to "a series of operations which brings a raw material from a natural state to a manufactured state" (Cresswell

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1976: 6). However, many *chaînes opératoires* do not lead to the creation of material goods, and archaeologists therefore cannot use the methodology to access all activities. For this reason, Lemonnier (1992: 26) considers an operational sequence as "more simply the series of operations involved in any transformation of matter (including our own body) by human beings." This definition does more than broaden the concept of the operational sequences. It also expands the notion of "technical" or "technological" behavior to include every action involving a "physical intervention that leads to a real transformation of matter, in terms of current scientific laws of the physical world" (Lemonnier 1992: 5). Unlike the behavioral or flow model, the *chaîne opératoire* is both an analytical method *and* an interpretive methodology "capable of forging robust inferential links between the material patterning of technical acts and sociopolitical relations of production" (Dobres 1999: 124).

I argue, however, that there are two current limitations with using the notion of *chaîne opératoire* to investigate past ceramic production and consumption activities. First, research on ceramic *chaînes opératoires* has focused primarily on discerning the factors affecting the production sequence through a study of decisions made by potters during production. However, the decisions made by consumers throughout the life-use sequence concerning use, reuse, and discard have not been adequately considered. Extending the analytical methodology to the study of artifact consumption (use and disposal), which it is well designed to do, offers a valuable means of overcoming this neglect. Second, following Mauss (1933), Leroi-Gouhran (1943) conceived of the *chaîne opératoire* methodology as a way to move beyond the study of artifacts to consider the gestures that moved them. Thus, the study of artifact life cycles cannot focus just upon the finished products, but upon all outputs of a single production-consumption system, and ideally, their relationships with other systems. As Lemonnier (1992: 8-9) has argued, we must therefore attempt to understand how technologies in a given society are interrelated, and how technologies are integrated into social phenomena. Clearly, to examine the relationships between all technologies is beyond the scope of this dissertation. However, in focusing on ceramic production and use, it is at least worthwhile to consider the organization and use of other pyrotechnic activities.

The *chaîne opératoire* methodology acknowledges the possibility of great latitude in most every technical aspect of the human endeavor. It emphasizes the decisions made

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by potters throughout the production sequence and consumers throughout the use-life sequence. This allows archaeologists to move beyond *a priori* assumptions about the evolution of technology and the organization of production, the function of pottery and the activities pottery was involved in. This approach shares much in common with ceramic ecology, which emphasizes the interaction between ceramics and their natural and sociocultural context (e.g., Arnold 1985, 1993; Kolb 1989; Kramer 1985; Krause 1985; Longacre and Skibo 1994; Skibo 1992). However, the approach presents a significant departure from ceramic ecology because the natural environment is viewed only as a context for the production and use of material culture (and social relations) and is not a determining factor. Instead, it is emphasized that social agency is crucial in defining, determining and articulating particular technologies throughout the production-consumption sequences (cf. Dobres and Hoffman 1994: 231).

In summary, the ceramic lifecycle involves the production, distribution and consumption of finished ceramic goods and foodstuffs. Production and consumption activities can best be understood as a process of variety generation and selection: production is the process of variety generation whereas consumption is the process of variety selection (Redman 1978: 173). Together, these processes create patterns of activity organization distinctive of different cultural attitudes and social arrangements (Rice 1987: 201). Archaeologically, consumption and production activities are more apt to leave an identifiable record of debris, tools, features and finished products at specific localities. Distribution events, in contrast, occur at archaeologically invisible exchange nodes within networks that may span meters or large territories. Therefore, different classes of data and analytical methods are required to infer the nature and organization of each stage in the ceramic lifecycle. In the following sections, I discuss the data and analytical methods that can be used to reconstruct ceramic *chaînes opératoires*. This methodology is offered as an alternative to normative classifications of production and consumption systems.

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DATA AND ANALYTICAL METHODS

Identifying and Reconstructing Production Activities

In pottery making, the production sequence may be carried out in six general stages (Figure 4.1): (1) raw material procurement, (2) clay processing or preparation, (3) fashioning or shaping, (4) decorative forming, (5) firing, and (6) post-firing treatments, such as applying waterproofing resins, paints or other surface treatments (Gosselain 1995; Rye 1981). All of the stages are not necessary for producing pottery: clays may not be prepared before forming, objects may not be fired or may be subject to two firings, pots may not be decorated, or they may not receive any post-firing treatments. As well, different stages of the production process will be more visible, and therefore accessible, to the archaeologist than others. Gosselain (2000) suggests that the stages ceramic production may be understood with decreasing precision inversely to their execution in the past; that is, archaeologists will be able to learn the most about post-firing treatments, firing, decorative forming, vessel fashioning or shaping, and clay preparation, in this order.

Archaeologists rely upon four main classes of data to identify production activities and evaluate variation in the production sequence: (1) raw materials, (2) manufacturing implements and facilities, (3) unintentional by-products, and (4) intentional finished products (Arnold 1991: 87-91; Rice 1987: 177-180; Santley *et al.*1989; Stark 1985). The first class involves the raw materials used in production. The second set includes the implements or tools used in production, which reflect the potter's ability to control the production process. The third category involves the production residues resulting from errors in the manufacturing process, and these data may provide information on the location and organization of production (e.g., Rye 1981; Stark 1985; Johns 1977). The finished product is the final category and the analysis of ceramic vessels can generate data on patterns of distribution and characteristics of the consumer population (e.g., Feinman 1980; Fry 1981).

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Raw Materials

The raw materials involved in the production process, such as clay, temper and pigments, are among the most elusive indicators of ceramic production (Pool 1990: 93).[2] Rarely are they found in association with artifacts or facilities indicative of production localities (e.g., Rattray 1990; Sheets 1979). The rarity of raw materials at archaeological sites is not surprising, because ceramic production is an additive process, wherein unused materials may be recycled in the next round of manufacturing. Small amounts of raw clay, tempering material and pigments are easily incorporated in the soil matrix of a site, and would not be easily distinguished through conventional excavation techniques unless they were purposefully sought out. In cases when large amount of raw materials are recovered, they are usually found in production locales abandoned rapidly (Pool 1993: 288).

The raw materials used in ceramic production affect the physical properties of the finished product—their ability to retain contents, survive impact, heat and cool effectively, and survive rapid temperature changes. Characterizing the raw materials used in ceramic production from finished products is done for two reasons. The first reason is to understand how potters achieved a balance between the contents of clays to facilitate sufficient plasticity for forming and to prevent cracking caused by shrinking during drying. To achieve this balance, potters must achieve create a certain proportion of clay, minerals, non-plastic inclusions, and organic constituents in the matrix. This would have been done by adding or removing minerals, non-plastics and organic materials, or mixing more than one kind of clay. Knowing the different combinations or "recipes" used by potters in manipulating their raw materials, says much about the overall strategies involved in production in order to produce vessels with physical properties desired in use. These strategies directly relates directly to the labor investment and degree of standardization of the production sequence. The second reason is to discern the origins of clay by utilizing the residual mineral and chemical constituents of finished products. This has been particularly helpful in differentiating between places of

[2] Temper is a behaviorally loaded term that implies potters added materials to modify the natural properties of the clay. The term *inclusion* is a behaviorally neutral term and I use it in this work to refer to the material constituents that are visible directly or indirectly (as voids or casts) in pottery fabrics (or pastes).

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production and consumption, as well as indicating the strategies potters use in acquiring clays (Tite 1999: 197-200).

Production Implements and Facilities

Production implements include the tools and facilities used in ceramic manufacture. Tools and facilities and thus inform the archaeologist about the techniques employed during pottery making. Tools are used to prepare clays and pigments, form vessels (e.g., thin and shape) and execute designs and surface finishes (e.g., impress, incise, burnish, and paint vessels). Most tools are made of perishable materials, such as wooden sticks, leaves, reeds, gourds, basketry, matting, netting, corncobs, plant fibers, or hair (Rice 1987: 136-152), and as such are incredibly difficult to identify archaeologically (Stark 1985). A more complicating factor is that many tools may have been used in other activities. Indeed, tools such as grinding stones, stones flakes, bone or stone knives and points, began their use life in other activities. Production implements are not immediately self-evident and the identification of such items necessitates a study of use-wear analysis, residues of pigments of clay and their presence in production contexts at sites. Thus, the location of implements is not an independent criterion for establishing production locales, for location may serve as a main form of evidence for inferring manufacturing implements.

Facilities involved in ceramic production include relatively stationary construction, such as bins and pits for storing raw materials, tanks for slaking and levigating clays, trampling floors for preparing clays, potter's wheels and benches used for forming, kilns, ovens, and pits for firing, sheds to house manufacturing operations, drying vessels before finishing decorating or firing and while awaiting transport (e.g., Arnold 1985; Peacock 1982; Rice 1987, Stark 1985). However, many of these items are portable, and it cannot be assumed they spent their entire life history in one place. As well, much of this equipment is used in more sophisticated, full-time ceramic production workshops, which is uncharacteristic of traditional pottery production in sub-Saharan Africa.

Even more difficult is discerning open firing spaces typically used in sub-Saharan Africa (David and Hennig 1972; Gosselain 1995; Krause 1997). The preservation of open

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firing locales depends on identifying areas of baked earth. The hardness and thickness of the baked layer depends upon the fire temperature and the duration and number of times the surface was exposed to high temperatures. Seldom are open fires of long duration or of remarkably high temperatures (Rice 1987; Rye 1982; Shepard [1956] 1995; Gosselain 1991; Livingstone-Smith 2001), especially when used for small-scale production. As well, it is also difficult to discern if multiple activities, such burning trash, cooking food, and pot firing were conducted sequentially over the same patch of burnt ground (e.g., Stark 1985: 165). Despite the difficulties in identifying production implements to infer production techniques and locations they are best used in combination with other evidence of production, such has unintentional by-products.

By-Products and Residues

Making pottery creates a variety of unintentional *by-products* and *residues* that reflect the potter's control over the drying and firing process. If not properly dried and fired, ceramics may spall, melt or even explode during firing (Rice 1987: 104-107; Rye 1981). As well as damaged vessels (i.e., "wasters"), other residues of firing may include ash and charcoal accumulations, vitrified pieces of slag and fused sherds, and amorphous lumps of fired clay. In the absence of permanent firing facilities, firing residues form the best class of evidence for inferring the location and nature of firing procedures, but they are somewhat ambiguous.

Ambiguity comes in two forms. First, the definition of wasters is problematic because it is difficult to determine which sherds were discarded during firing and discarded in firing locations. It may be quite problematic to distinguish wasters from vessels broken in use and discarded in the same contexts as those broken and deformed during firing. Second, the disposal of production residues may come about in two ways (Arnold 1991: 89): materials may be recycled so that their original form and/or function may be changed; or materials may be relocated to another space so it they do not impede other activities. A third problem is that the identification of firing defects is not entirely straightforward. Vessel deformation is dependent upon the composition of the fabric (the processed clay matrix with or without temper) and firing temperatures. Some fabric compositions are more apt to exhibit firing defects, and others may only result in

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discolorations rather than bloating, sagging or warping. Some defects, like heat-spalls and firecracks, do not make vessels unserviceable, although they could be used anyway (Stark 1985: 17). Even severe cracking may be repaired. Considering the difficulty of identifying by-products, and in particular their origins, it is useful to employ Stark's (1985, 1989) terms differentiating *severely deformed wasters* from *de facto wasters*.

Finished Products

Successfully made final products are the fourth main source of evidence. The physical (form, size, color, decoration, surface treatments), mineralogical and chemical properties of each pot hold a great deal of information about their production and use. The different attributes of pots provide a partial record of the physical constraints, choices, and alternatives open to the potter, the labor invested in different stages of manufacture, as well as markings and residues of their use. The vessels and sherds that comprise an assemblage are a record of the variation in the selection and execution of such choices by potters of a tradition when fashioning, decorative forming, firing, and applying post-firing treatments to pottery. This variation is analyzed using a host of analytic, macroscopic, microscopic, and radiographic techniques to distinguish the nature of the various stages of the production sequence. There are a number of thorough and updated discussions of these techniques (e.g., Rice 1987; Tite 1999).

Ceramic Composition

The nature and kinds of material that comprise the body of pottery are important for establishing pottery manufacture practices. Pottery fabrics consist of the clay matrix and the inclusions found in that matrix which are visible to the eye macroscopically, and those visible with the aid of a hand lens or binocular microscope. Ideally, two types of materials may be identified in any fabric: (1) those that were originally present in the clay matrix before fabrication, and (2) those that were added by the potter. The first type of material occurs naturally in the clay, while the second kind distinguishes materials that were added to the clay, materials commonly termed "temper." Fabric types are subjective descriptive categories for ordering data. They are only definitions of phenomenon and may not represent a criterion potters would use to sort or classify

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pottery. The most important aspect of describing fabrics, and other ceramic attributes, is that the resulting classifications can be described, defined and repeated by more than one analyst. Many ceramic specialists see fabric as the basic unit for distinguishing between different types of pottery. In certain situations, fabric may or may not prove to be the key attribute by which ceramic assemblages can be differentiated and categorized.

Identifying clay and inclusion sources is important for establishing where pottery was made, and knowing the location of production is essential for characterizing production, distribution and exchange (Rice 1987: 177-180). Numerous physical and chemical analyses that compare the compositional characteristics of pottery with known sources have been used to different pottery from different sources (Rice 1987: 413-426; Tite 1999). However, ethnoarchaeological research in sub-Saharan African has demonstrated that potters tend to use readily available materials irrespective of their properties. Potters instead choose to modify those properties by altering the manufacturing technology (clay processing, fashioning, and firing techniques) (see Gosselain 1994, 1995, 1999; Livingstone-Smith 2000; Mercader *et al.* 2000; Walde *et al.* 2000).

Fashioning and Finishing

The aim of examining ways of fashioning, decorating, and firing pottery is to develop an understanding of the repertoire of techniques, means, and choices used by potters in manufacturing ceramics. The fashioning process results in vessels or objects of different morphology by using one or a combination of a small number of techniques. Several complicated schemes have been proposed to distinguish steps of the fashioning and decoration process (e.g., Pool 1990: 43-57; Courty and Roux 1995: 20; Rye 1981: 66-95). However, none of these were specifically developed for African ceramic series. Gosselain's (1995) six part classification system outlined at the opening of this section subsumes the building, shaping, and finishing procedures which alter the visual and tactile attributes of pottery (color, texture, and hardness) covered in previous schemes.

Pottery firing is the most hazardous stage in the production sequence and is a true reflection of the potter's skill and control over the firing regime. Three main elements that define a firing regime include atmosphere, temperature range and fire duration. In the open and pit firings most commonly used in Africa, the rise in

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temperature is rapid and the maximum temperature may only be held for a short time (Gosselain 1992; Livingstone Smith 2001). Open firings are somewhat dependant on whether fast or slow burning fuels are used (Shepard 1995: 77). Most firings reach a maximum temperature between 500 and 900°C (most within the 600 to 800°C range) in 20 to 30 minutes, but will only stay at this temperature for a few minutes (Gosselain 1992; Livingstone Smith 2001). While the atmosphere in open firing can change from reducing (carbon deposition) to oxidizing (carbon extraction), rarely will pottery be fully oxidized. The short duration of open firings and the close proximity of objects to sooty and smoky fuel does not allow enough time for organic materials to be burned out (Johnson *et al.* 1988), and usually only coarse-textured pottery can be open open-fired. A direct estimate of firing temperature from changes in mineralogy and microstructure is not possible because firing temperature also depends on the composition of the clay and on the firing atmosphere (Tite 1999: 189).

The available data on temperatures and firing durations measured during experimental and ethnoarchaeological studies indicate that pottery firing in modern African communities is highly variable (Gosselain 1992; Livingstone Smith 2001). Portions of the same pot may be subject to different temperatures and atmosphere conditions. Gosselain (1992, 1995) has argued that the firing temperatures, heating rates and other characteristics of pottery firings in African situations cannot be determined with any accuracy. Instead, Gosselain (1992) suggested that it is more important to develop a general understanding of firing conditions, fuels, firing locations, rather than trying to document specific variation in temperature and firing durations. Using a broader database, Livingstone Smith (2001) has supported Gosselain's position by further demonstrating how many different firing procedures or "techniques" may result in high and low temperature firings. Since temperature variation is easily distinguished by identifying vitrified (high temperature firing) and non-vitrified (low temperature firing) sherds, actual thermal profiles are not necessary for determining firing procedures. Other methods that target variation in firing procedures and conditions can be used. In Chapter 8, I outline a method that attempts to do this using core pattern data. I examine how organics and other mineral constituents of clay bodies react when subject to temperatures over 400°C, to infer clay acquisition, preparation and fashioning strategies.

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Inferring the Organization of Production and Distribution

Production and distribution are two dimensions of the ceramic lifecycle that serve to bring raw material to a finished state and the finished products to consumers. These aspects of an economic system are often separated analytically because they involve different economic strategies and sub-sets of social interactions (Pool 1993). However, distribution cannot be disarticulated from production because it is an extension of the production process. This is particularly important to consider in many prehistoric contexts because producers and consumers are often the same. When finished products are moved for use beyond the household in these situations, the mechanisms of distribution are straightforward insofar as few people other than the producer are involved in the distribution process.

Inferring the organization of production has typically involved classifying production arrangements and exchange patterns into one of a series of discrete "stages" or "modes" (e.g., van der Leeuw 1977: 392-404, 1984; Peacock 1981: 8-11, 1982: 8-10; Rice 1987: 184-186; see Table 4.1). The overriding concern in these schemes is whether households in a community were making items for their own use (generalized production, or the Domestic Mode of Production; *sensu* Sahlins 1972), or whether a group of specialized producers were making goods for use by a larger group of non-producers (i.e., specialized production).

The past decade has witnessed a growing dissatisfaction with these typological schemes as archaeologists attempted to situate prehistoric production arrangements within them (Arnold 1991; Costin 1991; Pool 1993; Rice 1987: 182-191). Recent criticisms mainly surround two points. First, the typologies are derived from a limited database of ethnographic, historic and archaeological cases. As such, in some cases archaeologists may be attempting to characterize ancient production arrangements that have no appropriate historical analogue. Second, typologies are concerned primarily with identifying the emergence of specialization as a means of inferring social complexity. Therefore, they have rather ambiguous expectations regarding the diversity and nature of small-scale production systems.

Recent studies have dismantled previous typological schemes in order to examine the dimensions of variation that are more important for characterizing ancient production systems. The different production models expect general agreement between

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a number of different dimensions or parameters, involving production *scale* (output) and *intensity* (labor input), *labor organization*, and the *social context* of production (Arnold 1991; Costin 1991; Pool 1993; Rice 1987: 182-191). Variation in these parameters is inferred through a study of nine variables, including the (1) distances from which raw materials are procured, (2) size and relative elaboration of production facilities, (3) volume of finished goods produced, (4) density of debris produced, (5) intensity of work effort, (6) proportional weight given to craft activities in household income, (7) scale or setting of the craft activities (socio-political context of production), (8) spatial extent of the distribution network for finished goods, and (9) the spatial organization of different production systems.

These new approaches still use a model of household production as a baseline to infer the organization of production (Table 4.2), although several variables are difficult to operationalize in archaeological cases. The intensity of work effort (Torrence 1986) relies on measures of output. However, for small-scale production systems, evidence for the seasonality of pottery making may prove a better indicator. The spatial correlates of different production systems are also not well known. However, residential contexts are presumed to be associated with part-time low-intensity, local production, while high-intensity, full-time economically important craftwork is expected in non-domestic settings (e.g., Arnold 1991; Costin 1991, 2000; Peacock 1981: 8-11, 1982: 8-10; Rice 1987: 184-186; van der Leeuw 1977: 392-404, 1984). Both these and the other variables can be assessed through an analysis of ceramic *chaînes opératoires* considered within the broader cultural context in which production took place, including the organization of other production activities. The proportional weight given to craft activities in household income may not apply to early agropastoral societies in southern Africa, since this implies that ceramics were valued as commodities in a market/finance system. This requires an understanding of the distribution network for finished goods. The ceramic data required for inter-assemblage comparison in the study area are not yet available, so the subject of ceramic distribution is beyond the scope of this dissertation. However, some mention should be made of the place and significance of distribution in the ceramic life cycle as it would pertain to intra-settlement distribution.

Distribution involves acts that link producers and consumers. The mechanics of interaction between producers and consumers influences the quantity and range of

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products available and the levels of demand condition the movement of pottery from producer to consumer. Levels of demand are determined by many variables, such as breakage rates, the density and distribution of the population, and how finished products are transported to consumers (Stark 1993).

The spatial distribution of a ceramic category within settlements or regions defines the range and direction of distribution. Vessels and other objects may move from producers to consumers in three main ways: the producer distributes products to the consumer, the consumer collects products from the producer, and/or through the intervention of a third party (wholesaler, middleman, or central redistributive agency) (Redman 1977: 9-10; Renfew 1977: 9-10). The number of people involved in each distribution system reflects the *scale* of distribution. The first two mechanisms characterize most patterns of distribution in pre-industrial societies in which the total amount of pottery distributed is small and the spatial range of distribution is limited to the immediate settlement or local area (e.g., Balfet 1981; David and Hennig 1972; van der Leeuw 1977). More complex mechanisms involve intermediaries in distribution, such as itinerant middlemen or arrangements by which both producers and consumers travel to a third location (such as local or regional markets) (Dietler and Herbich 1994; Kramer 1992, 1995; Miller 1981; Reina and Hill 1978: 207-229; Stark 1993, 1994). However, even in modern industrial societies, inter-household and local exchange may be nested within a production system designed to meet broader consumer demands.

It is often assumed that increasing demand involves changes to more efficient production technology and a standardization of the production process (leading to vessels with more uniform physical properties) (e.g., Arnold 1991; Costin 1991; Pool 1992). However, the producer-consumer relationship cannot be viewed in a determinant fashion. Moreover, ecological factors and the demand for products may condition but not determine the scale and intensity of production or organization of the production process. For instance, Balfet (1981) observed that potters in the Maghreb (an area which includes Morocco, Algeria, Tunisia and Libya) might not adopt more efficient production technology or increase the size of work groups to meet increasing demand for their products. Many small production units can produce a large amount of pottery for widespread distribution. Thus, the complexity of production technology and labor organization does not directly reflect product demand or the extent to which objects may

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be distributed. The demand for products and the mechanisms of distribution are therefore better reflected in the scale of production, the location of producers vis-à-vis consumers (i.e., spatial distribution of goods), and the socioeconomic diversity of the consuming population.

One key to distinguishing unspecialized from specialized production arrangements is whether domestic self-sufficiency was a strategy pursued by members of a community. To assess the hypothesis that production was organized at the household level (in other words, it was unspecialized), I examine the socially influenced decisions affecting ceramic variability. To infer these social influences, I investigate the scale of production, seasonality and the degree of product standardization.

Scale of Production

The scale of production refers to the quantity of ceramics produced. For several reasons, small-scale production systems generally produce low quantities of ceramics. While there are often more producers in such a system, there fewer people involved in the system, so the demand for products is lower. While not all people will make pottery in a small-scale system, there are a greater proportion of potters to consumers and the producer and consumer are more often the same person. The size of production facilities, the kinds of manufacturing technology, the amount of production debris, and the quantity of products all reflect the size of the work group(s) (or production units; Costin 1991: 29-30) involved in production. A small-scale production system is usually inferred when fewer facilities are in evidence, manufacturing technology is not complex, and there are smaller quantities of debris and products. However, evaluating each of these variables is not without its problems.

Production output is directly related to the life span of pottery because the classes of pottery used in different activities last for different amounts of time. As such, the breakage rate, or use-life, of ceramics is an important factor governing the rate and scale at which pottery is replaced. However, use-life is not synonymous with the replacement rate of pottery (Shott 1996). For instance, pottery made seasonally may be produced in quantities greater than the immediate need of consumers (including the household) to balance the rate of breakage with the rate of replacement. Thus, production is designed to meet future as well as immediate demand.

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To infer production scale and use-life requires an estimate of whole objects represented in a ceramic assemblage. However, the relation between sherds and ceramic objects used is not entirely straightforward. The quantification of ceramic assemblages has been the subject of controversy for some time. Quantification, in a restricted sense, involves "the measuring of an amount of each type of pottery in an assemblage" (Orton *et al.* 1993: 21) with the objective of determining how much pottery there is.[3] Alone, an answer to this question tells us very little because we do not know how much pottery actually existed in the "life assemblage" as compared to the "death assemblage" recovered archaeologically. At the outset, it must be accepted that we have not collected all the ceramics deposited or used at a particular place and we cannot precisely evaluate the life span of particular types archaeologically. It is therefore necessary to assume that an archaeological assemblage is only a portion of a larger parent population, and the life-span of different kinds of pottery are roughly constant because they were made and used in similar fashions (Orton *et al.* 1993: 167).

Nevertheless, certain measures are more appropriate for comparing different assemblages while others work better for evaluating and comparing proportions of types or other characteristics within assemblages (for a summary see Orton *et al.* 1993: 166-181). Because the original size of the parent population from which the archaeological sample comes from is derived is unknown, the recovered assemblage must be treated as a fraction of it. That is why we can only speak of vessel estimates when dealing with the number of vessels in an archaeological assemblage. Determining the "true" number of vessels recovered is not the objective. Instead, the point is to estimate the numbers and compare their proportions in order to form and test hypotheses regarding ceramic production, use, deposition, chronological relationships and so forth. Estimates may be inferred from measures of frequency, volume, mass or number of individual pots represented by discarded sherds. The specific measures used in this study are outlined in Chapter 6, and the scale of production at Ndondondwane is discussed in Chapter 8.

[3] The more specific objectives of quantification in ceramic studies is to (1) summarize the amount of material by fabric, form, and so forth, (and any combination of these), (2) provide information about the proportions and relatedness of types in an assemblage and (3) present additional information about sherd size and the post-depositional processes from the various contexts that pottery was recovered.

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SEASONALITY

Seasonality is another important factor that is useful for assessing the organization of production. Weather and climate do affect the management and scheduling of pottery production (Arnold 1985). The most favorable weather and climatic conditions generally "occur during a time of sustained sunshine, warm temperatures, little or no rainfall and low relative humidity" (Arnold 1985: 71). However, these factors do not determine the nature of production because pottery can still be produced in less ideal conditions. In the cross-cultural sample summarized by Arnold (1985: table 3.2), there are also other reasons given for when pottery is produced, such as agricultural demands (scheduling around the agriculture season), personal comfort (too cold), lower operating costs, and in some cases demand is greater for certain wares during the dry season. These social and economic reasons related to the seasonality of pottery production underscore the necessity of considering how they may affect the management and scheduling of production. In Chapter 8, I address these concerns by examining how pottery management and scheduling may be inferred using a combination of environmental and archaeological evidence.

STANDARDIZATION

The study of pottery variability has been systematized around two main concepts: standardization and diversity (Rice 1987: 201). Standardization refers to a reduction in ceramic variability that results from potters using a limited range of material and techniques to generate objects that are very similar, or in some cases virtually identical. (cf. Peacock 1982, 121-122). In smaller-scale production systems, there tends to be a higher degree of idiosyncratic variation in the materials, tools and techniques used in production. The result are products that generally conform to a set of expectations of "what pots should look like," but there tends to be little heterogeneity in composition and appearance (form and decoration) within pottery categories (Rice 1987: 202). In this analysis, I develop multiple classifications of the Ndondondwane ceramics that serve to distinguish the homogeneity/heterogeneity in ceramic composition and appearance.

Another measure I will use to investigate standardization involves an analysis of stylistic variance. The premise of this analysis is that the pottery produced in small-scale systems will exhibit less homogeneity or standardization of the products. While fewer

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potters in larger-scale systems tend to adhere to principles of cost effectiveness, quality control and mass production leading to homogeneity, the decisions made by potters in smaller-scale systems do not adhere as strictly to these principles. As such, greater variation in the attributes of final products, such as shape, size and decorative attributes, should be expected. Measures of stylistic similarity have long been used as a way to evaluate the relatedness of cultural groups at the regional and inter-regional levels (see Rice 1996a). With stylistically homogeneous assemblages (those that belong to the same phase in a ceramic typochronological sequence) such as that from Ndondondwane, the frequency of ceramic microstyles—which are defined here as micro-variation in the decoration of different ceramic forms—provide a way to assess the decorative variation in a ceramic assemblage. The method for deriving microstyles and an analysis of their significance for understanding standardization are discussed in Chapter 8.

Ceramic Use

The consumption of goods is the one component of economic systems archaeologists most commonly address. It is often assumed that the lists of recovered goods at archaeological sites constitute an adequate discussion of consumption (but see Michael Smith 1987; Brumfiel 1987; Costin and Earle 1989; Miller 1988, 1987, 1998a, 1998b). During consumption, the finished goods and foodstuffs resulting from production are put into use in a variety of activities that many include production tasks (see Figure 4.1). Thus, consumption not only involves using, reusing and discarding goods and foodstuffs, but also is a meaningful and tangible component of the reproduction of cultural life through the manipulation of the material world. The archaeological study of consumption therefore has the express purpose of trying to explain variation in specific patterns of artifact use, reuse, and discard and changes in these patterns over time.

The main classes of data archaeologists utilize to discuss consumption are derived from the contents of assemblages and the spatial relationships within and between assemblages. In this thesis, I focus on the content and spatial relationships within an assemblage recovered from a single archaeological settlement. The data from my study area do not exist in a form that makes the comparison of assemblages possible.

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Therefore, I cannot address local or regional distribution of pottery classes. However, it is possible to assess or generate hypotheses about intra-settlement exchange indirectly, because distribution and exchange is not the same thing. Distribution involves processes of moving objects from producers to consumers, whereas exchange involves mechanisms of "paying" for products, which can include currency, reciprocal services, repayments in kind, or other forms of obligation. Exchange mechanisms affecting pottery and other goods can be indirectly inferred from the organization of production situated in the broader social context in which it took place. It must be noted that surplus production does not necessarily indicate that ceramics were made for regular exchange outside the household. A number of extra-household spheres of demand must be considered, including the immediate settlement or other settlements.

In order to identify and evaluate the nature of artifact use and activity organization archaeologists have primarily examined the spatial associations between consumption debris and fixed-feature elements at sites and the performance characteristics of artifacts. The first category refers to artifacts that are confined to specific locations or "places" on a landscape (e.g., Binford 1982; Thomas 1996: 85-91), such as burials, buildings or other areas where pottery was used or reused. The second category includes the formal, technical, and use-related properties of artifacts that reflect their mechanical, chemical, thermal, electrical, electromagnetic, visual, tactile, and acoustic properties while in use (Braun 1983; Schiffer and Skibo 1987, 1997; Schiffer *et al.* 1994; Skibo 1992).

Evaluating Ceramic Use

Ceramics are tools used in specific activities for specific ends (Braun 1983: 107). Several classifications of ceramic use or function have been developed to specify their general uses as containers. Generally, pottery is used for storing, processing, or and transporting dry or liquid contents. A number of factors enter into the relationship between vessel design and their practical use as containers (Rice 1987: 208, also fig. 7.1): (1) the nature of the contents (liquid or dry), (2) whether the pot will be used to heat or cool contents, (3) their mobility (stationary or often transported and how far), and (4) how often they are used. Each of these factors requires a different combination

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of attributes so that a product may reliably perform the role (monofunctional) or roles (multifunctional) it will be utilized in. In this study, I evaluate two sets of data to investigate pottery use at Ndondondwane. Neither has been utilized in the study of EIA pottery in eastern or southern Africa, so there is no comparative basis against which to evaluate ceramic use within settlements.

The first type of data pertains to the performance characteristics of pottery. All ceramic classifications are in some way based on the different attributes or characteristics of pottery that differentially affect their appearance or performance under different a variety of conditions. The performance characteristics of ceramics employed for inferring use cover a range of physical and chemical properties (Figure 4.2). The most common properties affecting ceramic use include those relating to their permeability, strength, toughness, thermal shock resistance, color, texture, hardness, size and shape. The influence that consumers and potters have on the performance characteristics of pottery provides a valuable way of investigating producer-consumer relations and how this affects ceramic variability (Figure 4.2). Consumers place certain demands on potters for objects that have different performance characteristics in use. Potters in specific environmental contexts meet consumer demands differently through the design of ceramics with particular physical and chemical properties. The choices made during the production sequence in terms of clay, temper, forming, surface treatments, and firing regime, create the properties of ceramics that can perform differently under certain conditions.

The other form of evidence involves studying the modifications made to the original physical and chemical properties of artifacts during the course of their life use. Use alteration studies provide a physical and chemical basis with which to infer the nature of artifact use. Those pertaining to ceramics fall under a number of different headings depending upon their source and their effect on objects: (1) surface wear or attrition, (2) surface residues and markings, and (3) organic residues.

Surface wear or attrition, such as scratches, pits, and chips, may indicate the ways in which pottery was used. Ethnoarchaeological data can give some indication of the sources of attrition. For instance, Skibo's (1992) work in a Kalinga village in the Philippines showed that abrasion areas on the exterior and interior of pots are due to a host of different activities. On the exterior surface, those on the based of pots are due to

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contact with hearths or fire dogs during cooking; scratches on the lower to mid-exterior surface resulted from washing; while those on the upper surface of pots were due to carrying. On the interior surface, scratches resulted from stirring, serving and washing, while surface spalls (due to the vaporization of water from the vessel wall) resulted from a lack of water in pots when they were still being heated. This only occurs in rice cooking pots, and is rarely found in meat cooking vessels, which normally are half-filled with water.

Surface residues and markings can be of several different kinds, including carbon, soot, limescale, calcium carbonate, food deposits, as well as other non-decorative impressions and perforations. Cooking over an open fire can result in the formation of distinct zones of deposited carbon or soot, which reflect the distance of the pot from the fire and the different temperatures used to cook food (Skibo 1992). Non-decorative impression can include sherds with seed impressions, angular impressions caused by stones or other material that became imbedded in the vessel surface as it was being made, as well as fingerprint impressions made by potters during the fashioning process. Holes made in vessels are also important in determining vessel function and discussing vessel repair. Perforations may be single or paired (usually indicating repairs), numerous and not necessarily paired (common with strainers), or numerous (characteristic of sieves).

While the presence of abrasion and other surface markings are helpful for establishing that sherds came from vessels used for cooking, storage, and other activities, it is generally difficult to explain precisely the causes of certain abrasions, scratching patterns, or glossy residues on vessel surfaces. To this end, the analysis of organic residues resulting from the food contents of vessels, or sealants applied to their surfaces, has received great attention in the past decade (Evershed *et al.* 1992; Skibo 1992; Heron and Evershed 1993). Such analyses can examine residues adhering to the surface of sherds or those were absorbed into the porous body of pots, and provide information on the use of pottery as well as past diet and culinary practices. A variety of methods have been used to identify the lipids (fats, oils, waxes, and resins) or sterols (fatty acids) which can be used to distinguish animal and vegetable products to varying degrees of accuracy (for a recent review see Tite 1999: 209-210 and references). The patterns of lipids must be compared with patterns obtained from modern examples for increasing

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accuracy in identification. In contrast, with the use of stable carbon isotope analysis, the fatty acids extracted from pottery may be used to distinguish fats from ruminant (ovine, bovine) and non-ruminant (porcine) animals (e.g., Evershed *et al.* 1997), and in some cases the resins used as pottery sealants (e.g., Evershed *et al.* 1991).

A small sample of five sherds with and without visible residues was submitted for analysis of their fatty acid composition (Malainey n.d.). The objective of this pilot study was twofold. The first goal was to determine if in fact fatty acid residues could be detected on EIA sherds representing the main form classes defined in the assemblage. The second aim was to corroborate determinations of vessel function through a study of use alteration; that is, did the fatty acid analysis support the inference a cooking pot based on the identification of abrasions, sooting patterns and other surface markings? The results of these analyses are discussed in Chapter 7.

The Scale and Intensity of Consumption

The scale and intensity of consumption is directly related to the size of the consuming population. Scale refers to the overall consumption of goods in a site and/or region, while intensity refers to the consumption of goods per person, household, or in the context of other areas of consumption (e.g., communal facilities). Estimating population size using ceramic data is problematic because the density of consumption debris in houses, settlements or other locations may not reflect the size of the population (Tani 1994). As discussed above, this is because the classes of pottery used in different activities last for different amounts of time. The scale and intensity of consumption can therefore only be indirectly inferred from data on the scale of production and use-life of pottery.

Ceramic Diversity and Social Differentiation

Identifying social differences amongst people who used ceramics is based on the premise that the appearance of specific ceramic forms and ware-types in different areas of a settlement is not accidental. In this study, I utilize several measures to evaluate patterns in the distribution of ceramics between households and other activity areas in a settlement.

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The first measure is based on the concept of diversity. The diversity concept has been borrowed from population ecology that has been applied to the study of artifacts (Rice 1981, 1987: 202-203). It is a measure of the variation in an assemblage, and may be used to evaluate the degree of homogeneity or heterogeneity of different consumer assemblages within sites or regions. Assemblage variation may be described in terms of the "numbers and frequencies of different categories of pottery, which may be taxonomic units, form classes, decorative styles, and so forth" (Rice 1987: 202). The variation is described as the *richness* of the assemblage, or the number of categories present (i.e., the number of taxonomic units, form classes, or decorative styles), and as evenness, or the distribution of individuals within the categories (the range of variation within a taxonomic, form, or decorative style category). The number of categories and sub-categories found in different spatial contexts within a site or region is an important dimension of variation that may be indicative of the segregation of the consumer population in terms of ethnic, social, or occupation criteria.

The diversity concept has been used primarily to examine variability in ceramic assemblages to infer past production arrangements (Rice 1981; Deal 1999). Operationally, I evaluate diversity as a weighted measure calculated by dividing the number of use categories in each activity locus by the total number of identified categories in the assemblage. Thus, the measure evaluates the richness of pottery serving different functions that are found in different activity areas in a settlement in relation to the total functional variation in the assemblage. Certainly, more sophisticated statistical measures of diversity have been offered (see Deal 1998; Rice 1981). However, these have been developed for modern situations in which production is complex, distribution spans large territories and the consuming population is socially and economically stratified. The organization of production, distribution and social organization of early farming societies in sub-Saharan Africa remain empirical questions to be investigated. At this stage in research, this simplified measure should suffice, although its utility will be evaluated here.

Diversity has been more generally utilized by archaeologists as a means to link artifact variability to the function of sites or areas within sites (e.g., Hietala 1984). Kent (1999), for instance, was able to distinguish trash from storage areas at San camps because trash areas tend to have greater diversity in artifact types than areas used for

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storage (i.e, *de facto* refuse: caching, curation, etc.). Thus, ceramic diversity may also be utilized to determine if the hypotheses about discard practices have some connection to the function of different activity areas.

A related area of increasing archaeological interests in evaluating social identity through ceramic analysis is investigating the social identity of artisans, along such lines as such as class, social rank, gender, ethnicity, legal status, etc. (e.g., Costin 1998). These are important to understand because they provide a way to consider the perspective from which objects were invested with meaning (Hodder 1982). Prehistoric artisans are never directly visible archaeologically, and many methods, including ethnographic analogy, have been heavily criticized as purely speculative when it comes to inferring the social identity of prehistoric producers (e.g., Gero 1991; Wright 1991). While the gender or social identity of EIA potters has rarely been investigated (e.g., MacLean 1996), and no consensus has been reached on this subject, it is often implicitly assumed that women were potters. Primarily this is because women are predominantly the makers of pottery in Bantu speaking Africa (Barley 1994; Hall 1998; Herbert 1993; Gallay et al. 1996: 29-33; Gosselain 1995; Krause 1985; Stahl and Cruz 1998), possibly because are normally responsible for harvesting and food processing activities (Ehrenberg 1989: 87; Vincentelli 2000). There are cases in Africa in which men make pottery, although these are restricted to situations in which pottery is made primarily for use beyond the household. When women are potters, men may otherwise help during the production process and with selling pots (Balfet 1965, 1980). At this stage in research, the gender of EIA potters remains an open question.

However, the CCP predicts that male- and female-related activities will be spatially segregated. The activities predominated by men occur in the center of settlements while those undertaken by women are resigned to domestic or peripheral areas located away from the center of settlements. To test this assertion, I will examine evidence for the spatial distribution of craft activities traditionally associated with men and women in southern Bantu societies. Generally, men's crafts tend to be *subtractive* in nature, such as woodworking, ivory working, and smelting and forging, while women's crafts are *additive*, such as pottery making, basketry, textiles and beadwork. Therefore, we would generally expect subtractive crafts to be restricted to central areas and additive crafts to peripheral areas in settlements organized according to the principles of the CCP.

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Ceramic Discard and Site Formation

It is widely appreciated that an understanding of the nature and extent of natural and cultural processes responsible for archaeological site formation is a prerequisite for interpreting past cultural behavior. Descriptions of the three dimensional relationships between artifacts, features and deposits at archaeological sites, or *site structure*, must precede subsequent interpretive levels of archaeological inquiry because all interpretations rely upon the initial descriptions (Binford 1981, 1982a). Since the late 1970s, a deepening appreciation for site formation processes (Schiffer 1972, 1976, 1985, 1987, 1989) led archaeologists to challenge assumptions about the relationships between artifacts in system context and organization of past activities (O'Connell 1993, 9, 1995: 212). These assumptions include: (1) that humans at sites worked in discrete, exclusive, activity-specific areas (i.e., an *activity area*); (2) each activity was associated with a specific set of artifacts (i.e., a *tool kit*); (3) activity-specific artifacts were discarded at their use location along with debris (i.e., *activity sets*); and (4) artifact frequency varied directly with activity frequency. Because these assumption have been seriously questioned, proven incorrect or simply unwarranted, it can no longer assumed that there are direct links between human behavior and the patterning of artifact and feature distributions in settlements.

Directly relevant to this study are two significant ideas proposed in Carr's (1984) critical review of the goals and methods of quantitative spatial analysis. First was the idea that artifacts found together do not equal activity areas and should be referred to as *depositional sets* (Carr 1984: 114). Second, Carr (1984: 114) introduced the notion that the locations of depositional sets should be termed *depositional areas*, and that depositional sets do not equal tool kits. Neither of these terms specifies the natural or cultural processes that led to artifact associations and correlations.[4] As I discussed in the

[4] With the advent of quantitative spatial analysis in the early 1970s, American archaeologists began to differentiate between the associations and correlations of artifacts (Binford 1972). Associations may be singular or recurrent (Schiffer 1987: 20): singular associations are the basis of defining *features* and refer to the finding of two or more material residues close to each other, while recurrent associations refer to the redundant co-occurrence of single associations. Correlation, in contrast, refers to artifacts that have specific (often statistical) properties that characterize their recurrent association.

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previous chapter, the notion of activity-specific areas and artifacts underlay most interpretations of early agropastoral settlement space in southern Africa. However, there have been no systematic discussions of depositional phenomena at EIA sites and the important role they play in the formation of the archaeological record.

Principles of Refuse Disposal

Defining principles of refuse disposal has been central to considering the importance that depositional phenomena play in the formation of the archaeological record and how this affects the interpretations of it. Shott (1996: 17-19) has identified several types of discard processes that transfer artifacts and ecofacts from systemic to archaeological contexts: (1) breakage during production, (2) abandonment during or after production, (3) loss or breakage while in use, (4) abandonment in use, (5) depletion during cycles of reuse and maintenance, and (6) recycling. Since recycling involves the transformation of an existing object into a new product that will serve a different use (Schiffer 1976), it is clearly not a discard process and should be dropped from the list (cf. David and Kramer 2001: 94). Importantly though, the notion of loss implies unintentional discard. While a very real phenomenon, it may be virtually impossible to distinguish unintentional and intentional discard in the archaeological record. As well, abandonment and breakage imply intentional discard. The prospect of identifying these processes is somewhat more positive, because each may be characterized by the condition of artifacts and different structural patterns in artifact distributions.

To this end, Schiffer (1976: 30) has presented a terminology distinguishing types of refuse intentionally discarded at or near the end of its use life: *primary refuse* refers to the discard of material near its location of use; *secondary refuse* is discarded in a location other than where it was used. Many archaeological studies have determined that the discard of secondary refuse is the principal way refuse enters the archaeological record during the occupation of a site, while primary refuse is less common (Cameron 1991, 1993; Cameron and Tomka 1996; Deal 1985; Hayden and Cannon 1983; Lange and Rydberg 1972; Savelle 1984; Schiffer 1976, 1985, 1987; Stevensen 1982, 1985). *Abandonment refuse* involves a special case of disposal that occurs before and during site

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abandonment. During the gradual abandonment of a site, normal disposal standards are not observed and materials are deposited in areas not normally used for discard, such as within living areas (Schiffer 1985: 25). *De facto* disposal (Schiffer 1987: 89) is when objects that have not reached the end of their use lives enter the archaeological record during abandonment without having been discarded. These principles of refuse disposal provide a framework to examine one of the most important cultural practices affecting the formation of archaeological sites.

All of these disposal patterns relate to how human habitation areas, whether camps, villages, or urban centers, are maintained and abandoned. Schiffer's (1972, 1976, 1987) work has suggested that site maintenance and abandonment processes involve behaviors that are different from the normal use of activity areas and settlements. Site maintenance involves the removal of refuse from areas so it does not interfere with the routine activities that occur in these places. Abandonment processes are activities that occur during abandonment of settlements, and include the curation or caching of tools, the dismantling of structures, and the interruption of normal disposal or activity patterns (Schiffer 1987: 89-98). They also differ in scale. Site maintenance is an intra-site phenomenon, while abandonment may involve the desertion of settlements, which are a normal part of regional settlement systems, or the structures and activity areas within settlements.

Site abandonment is often gradual, seasonal, or periodic (e.g., Binford 1973, 1977, 1978, 1991; Cameron 1991; Deal 1985; Schiffer 1987), but rapid, catastrophic abandonment also occurs (e.g., Stevenson 1982). In either event, the effects of abandonment leave very different and contrasting residues. When no return is anticipated, usable artifacts, structures and building materials may be removed (Cameron 1991). In these cases, the rate of abandonment, transport, season, distance to next location, activities in next settlement, size of the population, and the size and weight, replacement cost, function and remaining life use of artifacts influence curation and retention decisions. But if abandonment is temporary, such usable cultural material may be left behind (Schiffer's *de facto* refuse, 1972: 160; 1976: 33-34; 1987: 89; Binford's 1977, 1979 curate behavior.). Factors besides the anticipation of return may condition the deposition or removal of cultural materials. Rituals aligned with abandonment, for instance, can result is in massive deposition of unusual quantities of

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types of refuse (e.g, Deal 1985: 269; Kent 1984: 139-141; Hodder 1982: 24). At the settlement level, many factors can affect the structure of archaeological sites, masking or enhancing the visibility of activities: the rate of refuse generation (Kent 1984; O'Connell 1987), the variety of performed activities (Gould 1980), seasonal and ritual cycles (Schiffer 1987: 65-66), differential treatment of refuse (Hayden and Cannon 1983), reincorporation, salvage, scavenging, collecting, pothunting (Schiffer 1987: 99), or ideology and symbolic factors (Hodder 1982: 24).

In the past decade, spatial analyses have fully embraced the fundamental implications of formation processes research conducted in the 1970s and 1980s. Spatial analysts now agree that the most appropriate methodologies for relating complex archaeological phenomenon to complex systemic phenomenon involve some variation of Wylie's (1989) *two-pronged* approach. This approach entails performing a series of analyses "describing the distributions of a series of formationally sensitive attributes [of artifacts or features] and comparing these with distributions that have been documented actualistically or are theoretically understood" (Wandsider 1996: 339). In the first step, many analyses are carried out with each focusing on a different process. The analyst produces several lines of *incomplete* information about the formation history of a site. In the second step, spatial patterns across a number of archaeological contexts are compared, and at this stage, the analyst may then be able to narrow the gap between possible and unlikely interpretations of individual contexts and overall site structure through a means other than identification. There is no one protocol or single method for doing this, and it is improbable that one spatial analytic panacea will ever develop (Wandsnider 1996). However, focusing analyses on many attributes (or *multi-attribute* analyses) of artifacts, ecofacts, and features is one way to constrain interpretations and construct formational histories.

Attributes are specific artifact features, which, for ceramics, would include variables such as temper, surface treatment, color, decoration and size. Objects can share some attributes, but not others. An attribute is often considered the state of a variable (e.g. Rouse 1960, 1964), such as shell-temper or burnished surface treatment, but it is seldom considered the variable itself (Chilton 1998). In this analysis, I consider multiple artifact attributes in order to examine variation and covariation between objects and groups of objects. The objective of focusing on a wide range, or suite, of attributes, is

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because certain attributes are more sensitive to post-depositional attrition or wear during their use-life. For instance, sooting, burning marks, greater wall thickness, vessel shape, and clay-temper compositions well-suited to handle rapid changes in temperature are diagnostic attributes of most kinds of cooking pots (Rice 1987). However, sooting may be affected by many post-depositional attrition processes, such as water erosion, and may not be detectable during analysis. As well, both sooting and burning marks may result from processes other than cooking, such as pots trapped in a house fire. Therefore, certain combinations of attributes are more sensitive indicators of the conditions under which objects were made, used, discarded and remained in archaeological context until recovered.

Ceramics are one class of material culture that is found in most deposits in EIA settlements in southern Africa, and may therefore be a sensitive indicator of certain natural and cultural processes that contribute to site formation. To examine site formation processes and disposal patterns at Ndondondwane, I compare the condition (weathering and fragmentation), kinds (range of formal types and use categories), and quantity of ceramics found in different deposits at the settlement.

CHAPTER SUMMARY

The approach to the study of ceramic production and use proposed in this chapter combines principles of spatial analysis with the theoretical and analytical dimensions of ceramic *chaînes opératoires* research. This is a synthetic strategy that attempts to accomplish three goals: (1) to generate the maximum amount of information about past activity organization using (2) a minimum of material culture data that can (3) produce defensible inferential statements about a wide range of past cultural processes acting to regulate activity organization.

Two aspects of this approach differ from previous research. First, I ground the *chaînes opératoires* methodology in Bourdieu's theory of practice, with which practioners of the *techniques* school of research may not agree. Other scholars have linked the *chaînes opératoires* and practice theory for different reasons (cf. Dietler and Herbich 1994, 1998). I find value in connecting Bourdieu's work with material culture studies as a means to study the spatial organization of practice. Second, I extend the conceptual

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basis of the *chaînes opératoires* approach to the study of the techniques involved in *using*, *reusing* and *discarding* objects in a complete analysis of the lifecycle. In the conclusion of this thesis, the strengths and weaknesses of this theoretical and methodological framework will be assessed as the specific research questions regarding early agropastoral community organization proposed in the previous chapter are subject to analyses.

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Table 4.1. The organization of ceramic production systems

Production System[a]	Description
Household production	Small-scale production for use within individual households.
Household industry	Production at household level for extra-household consumption.
Workshop industry	Increased scale and efficiency of production by specialist producers, often in relatively small-scale family workshops.
Large-scale industry	Production on massive scale, employing large number of workers, highly specialized.

[a] *Sources*: Costin (1991), Peacock (1981), van der Leeuw (1977).

Table 4.2. Elements of a domestic mode of ceramic production

Dimension of Production	Variable	Correlates of the Household Production Model
Scale	Volume of finished goods	Low
Intensity	Distance to raw materials	< 5 km
	Density of debris produced	Low
	Size and elaboration of production facilities	Small, unelaborated
	Intensity of work effort	Part-time
Concentration	Spatial extent of distribution	Local
Context	Social setting of production	Dispersed among multiple locations (i.e., settlements or areas within settlements)

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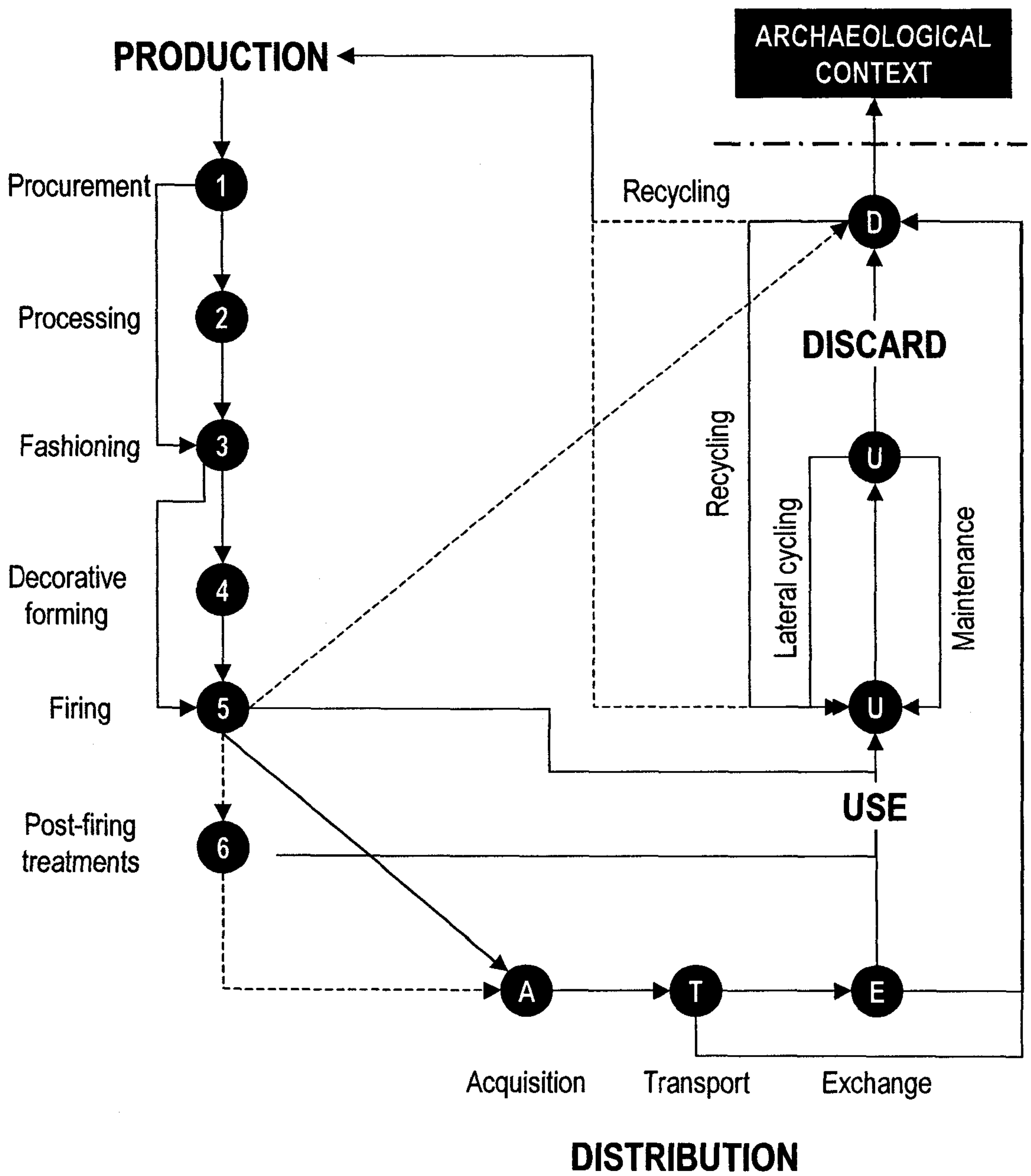

Figure 4.1. Stages in a ceramic production and consumption sequence.

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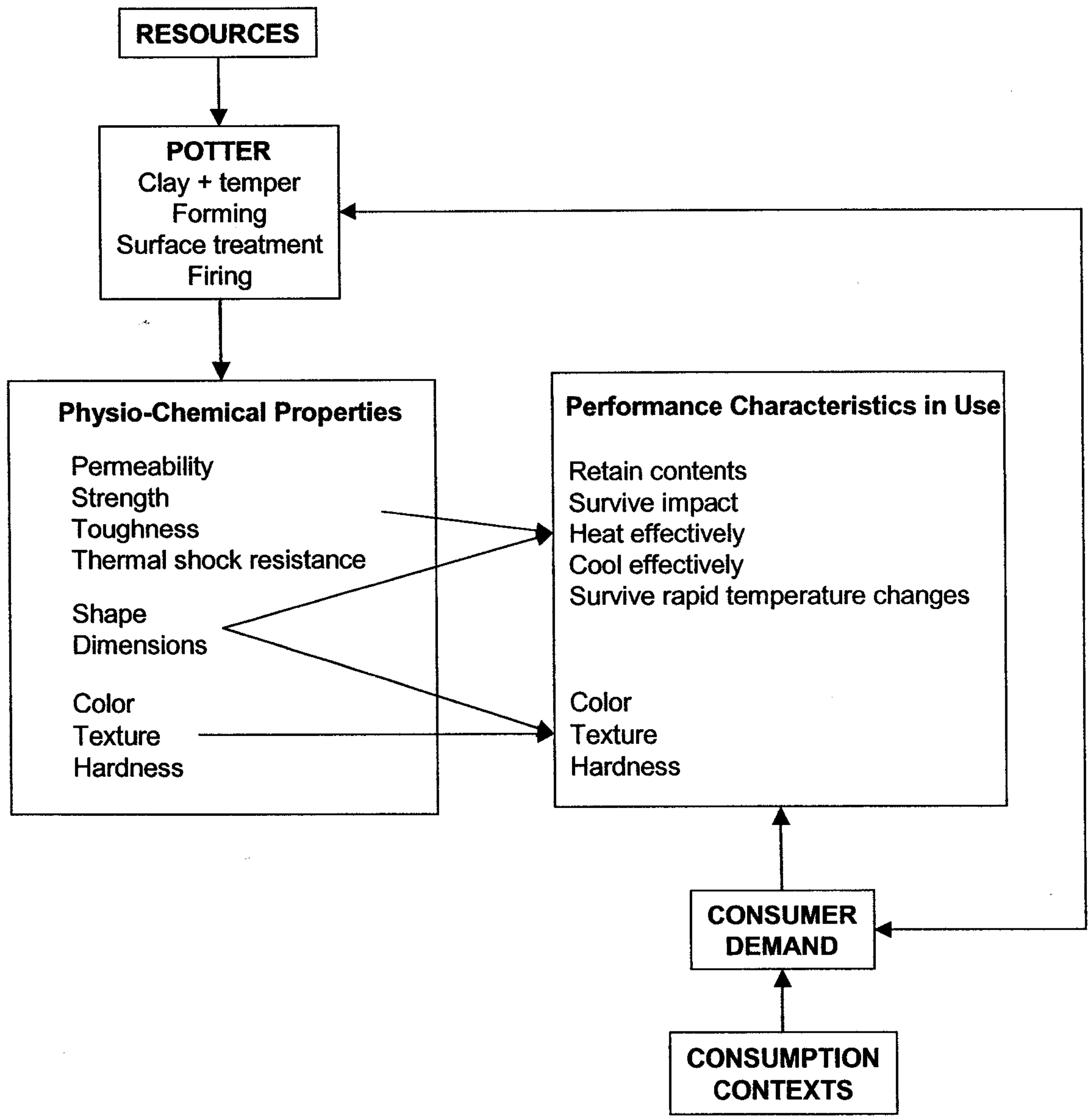

Figure 4.2. The influence of consumers and potters on the performance characteristics of ceramics in use.

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CHAPTER 5

MATERIALS: THE THUKELA BASIN STUDY AREA

THE EARLY IRON AGE IN THE EASTERN LOWLANDS

Archaeological deposits containing extensive residues of iron working were recorded in the Thukela Basin as early as the 1930s (Laidler and Scot 1936). The remains were first ascribed to Bantu-speaking peoples who occupied the region between the late sixteenth and early nineteenth centuries AD (Schofield 1948:158-162). Schofield's *Primitive Pottery* (1948) was the first attempt in eastern South Africa to order previously identified "Bantu period" pottery (e.g., Laidler and Scot 1932). Schofield arranged the southeastern pottery sequence into three main phases. Natal Coastal Ware 1 (Class NC1) included all pre-Bantu pottery; Natal Coastal Ware 2 (Class NC2) included all pottery of the earliest Bantu inhabitants of the area, or iron-using mixed farmers with Sotho affinities; and Natal Coastal Ware 3 (Class NC3) was made by later iron-smelting Bantu speakers that were likely associated with the Lala. The sequence stayed within the dominant historiography of the time and dated the earliest phase to the middle of the sixteenth century AD (Schofield 1948: 61).

Schofield's study remained the standard reference for the identification and classification of "Bantu" pottery until the 1970s, when Maggs initiated a research program to systematically examine archaeological deposits associated with early farming communities in the eastern lowlands. Maggs redefined the region's cultural-historical sequence by demonstrating that the pottery studied by Schofield was of far greater antiquity (Maggs 1973, 1976, 1980a, 1984a, 1984b, 1984c; Maggs and Ward 1984). The analysis of large and well-dated archaeological ceramic assemblages anchored by radiocarbon dates showed that NC3 was in fact the oldest and not the youngest phase in the sequence (Maggs and Michael 1976; see also Evers 1973; Klapwijk 1973; Maggs 1973; Mason 1973). With settlements confidently assigned to the first millennium AD, Schofield's terminology was abandoned and it was suggested that "Natal Early Iron Age"

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was a more appropriate cultural historical term when referring to first millennium agropastoral societies (Maggs and Michael 1976).

The chronological scheme for the eastern lowlands defined by Maggs (1980c) includes four discrete ceramic phases (Table 5.1, Figure 5.1), which may be placed in either the Nkope and Kalundu ceramic traditions defined by Huffman (1989). The Mzonjani phase (AD 420–580) is what Maggs (1980c) termed the "first expression" of the EIA in the region. It is now situated in the Nkope branch of the Urewe Tradition and is the second ceramic phase of the EIA sequence in South Africa (Klapwijk and Huffman 1996; see also Figure 3.2). The three subsequent phases belong to the Kalundu Tradition, and are distinguished by Msuluzi (AD 640–780; Maggs 1980b), Ndondondwane (AD 780–970; Maggs 1984c; Loubser 1993) and Ntshekane (AD 970–1050; Maggs and Michael 1976) pottery styles.

Most Mzonjani sites are located within 6 km of the coast and all are within 20 km (Whitelaw 1998:5; Whitelaw and Moon 1996), while sites with Msuluzi pottery have a much wider distribution within the river valleys (Figure 5.2). These different phases reflect the expansion of Msuluzi farmers into the savanna *bushveld* and woodlands of the deeply incised river valleys. Msuluzi pottery is often more elaborately decorated than the earlier Mzonjani phase. The relationship between the Mzonjani and Msuluzi phases has been the subject of controversy for some time (Huffman 1978, 1979, 1984a; Maggs 1980a), and it has now been suggested that they are unrelated and belong to two different stylistic traditions (Huffman and Klapwijk 1996; Whitelaw and Moon 1996). It is not known if the ninety-year gap between Mzonjani and Msuluzi represents a real historical hiatus in the region, the archaeological visibility of Mzonjani–phase sites, or simply a gap in research (Whitelaw and Moon 1996).

The Ndondondwane phase (AD 790–970) is a later development of Msuluzi. The pottery characteristic of this phase is best known from the type-site of Ndondondwane (Maggs 1984c; Loubser 1993), but stylistically similar ceramics are also found at other sites in the Thukela valley (van Schalkwyk 1994a, 1994b), in the Mngeni River basin (Whitelaw 1994; Whitelaw and Moon 1996), and the Eastern Cape (e.g., Prins and Granger 1993). There is considerable overlap in Msuluzi and Ndondondwane decoration, but Maggs (1984c) suggested that Ndondondwane pottery is simpler in design.

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The subsequent, and final, EIA ceramic phase is represented by pottery from Ntshekane (Maggs and Michael 1978). The Ntshekane phase dates from AD 970–1050. Sites with Ntshekane pottery are few and the pottery only occurs in settlements dating to more than one ceramic phase (Hall 1980; Maggs 1980b, 1980c, 1984c; Maggs and Michael 1976; van Schalkwyk 1991; Whitelaw 1993, 1994). While many of the decorative characteristics of Ndondondwane phase ceramics are still present on Ntshekane pottery, a new range of shapes appears,[1] decoration is more elaborate on Ntshekane pottery and the walls of vessels are much thinner. The reason why the Ntshekane phase is so brief and ends so abruptly is unknown, although the sharp stylistic break occurring after AD 1050 is concurrent with the settling of the *highveld*.

The bag-shaped and U-shaped spherical forms and sparse decoration clearly differentiate LIA pottery from the more elaborate Ntshekane pottery. Ceramics from Blackburn (AD 1050-1250) and later Moor Park (AD 1250-1400s) are the only well defined LIA phases in the eastern lowlands (e.g., Davies 1971, 1974). The LIA in the eastern lowlands is poorly defined, primarily because of a lack of research.

Radiocarbon dates from agropastoral settlements in the eastern lowlands, let alone long series of dates from a single settlement, are not plentiful. The culture historical sequence is based on 32 calibrated radiocarbon dates from 19 EIA sites (Table 5.1). Dates from EIA sites have been taken from carbon and bone collagen samples. There are discrepancies between the radiocarbon data and the ceramic sequence. The Msuluzi phase is the best dated of the Kalundu sequence, as there is very clear correspondence between Msuluzi style pottery and radiocarbon dates. As one moves into the later Ndondondwane and Ntshekane phases, there is an increasing number of discrepancies between the relative dating sequence and the radiocarbon dates. A distinct stylistic break marks the separation of the Msuluzi and Ndondondwane phases. At later dated Ndondondwane phase sites, the characteristic spiral and curvilinear Msuluzi motifs appear to have been dropped from the decorative repertoire although many forms persist. However, sites with Ndondondwane- and Msuluzi-phase components overlap often by as much as 100 to 170 years. A similar situation exists between the Ndondondwane and Ntshekane phases. The best-dated Ntshekane deposits come from

[1] These spherical jars with everted and straight necks of the Ndondondwane phase give way to more baggy-shaped bowls and pyriform-like jars with high, insloping necks.

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the type-site of Ntshekane and these dates fall well within the upper limits of the Ndondondwane phase. The same vessel forms are documented during the Ndondondwane phase, but Ntshekane decoration on jars generally tends to be more complex and covers more surface area. At the same time, the red- and black-burnished vessels characteristic of the Msuluzi and Ndondondwane phases are not found in Ntshekane assemblages.

The EIA sequence of the eastern lowlands is one of the least controversial in southern Africa. Together, settlement patterns, ceramic styles and radiocarbon dates bear out discrete spatial and temporal phases of agropastoral habitation in the region. Initial settlement of the coast and coastal margins was succeeded by a colonization of fertile locations in the river valleys after AD 500. This inland expansion does not appear to have been gradual for the earliest sites of the Msuluzi phase occur up to 60 km inland of the coast. Later dated sites with Ndondondwane and Ntshekane components were established within 40 km of the coast. It appears that EIA farmers moved along major watercourses as resources, and particularly soils, was depleted.

THE LOWER THUKELA BASIN

The Thukela River is the largest easterly flowing river in South Africa. The basin is centrally located in the province of KwaZulu-Natal and covers an area of approximately 4,500 km^2. The basin is ecologically and geologically diverse with differences in seasonal temperature, rainfall, and vegetation cover in each of the main ecozones (mountain, plateau slopes, valleys, coast). Today, the valley is a rural area populated primarily by Zulu speakers belonging to different territorially defined lineage groups (i.e., clans) who live on the slopes of the river valley. This study focuses on a portion of the lower basin covering some 660 km^2 that was archaeologically surveyed between 1984 and 1985 by van Schalkwyk (1991) (Figure 5.3).

The Environmental Setting

The six tributaries of the Thukela (Manyana, Mandlalati, Nsuze, Wosi, Mamba, and Mambulu rivers) in the lower basin only flow during the wet season (late September to March). The Mamba and Nsuze rivers rise in an outlier ridge of the Nkandla heights

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and flow in a westerly direction into the Thukela. The Mamba flows for some 20 km through the countryside before emptying into the Thukela, while the Nsuze is considerably longer, some 35 km from its source. In contrast, the east-flowing Wosi, Mandlalati, and Mambulu rivers rise from the edge of the Kranskop Divide. All of these rivers are currently exposed to intensive subsistence agriculture and excessive livestock numbers (van Schalkwyk 1991). As such, their catchments are severely eroded and the associated seep-lines and wetlands have ceased functioning. Rapid run-off, higher silt loads and abrasive flash flooding have deeply incised their courses and led to their non-perennial nature (van Schalkwyk 1991). Although the Wosi and Manyana rivers are considerably shorter, these hydrological changes are more intensive because the valley slopes are steeper at their source and catchments. Thus, although these catchments lie in an area of high precipitation (between the Kranskop Divide and the Nkandla Heights), their current degraded state permits only sporadic stream flow.

The geological deposits in the lower basin have been identified predominantly to formations of the Natal and pre-Natal Group and classified within the Tugela Series of the Basement Complex (Brink 1931). The Vryheid Formation separates the upper from the lower Thukela Basin (see Figure 5.2). Lithostratigraphic studies place the basin broadly within the metamorphic Karro System, in which schist and gneiss deposits (of the hornblende series) cross with granitic veins. Amphibolites and quartzitic alluvium are found along the valley floor (Du Toit 1954). Veins of titaniferous magnetite with high concentrations of vanadium occur within intrusive streams of gabbro (Luyt 1976). These deposits occur within one to five kilometers of all known agropastoral sites and are the ore sources exploited by Iron Age farming communities. The bedrock geology of the basin is marked by calcrete and limestone deposits, overlain by micaceous, talc-schist deposits. These raw materials appear to have been used by early farming communities in the region (van Schalkwyk 1991, 1994/95). However, while copper is exposed in the rivers flowing out of the Nkandla Heights in the lower Thukela Basin (Hammerbeck 1976), there is no evidence that copper was smelted during the EIA.

In the Thukela valley, deep well-drained soils predominate along the riverbanks and foot-slopes on which EIA sites are found (van Schalkwyk 1991). The characteristic red soil color is a result of the dominant geological material on the valley floor—amphibolites, schists and gneisses. The soil is stable and composed of non-swelling iron-rich kaolin clays with a high base and nutrient status (Maphumulo 1986). These soils are

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particularly well suited to dry-land agricultural practices, and are especially favorable for drought-resistant cultigens such as sorghum and *Pennisetum* and *Ellusine* millets preferred by EIA farmers (Klapwijk 1973; Maggs 1984b, 1984c).

No historical climatic records exist for some portions of the river valleys in eastern South Africa such as the Thukela Basin. It is therefore assumed that the local climate conforms closely to the general patterns typical of the sub-tropical region (van Schalkwyk 1991). The semi-arid lower basin falls within Bioclimatic Zone 10 (Tainton *et al.* 1979). Average maximum daily temperatures vary from 22 °C in June to 29 °C in January, but are often much higher (summer temperatures in excess of 35 °C are not uncommon). Average daily minima are substantially different from summer to winter, varying from 17 °C in January to 8 °C in July when light frosts can occur in the river valley bottoms (Shulze 1982). Rainfall in the region averages between 470-750 mm per year, while the Annual Potential Evaporation lies between 1720 and 1740 mm (Shulze 1982). Most precipitation is received from rainy season thunderstorms during the summer months, mainly in March, while occasional showers and southwesterly winds prevail throughout the winter. Humidity is high during the rainy season, averaging from around 78% in March to 55% in September/October.

These high indices of temperature and evaporation partly explain the inadequate effect any precipitation presently has in the valley. The local topography is also responsible for the disparity between precipitation and evaporation. A rain shadow effect is produced by the steep east facing slopes of the Kranskop Divide, impeding the advance of prevailing frontal rain (Schulze 1982). In stark contrast, annual average precipitation along the Nkandla Heights some 20 km to the northeast is 1000-1200 mm, which allows a semi-coastal forest and grassland to thrive (Edwards 1967). Based on regional changes in temperature and rainfall over the past two millennia in southern Africa discussed in Chapter 2 (see p.15), we would expect climatic conditions to have been warmer and wetter in the valley between AD 500–700 and close to current conditions between AD 600–900.

Hall (1981) originally proposed that the valley slopes and *lowveld* areas were covered by closed savanna woodland before the colonization of the area by EIA farmers. Only in these contexts is it clear that an opening of the river valley savanna-woodland during the EIA forced certain species to shift the range of their habitat, and their

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presence during the first millennium suggests such forest conditions existed. All documented sites in the lower Thukela are found within 100 m of the canopy fringe (van Schalkwyk 1991). The present vegetation of the valley bottom in the lower Thukela Basin (Figure 5.4) and the archaeobotanical record (Table 5.2) support these reconstructions. Generally, present-day vegetation in the valley represents an environment exposed to excessive over-utilization of the land base by the local population (van Schalkwyk 1991). Disturbed areas on the river valley bottom are dominated by the indigenous, deciduous umbrella thorn (*Acacia tortilis*) and drought resistant *Dichrostachys cinerea* thicket, as well as invasive *Euphorbia* species (*E. tirucalli* and *E. grandicornis*). Fallow fields in the area are often quickly over-run with scrub (*Croton menyhartii*), and the original sweetveld (red grass) understory (*Themeda triandra*) is commonly replaced by the sparser bushveld signal grass (*Urochoola mossambicensis*). Remnant grazing lands are dominated by the pervasive *A. tortilis*.

Excessive scouring has also changed the fringe vegetation along the banks of the Thukela and its tributaries. Reedswamp communities (*Phragmites communis*) are heavily stunted due to abrasive river flow and over-grazing. The associated riverine canopy has been heavily depleted and several relict species (*Ficus sycamorus*; *Syzygium* sp., *Salix woodii*, and *Trichelia emetica*) indicate that there was a more diverse riverine flora in the recent past. On the adjacent flat areas only isolated specimens of the deciduous marula (*Sclerocarya birrea*), tamboti (*Spirostachys africana*), and acacia (*Acacia robusta*) have survived, while on hill slopes the red bushwillow (*Combretum apiculatum*) dominates. The climax sweetveld community (*Themeda* and/or *Hyparrhenia*) has been mostly replaced by tufted and less palatable grasses (*Aristida congesta*, *Sporobolus* sp.) and browse-stunted acacia thicket (van Schalkwyk 1991).

While the vegetation history of the eastern lowlands has been the subject of some research, there is a paucity of archaeobotanical remains from Iron Age sites. Throughout eastern and southern Africa only 36 archaeological sites dating from the third to the eighteenth centuries AD have produced evidence of grain (Reid and Young 2000), and direct evidence for pulses and legumes that would have added variety to the EIA diet and proved useful in renewing soil nutrients is equally rare. While plant remains may be preserved on sites in sub-tropical climates, indirect artifactual and botanical evidence are of vital importance for inferring plant food consumption and the workings of early agricultural systems (Reid and Young 2000).

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Fourteen sites with evidence of grain are dated to the EIA in southern Africa (or 38% of all Iron Age sites in eastern and southern Africa), and most are linked to the research strategies initiated by Maggs in the eastern lowlands. Floral material recovered from sites in the eastern lowlands is therefore typical of the range of plant foods and wood fuels exploited during the EIA (Table 5.2). Particularly notable is the presence of many herbs and fruits as well as plants known to have medicinal properties. The overall range of edible plant materials in evidence at EIA sites is rather limited, and certainly does not reflect the breadth of botanical knowledge in early farming communities or the role that foragers may have played in developing the knowledge EIA peoples had of regional medicinal plants (Mazel 1989a,b).

There is a limited range of domesticated animal species found at most EIA sites (Table 5.3). Cattle, sheep, goat, domestic chicken and dog have been identified at most sites post-dating the sixth century AD. The lack of domestic stock at many Mzonjani phase sites can likely be attributed to poor preservation due to soil acidity and exposure in a coastal ecology (Davis 1974, 1975; Maggs 1980c). Analyzed samples from inland sites indicate higher ratios of sheep over goat, and caprids over cattle during the latter first millennium (Maggs 1980c, 1984b; Maggs and Michael 1976; Maggs and Ward 1984; Voigt 1984; Voigt and Peters 1991; Voigt and von den Driesch 1984). In some areas, like eastern Botswana, cattle, small-stock and wild fauna occur in almost equal numbers (Reid *et al.* 1998). However, at most sites, it has been argued that domesticated animals would have made up 70-90% of the protein intake for EIA farmers (e.g., Plug 2000; Voigt 1984; Voigt and von den Driesch 1984).

Hunting and trapping seem to have played a small role in the subsistence of farmers in the eastern lowlands. While wild faunal remains are diverse in EIA samples (Table 5.3), it is unlikely that all the fauna, such as reptiles or rodents were source of animal protein in the diet. Not all EIA farmers in southern Africa followed this same pattern. Work in the Kruger Park in northern South Africa (Meyer 1986; Plug 1988) and in eastern Botswana (Denbow 1982, 1990) shows how early farming communities there drastically altered their subsistence focus in a marginal agricultural landscape by placing greater emphasis on hunting to offset the small amount of domesticated meat in their diet.

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Settlement Pattern

Since the seminal research program begun by Maggs, studies of the EIA in this area have mainly focused upon clarifying settlement and subsistence patterns and a chronological and typological framework for the period from AD 400 to 1100 along the coastal plain and inland to the major drainage basins (Hall 1980a, 1980b, 1981; Loubser 1984; Maggs 1980b, 1980c, 1984b; Maggs and Michael 1976; Maggs and Ward 1984). Recent research has come to focus upon social dynamics in the earliest agricultural communities to colonize the region's major river basins between AD 600 and1000 (Greenfield *et al.* 1997; van Schalkwyk 1991, 1994a,b, 1994/95; van Schalkwyk et al. 1997; Whitelaw, 1993, 1994).

The survey conducted by van Schalkwyk (1991, 1994a,b, 1994/95) in the early 1980s has defined the broader EIA settlement system in the lower Thukela Basin (Figure 5.3, Table 5.4). The survey located four previously reported sites (Laidler and Scot 1936), and identified seventeen new sites dating to the first millennium AD (van Schalkwyk 1994/95). All sites belong to either the Msuluzi or Ndondondwane phases, with 82% placed in the Ndondondwane phase. Van Schalkwyk (1994/95) identified the sites to two size classes: large sites 6-10 hectares in area and small sites of 1-5 hectares. The larger sites belong mainly to the Msuluzi phase, while the smaller settlements date to the subsequent Ndondondwane phase. However, only four (19%) of these sites have been excavated and only Ndondondwane has been subject to large-scale excavation. Nevertheless, both survey and excavation reveal that iron-working residues occur neither at all contemporary sites nor at the largest settlements. The organization of iron production during the EIA is a contentious issue (Huffman 1993; Maggs 1992; Miller and Whitelaw 1996). Iron and pottery production were important pyrotechnic crafts during the Iron Age and ceramic structure (such as furnace walls and tuyeres) and objects were utilized in iron production. Because of the connections between these crafts (discussed in Chapter 8), the distribution and significance of iron production resides at Ndondondwane will be addressed in this thesis.

Perhaps the most striking pattern about the EIA settlement system in the lower basin is that few sites were occupied for more than one phase and no Ntshekane settlements were established in the lower basin (Figure 5.5). Mamba II and Wosi were the first sites established in the valley during the Msuluzi phase. These sites and two

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others were occupied throughout the Msuluzi and Ndondondwane phases. During the Ndondondwane phase, the number of contemporary sites in valley increases by over 60%. The population in the basin may have come close to tripling during the Ndondondwane phase since it was first inhabited 100 years earlier.

Based upon survey data and excavations at Wosi, Mamba I and II (van Schalkwyk 1992, 1994a, 1994b, 1995) and Ndondondwane (Maggs 1984b; Loubser 1993), van Schalkwyk revised Maggs's (1984a) contention that EIA settlements in the region were economically and socially self-sufficient. Instead, van Schalkwyk suggested that the Ndondondwane phase represents "a phenomenon of community fission defined by an increasing number of smaller, less intensively settled residential locales which were satellite to a few larger, specialist village centers" (1994/95:197). Many of the smaller settlements have no evidence for iron smelting and may have been reliant on an outside source. In contrast, the larger sites show evidence for increases in the number of cattle compared to earlier phases, and ivory and iron tools and ornaments were made at these sites. Establishing special-function sites at specific localities through fissioning would have been an effective mechanism to diversify the productive base of EIA communities already established in the valley. According to a similar pattern documented in the Limpopo-Shashe basin (Huffman and Hanish 1987), it has been suggested that the larger sites would have acted as centers of political and economic power, with smaller sites taking a subordinate position (Huffman 1986, 1993; Whitelaw 1994), and livestock would have functioned as the principal means of signifying these relationships (Huffman 1982, Hall 1987).

Van Schalkwyk (1991, 1994/95) has proposed that competition for productive land in the Thukela was a mitigating factor in burgeoning trade in the valley. Increasing trade allowed villages to obtain grain staples from other villages as soil productivity decreased over time. Van Schalkwyk sees the exchange of non-agricultural goods, such as iron, talc and pottery as early sources of wealth, which farmers then invested in livestock to offset decreasing soil fertility and the subsequent decrease in sustainable crop yields. Following Hall (1987, 1990), he argued that this eventually led to a political economy based upon wealth in cattle. However, evidence for competition over valuable productive land is very limited and there is no indication that territory was marked or even a matter of dispute.

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NDONDONDWANE

Ndondondwane is located on a relatively flat expanse of the east bank of the lower Thukela River some 200 m asl (Figure 5.6). It is situated on the deep well-drained red soils along the riverbanks and foot slopes where other first millennium sites are found (Maggs 1984a; Maphumulo 1986; van Schalkwyk 1991). Previous research at Ndondondwane has established that the site contains well-preserved architectural and artifactual remains including both fauna and flora. During the late 1970s, excavations confirmed that the Ndondondwane ceramics composed a new stylistic phase in the regional Iron Age ceramic sequence. The ceramic typochronology, secured by radiocarbon dates, dated the EIA occupation of Ndondondwane to the ninth century AD (Maggs 1984c). Further excavation in the early 1980s uncovered a livestock enclosure, iron smelting and ivory working areas near the river, and a contemporary midden to the east of this (Loubser 1993).

History of Research

Maggs (1984c) conducted the initial excavations at Ndondondwane in 1978 after being notified by a local storeowner of bone and ceramic fragments in a plowed field adjacent to the Ndondondwane ford (Middledrift) of the Thukela River (Figure 5.3). Maggs chose to excavate what was later recognized as a large midden deposit that included debris of iron smelting, ivory working, and ritual objects reminiscent of finds at the Lydenburg Heads sites (Innskeep and Maggs 1975; Maggs and Davidson 1980). Maggs's excavations were limited to this large midden, since termed the "Mound Area." Maggs's research design was mainly concerned with obtaining ceramic and faunal samples to build upon the culture historical sequence for the region and gain insight into the economy of what was now recognized as the earliest farming communities in the region. It was clear, however, that the Ndondondwane ceramics composed a new phase in the EIA sequence, which was by convention named after it.

Maggs's excavations were also unique because they yielded the first large-scale collection of botanical (Maggs 1984c) and faunal (Voigt and von den Driesch 1984) remains in the region. The collection of such data from previously excavated EIA sites had been limited because they were disturbed by multiple occupations or extensive erosion. The largely undisturbed site (Maggs 1984c; Greenfield *et al.* 1997; van

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Schalkwyk *et al.* 1997) thus contributed new data on the ecology and economy of EIA communities in the region, including the first direct evidence of bulrush millet (*Pennisetum typhoides*) as a cereal crop (Maggs 1984a, 1984c).

With plans to construct a dam in the basin, which would have flooded Ndondondwane and several other important sites, in the spring of 1982 the South African Defense Force seconded Jannie Loubser to the KwaZulu Homeland Government to extend Maggs's original excavations. Loubser (1984, 1993) excavated the remaining content of the mound and discerned three other activity areas. Loubser (1993:141-148) showed how the mound accumulated as a result of a series of activities, which included the construction of a hut, ivory bangle manufacture, ritual activities represented by numerous clay mask fragments, and iron smelting. Based on new evidence for ceramic heads at the site, Loubser (1993) also argued that ritual activities were conducted in the Mound Area. In addition, he also initiated a study of the area around the mound through a series of auger samples and test trenches. He identified a dung accumulation some 40 m to the north of the mound and interpreted the deposit as a cattle byre that may have shifted laterally during the occupation of the site. This has since become known as the Dung Area. Excavations here revealed several post-holes (Loubser 1993:122) and from this Loubser suggested that the byre was constructed of a double-row palisade of interconnecting poles. A series of smaller postholes to the west was further interpreted as a small stock enclosure. To the east of the mound, Loubser placed several test trenches in an area where a more visible concentration of plow-scattered daga (fired clay) was located (Midden 4). A *daga* (dung-clay mixture) floor and a small ash deposit were identified, which Loubser attributed to a domestic unit. It was suggested that this household complex was associated with the Mound Area and livestock enclosure byre, and that houses were arranged in a linear fashion oriented towards the river. Loubser (1984, 1993) described the ceramic samples and iron smelting evidence, but the faunal and botanical samples have never been fully published.

Additional excavations were conducted at Ndondondwane from 1995 to 1997, followed by extensive analysis of the recovered artifacts and ecofacts (Greenfield 1996, 1997, 1998, 1999; Greenfield *et al.* 1997; van Schalkwyk *et al.* 1997). The objective of this research was to collect spatially representative samples of data from an EIA settlement to test models of intra-settlement socioeconomic organization. During 1997, I

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was responsible for excavating portions of the Midden 3 area discussed below (the Western Midden and the house floor) and analyzing the ceramics recovered from all the field seasons spanning 1978 to 1997.

This site was chosen for study because it was a single-phase settlement occupied for a comparatively short duration (<100 yrs.). This has resulted in less pronounced settlement drift—the temporal and spatial changes in activity areas—characteristic of other EIA settlements in the region (e.g., Lane 1998; Maggs 1984b; Whitelaw 1994). Ndondondwane has not been disturbed by many of the post-depositional processes typical of other multiphase EIA settlements (e.g., Fowler *et al.* 2000; see also Feely 1987; Hall 1981, 1984; Marker and Evers 1976).

The most recent excavations at Ndondondwane expanded previous excavations and investigated new areas of the settlement (Greenfield 1998, 1999; Greenfield *et al.* 1997; van Schalkwyk *et al.* 1997). They confirmed that Ndondondwane was occupied only during the Ndondondwane ceramic phase. It is not possible to give a more precise length of occupation beyond dating the site to the ninth century AD. However, there is no question about the contemporaneity of features. For this reason, it was possible to distinguish a series of spatially discrete activity areas which have been divided into Central and Peripheral zones separated by an open space some 100 m across (Greenfield *et al.* 1997; van Schalkwyk *et al.* 1997; Greenfield and van Schalkwyk 2000). The Central Zone is composed of three activity areas arranged about 40 m from each other in a line from the northwest to the southeast (Figure 5.6): a livestock enclosure (Dung Area), a large hut floor (Transect 1), and an area (Mound Area) reserved for iron smelting, ivory working, and possibly ritual activities (with clay mask fragments, human figurines, etc.). Arranged in a rough arc to the north of the Central Zone, separated by an apparently large open space of some 100 m, are a series of domestic activity areas (Middens 1 to 4). A fourth activity area used for charcoal and iron ore preparation is located at the southeast end of the zone.

Site Stratigraphy

The most recent excavations were able to discern microstratigraphic horizons within the activity areas in the Central and Peripheral zones. Based on extensive surface (field collection) and subsurface (conductivity, auguring and excavation) reconnaissance

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of the site, the excavators have proposed five major temporal horizons at Ndondondwane (Figure 5.7; Greenfield *et al.* 2000: 13-14, fig. 6):

(1) Horizon 4. Plow zone, with an upper (10 cm thick) and lower (15 cm thick) component. The plow zone decreased in thickness as one move upslope from the Central to Peripheral activity areas to *c.* 10 cm in depth.

(2) Cultural Horizon 3. This is the latest temporal component of the occupation, the abandonment stage of the settlement, and includes the Upper of the Middle horizon in the Dung Area, Transect 2 (Cultural Horizon 1) and the Stage 5 activities in the Mound Area.

(3) Cultural Horizon 2. The second temporal component of the occupation, the main occupation of the settlement. The hut in Transect 1 is linked to the second set of strata in the Dung Area (Middle of Middle and Upper Loose and Compact Dung horizons), Transect 2 (Cultural Horizon 2) and Stages 3 and 4 in the Mound Area.

(4) Cultural Horizon 1. The earliest occupation horizon at the site corresponding to the initial establishment of the village. It is linked stratigraphically to the burned hut in Transect 1, the earliest strata in the Dung Area (Lower of Middle and Lower Loose and Compact Dung horizons, Transect 2 (Cultural Horizon 3) and Stages 1 and 2 in the Mound Area.

(5) Sterile Base. This was the pre-EIA occupation sedimentary horizon.

While the stratigraphic relationships within the Central Zone are clear, those between the Central the Peripheral activity areas are less certain. Microstrata were detected in the activity areas and features (e.g., pits) in the Peripheral Zone, but it is not known if or precisely how these are associated with the horizons defined in the Central Zone. The excavators have suggested, however, the following relationships. (1) The pit fillings in the domestic complexes correspond to the final, abandonment of the village. (2) Coring of the space between the zones indicate that the depth of the Horizon 3 stratum in the Central Zone is not mirrored in the domestic complexes, and only the two lower horizons, Horizons 1 and 2, link the deposits in Midden 2. This suggests that the domestic complexes were occupied for the duration of the occupation. In Chapter 7, I utilize the ceramic data to help clarify the relationships within and between the activity

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areas identified in each zone. I now turn to a more detailed description of the nature of these activity areas.

The Central Zone

Dung Area

The largest activity area in the Central Zone of the site is the livestock enclosure (Figure 5.8). The most recent excavations have isolated two activity zones in the Dung Area: one used primarily by humans in the east and the other by livestock in the west. A stockade wall appears to divide the two zones (Figure 5.10; Greenfield *et al.* n.d.; Greenfield *personal communication* 2000), and the stratigraphy in each zone is very different (Figure 5.9).

In the livestock zone, four strata have been attributed to three temporal horizons (Figure 5.9). Each temporal horizon contains a pair of overlying loose and underlying compact dung. The loose dung strata are mixed with ash and charcoal. The Upper Loose Dung stratum is a mix of dung, small charcoal fragments and ash, while the Lower Loose Dung stratum includes only dung and charcoal fragments. In contrast, both compact dung strata are composed almost entirely of decomposed animal dung, but are not uniform over the entire area. In modern byres, compact dung only forms where livestock tend to cluster in an enclosure, and this is often at the lowest elevation in the byre (in this case, towards the west). Thus, compact dung did not accumulate where human activity occurred.

The eastern half of the Dung Area, some 10 cm uphill from the livestock zone, is where human activity is clearly attested (Figure 5.9 and 5.10). It is termed the human activity zone of the Dung Area because there is evidence for the reworking of iron implements (i.e., charcoal and forging slag) and the dumping of cultural debris (animal bone, pottery, etc.). It is also where meat was roasted on many occasions over a bowl-like depression, resulting in the accumulation of much ash, charcoal, and burnt bone within the depression (Figure 5.10). Three strata were found in this area: 1) an Upper Horizon of loose fine ash; 2) a Middle Horizon of coarser ash, mixed with bone and some charcoal; and 3) a Lower Horizon of coarse sediment, mixed with large amounts of

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charcoal and bone. Ceramics are abundant throughout the deposits. The Upper Horizon in the human zone could not be linked stratigraphically to the livestock zone because previous disturbances had truncated its spatial association. However, the association of the other horizons in the human zone of the Dung Area is clearer. The Middle Horizon can be linked stratigraphically to the Upper Loose and Compact Dung Horizons in the animal zone (*c.* 15-35 cm depth), while the Lower Horizon is linked to the Lower Loose and Compact Dung Horizons (*c.* 35-60/75 cm depth).

Mound Area

The second major activity area in the Central Zone is the Mound Area (Figure 5.11). It appears to be reserved for specialized activities associated with iron smelting (with a furnace and slag pit), ivory working (bangle manufacture) and various rituals, which have been inferred from the presence of numerous fragments of terracotta "heads" (Loubser 1993: 141-148). The mound accumulated through a shifting series of these activities. Loubser proposed a five-stage sequence for the Mound. The first stage saw the construction of a house, which is associated with stone, daga and black ash and gray silt deposits (Figure 5.11(a)), and the accumulation of its associated middens, the Red Midden and Grey Lens. The demolition of the house marks the end of the second stage.

In the third stage, there was the construction of a fence (Figure 5.11(b)). Loubser was able to differentiate between rodent burrows, holes and wide, shallow channels running through the area (Figure 5.12). The holes occurred at regular intervals and he argued that the holes and channels formed the fence of a rectangular-like structure (Loubser 1993: 117). However, this "rectangular" shape is not immediately apparent, as the fence appears to be linear in the east and circular in the west. Whatever its original shape, it is associated with the deposition of many large pottery sherds and craft production activities. The sherds cluster outside and inside the west wall of the fence and one either side of the northern part of the enclosure where there is a "step."

The sherds and faunal remains are associated with the use of the area during Stage 4. All of the elephant and hippopotamus ivory were concentrated in this area. The ivory is associated with large concentrations of ash and pottery that make up the Grey Midden (Figure 5.11(c)). The accumulation of this midden marks the beginning of Stage 4. Many large pottery sherds, figurines and fragments from at least four terracotta heads

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were recovered from the fill of the midden. Loubser (1993: 117-118) suggested that at this time the northwestern part of the fence was removed and the eastern portion shifted. A reconstruction of this scenario is illustrated in Figure 5.11(c). The eastern and southeastern portion of the fence may have been retained for craft workers in the area as a windbreak that would have blocked the prevailing winds during the summer and winter months.

In the final stage, the remaining fence was removed and an iron-smelting furnace was constructed to the west of the Grey Midden (Figure 5.11(d)). After smelting had occurred, the daga block superstructure was dismantled and deposited to the north. The evidence for iron smelting in the Mound Area is quite clear. Loubser (1993: 118-119) interpreted an oval depression 40 cm deep, 125 cm long, and 95 cm wide with a 20 cm thick lining of slag as a smelting furnace. Adjoining the slag-lined bowl was a depression 20 cm deeper, which was interpreted as a rake pit for the furnace. Other evidence of smelting is indicated in the northern slope of the Mound (Figure 5.13). Here 300 liters of slag in either an unreduced and/or undesolved oxide particles (indicating it was in a fluid state), daga furnace blocks (which were partly reconstructed (Loubser 1984)), and the fragments of at least four slag encrusted tuyeres were recovered overlying a large patch of vitrified sediment at the east end of the area (see Figure 5.11(d)). There is little doubt iron was smelted at Ndondondwane. The question is when this activity occurred in relation to other during the occupation of the settlement.

Transect 1, Domestic Complex

The second major activity area in the Central Zone is a large, burnt, circular *daga* floor, some 10 cm thick and 10 m in diameter some 1.15 to 1.20 m below the surface (Figure 5.14). The floor was most intensely burnt in the center, where the daga is hardest. Less intensely burned patches occur around the periphery of the floor. The presence of a single large post-hole in the center of the floor, reed impressions in the burnt daga, the absence of any peripheral post-holes, suggests the structure was beehive-shaped (van Schalkwyk *et al.* 1997: 68). An ashy depression, filled with charcoal towards the center of the hut floor, suggests the presence of a possible hearth towards the center of the hut. Associated with the floor were a number of lower and upper grinding stones (Figure 5.15). The flat lower grinding stones have a polished surface and groove running

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along the middle of the stone. However, other large stones found in the center of the floor were of a different shape and did not have the characteristic groove of lower grinding stones. This implies that they were not used for grinding grain, but may have instead been used for sharpening iron tools and weapons. Also on the floor of the house was a large quantity of sherds. The remains of both large and small vessels were clustered along the N and NE extremity of the floor. A number of small jars and bowls were also present.

Few artifacts were recovered from the surrounding area, suggesting the house and its contents were abandoned after the fire. Most of the space elsewhere in Transect 1 is devoid of features and may represent a large open area within the settlement.

Transect 2

Loubser (1993) originally suspected that the space between the Mound and Dung Areas should be largely devoid of features and concentrations of cultural material. The finding of the hut in Transect 1 disproved this, but the excavators also examined whether any concentrations extended to the north of Transect 1. Auguring and a series of test trenches confirmed that the stratigraphy was similar to that in Transect 1 (Figure 5.7; Greenfield *et al.* 2000). However, the nature of activities in this area is somewhat ambiguous due to the disintegrated nature of the deposits. The area may be a general exterior activity area (Greenfield *et al.* 2000), but it may also be the result of downslope wash after abandonment (Greenfield, *personal communication* 2001).

The Peripheral Zone

The peripheral zone can be divided into a series of domestic and specialized activity areas. These formed an arc around the Central Zone. The space between domestic middens, just as the space between peripheral and Central Zones, is largely "empty" of activity loci. No features or artifact accumulations were found in these areas despite intensive systematic surface collection, geophysical survey and auguring.

The nature of five areas was defined based on the presence of several diagnostic features, including hut floors, dung-lined pits, and concentrations of ash and other cultural debris. Four of the five loci were the remains of domestic household complexes

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(Middens 1-4), which were located to the north, east and southeast of the Central Zone. The nature of domestic household compounds has largely been defined. The pattern repeats itself from midden to midden across the entire site. Each domestic household complex contained at least one hut, a food preparation and storage area and a discard area. These are the essential elements of the EIA "household." There is a notable disparity in the sizes of the house floors; they vary from 3.5 to 10 m in diameter, or about 11 to 31 m in circumference. Four or five people may have used the smaller houses, while twice this number may have occupied the larger ones. If all the households were occupied at the same time, the population of Ndondondwane would not likely have exceeded 40 people. A fifth peripheral activity area was found in the southeastern end of the arc some thirty meters to the southeast of Midden 2. This area was used for charcoal and raw iron ore preparation and was subsequently termed the Charcoal Preparation Area (Greenfield *et al.* 1997).

Midden 1

The best-preserved example of a domestic activity and living area is Midden 1 (Figure 5.16). This area is defined by the presence of several features: a house floor, ash deposits, a concentration of iron ore and forging slag, and pits. The floor of a living structure occurs in the east end of the area. The pits, ash and forging debris are distributed in an arc to the west of the house floor. The floor is a very hard, compact, thin (<5 cm) horizon with no cultural debris associated with it, and may have been about 5 m in diameter. A small hearth (30 cm diameter) was placed in the floor, but its original position in the hut is not clear.

The series of ash deposits scattered across Midden 1 appear to be associated with a different micro-activity locus. Ash 1 is the largest and accumulated in a shallow depression that was dug down into the pre-EIA rocky substrate. The excavators suggest that the quantity of ash, calcite nodules, ceramics and bone in the depression resulted from domestic activities that may have included cooking, pottery firing, and the cleaning of domestic activity areas or storage pits. An iron-forging locus was identified by a burnt patch of sediment with charcoal, ash and slag in a 50 by 70 cm area that occurred to the northwest of Ash 2 (in square A4). Other small bits of forging slag were found scattered around the core of the activity area.

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Four other ash deposits were above the sterile base, and were relatively thin and ephemeral. Ash 5 is associated with the forging locus, while Ash 6 surrounds the ash-filled Pit 2. Ash 3 was near Pit 3, and Ash 4 (not shown in Figure 5.16) is probably related to another feature that has been destroyed by erosion and plowing immediately south of the excavated area.

Three storage pits, filled with refuse, were found in the Midden 1 area. All three pits are cut downwards into the underlying Pleistocene deposits and calcium carbonate substrate. They tend to be circular in shape, with a diameter of about 1 m, extending 1 to 2 m in depth. All were smeared with dung suggesting they originally functioned as a grain storage pits. Dung linings are used for sealing grain storage pits from moisture to protect grain, which was probably placed in baskets.

The pits found in the area were either empty or filled with debris. Pit 2 was capped by a group of large rocks, but it is unlikely that it was abandoned with its contents intact. The fill of the pit contained ash, charcoal, and large and small upper and lower grinding stones. The stones were all deposited at the same time. The basal horizon contained a random distribution of ceramics, bones, beads, grinding stones and charcoal. At the base of the pit, four large cattle long bones were found arranged in a cruciform pattern in the center.

Pit 3 is of special interest because it was also used for a burial. This pit is shallower (*c.* 40 cm from the preserved mouth) than the other pits and contained three major horizons. Above the thin basal horizon, an inverted ceramic jar was found. The jar contained the complete skeleton of a two to three-month-old infant, charcoal, burnt animal bones, and three beads.[2] The infant was originally placed with its head toward the mouth of the jar. The pot was carefully placed when inverted, and the body fell forward against the upper wall and shoulder of the pot. The sediment of this level was to fill the burial.

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[2] The age of the infant was provided by Darryl DeRuiter (*personal communication*, 2000), who is presently examining the remains for the final report. Based on a study of the teeth and length of the long bones, DeRuiter estimates age at death between 2 and 3 months.

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Midden 2 and 4

Middens 2 and 4 are located in the area where Loubser (1993) recognized a concentration of *daga* and other artifacts on the surface at the edge of the cultivated field (Figure 5.17). He augured the area and opened seven test trenches to evaluate the nature of the surface concentration.

The remains of a *daga* floor and a small ash deposit were located and sampled, and it was subsequently termed the Daga Area (Loubser 1993). Although Loubser (1993) argued that a linear arrangement of domestic locales (E to W) was most likely, subsequent excavation revealed that the linear spread of surface material was a function of modern plowing and not human activity. The subsequent systematic surface collection of the eastern side of the fence during 1995-1996 discovered the full spatial range of surface materials. The latter proved that the domestic loci were spaced in an arc around the Central Zone. Due to the shallow overburden and extensive plowing in this area, almost all of the remains were found incorporated within the plow zone and were disturbed. Very little was left *in situ* below the plow zone. The features described by Loubser (1993) were remnants, and plowing had displaced the bulk of the domestic debris. New excavations exposed a small intact ashy midden containing cultural debris (ceramic, bone and *Achatina* sp. disk-beads). Renamed Midden 2, this area of the site is interpreted as an area of domestic residence and activities. The size of the house floor given in Figure 5.7 is estimated from the curvature of the intact floor fragments reported by Loubser (1984) and subsequent excavation of the area in 1996.

A surface concentration of EIA cultural debris was exposed southeast of Midden 2, tentatively termed Midden 4. Excavations and coring failed to locate any further features or artifact clusters associated with either Midden 2 or the surface scattered *daga* fragments. It likely represents the southernmost extent of the Midden 2 area.

Midden 3

The area termed Midden 3 is actually composed of two large, deflated middens separated by 5 m and a house floor situated a further 10 m upslope (Figure 5.18). Aligned with the excavation grid, the middens are situated in "western" and "central" sub-areas of Midden 3, while the house is in an "eastern" sub-area. The Western and Central middens are open middens that each had pits similar to those in Midden 1. They

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are also circular in shape, but only the pit in the Central Midden may have been dung lined. This pit extended down about 1 m and was filled with household debris. The pits in the Western midden were small and shallow and one contained a single broken pot.

Open Space

Up-slope from the river, between the livestock byre and domestic areas, was a large open area with little debris and no apparent structural features. The excavators have suggested that this "empty space" was the location of gardens and fields, with the surrounding settlement providing a barrier that protected crops from wild ungulates and graminivorous birds (van Schalkwyk et al 1997: 74). In addition, burnt sorghum stalks in cultural deposits at the fringes of these areas were also found (Fowler *et al.* 2000; see also discussions in Chapter 6 and 7). These stalks have been interpreted as the remnants of stubble burnt as fuel after cultivation and then deposited in middens in the Dung Area and elsewhere. However, their proximity to the vacant spaces between the central activity areas and the domestic complexes is not direct evidence for crop cultivation within the settlement. To date, no research has yet defined where the early agriculturists may have grown their crops.

Summary

On the surface, the spatial distribution of features at Ndondondwane matches the general expectations of a settlement organized like the CCP; a peripheral zone of residences surrounds a livestock enclosure and an area where traditionally male activities, such as ivory working, took place. The spatial organization and short occupation of the site make it an important test case for evaluating models of EIA intra-settlement spatial organization and cultural behavior. Most other comparable EIA settlements exhibit multiple occupations spanning several hundred years and more than one ceramic phase (Maggs 1984a, 1994/95; Whitelaw 1994, 1996). This invariably confounds interpretation of the relationships between various deposits and the nature of activity organization within settlements. It also complicates discussions of more complex issues, such as social and economic organization. Beyond the well-preserved botanical

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and artifactual remains recovered from the site, it also has the largest EIA ceramic assemblage available for analysis from the eastern lowlands.

THE NDONDONDWANE CERAMICS

Previous Research

Between 1978 and 1997, fieldwork was conducted at Ndondondwane by three different research teams. Each team had different analytical objectives, and consequently, each utilized a different system of field recovery, data recording and classification methods in studying the ceramics (Table 5.5).[3] As well, different quantities of ceramics were recovered and analyzed since the site was first investigated in 1978.

During the 1978 excavations, over 14,000 sherds were recovered from the Mound Area, of which Maggs (1984c) analyzed 89 partly or completely reconstructed vessels (43 jars and 46 bowls) and fragments of ceramic sculpture (Table 5.5). The 1978 sample comprises almost 29% of the total assemblage. Maggs used a multi-dimensional list classification to compare morphological and decorative traits at Ndondondwane with other EIA ceramic assemblages (Maggs 1980b,c, 1984; Maggs and Michael 1976). This procedure inventories the various traits in a ceramic assemblage and presents the frequency of their occurrence in a matrix format. Most commonly, such inventories concentrate on the frequency of various shapes and decoration techniques (e.g., Fagan 1957; Huffman 1978, 1980; Robinson 1972; Soper 1971). This system does not focus only on shape and decoration technique. Instead, some thirty-eight characteristics were noted under the headings of shape, surface treatment and decoration. Other modifications to the surface, such as burn marks and color burnished or matte finishes, have normally been recorded for EIA assemblages (Maggs and Michael 1976; Maggs 1980a, 1980b) but were not noted in the analysis of the Ndondondwane sample.

Using this approach, only the relationship between two attributes can be examined, placing severe limits upon the degree to which relationships between traits can be assessed. For example, from any multi-dimensional list one cannot determine

[3] The previous collections are housed in the Natal Museum in Pietermaritzburg, KwaZulu-Natal, South Africa. The material from the 1995-1997 excavations is currently stored in the Heritage KwaZulu-Natal head office in Pietermaritzburg.

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how many vessels with everted necks and rounded lips had oblique hatching on the lower neck. Thus, conclusions cannot be made about how many attributes covary or interrelate. In essence, one cannot construct a typology. This method is best suited to monitoring the pervasiveness of traits, such as shapes or motifs, through time and space (Maggs and Michael 1976), and therefore was not adequate for this study.

During the 1982-1983 excavations, almost 5,000 more sherds were recovered from the Mound Area, the Dung Area and Midden 2 (Table 5.5). Loubser (1993) re-analyzed the assemblage from both excavations and added 103 complete or nearly complete vessels to the original sample for a new total of 192 vessels (Loubser 1993). While the second series of excavations seems to have substantially increased the total sample for analysis, the actual number of sherds recovered comprises less than 10% of the total assemblage and a small portion of that recovered during 1978 (35% of combined 1978 to 1982/83). The figures are somewhat misleading because the size of the sherds recovered from this area of the site are larger; in other words, they are less broken. The value of Loubser's analysis was a restudy of all available material and his interpretation of the significance of the ceramic sculpture. Most sherds representing the 192 vessels were illustrated, including unique sherd material, figurines and ceramic sculpture. Only the ceramic sculpture was photographed. Preserved daga fragments were weighed but furnace bricks (Loubser 1984) and pottery were not.

Loubser re-analyzed the Ndondondwane assemblage utilizing a different classification system. The multi-dimensional typology, or "core concept approach" (Huffman 1978, 1980) differs from the multi-dimensional list in several respects: it focuses mainly upon the "stylistic" elements of a ceramics assemblage, it is both intuitive and statistical in nature and it attempts to identify discrete types within an assemblage. As Huffman explains, "The core concept approach was an attempt to characterize the underlying structure of style systems by emphasizing conceptual categories rather than actual execution" (1980:128). This method removes techniques from analysis and instead focuses upon three dimensions of decorative style: vessel profile (shape), design areas (the available decorative surfaces) and decoration (which includes individual geometric motifs, motif combinations and other surface modifications such as paint and burnishing). With this approach, only vessels with complete (or nearly so) profiles are used. Vessel shape is determined by qualitative visual comparison and quantitatively

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using diameter/height ratios (Huffman 1980:128). Decoration is analyzed by differentiating between individual motifs and motif combinations, other surface treatments (like burnishing), and the variation in their placement on a vessel. Therefore, this method combines both statistical procedures and intuitive principles. The final classification has been presented in two forms: (1) as discrete types composed of certain varieties (a type-variety scheme), or (2) as "classes" or descriptions of particular shapes with combinations of decorative elements placed in certain locations on vessels.

Operationally, the core concept approach is easy to use and analytically it does establish connections between three important aspects of ceramic decoration. However, it has a limited number of applications and was primarily designed to monitor inter-assemblage variation to infer chronology and inter-group relatedness (Evers 1988; Huffman 1980). The approach is well designed for this purpose, but it cannot be utilized in studies of technological or functional variation because it does not specify the appropriate attributes required for such analyses.

My analysis of the Ndondondwane ceramics began during the field season of 1997 and continued with a post-excavation study season in 1998 during which ceramics from previous excavations were analyzed. Over this period, the entire collection was re-studied and all unprovenienced or untraceable ceramic objects dating from earlier excavations were discarded from the analysis. Previously unpublished material was examined and published vessels and other objects were photographed, videotaped, re-examined and in some cases redrawn. There are several exceptions. Some of the material recovered during the 1982-1983 excavations could not be located for re-study. Fortunately, most of these objects were reported, discussed or illustrated by Loubser. Material recovered by a poorly trained excavator subsequent to Loubser's departure was discarded from analysis (see Greenfield *et al.* 1997; van Schalkwyk *et al.* 1997). Another factor complicating reanalysis was that some sherd material and reconstructed vessels from earlier excavations were unwashed and permission could not be gained to examine fabric characteristics by creating fresh breaks. For these reasons, it was not always possible to record accurate surface colors or examine all of the fabric attributes. At this level of detail, the observations and comparisons that can be made between areas of the site excavated by different investigators are uneven. However, this situation affects only 823 sherds, or less than 2% of the total assemblage.

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Renewed excavations that used a broader range of recovery procedures at Ndondondwane have greatly increased the ceramic sample available for analysis. A new sample of 29,242 sherds was added to the existing assemblage, and another 15 vessels were reconstructed bringing the total to 211. In total, 49,156 sherds were recovered as surface finds, while taking auguring samples and during systematic surface collection and excavation (Table 5.5). As a whole, this sample is impressive when compared to those recovered and analyzed from other EIA sites in eastern South Africa. In fact, the EIA ceramic typochronological sequence was constructed with an original sample of less than 900 complete or partly reconstructed vessels. The Ndondondwane assemblage made up about 20% of this sample. This is one of the largest and best-preserved EIA ceramic assemblages analyzed in southern Africa to date.

Unlike previous studies of the Ndondondwane ceramics, this analysis employs ceramic data from the settlement to investigate patterns of production, use, and discard to increase the present understanding of intra-settlement activity organization. The greatest obstacle facing the study of the Ndondondwane ceramic assemblage was reconciling previous analytical systems and integrating old and new data sets. To meet this new research objective two problems not encountered by earlier excavators had to be resolved:

The first problem involves classification. To investigate the production and use of ceramics, it is necessary to develop typological schemes that target regularities in manufacture (i.e., a technological typology) and use (i.e., a functional typology). Data must be collected about the attributes of pottery that reflect these regularities. Earlier research by Maggs and Loubser constructed two typologies for different purposes. The typology developed by Maggs was designed to assess the developmental sequence in the eastern lowlands. In contrast, Loubser generated an "emic" ordering of ceramic classes for inter-site comparison using the core concept approach. The behavioral phenomenon underlying both typologies involved regularities in manufacture (forming and decoration). However, since the technological or functional bases of these regularities were not of interest, it was necessary to reexamine all of the ceramic data from Ndondondwane in these terms.

Another shortcoming of previous research is the lack of quantitative data that would be useful for intra-assemblage classification and comparison. To infer patterns of activity organization within settlements different categories of ceramics within and

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between activity areas must be compared. The quantification of ceramic attributes provides a way of defining or verifying the conditions for membership in the classes that define a typology, and estimates of the number of different technological and functional types in an assemblage allow archaeologists to specify the quantities of ceramics occurring in different areas of a village.

CHAPTER SUMMARY

The best insights we have into EIA settlement and subsistence behavior in the eastern lowlands of southern Africa comes from the extensive survey and excavations that have been carried out in the Thukela Basin. No other valley in the eastern lowlands is as well investigated or the EIA settlement system as well defined. In the lower basin, the site of Ndondondwane is the only single-phase EIA settlement identified so far in the eastern lowlands. Large-scale excavations indicate that the spatial distribution of activity areas appears to tentatively support the CCP model in its broad outlines. The central area of the village is dominated activities traditionally associated with men (cattle keeping, ivory working, iron production), which are surrounded by domestic compounds. The domestic complexes are distributed in an arc to the north of central area and are almost equidistant from each other and the stockade.

The ceramics from Ndondondwane represent one of the largest and best-preserved assemblages from a single EIA settlement in southern Africa. The major benefit of utilizing ceramic data from this settlement is that samples were collected from a series of well defined, spatial discrete, activity areas in the settlement. In Chapter 6, I outline the typological characteristics and spatial distribution of the assemblage, followed by a more detailed investigation of the spatial organization of activities at the site.

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Table 5.1. Radiocarbon dating of major Early Iron Age sites in the eastern lowlands of South Africa.

Site[a]	Lab. No.	C^{14} Age bp	s.d.	Calibrated Age Range AD[b]		
				Min.	Midpoint	Max.
		Ntshekane Phase (Kalundu Tradition)				
Ntshekane	Pta-057	1076	50	892	910	998
	Pta-058	1126	45	783	892	976
		Ndondondwane Phase (Kalundu Tradition)				
Magogo Pit 13B	Pta-2875	1190	50	867	892	974
Ndondondwane	Pta-2389	1190	50	867	892	974
	Pta-2388	1220	50	790	879	905
				919	-	951
Ntsitsana	Pta-4684	1290	50	-	660	-
	Pta-4687	1180	50	-	770	-
	Pta-4695	1180	50	-	770	-
KwaGandaganda	Wits-1919	1245	60	769	823, 827,857	892
	Wits-1937	1260	60	762	798	887
				717	-	737
Wosi Grid II	Pta-4095	1270	60	705	790	867
	Pta-4094	1290	50	696	779	867
Mamba I	Pta-4164	1170	60	874	905	991
	Pta-4132	1290	50	696	779	867
	Pta-4114	1300	50	689	774	823
	Pta-4137	1300	50	689	774	823
		Msuluzi Phase (Kalundu Tradition)				
Nanda	Wits-1917	1275	60	696	784	879
2930DB 43	Pta-4303	1300	50	689	774	823
				827	-	857
Magogo Pit 15	Pta-3716	1320	50	679	717, 737, 762	790
Pit 1	Pta-2874	1360	50	663	683	769
Mamba II	Pta-4093	1390	50	652	670	696
Mhlopeni	Pta-2878	1400	50	648	667	689
Msuluzi Confluence	Pta-2195	1340	40	689	769	790
	Pta-2197	1370	30	667	679	696
KwaGandaganda	Wits-1938	1315	60	674	717, 737, 762	790
	Wits-1918	1395	60	644	667	696
Wosi Grid II	Pta-4104	1430	60	628	656	679
	Pta-4100	1460	50	615	644	663
		Mzonjani Phase (Urewe-Nkope Tradition)				
Enkwazini	Pta1977	1540	60	536	588	634
	Pta1847	1650	50	408	434	536
Inanda Quarry	Pta-5492	1580	50	448	548	599
Mzonjani	Pta-1980	1670	40	408	423	448

[a] Data from Prins and Granger (1993); van Schalkwyk (1994b); Whitelaw and Moon (1996: table 2). See Figure 4.2 for site locations.
[b] Calibrated historical dates AD are given using the Pretoria Calibration Program (Talma and Vogel 1993) based on the data of Stuiver and Pearson (1993) and adjusted for the southern hemisphere (Vogel *et al.* 1993).

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Table 5.2. Typical Early Iron Age floral material identified from flotation samples in the eastern lowlands

Identification	Description	Possible uses and comments
Acacia (burkei?)	Thorn tree, charcoal	Very common, fuel
Acacia karoo	Thorn tree, charcoal	Very common, fuel
Amaranthus sp.	Weeds of cultivation	Leaves are a staple
Capparidaceae (*Cappari* sp.)	Shrubs	Magico-medical properties
Celtis sp.	White stinkwood	Medicinal properties
Citrellus sp.	Melons, wild and cultivated	*C. lanatus* important cultivated melon
Commelina sp. (*Benghalensis*)	Herb	Leaves edible
Commelina crispa	Herb	Edible
Convulvulus sp.	Numerous herbs	Edible
Dovyalis sp.	Shrubs/trees	All have edible fruit (e.g. Kei-apple)
Drypetes sp.	Shrubs/trees	Edible fruit
Euphorbia spp.	Succulent shrubs/trees	Very common, poisonous
Fabaceae (*Desmodium* sp.)	Herbs	Edible
Galenia sp.	Small shrubs	Medicinal?
Galium sp.	Scrambling herbs	Roots medicinal, leaves edible
Grewia sp.	Shrubs	Many have edible fruits
Hyptis sp.	Coarse herbs	Edible
lpomoea sp.	Convolvulus	Various medicinal properties
Kedrostis sp.	Wild cucurbits	Roots medicinal, leaves edible
Lamiaceae (*Salvia* sp.)	Herbs of sage family	Medicinal
Lantana sp.	Shrubs	Edible fruits
Mollugo sp.	Small herbs	Edible
Olea sp.; *Olea* (*africana*?)	Wild olive; tree charcoal	Dominant, fruit and leaves edible; fuel
Panicum sp.	Grasses	—
Panicum milaceum	Broomcorn millet	Weed of cultivation
Parinari sp. (*P. curatellifolia*)	Mobola plum	Edible fruit
Potamogeton sp.	Water weed	Edible?
Rhus sp.	Shrubs; tree charcoal	Some have edible fruits; fuel
Sapindaceae (*Pappea* sp.?)	*P. capensis*?, tree	Edible fruit
Sclerocarya caffra	Marula nuts; tree charcoal	Edible fruit; fuel
Setaria sp.	Grasses	—
Vangueria sp.	Shrubs/trees	Edible fruits
Zygophyllaceae (*Zygophyllum*)	Herbs	Some are poisonous

Sources: Maggs (1984c: Table 5); Maggs and Ward (1984: Table 5). Exotic plant remains and pioneer species common in disturbed or overgrazed areas are excluded from this list.

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Table 5.3. Principle domesticated and wild animals represented on major Early Iron Age sites in the eastern lowlands of southern Africa

Species	Site MSZ	MAG	MHL	WOS	MAM	NDO	KWG	NTS
Domesticated Species								
Sheep (*Ovis aries*)	•	•	•	•	•	•	•	
Goat (*Capra hircus*)		•		•	•	•	•	
Caprids	•	•	•	•	•	•	•	•
Cattle (*Bos taurus*)	•	•		•	•	•	•	•
Dog (*Canis familiaris*)				•	•	•	•	•
Chicken (*Gallus domesticus*)				•		•	•	
Pig? (*Suid* sp.)						•?	•?	
Non-Domesticated Species								
Bovid sp.[1]	•	•		•	•	•	•	•
Wild pig (*Suid* sp.)				•		•?	•?	•
Hippopotamus (*H. amphibius*)				•	•	•	•	
African elephant (*Loxodonta africana*)				•	•			
Amphibian/Reptile sp.[2]		•		•	•	•	•	•
Rattus rattus				•		•	•	
Other rodent sp.[3]	•	•	•	•		•	•	
Small mammal [4]		•		•		•	•	•
Bird sp.[5]		•		•		•	•	
Fish sp. [6]	•	•		•	•	•	•	
Landsnail (*Achatina/ Metachatina* sp.)	•	•		•	•	•	•	
Freshwater mussel [7]	•	•		•	•	•	•	
Marine shell [8]				•		•	•	

Sources: Voigt (1980, 1984); Voigt and von den Driesch (1984); Voigt and Peters (1994).
Abbreviations: MSZ = Msuluzi, MAG = Magogo, MHL = Mhlopeni, WOS = Wosi, MAM = Mamba I, NDO = Ndondondwane, KWG = KwaGandaganda, NTS = Ntshekane. Sites are listed in order of their lowest chronometric date. For site location see Figure 4.2 and for phase classification see Table 4.1.
Notes:
[1] E.g., Nyala antelope (*Tragelaphus angasi*), Bushbuck (*Tragelaphus scriptus*), Common duiker (*Sylvicapra grimmia*), Grey rhebok (*Pelea capreolus*), Reedbuck (*Redunca arundinum*).
[2] E.g., Crocodile (*Crocodylus niloticus*), Monitor lizard (*Varanus* sp.), Plated lizard (*Agama* sp.), Frog (*Bufo* sp., *Pyxicephalus* sp.).
[3] E.g., Red veld rat (*Aethomys chrysophilus*), Cane rat (*Thryonomus swinderianus*), Mouse (*Praomys natalensis*).
[4] E.g., Hare (*Lepus* sp.).
[5] E.g., Duck (*Anas undulata*), Red-necked francolin (*Fra7ncolinus after*).
[6] E.g., *Labio* sp., *Silurid* sp., *Cichlid* sp.
[7] E.g., *Unio* sp., *Aspatharia* sp.
[8] E.g., *Nerita* sp., *Limpet* sp.

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Table 5.4. Early Iron Age sites in the lower Thukela Basin survey area

Ceramic Phase	Site	Size (ha)	Iron working residues[b]	Source
Ndondondwane	Ndondondwane[a]	6-7	+	Maggs 1984c; Loubser 1993; Greenfield et al. 1997, 2000
	Shushu Hotsprings	4-5	Unverified	Laidler and Scot 1936; van Schalkwyk 1991
	Mambulu River	4-5	?	van Schalkwyk 1991
	Silambo	3-4	+	van Schalkwyk 1991
	Kwasojiji	3-4	+	van Schalkwyk 1991
	Kwabhengu	3-4	+	van Schalkwyk 1991
	Kwadamu	3-4	+	van Schalkwyk 1991
	Nsundukazi (84/3)	3-4	-	van Schalkwyk 1991
	Nsundukazi (84/4)	3-4	-	van Schalkwyk 1991
	Nsuze East	3-4	-	Laidler and Scot 1936; van Schalkwyk 1991
	Mambulu Farm	3-4	-	van Schalkwyk 1991
	EIA surface scatter	2-3	-	van Schalkwyk 1991
	EIA surface scatter	2-3	-	van Schalkwyk 1991
	EIA surface scatter	2-3	-	van Schalkwyk 1991
	EIA surface scatter	2-3	-	van Schalkwyk 1991
	Uphamba	2	+	van Schalkwyk 1991
	Uphamba	1	+	van Schalkwyk 1991
Msuluzi / Ndondondwane	Mamba I (83/4)	8-9	+	Laidler and Scot 1936; van Schalkwyk 1991, 1994a
	Mandleni/Mandlalati	10	+	van Schalkwyk 1991
	Wosi (84/5)[a]	10	+	Laidler and Scot 1936; van Schalkwyk 1991, 1994b
Msuluzi	Mamba II (86/7)[a]	9-10	+	Maggs 1980b; van Schalkwyk 1991, 1994a

[a] Excavated site. For radiocarbon ages see Table 5.1.
[b] Residues of iron working present (+), absent (-), uncertain (?).

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Table 5.5. Analytical systems and sample sizes utilized in the study of the Ndondondwane ceramics

Excavation Year	Classification System			Quantification		Sample Size[c]			
	Approach[a]	Demonstrates:	Replicable/ Verifiable	Analytical Unit(s)	Procedures	Fragments[d]	Conjoined[e]	Sherds	Vessels Examined
1978 (Maggs 1984c)	Multi-dimensional list (Maggs and Michael 1978)	Pervasiveness of morphological and stylistic traits between assemblages	Yes	Reconstructed vessels, sculpture	None	14,363 (29%)	276 (37%)	14,162 (29%)	89
1982-1983 (Loubser 1993)	Core concept approach (Huffman 1980)	Stylistic affinity between assemblages	Problematic	Reconstructed vessels, selected sherd material, sculpture	None	5,038 (10%)	217 (29%)	4,895 (10%)	103
1995-97	Multi-dimensional attribute analysis[b]	Formal, technological and stylistic variation within an assemblage	Yes	Entire sample including sherd material	Sherd counts, estimated equivalents, volume	30,287 (61%)	253 (34%)	30,099 (61%)	15
					Total Sample Size	49,688 (100%)	746 (100%)	49,156 (100%)	211

[a] After Huffman (1980).
[b] Applied to the study of all ceramic materials collected between 1978 and 1997 (i.e., the total sample size list in the last row).
[c] Numbers given in brackets are percentages of the total fragments, cojoined fragments, and sherds recovered.
[d] Individual pieces (fragments) of ceramic materials.
[e] Reconstructed fragments belonging to the same object. Each set of cojoined fragments is counted as a single sherd.

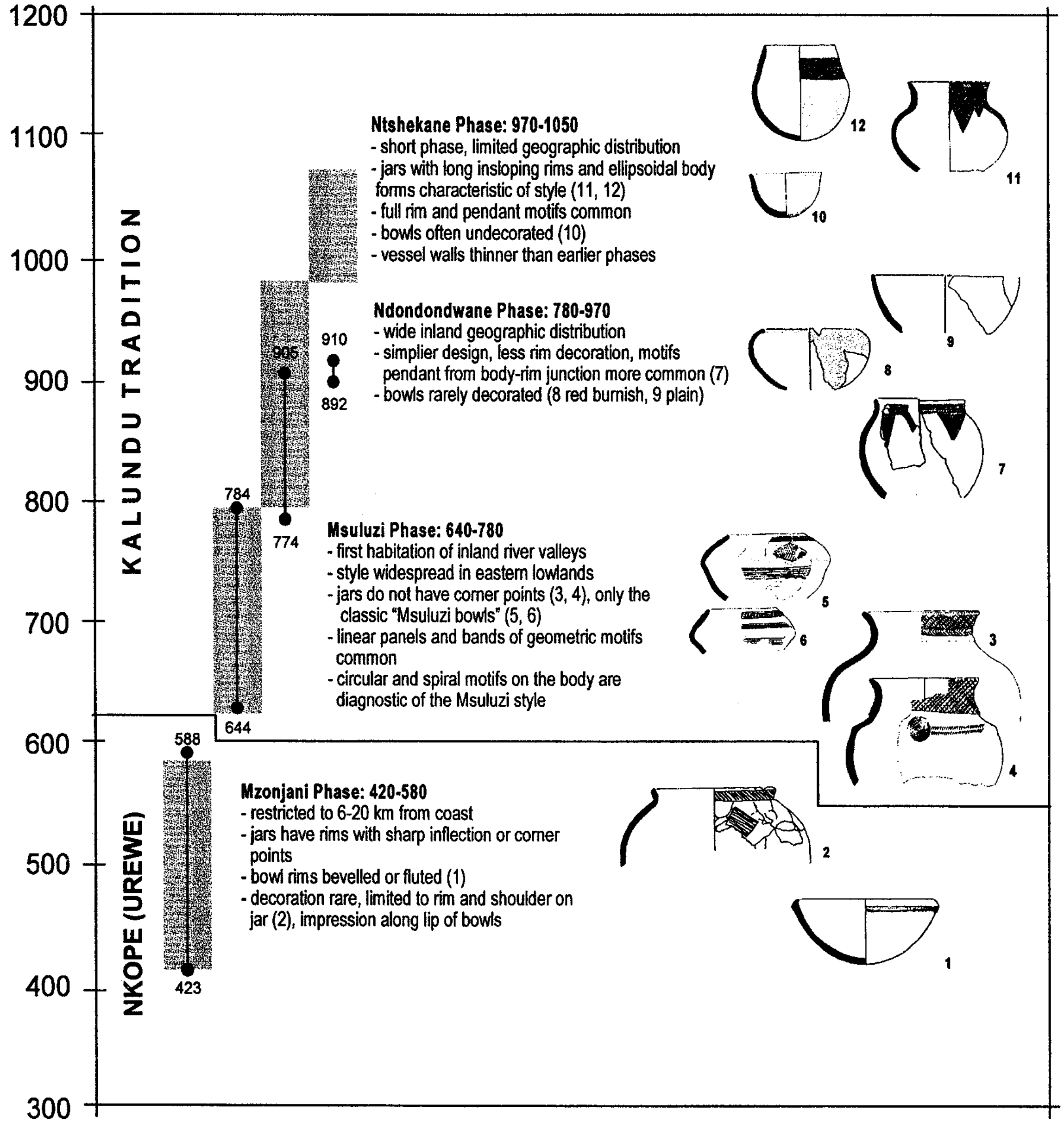

Figure 5.1. Early Iron Age ceramic typochronology of the eastern lowlands (in calibrated ages AD, see Table 5.1).

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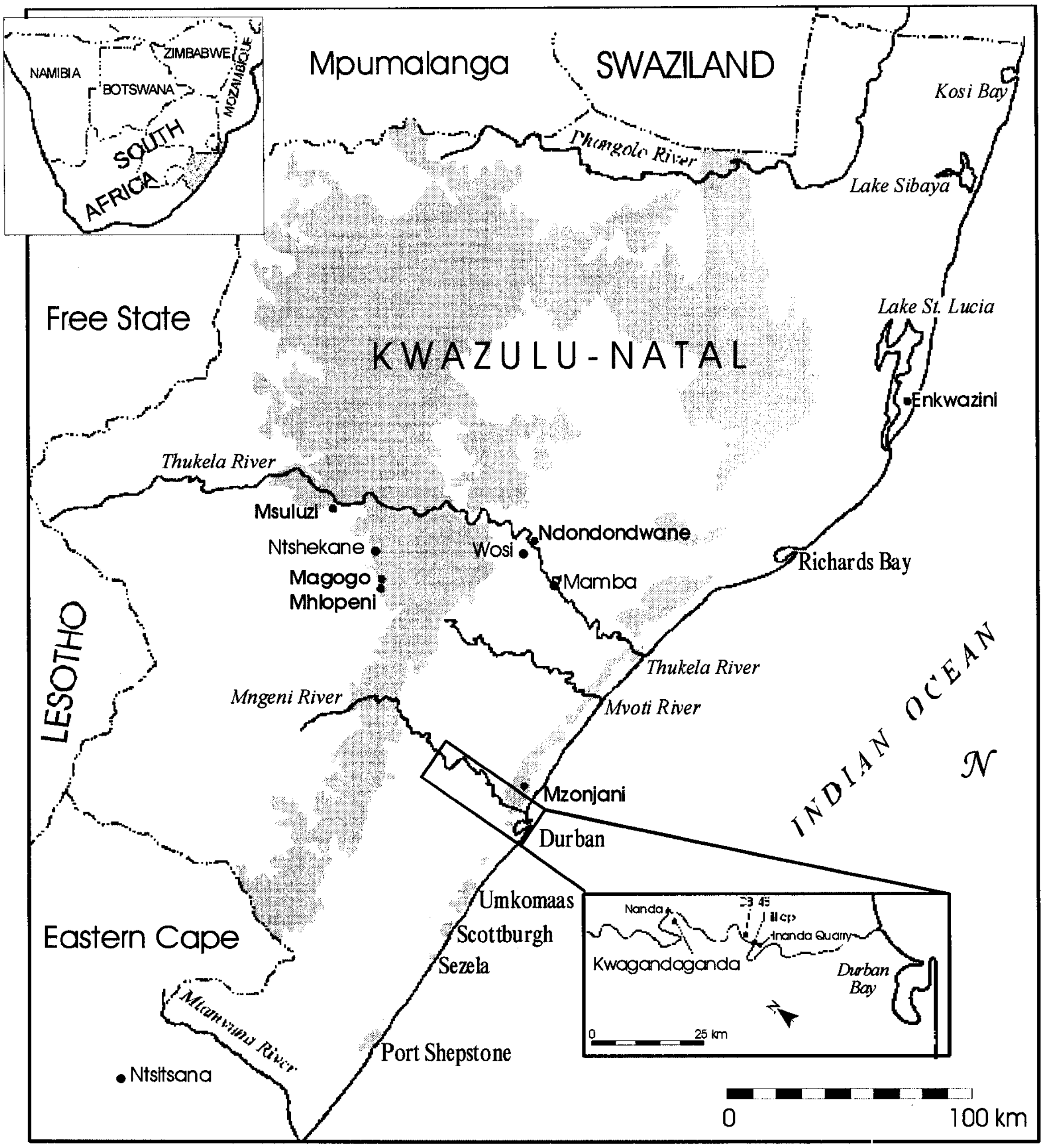

Figure 5.2. Principal Early Iron Age archaeological sites in the eastern lowlands of South Africa shown in relation to primary sources of iron ore located in major outcrops of the Pietermaritzburg Shale and Vryheid Formations (shaded).

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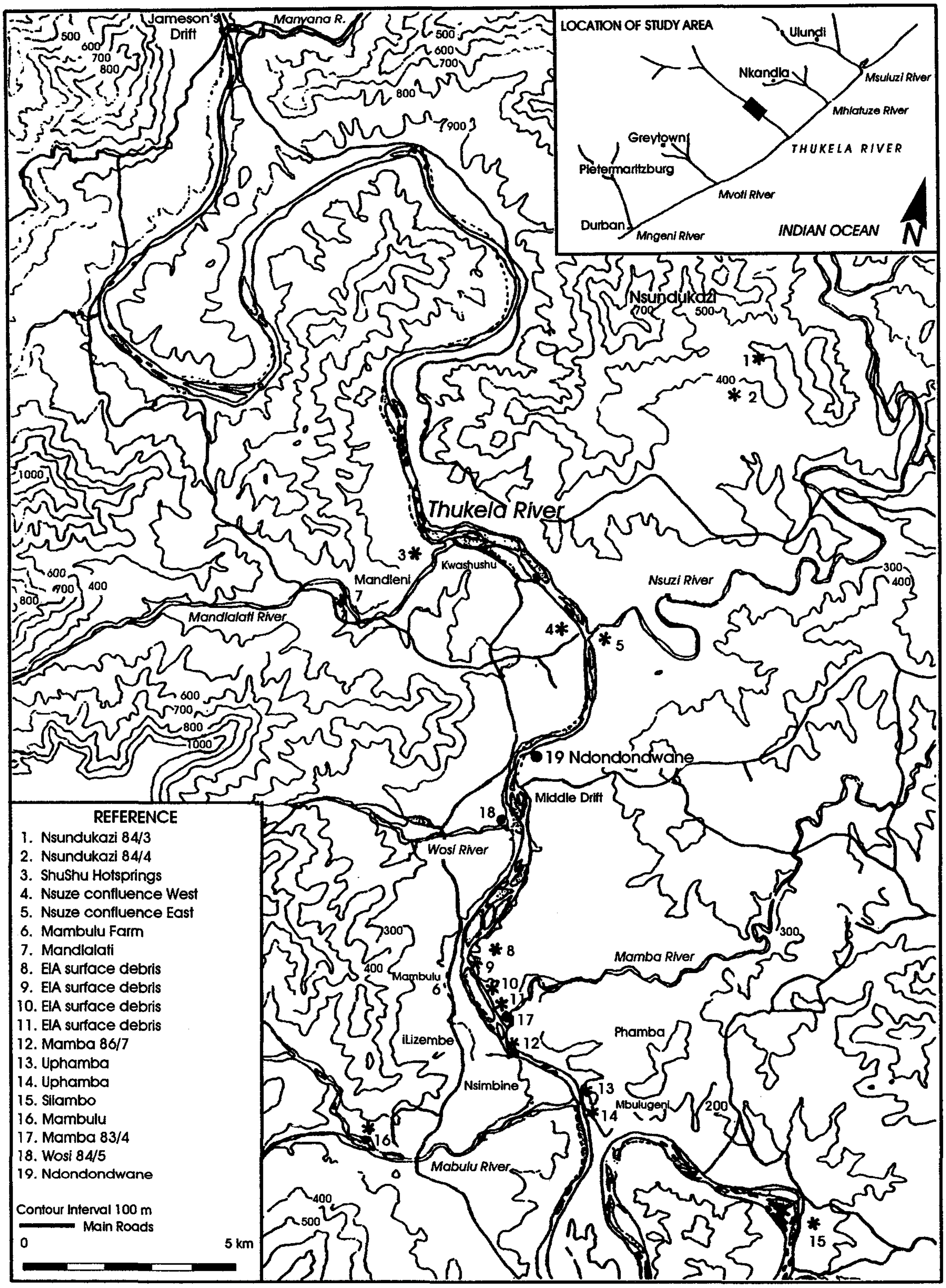

Figure 5.3. The lower Thukela Basin study area (modified after van Schalkwyk 1991:fig. 2).

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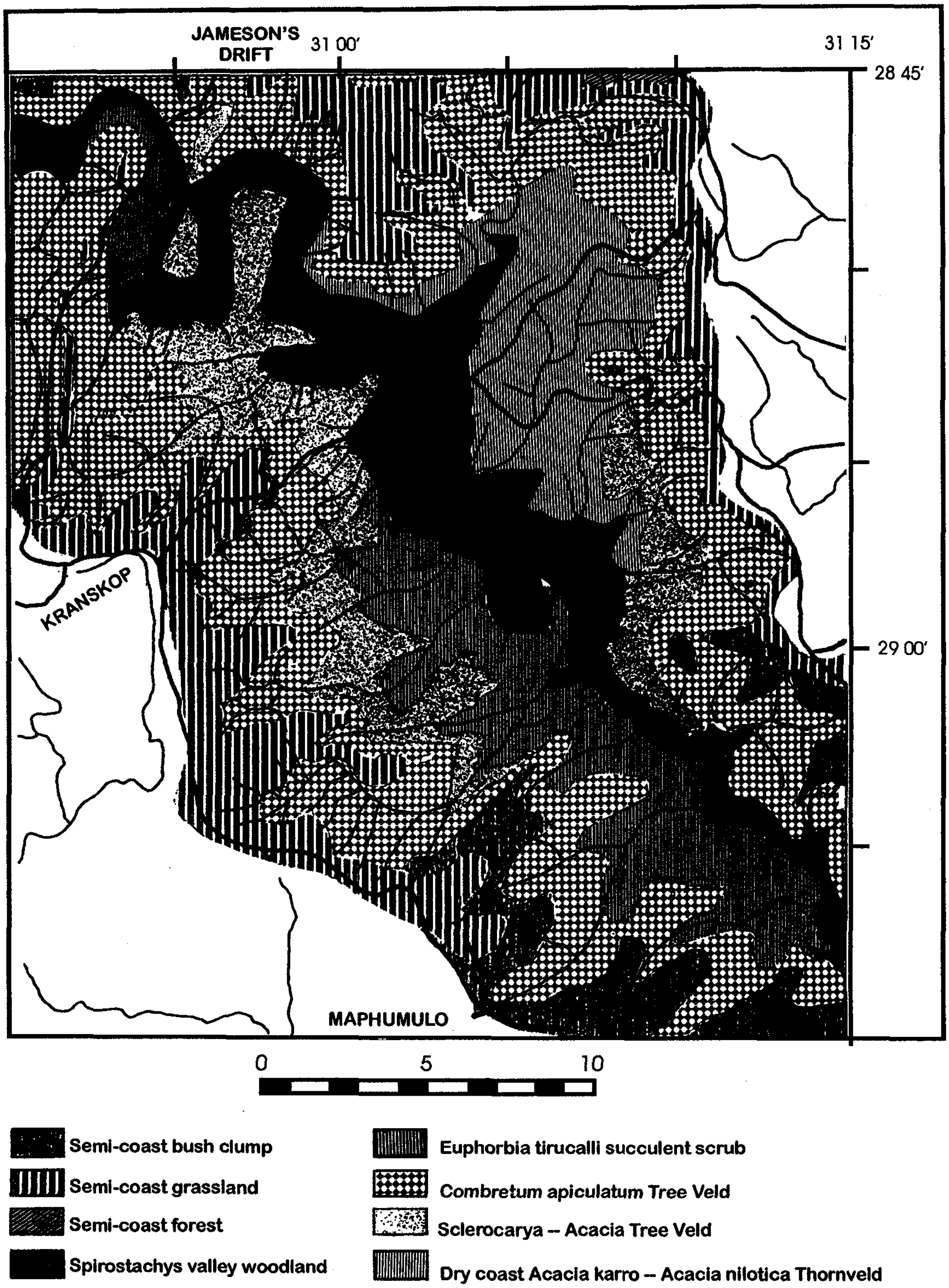

Figure 5.4. The present vegetation distribution in the lower Thukela Basin study area. Modified after van Schalkwyk (1991: fig. 5).

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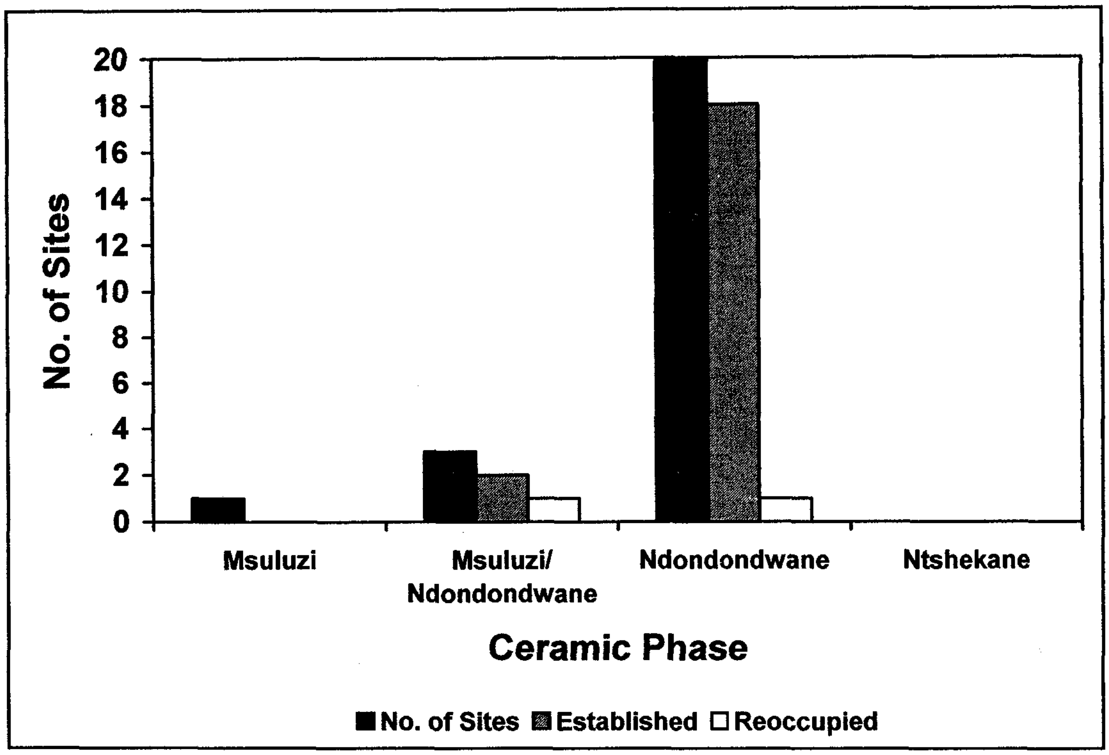

Figure 5.5. Settlements established and reoccupied in the lower Thukela basin during the EIA.

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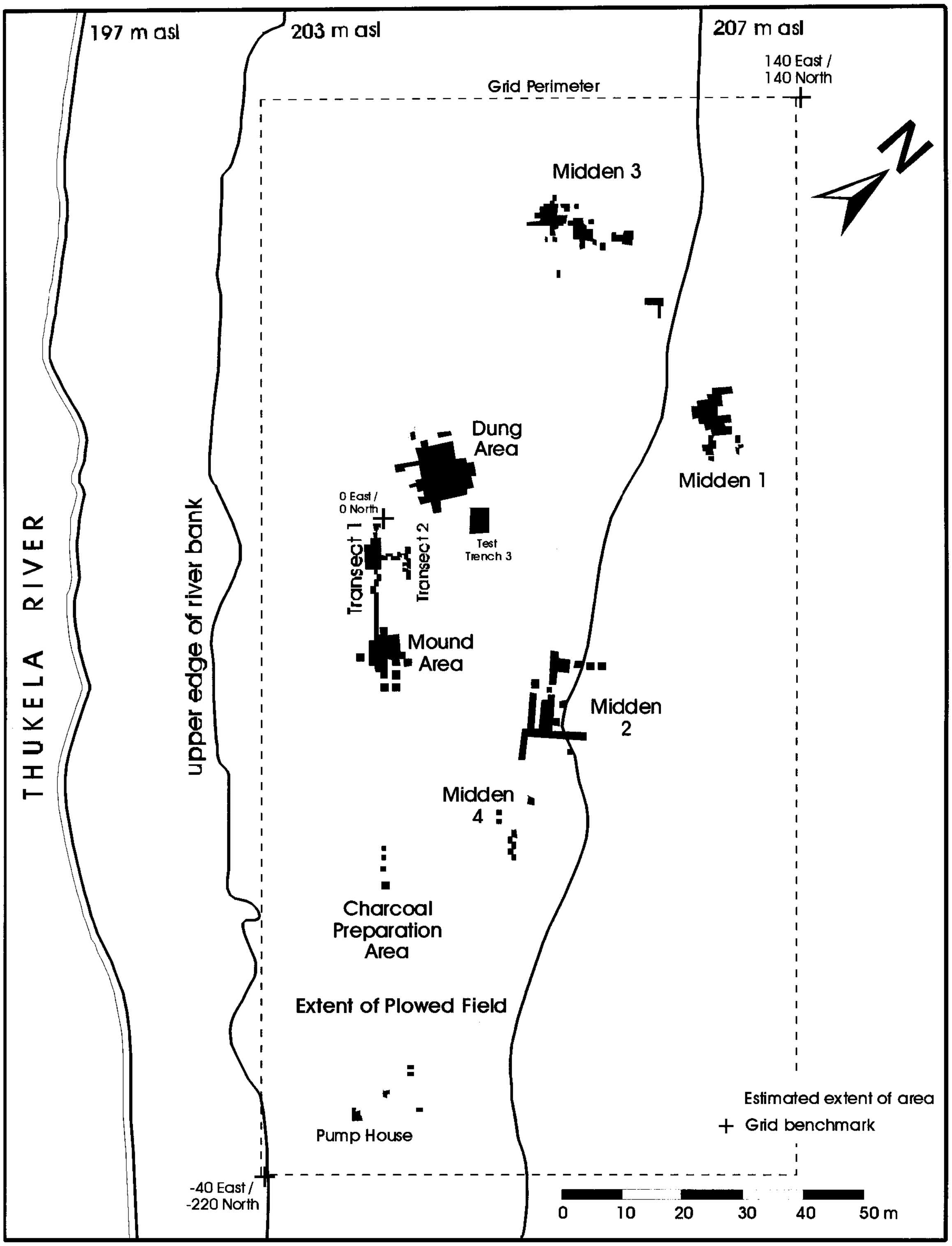

Figure 5.6. Early Iron Age settlement of Ndondondwane showing excavated locations, estimated extent of activity areas, and physical features of the landscape.

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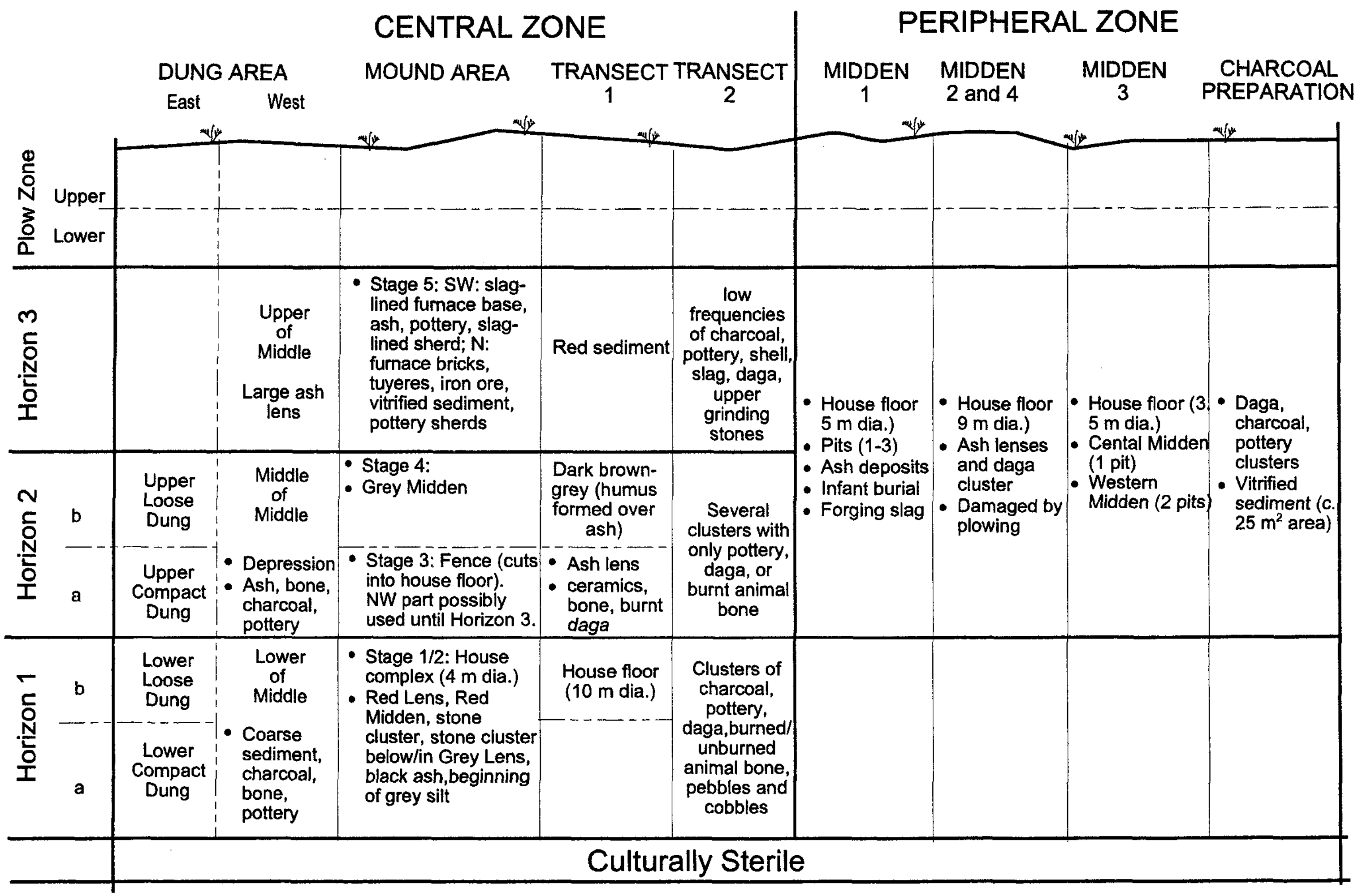

Figure 5.7. Stratigraphic relationships proposed for the occupation of Ndondondwane.

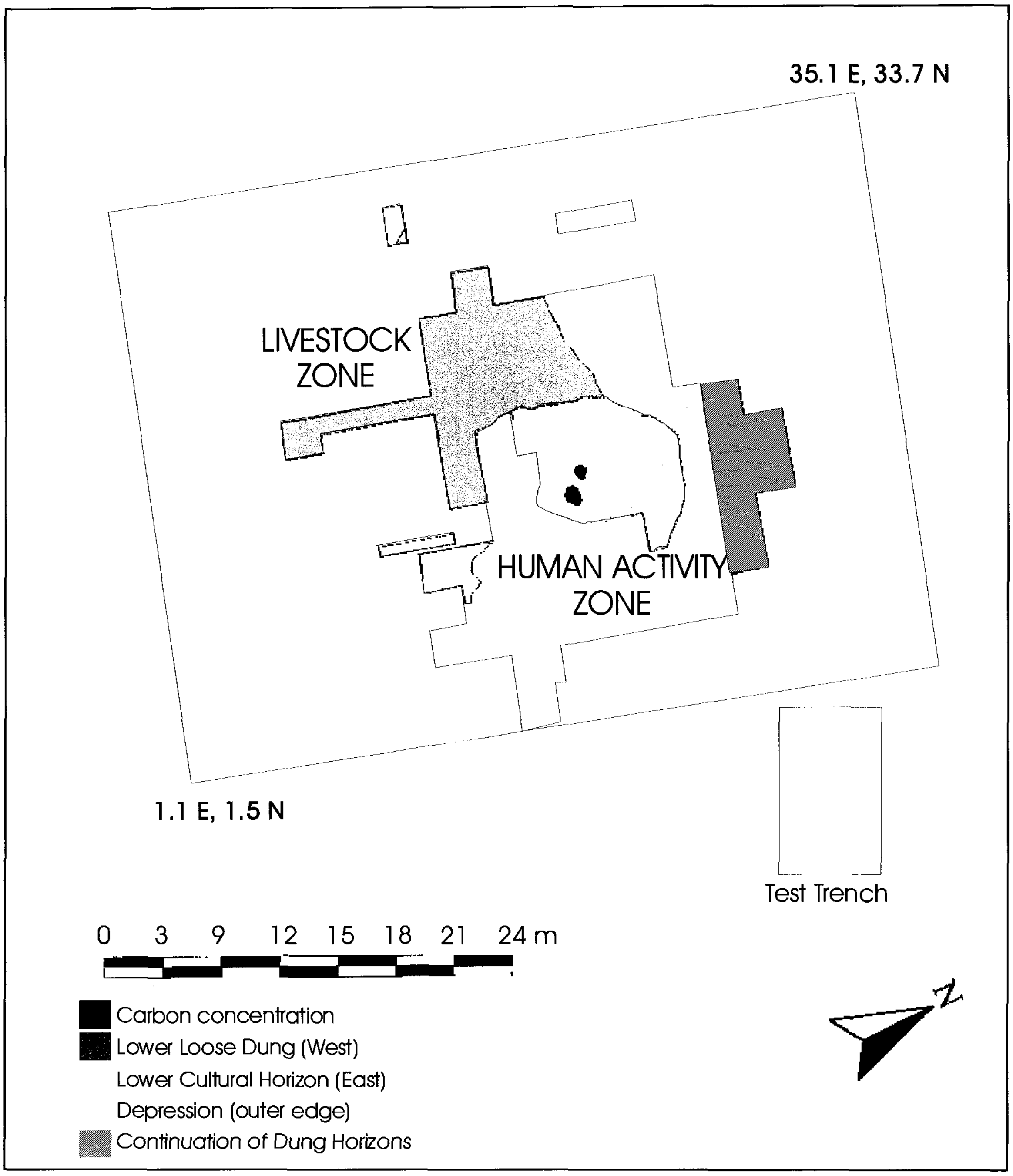

Figure 5.8. Main features of the Dung area.

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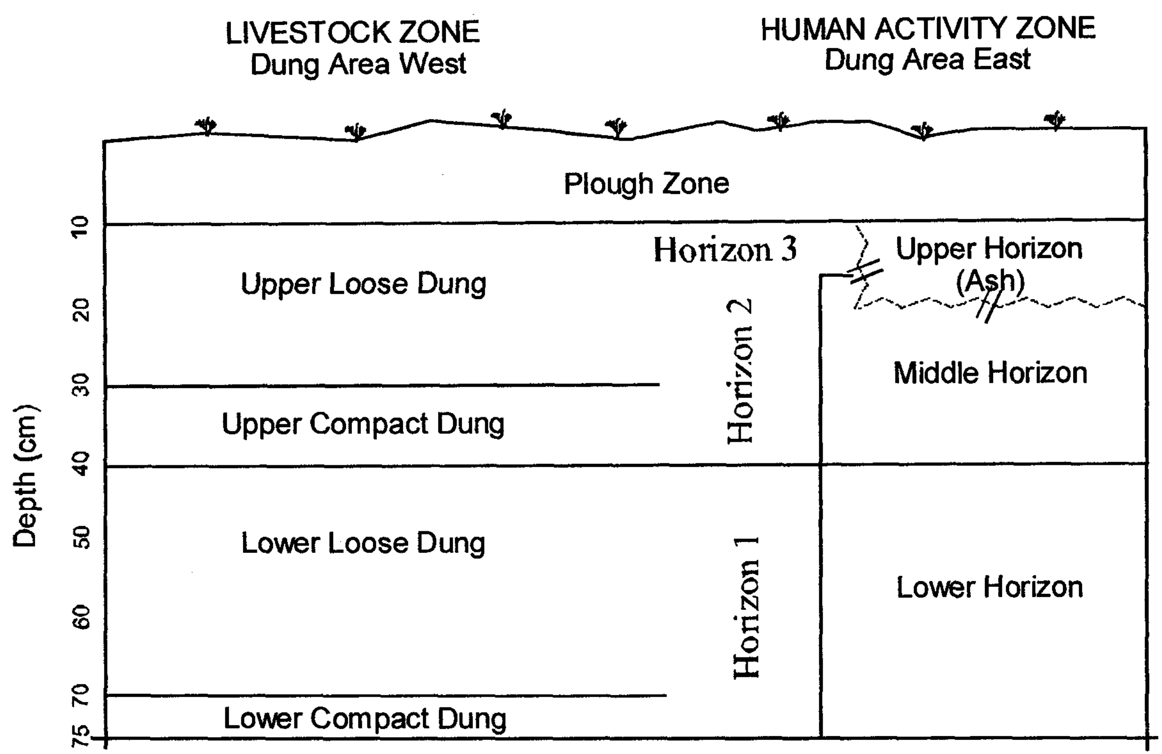

Figure 5.9. Simplified profile of the Dung area showing associations between the stratigraphy in the eastern and western areas.

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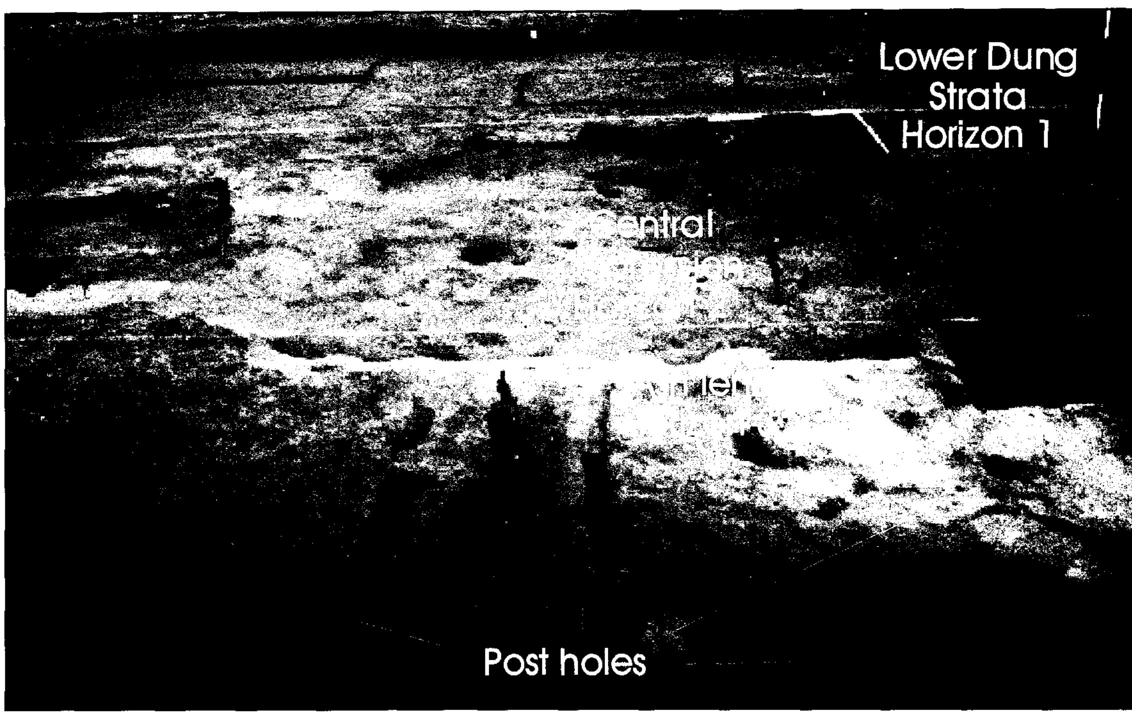

Figure 5.10. Main features of the Human Activity Zone in the Dung during Horizons 2 (central depression in center of photo) and Horizon 3 (ash lens right of center) viewed from the northwest. Meter sticks (at 50 cm intervals) point east.

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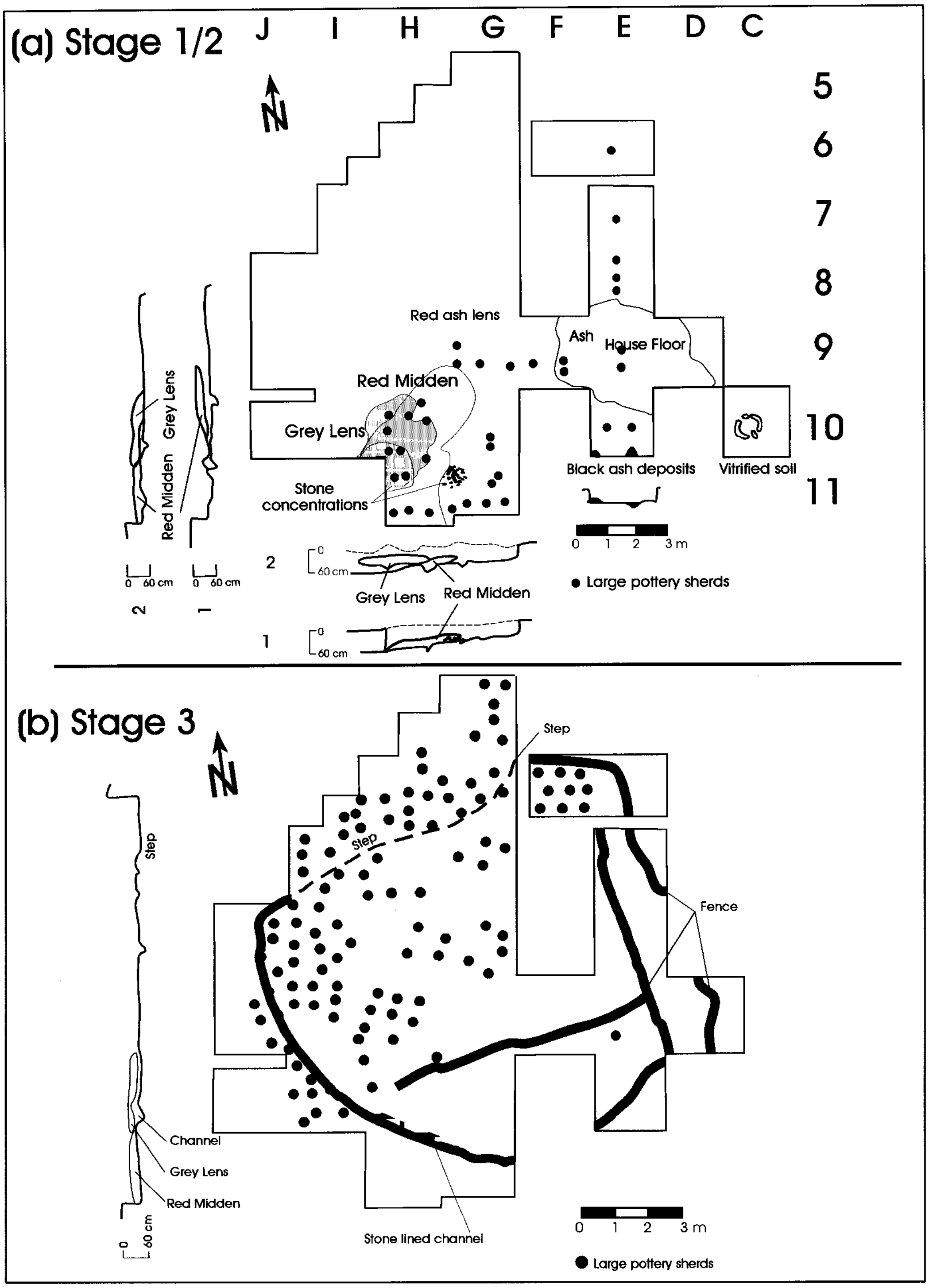

Figure 5.11.

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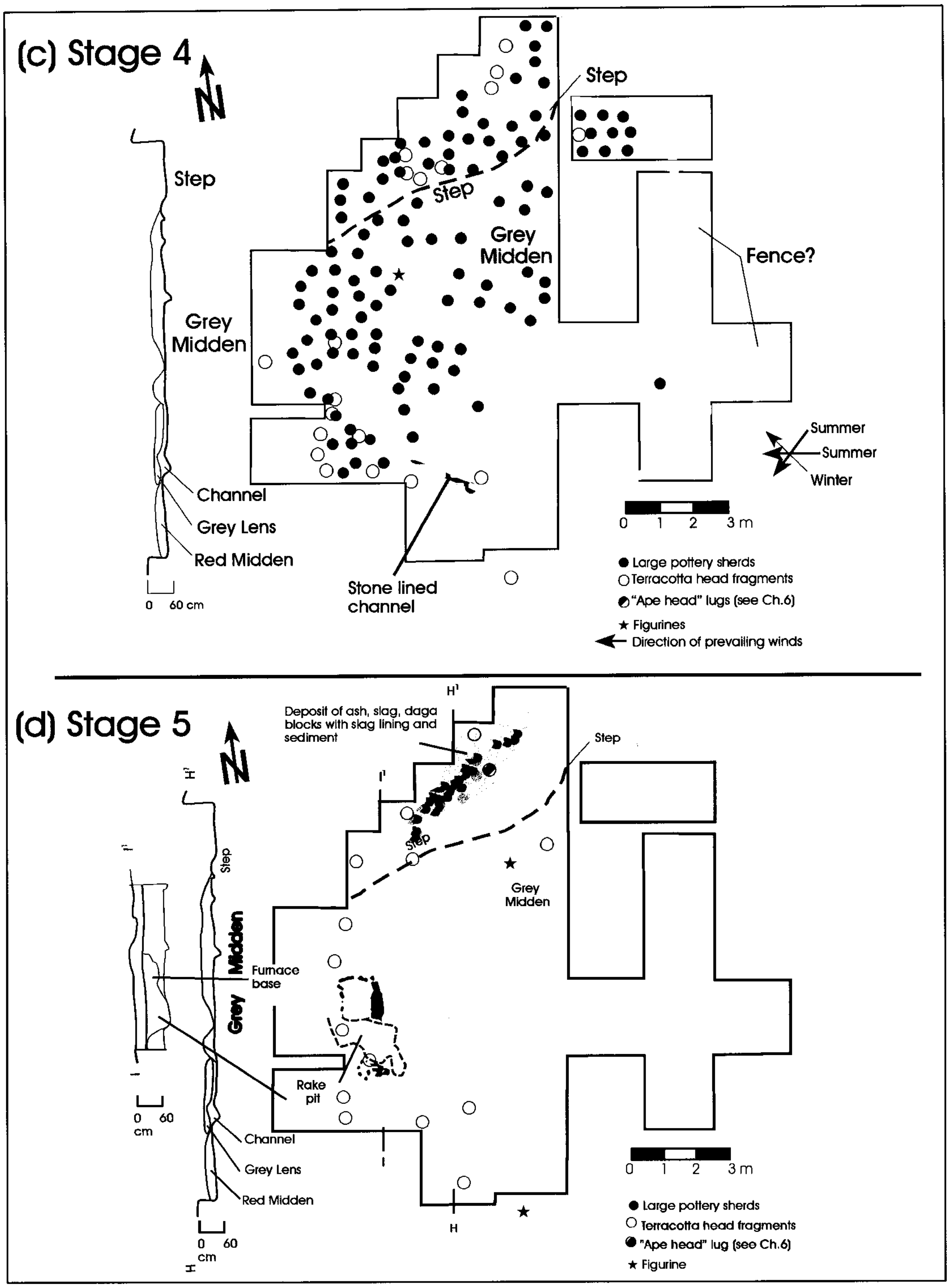

Figure 5.11. (*Continued*)

Figure 5.11. Activity sequence in the Mound area: (1) occupation of the house and (2) accumulation of its associated middens, (3) construction of the circular structure (continued). Activity sequence in the Mound area: (4) accumulation of the Grey Midden and distribution of ceramics, (5) construction, use and demolition of the iron smelting furnace.

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Figure 5.12. Detail of Horizon 2 features in the Mound Area viewed from the north along Trench E: channel, rodent burrows (bottom right) and circular post-holes (bottom left, right middle) of the circular structure.

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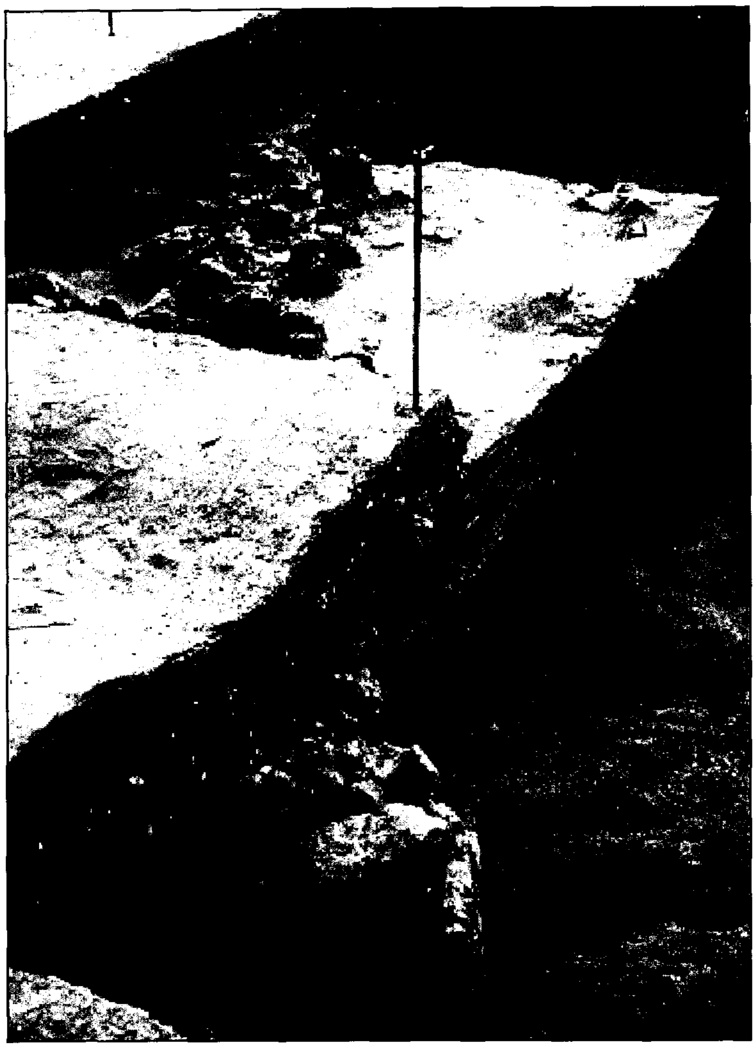

Figure 5.13. Detail of Horizon 3 features in the Mound Area looking northeast from Trench I6 to G5 (see Figure 5.11(a)): the distribution of iron slag, vitrified daga blocks, ash, and vitrified sediment in the north eastern area. (see 5.11(d)).

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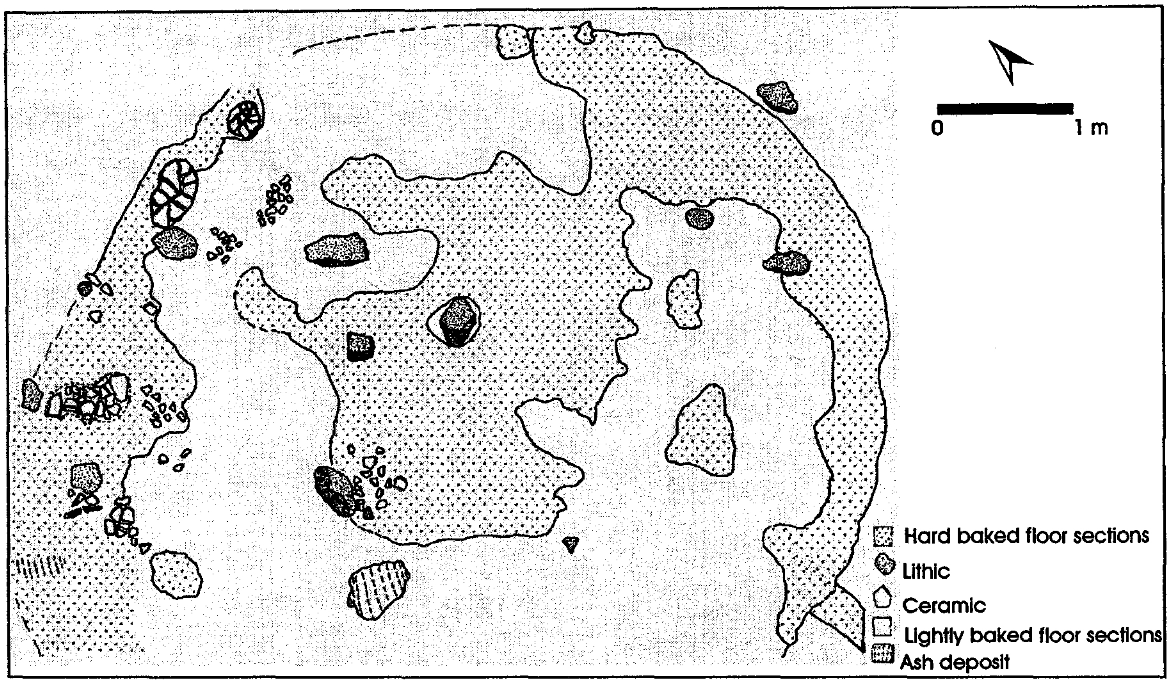

Figure 5.14. The baked house floor in Transect 1.

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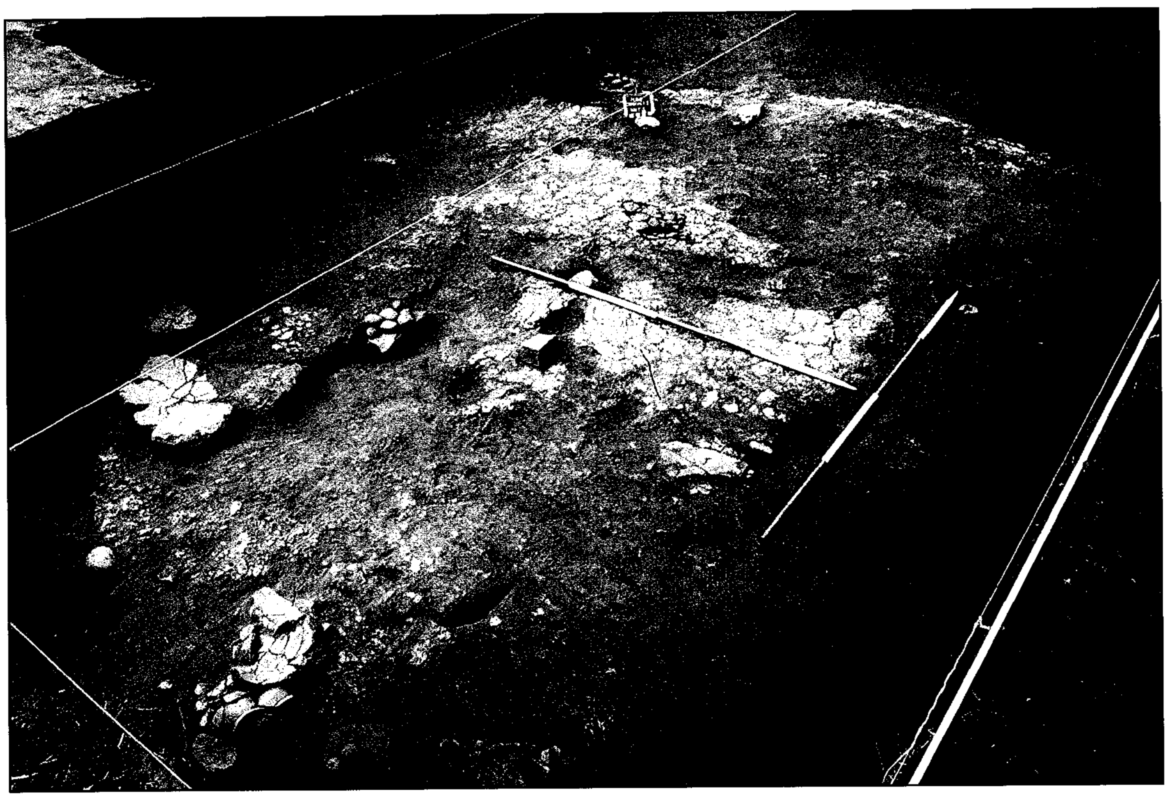

Figure 5.15. Transect 1 house floor viewed from the west after excavation.

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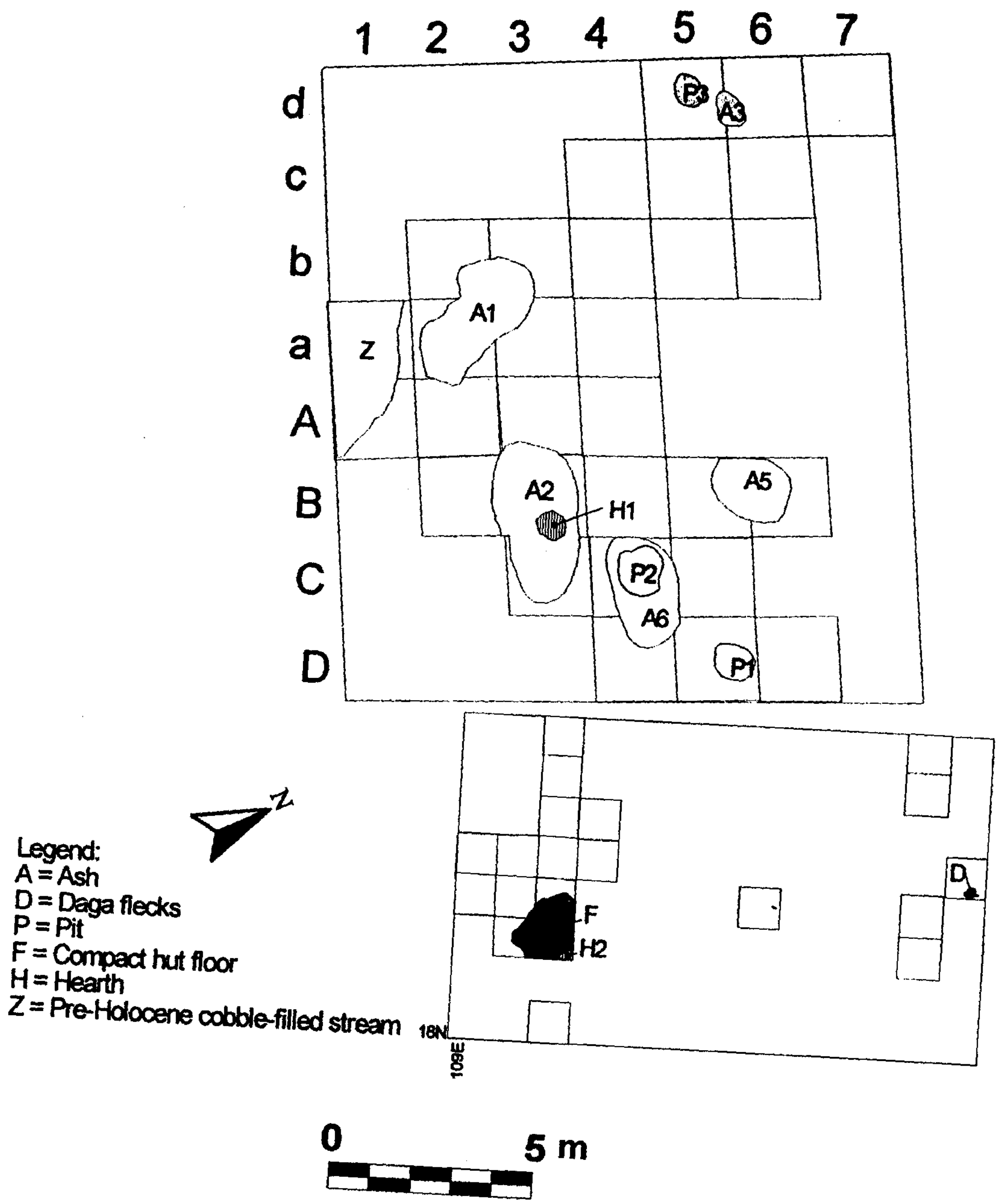

Figure 5.16. Main features of the Midden 1 domestic complex.

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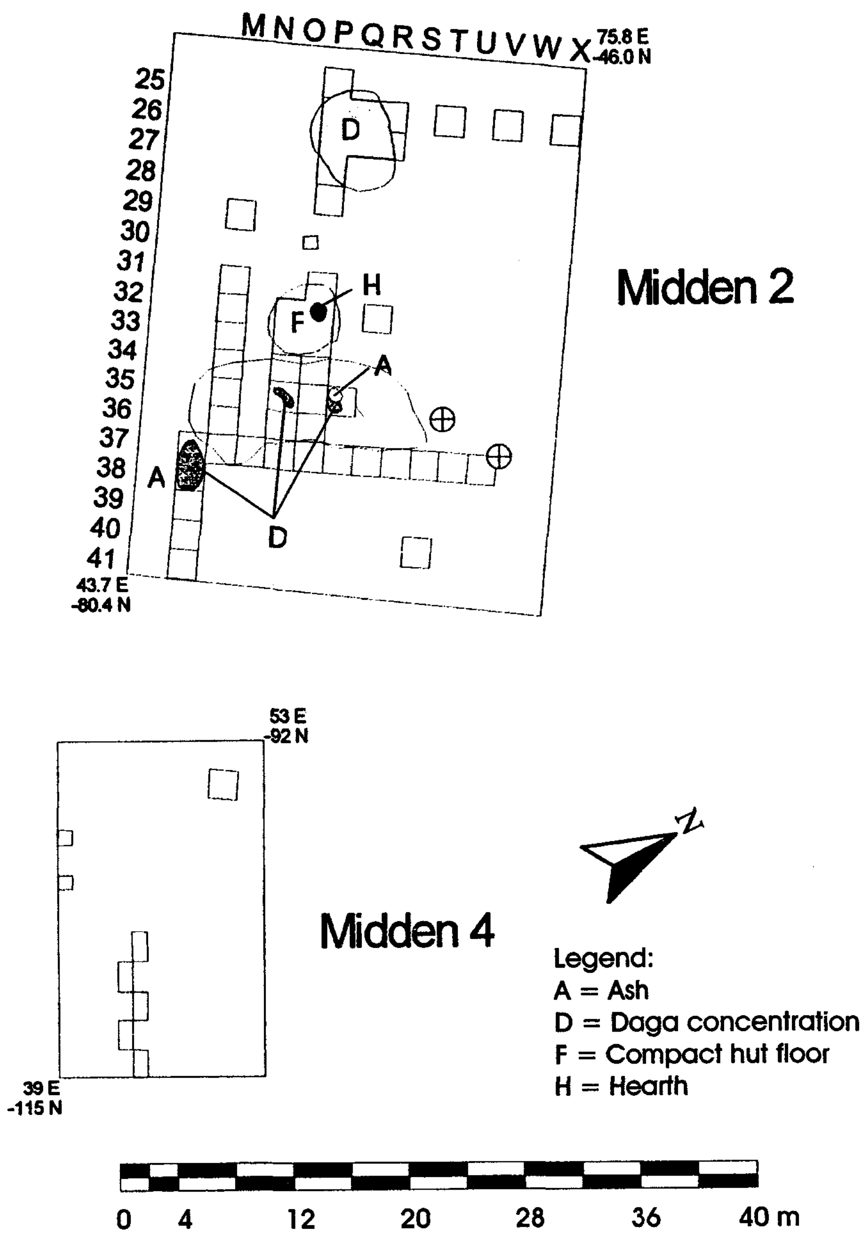

Figure 5.17. Main features of Midden 2 and the Midden 4 areas.

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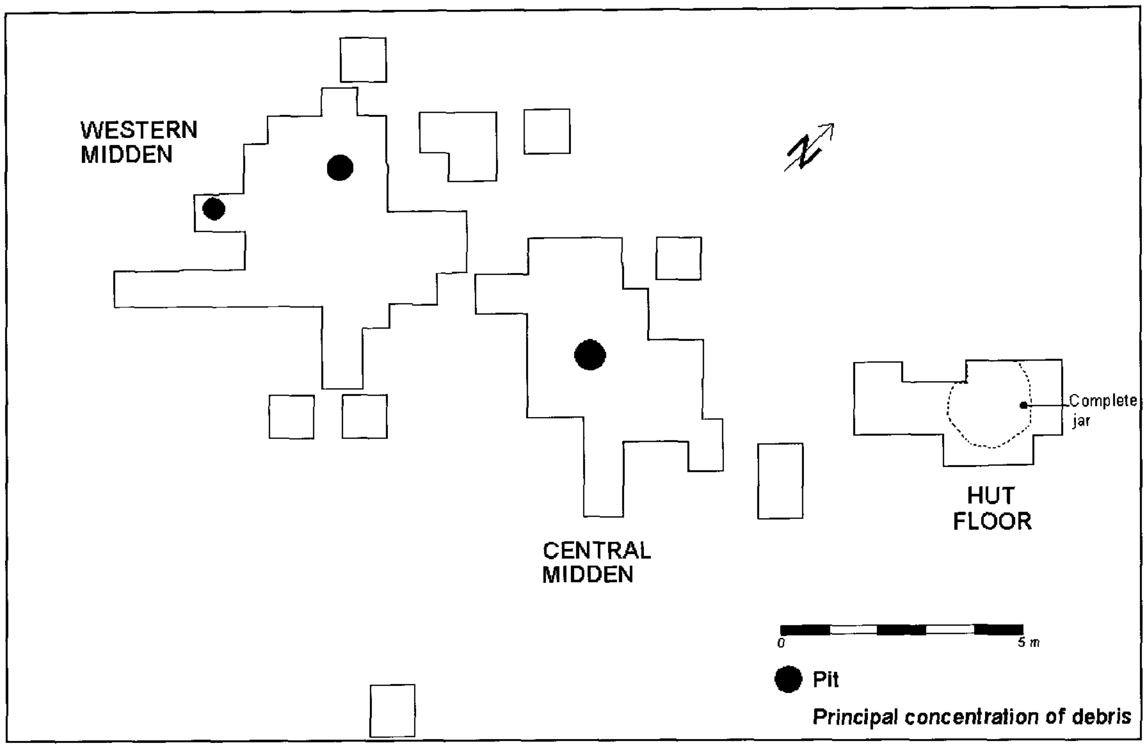

(a)

(b)

Figure 5.18. Excavated areas in Midden 3 viewed from the southeast: (a) Principal features and estimated extent of debris from each midden, (b) Photograph showing the relative spacing of the house floor, Western Midden, and Central Midden.

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PART III

ANALYSIS AND INTERPRETATION

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CHAPTER 6

CLASSIFICATION: CERAMIC VARIATION AT NDONDONDWANE

Inferences about patterns of past ceramic production, use and discard are based upon a classification of the variation in an assemblage and a study of the occurrence of classes in different deposits within or between sites. In this chapter, I present two analytical classifications of the ceramic data from Ndondondwane based on the study of morphological, decorative and use related attributes (e.g., use wear, residues). The objective of the analyses presented in this chapter is to move from multiple classifications of the ceramic assemblage. This may, in light of depositional and post-depositional process characteristic of Ndondondwane (Chapter 7), improve our understanding of the use of space and contribute to evaluating the competing hypotheses of EIA social organization. To begin, I outline the methods used to classify the assemblage, the general condition of the materials and how preservation conditions may affect classification. With these conditions in mind, I then propose a taxonomic (type-variety) and a functional classification of the ceramic data. In subsequent chapters, I attempt to explain the variance observed in the ceramic assemblage and the spatial distribution of ceramics at Ndondondwane by modeling each stage of the ceramic lifecycle.

CLASSIFICATION METHODS

Ceramic Categories

Ceramics include all intentionally or unintentionally made objects of fired clay. At Ndondondwane several categories of ceramic objects were identified: (1) containers, (2) sculpture, (3) architecture (pieces of fired *daga*, a clay-dung mixture used to cover the lattice structure of circular huts), (4) iron production technology (tuyeres, furnace blocks, parts of forging bellows) and (5) a miscellaneous category for ceramic objects of indeterminate function. Three of these five categories—containers, sculpture and

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miscellaneous objects—are focused upon in this analysis. Other specialists are currently analyzing architectural remains and iron production technology.

Approaches to Classification

I utilize three complementary approaches for the analytical classification of ceramic assemblages in this analysis. The first is referred to as a *paradigmatic* or *descriptive* classification (Rice 1987: 276-277). This kind of classification creates descriptive units using certain equivalent and unordered dimensions of ceramic variability (or attribute states). For example, I utilize features of form to distinguish morphological types, such as bowls, jars and cups. The second approach is a *taxonomic classification,* which orders descriptive units into a series of hierarchical categories for which the requirements of membership are increasingly restrictive (Rice 1987: 276-277). Attributes, or individual measurable traits, are the basic unit of analysis. Formal, conceptual units that share unique attribute combinations are referred to as *types.* Different types can share one or more common attributes, and I will utilize the term *class* as a "generic term referring to any division of material into grouping based on similarities and differences" (Hill and Evans 1972: 233) in certain shared attributes. For instance, I define several container *classes* based on morphological criteria. Further differences within these classes are distinguished based on specific variation in size and rim morphology, and these smaller variations, the lower units in the hierarchy, are used to define *types* and *varieties* within the broader class designation. In other words, I utilize divisions of classes to create a *typology* of the Ndondondwane ceramic assemblage. Third, I also employ an analytical classification of the assemblage to distinguish *modes.* The definition of a mode is based on attributes that the analyst deems to justifiably reflect accepted community standards for manufacturing and using past artifacts (Rouse 1960: 313). Modes attempt to achieve some correlation between classifications by archaeologists and those who made and used the pottery. In this thesis, I use two conceptual modes inherent in the data: the first attempts to define the assemblage in terms of procedural modes relating to ceramic manufacture, the second defines the assemblage in terms of decorative modes. Procedural modes form the basis for inferring certain stages of the ceramic *chaînes opératoires* (Chapter 8), while decorative modes are

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used to discern similarities and differences in the pottery found in the various household complexes at Ndondondwane (Chapter 9).

The selection of variables and measurements for analysis were made based on the guidelines and procedures recommended by the Prehistoric Ceramic Resource Group (PCRG 1997) of Britain which I modified for a computer-based recording system, standard ceramic analysis references (e.g., Joukowsky 1981; Rice 1987; Rye 1981; Shepard 1995), and key regional works (e.g., Huffman 1980; Maggs and Michael 1976). Five sets of attributes are examined in the following analyses: (1) sherd condition (e.g., size, weathering, fragmentation), (2) morphology (shape and size), (3) decorative surface treatments, (4) fabric composition (mineralogy), and (5) non-decorative modifications to the surface of objects (e.g., traces of use). The general quantification procedures using in this analysis are discussed below. Additional variables and measurements used in classifying the Ndondondwane assemblage are discussed in detail in the sections that follow.

Quantification

The quantification methods used in this study are designed to describe the proportion of different ceramic attributes or classes within the assemblage. Ceramic data are presented and discussed in two ways. The first is the *number of sherds* (presented as n_s). Sherd counts can refer to two different units of actual objects in analysis: (1) fragments of a single ceramic object that were originally deposited together or (2) fragments that are part of the same original vessel but are not deposited together. Sherd counts are used here as the basic numerical unit for comparing the frequency of certain traits or characteristics, such as fabric, wall thickness and curvature, form types, or surface treatments (and/or codependent combinations of these). This allows the pervasiveness of traits in a ceramic assemblage to be evaluated and presented statistically.

The second measure is an estimated equivalent of the total number of complete ceramic objects represented in the assemblage (presented as n_e). Two types of equivalents are given in the text and tables: *estimated vessel equivalents* (EVE) and *estimated object equivalents* (EOE). EVE measures are the most statistically accurate method of representing pottery for comparative purposes (Tyers and Orton 1991). EVEs

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assess the part of a vessel form that is a percentage of the whole. An element of a vessel has to be measured that represents such a portion, such as a rim, base or a handle. For vessels, I based EVE calculations on rim sherds, or rim-EVEs, because the rims of Iron Age vessels are circular and they are the most common form element in assemblages. Rim-EVEs are based upon a measure of the percentage of rim present. Statistically, portions of the rim form are presented as 1.0 (whole) or less than 1.0. For example, if rim form type R12 has measures of 22%, 5%, <5%, 10%, and 12% then the total is minimally 50% or 0.5 of an EVE, which is one half of a vessel. If 500% is represented then there are five rim-EVEs, or five estimated vessels. The rims of many vessels in the Ndondondwane assemblage are not uniform, presumably because they were hand-built. More than 20% of the original rim was usually needed to accurately determine the original rim diameter. However, the diameter and percent of rim present could be taken using rim sherds from smaller vessels for two reasons. First, they could be compared to the many better-preserved examples of complete or nearly complete small vessels. Second, it was easier to visualize the arc of the rim over 5 or 10 cm than 20 or 30 cm. Therefore, the rim diameter of small vessels with 10-20% of the original rim were used to calculate EVE frequencies. These measurements were taken by myself and a several other students and checked on a daily basis for errors.

EVEs are only useful for estimating the number of containers in ceramic assemblages that have circular rims. A different measure was needed to discuss the frequency of other kinds of ceramics objects. A variation of the EVES concept was used for this purpose. I term this measure an *estimated object equivalent*, or EOE. EOE frequencies were estimated based on the total number of parts represented for different kinds of figurines, sculpture, beads and other objects. Similar to the calculation of MNI (minimum number of individuals) in faunal studies, the number of heads, arms, torsos, etc., in the assemblage, was used to estimate the number of whole objects that are *not* containers, and was used to calculate the frequency of sculpture, figurines and other objects at Ndondondwane.

SHERD PRESERVATION

To evaluate preservation conditions and the possible effects of post-abandonment disturbance of archaeological deposits with ceramics at Ndondondwane, I examined the

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quantity, weathering, fragmentation and presence of sherds with mineral accretions at different deposits across the site.

Over 40,000 sherds were recovered during the excavation of different activity areas at Ndondondwane. An additional 9,000 sherds were recovered as surface finds, during auguring and systematic surface collection. The quantity of excavated ceramics from different activity areas is quite uneven (Table 6.1). Just over 71% of the sherds were recovered from the Central Zone, while the remainder was found in peripheral areas (29%). Areas in the Central Zone clearly have a disproportionate number of sherds. Only Midden 3 is comparable with the central activity areas. However, Midden 3 has up to 23 times the number of sherds found in other domestic complexes. The small number of sherds from Transect 2, Midden 4 and the Charcoal Preparation areas is likely due to the limited excavations in these areas.

A measurement combining roundness and weathering was adopted as a standard for recording the general condition of sherds. Four categories were used: (1) *fresh* refers to very well-preserved sherds; (2) *average* indicates that the sherds were slightly marked and had somewhat rounded edges; (3) the *worn* category indicates that the sherds had suffered some damage to the surface and had more rounded edges than average; and (4) *very worn* describes sherds that had very rounded, smooth edges and/or surface treatments and decorative features that were almost completely obliterated. No sherds from Ndondondwane were placed in the very worn category (Table 6.2). Most sherds fall into the fresh category (42%), while there are comparable numbers of average (30%) and worn (27%) sherds. Sherds from most areas are well preserved. Central areas tend to have few worn sherds (13-26%), with the exception of Transect 2 (61%). Peripheral areas have slightly poorer preservation, with 17-50% in the average category and 16-20% in the worn category. It is interesting that the sherds from Midden 3 are only moderately better preserved that those from other domestic areas or those in the Central Zone.

Crystalline calcite is the only type of mineral scaling observed in the assemblage, which was easily identified as a hard, white surface residue that looks very much like white paint. Very few sherds were affected by scaling (n = 36), so it is unlikely that leaching or water erosion had a major impact on the general preservation of the assemblage.

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In general, sherds from the more deeply buried deposits in the Central Zone were better preserved, but those in Horizon 3 were affected by plowing when this part of the site was used for growing maize in the 1960s and 1970s (Loubser 1993). Clearly, sherds from the plow zone and from shallow deposits in the Peripheral Zone have experienced greater post-depositional attrition. This may affect the ability of archaeologists to classify the decorative attributes and identify certain traces of use, such as sooting or abrasion patterns, from sherds in these areas.

Another important measure of the quality of preservation involves a description of the *extent of form elements* (rim, body, base, handle, etc.) as a description of the profile present in archaeological context. While extent may be presented in nominal form as a percentage of the vessel/element described, especially where there is a well-established form series for a region, it can also be presented using an ordinal scale. In the absence of such a regional form series, form extent was recorded according to a descriptive scale that approximates numerical percentages. The form extent of containers was classified according to the following scale:

R -	Rim (including lip) and possibly some neck present
R +	Rim (including lip) and neck zones and possibly some body form present
N -	Only portion of neck zone present
N +	Neck (including rim/lip) with some shoulder form (i.e., upper body) present
B -	Only body, plain, undiagnostic (of form) body sherds
B +	Diagnostic body sherds present
BA -	Only base present, undiagnostic
BA +	Base and lower body present, diagnostic of base type
T -	Upper body of profile present excluding base (from girth, or maximum diameter, to lip). Vessel incompletely preserved, ~50% of complete form.
T +	Total vessel profile present including some base. Vessel incompletely preserved, (>50% - <100%)
T	Total vessel profile present, vessel completely preserved (100%)

The extent of form present is also a measure of how identifiable sherds are to form categories. The least identifiable sherds would fall under the R-, N-, B+/- and BA+/- categories, while the most identifiable would be T, T+/-, R+, and N+. Table 6.3 shows the percent of sherds that fall into these high and low identifiability groups using

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data from all levels including the plow zone and surface finds (designated by "Horizon 1-5").

Not surprisingly, areas with a greater number of sherds have lower identifiability. There are more unidentifiable body sherds in these deposits; pots in these deposits are more "broken." Although Transect 2 has a relatively low frequency of sherds, most are small body or rim sherds, and this area has very low identifiability in comparison to other areas (82%). In contrast, the Peripheral areas tend to have more identifiable sherds as a whole, with the exception of Midden 4. This situation is not altered substantially if the data are considered by horizon.

Midden 3 appears to be an anomaly, and we must consider that the large number of sherds from this area may be a result of recovery procedures. Midden 2 was excavated in 1982-83, Midden 1 in 1995, and Midden 3 in 1997. Recovery procedures were different during the 1982-83 and 1995-97 seasons, and it is possible that the sherd selection occurred in the field rather than in the field laboratory or during post-excavation analysis. If preservation condition were a key criterion for sherd selection during the excavation of Midden 1 and 2, we would expect a much higher number of fresh sherds and perhaps none in the worn category. However, domestic areas have comparable number of sherds in the fresh and average categories (Table 6.2). We may also expect that sherds recovered from Midden 1 and 2 would be more identifiable than those from Midden 3. Indeed, Midden 3 has a considerably greater number of unidentifiable sherds than other domestic complexes (Table 6.3). These analyses are contradictory, and therefore inconclusive. Midden 3 has more in common with the Dung and Mound Area than with other domestic complexes. However, the central areas had very deeply buried deposits (up to 1 m). It may therefore be suggested that the frequency of sherds in Midden 3 was either the result of differential recovery practices or differential discard and use patterns during the occupation of the settlement. Both possibilities are explored in the following chapter.

DESCRIPTIVE CLASSIFICATION

Containers

A significant problem in classifying pottery forms in eastern South Africa is the absence of a regional form series. A complete list of Iron Age vessel forms has not yet

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been compiled and there are no standardized, formal criteria for identifying EIA ceramic forms or terminology for discussing them. Even a brief perusal of site reports shows that the range of EIA ceramic vessel forms in southern Africa is highly variable and many terms have been introduced to describe them. For example, terms such as sub-spherical and sub-carinated are used to classify vessels of the same shape (e.g., Maggs 1980c; van Schalkwyk 1994a). This terminological confusion derives in part from the lack of distinction made between angles (corner points) and curvature changes (inflection points) in complex and composite shapes. Complex shapes have two or more corner and/or inflection points, while composite shapes have no inflection points (Rice 1987: 211-222). This may seem like a trivial distinction, but it is an important one because Iron Age pottery traditions are intuitively differentiated on the ratio and placement of corner to inflection points (Gavin Whitelaw, *personal communication*, 1998). At the most general level, corner points are more frequent in Urewe Tradition forms and inflection points are more frequent in Kalundu Tradition forms. Beyond these basic differences, there remains a great deal of variation that must be addressed.

Thus, two main objectives guided the study of ceramic forms at Ndondondwane: (1) develop as complete a list as possible of all the vessel shapes and sizes in the assemblage, and (2) examine evidence for similarities and differences in manufacturing techniques for different forms. In this analysis, ceramic forms were defined on the basis of overall form (complete profile), form elements (vessel parts), and, if possible, forming techniques.

Vessel Form and Size

There were three steps in the classification of Ndondondwane vessels forms. In the first step, geometric and contour classification systems were utilized to define a series of vessel forms based on an analysis of 211 vessels with complete or nearly complete vessel profiles. Following Shepard (1976: 225-236), complex and composite shapes were defined first in terms of their geometric equivalents. The characteristic points (corner and inflection points) on these forms were then identified as reference points on vessel profiles. Using a modified version of Castillo-Tejero and Litvak's (1968) system, these reference points allowed forms to be more accurately characterized beyond their ideal geometric equivalents. The combination of these two methods may be

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referred to as a *geometric profile-point system*. The resulting form categories were given descriptive form names or keywords. This method allowed a set of general forms to be identified, and made it possible to distinguish morphological attributes (such as rim, neck, shoulder or body profiles) that would be diagnostic of different forms.

In the second step, an attempt was made to classify form elements. It was hoped that a more complete form-series could be arrived at by matching diagnostic elements to defined forms and distinguishing other elements that could not be classified. Secondary form elements joined to the surface of vessels, such as handles, lugs and other applied features were considered in distinguishing new form classes and types. At this point, the analysis was extended to the range of published EIA vessel forms in the region. This step in the analysis was based on a measure of the extent of form elements and the morphology of different vessels parts. This measure indicates how much information is available to the analyst to determine which form the sherd came from. It is also an indicator of the reliability of the decision-making process and why it may only be possible to give a very general form type (such as "open bowl" as opposed to "bi-conical bowl"). Using this method, sherds with diagnostic profiles from approximately 2,000 containers (based on rim-EVEs) were identified. In decreasing order of importance, the morphological criteria used in this classification included: (1) the presence or absence of a neck, (2) the presence or absence of handles and (3) attributes of body shape (the restriction of the opening, or orifice, body form, rim morphology, and size).

Using the first and second criteria, three general forms were identified: bowls, jars and a cup. Jars are composite vessels combining more than one geometric form. They are distinguished by the presence of a *neck*, which is a vertical extension of the orifice at the throat that restricts accessibility (Rice 1987: 212). Bowls are defined by the absence of a neck, and the atypical shape and the presence of a lug handle distinguish the cup form. Further distinctions among these categories were based on three other attributes of body shape.

Four basic geometric body forms were identified (Figure 6.1): (1) spherical (uniform contour in profile) or segments of a sphere, (2) ellipsoidal (horizontally "depressed" sphere), (3) ovoid (vertically elongated sphere) (4) pyriform (segment of an ovoid shpae) and (5) cylindrical. Seven rim morphology categories were defined, which could be placed in unrestricted and restricted sub-categories (Figure 6.2):

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(1) *Vertical*. Rims have a stance parallel with the vessel midline. This type of rim will not deviate from the vertical stance by any more than 2-3°, although the curvature of the body form is variable. It characterizes the rim forms of both jars and unrestricted bowls.

(2) *Flared*. Rims curve outwards from the vessel midline and are marked by two inflection points (curvature changes). Flared rims will characteristically arc through 60° to 120° from the body-rim attachment to the lip. This type is limited to jars.

(3) *Outsloping*. Rims have no corner or inflection points and slant away from the vessel midline. It occurs on composite forms (i.e., jars) and one bowl form.

(4) *Everted*. Rims angle inwards towards the vessel midline between 70-80°, but a corner point on the interior surface marks a second change in the angle of the rim profile away from the midline.

(5) *Incurving*. Rims are turned to the interior of vessels with an inflection point on the exterior surface, giving it a convex profile. The inflection point may not be pronounced.

(6) *Inverted*. Rims angle inward to the vessel midline at a clear corner point on the exterior of the vessel. The rim may start high or low on the vessel profile (in relation to the orifice) resulting in asymmetrical or symmetrical profiles, respectively.

Restrictedness of vessel forms is defined by the combination of rim and body morphology. Using the criteria of restrictedness and overall form, 12 vessel forms were placed into unrestricted or restricted categories (Figure 6.3). With unrestricted forms, the rim is the maximum circumference (or girth) of the vessel. Four unrestricted vessel (UV) forms were identified (Figure 6.3). Restricted vessel forms are defined by a rim diameter smaller than the maximum circumference of the vessel. Eight restricted vessel (RV) were identified in the Ndondondwane assemblage: the two forms placed in RV 1 are ellipsoidal, but differ in the width of the mouth (or orifice); RV2 is ovaloid (or pyriform) shaped; RV3 forms differ in the placement of the inflection point in profile; and the three jar forms (RV 4-6) differ primarily in body form.

Size was another dimension used to distinguish variation within the form series. Vessel size for containers was based on four measurements: rim diameter, orifice

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diameter, maximum diameter (girth) and vessel height. Height calculations that could not physically be taken from vessels with greater than 80% of their profile present were estimated from scale illustrations when this was reasonable. These measurements were used to infer the use life (see below) and capacity (in liters) of different classes of pottery. Capacity was calculated using formulas for the volume of three-dimensional geometric shapes (Rice 1987: table 7.1). Capacity figures were only calculated for the volume of the body of vessels (the "bowl" of containers). The measurements needed to calculate the volume of necks for jars (which are spherical segments, cones, or frustum shapes, or combinations thereof) could not be accurately taken. Less than 10% of jars could be measured. Since this sample was not representative of all types, neck capacity is not included in this study; thus, *the total volume of vessels is not used in this analysis*. The benefit of excluding neck volume is that jar and bowl volumes are directly comparable because only the body volume is considered. The necks of jars serve to restrict the width of vessel mouths and would not greatly increase their capacity to hold liquids or solids. Thus, differences in volume between similarly sized bowl and jar forms are not likely substantial. Further, the volume of the neck of jars is also dependent upon the *height* of the neck, not just its diameter. Thus, two jars with the same body and rim form may hold different volumes of liquid. If the rim form is vertical, for example, and each jar has a 20 cm rim diameter, one with a neck height of 10 cm will have a greater capacity than the other with only a 3 cm high neck. Neck height to rim diameter ratios are therefore necessary to establish the true volume of jars. I discuss below how that this may be quite problematic for EIA assemblages because of the way jars break.

Rim diameter and capacity were both considered in establishing vessel size classes. Rim diameters ranged from 2 to 48 cm, and volume ranged from 0.1 to 49 liters. Four size categories were identified from rim diameter measurements (Table 6.4). The categories were defined on the basis of breaks in the frequency of vessels with different diameters along the 2 to 48 cm continuum (Figure 6.3). Using the same divisional criteria, five size categories were defined using volume calculations (Figure 6.4). As shown in Table 6.5, there is considerable overlap between rim diameter and volume classes. This indicates that rim diameter is a better measure of vessel size within a form category, whereas volume is a better measure of size variations between form categories. Volume measurements are therefore used in discussing size differences for the

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assemblage as a whole. As such, volume is used as the basis for distinguishing *size categories* in this analysis.

Based on the identification of ten morphological and five size categories, the following classification of the Ndondondwane vessel form series can be proposed. The frequency of the *form classes* and their characteristics are summarized in Table 6.6.

Unrestricted Bowls

A spherical-shaped body and the absence of a neck define this class of bowls. Variations in rim stance, curvature and appendages distinguish three morphological types.

Form Class 1 (UV1): Spherical Bowls. Defined by a vertical to slightly incurving rim. The rim diameter of Class 1-A bowls ranges from 10 to 44 cm, their volume from 0.1 to 20.5 L.

Form Class 2 (UV2): Hemispherical Bowls. These are the second most common bowl form at Ndondondwane. A wide, outsloping rim stance and a shallow spherical body define the "hemispherical" bowls. Rim diameters may reach 12 to 46 cm, but because they are shallow, they do not exceed 20 L capacity.

Form Class 3 (UV3): Handled Bowl. This small oval-shaped bowl has a perforated handle formed from the same clay used to fashion the body. Because of its irregular shape, it was not possible to estimate its volume with any accuracy. This vessel may have been classified as a variation of UV2, because the pierced handle is a secondary form element. However, while the bowl is spherical in profile, viewed from the top it is oval-shaped and the handle clearly distinguishes it from wide-mouthed bowls. As no comparable vessel form has been defined in any existing EIA ceramic assemblage, it was felt that its placement in a separate category was warranted.

Form Class 4 (UV4): Cup. The cup has a cylindrical, or U-shaped, body with an everted neck and a flat base (Figure 6.6 (1)). A lug-handle is oriented vertically and attaches at a ridge built up around the throat and at mid-body. The mouth of the cup is 6 cm in diameter. It has an average wall thickness of 0.7 cm, and is 3.12 cm in height. It has a very small volume (0.5 L).

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RESTRICTED VESSELS

Form Class 5 (RV1): Ellipsoidal Bowls. These bowls have an ellipsoid -shaped body and sharply incurving rim. Two varieties of this restricted shape are defined by length of the incurving rim and therefore the restrictedness of the mouth opening (or orifice).

Form Class 5a (RV 1A): Wide-mouthed. These bowls are shallow and have wide mouth distinguished by the extent to which the rim curves in toward the vessel mid-line. The rim is incurved but short. Rim diameters vary between 8 and 44 cm and capacities range from 0.5-21.4 L.

Form Class 5b (RV1B): Narrow-mouthed. The incurved rim of these bowls is long in comparison to the RV1A form, giving the bowls a narrow mouth and more "complete" ellipsoidal shape. These bowls range widely in rim diameter (8 to 42 cm) and volume (0.2 to 30 L), and this is the only form to fall within all size categories.

Form Class 6 (RV2): Pyriform Bowls. This is an ovaloid geometric form cut off near the maximum width, at which an incurving rim characteristic of Class 5 is added. This gives the bowl an inverted pyramid-like shape, and is therefore termed *pyriform* so as not to confuse it with the ovaloid-shaped jars defined below. Only two examples of this form were identified in the Ndondondwane assemblage. This form may be underrepresented in the assemblage because the rim form is the same as Class 5a. However, what distinguishes pyriform bowls is their acute body angle in profile, and no incurving rim sherds were assigned to Class 5 or 6 unless enough shoulder was present to infer the body angle. Both pots have small capacities due to their shape: the smaller one had a 14 cm rim diameter and is approximately 0.8 L in volume, while the larger pot was 22 cm in rim diameter and had a volume of 1.7 L. If the rim volume is taken into consideration, these numbers increase to about 1.0 and 2.0, respectively.

Form Class 7 (RV3): Bi-conical Bowls. These are restricted bowl forms with an insloping rim. They are generally known as "Msuluzi bowls" as they were first identified at the EIA site of Msuluzi (Maggs 1980b). The position of the curvature

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(inflection) point in profile distinguishes two varieties, both of which are comparable in size.

Form Class 7a (RV3-A): Symmetrical Bi-conical Bowls. A restricted form with an insloping rim and sharp inflection point (almost an angle) marking the horizontal midline of the body (i.e., it bisects the form horizontally) and the maximum circumference of the body. The shape resembles two cones placed with their wide ends together forming a symmetrical conical (or bi-conical) shape. This form ranges in rim diameter from 14 to 24 cm and in volume from 1.2-3.6 L.

Form Class 7b (RV3-B): Asymmetrical Bi-conical Bowls. This form resembles a cone shape set on top of a spherical lower body form with the contact defined by a corner point. Unlike 7a, the inflection point does not bisect the form into two equal halves. Although both bi-conical forms have an angled body profile, the rims of Class 7b bowls are not as long and are located above the horizontal midline, which gives it an asymmetrical bi-conical shape. The rim diameter of these bowls may reach 34 cm. However, because the lower portion of the body is quite shallow, their volume is seldom greater than 5 L.

Insloping rim sherds and angled body sherds were also identified to the bi-conical class. Rim-EVE estimates indicate as many as 236 additional vessels may be placed in this class, making them the most numerous kind of bowl in the assemblage. The thin walls and unusual shape of this class may have contributed to their breaking more easily.

Form Class 8 (RV4): Spherical Jars. This jar class has a lower body profile of nearly uniform circular shape. Spherical jars may have vertical, outsloping, flared and everted necks. The flared (out-curving with no corner point) and everted (corner point marking rim-neck junction) neck types are easily distinguishable because they depart at a considerable angle away from the vessel midline. This jar form varies greatly in wall thickness (0.25-1.82 cm) and size, ranging from 6 to 44 cm in rim diameter and 0.5 to 20 L in volume. This class of jar falls within four of the five size categories.

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Form Class 9 (RV5): *Ellipsoidal Jars*. Ellipsoidal jars are characterized by a "depressed" spherical body shape, which may have vertical, vertical-outsloping, and flared necks. Ellipsoidal jars range widely in rim diameter (10 to 42 cm) and volume (0.7-36 L). There is a large gap in volume size categories for this class, between 18 (size III) and 26 L (size V). Only small to moderate (size I to III) and very large sized (size V) ellipsoidal jars were therefore in use at Ndondondwane.

Form Class 10 (RV6): Ovoid Jars. This term is used to refer to an imperfect spherical form elongated along the vertical axis, with an inflection point marking the maximum diameter. The most sherds were identified to this jar class (n_s = 429), yet they amount to almost the same vessel equivalents as spherical jars (n_e = 27). As well, ovoid jars have comparable rim diameters to other jars, but perhaps due to their elongated form they tend to have more limited capacity range than the other jar classes (0.8 to 15 L). There are only two sizes of ovoid jars: Size I (0.8-1.7 L) and Size III (14.5 L).

OTHER CONTAINERS

A distinct group of containers identified in the assemblage do not fit within the categories established above. These pots appear to be crudely made, miniature versions of Form Classes 1, 5b, 8 and 10, but are distinguished by forming technique and size (Figure 6.6 (2-9)). The primary forming technique used to make these pots is pinching, and for this reason they are termed *pinch-pots*. Pinching involves moving around the circumference of the vessel squeezing clay between the fingers and thumbs to thin the walls and increase their height. Pots made in this fashion may have variation in wall thickness, but typically have a relatively smooth and regular exterior appearance. The Ndondondwane specimens exhibit variation in wall thickness, but have an irregular, bumpy surface. Eight complete and well-preserved pinch-pots at Ndondondwane have rim diameters ranging from 2 to 10 cm in diameter and would have held around 100-250 ml of liquid (0.1 to 0.25 L).

One pinch pot had a fairly well preserved fingerprint (Figure 6.7). A silicon rubber mould was made of the fingerprint using the Cutter Perfourm Light Vinyl Polysiloxane Impression Material (type I, low viscosity) dental impression compound. The shape of the mould is the reverse of the original specimen; it is everted rather than inverted. Ridge breadth measurements were taken from the fingerprint to estimate the

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age of the individual who produced the prints. Compared against recent data on the relationship between age and ridge-breath (Kamp *et al.* 1999), the fingerprint falls within a ridge-breadth range of 0.32-0.35 mm. This places the age of the individual around 96 to 108 months, or between 8 and 9 years of age. Children may have made the pinch-pots at Ndondondwane. Pinching and drawing are the two most basic techniques in forming handmade pottery and are easily and quickly learnt by children. The pinch-pots mirror the "style" of the spherical, ellipsoidal, and ovaloid shapes which characterize 87% of the Ndondondwane vessel forms (n_e = 1,724/1974.9; Table 6.6). Although the objects were not finished by scraping or trimming excess clay from the surface, the simple impressed and incised decoration show symmetry and control in execution. Cross-cultural studies in psychology and education show that children have the cognitive ability and mastery of these motor skills by 7 to 9 years of age (Crown 1999). This is potentially the first direct evidence for the instruction of pottery making during the EIA.

UNIDENTIFIED VESSELS

A large number of jars could not be accurately assigned to one of the jar classes (Table 6.6; n_s = 8,271, 93% of all jars; n_e = 1,314, 95% of all jars). There are two reasons for this. First, rim types are not diagnostic of the Spherical, Ellipsoidal or Ovoid jar classes. While only certain jars have certain rim types, they do not covary with the lower body or bowl shape of jars. For instance, Ovoid jars do not have vertical rims, but with only a portion of the rim sherd to work with, one cannot assign all vertical rims to the Ovoid jar class because the others also have this rim form. Consequently, specific jar types could only be identified from sherds that had substantial portions of the rim and upper body (shoulder). The second reason has to do with the way jars break. The form elements identified in the assemblage give some indication as to the breakage patterns of jars. These breakage patterns leave different portions of primary (neck, shoulder, lower body) and/or secondary (rim, lip) form elements diagnostic of the original vessel form. These patterns correspond to the form extent categories defined above. These may be revised as breakage patterns ranked in order of the degree of brokenness (or extent of profile remaining) and where the breakages occur:

(1) Total vessel profile present, vessel completely preserved (100%) (T).

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(2) Total vessel profile present including some base. Vessel incompletely preserved, <100% (T+).

(3) Upper body of profile present excluding base (including girth). Vessel incompletely preserved, ±50% of complete form (T-).

(4) Rim (including lip) and neck zones and shoulder form present (R+).

(5) Neck (no discernable rim or lip) with some shoulder form (i.e., upper body) present (N+).

(6) Rim (including lip) and neck present (R-).

(7) Only portion of neck zone present (N-)

To identify a complete form, greater than 50% of the form must be present (Patterns 1-3). Indeterminate jars are broken in patterns 5 to 7; thus, the original form could not be identified. However, as discontinuous motifs originate at or near the throat (neck-shoulder junction), the motifs present and often their arrangement could be reasonably inferred from large sherds belonging to vessels with breakage patterns 4 and 5.

EIA bowl forms are somewhat easier to identify than jar forms because one does not need to match the curvature of necks *and* body form elements to classify sherds to a morphological category. For this reason, more bowl sherds could be identified to a specific bowl form. However, there are two exceptions. Only sherds belonging to the bi-conical class were difficult to identity. Both types share the same rim form and rim length is diagnostic of size not the form. Not all angled body sherds or inverted rims could be placed with confidence in either class.

A large number of fragmentary sherds and form elements could not be assigned to a form. As discussed above, some fragmentary material could be classified by the element represented. For these sherds, other attributes could also be measured, such as fabric characteristics, the rim diameter of R- sherds, and evidence of use wear. However, many rim and body sherds could not be classified to a particular form. The sherds in this category are less than 3 cm in width or length. However, their thickness, core patterns and fabric characteristics indicate they were parts of containers.

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Surface Treatments

Surface treatments refer to any purposeful modification made to the surface of a ceramic object that alters its color, texture or hardness. To monitor the process behind the decoration of EIA ceramics, data were collected on techniques of decoration and design structure (combination and layout of motifs and surface finishes). Surface treatments could be classified into four categories (1) cutting (incision), (2) displacement (impression), (3) joining (decorative elements applied to the surface of objects),[1] and (4) surface finishing treatments (for definitions see Rye 1981: 89–94).

MOTIFS

Incised and impressed decoration is most commonly used to decorate EIA ceramics. Ndondondwane potters utilized both techniques to generate six groups of geometric motifs: (1) hatching/grooving (alone or in combination), (2) cross-hatching, (3) chevrons, (4) triangles, (5) ladders, and (6) isolated motifs and impressions. Twenty-nine varieties of motifs were identified in the assemblage (Figure 6.5). These different motifs are arranged horizontally ("continuous") and vertically ("discontinuous") on vessel surfaces (Maggs and Michael 1976). *Continuous motifs* are arranged in bands (a design register) along the horizontal axis of vessels. A series of parallel registers may involve a single motif or a combination of different types of motifs. A series of parallel registers (register groups) mark horizontal design zones that combine to create a horizontal design structure. *Discontinuous motifs* are oriented along the vertical axis of vessels. They originate at the beginning of the rim of bowls or the neck-body junction of jars and extend downwards (in a pendant fashion) vertically or at an angle towards the base. At Ndondondwane, only certain motifs are discontinuous (Motif Class 2-4 and 2-5, and 4 to 6).

Based on the technique and the arrangement of motifs, incised and displaced motifs were placed into two classes:

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[1] Two joining techniques were used at Ndondondwane. The first is *appliqué* proper, in which applied pieces of clay were attached to vessel surfaces; there are two categories: lugs and handles. The second technique is *modeling*, which was used to make distinctive ceramic sculpture.

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Motif Class 1: Zone-Incised (ZIC). Incised motifs are arranged in specific horizontal and/or vertical design zones. Incised lines often mark the boundaries of motifs designating registers and zones.

Motif Class 2: Zone Impressed (ZIP). Impressed motifs resulted from pressing a flat-edged tool, a circular tool (i.e., punctation), or a fingernail into the clay surface. These motifs are arranged in zones similar to ZIC decoration and may have incised boundary lines.

Applied Decoration

Several kinds of applied decoration were identified in the assemblage. Lizard-like creatures were applied to the surface of two ovoid jars. Seven kinds of lugs were also identified (Appendix 1). They are either solid or perforated. The solid lugs are oriented vertically or horizontally on the neck or shoulder of jars. The conical lug type is only used on ceramic heads (see below). Lugs are not specific to any vessel class.

Surface Finish

Three kinds of surface finishing were defined at Ndondondwane based on surface color and technique:

Surface Finish Class 1: Brown (buff)-burnished. These vessels have a burnished, matte finish and fall within a "brown-orange-gray" color spectrum range typical of the assemblage (Munsell 5YR 4-6, 7.5 YR 5-6).

Surface Finish Class 2: Black-burnished. Vessels with dark black surface finishes fall in a color range from black to very dark gray/brown (Munsell 2.5YR 3, 5YR 4, and 10YR 3). It is difficult to discern the technique used to produce the dark black surface finish characteristic of this class. It may have resulted from the application of a crushed graphite/water suspension applied to vessels, which was then burnished to a relatively high luster. Rendered animal fat may also have been rubbed onto vessel surfaces or added to the suspension to increase luster (e.g., Krause 1984: 120). Alternatively, a simpler and less time-consuming technique is smudging (Rice 1987: 158). With this technique, the pottery is blackened, normally at the end of firing, by covering the fired pots with fine organic material, such as powdered manure or sawdust. The organic material closes off the oxygen supply to the pots and carbon is deposited on the surface

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and in the pores of pots. The presence of dark organic matter visible in the cross-section of sherds just below the surfaces is diagnostic of smudging (Rice 1987: 335). Evidence for this practice will be addressed below in the discussion about the organic composition of the pottery (p. 157-158).

Surface Finish Class 3: Red-burnished. These are burnished vessels with a distinct reddish surface finish on the exterior and/or interior of pots. A thin lens of red colorant is visible in cross section with a hand lens (x 20-40) and more clearly under a binocular microscope at a higher power (x 60-100). The colorant was probably red ochre, which is readily available in the valley. Red-burnished finishes are of two types: those with deep red lustrous surfaces and those with a thin flakey lens of dull red colorant that gave sherds a "washed-out" appearance. Sherds with deep red lustrous surfaces are hard (Mohs 3), while the "washed-out" red-colored sherds have slightly softer surfaces (Mohs 2.5). Specimens with both surface finishes were recovered from the same deposits or pits that contained sherds with fresh to moderately worn surfaces. Thus, preservation factors are not likely responsible for differences in surface finish. However, differences in application technique would account for both lustrous and matte red-colored sherds from different vessels being found together in the same deposits. Two types of pigment recipes may have been used to make red-colored pottery: (1) A clay-water-ochre slip suspension was applied to vessels before firing so that it would adhere to vessel surfaces better and were burnished afterwards (red-burnished); and (2) A lower quality clay-water-ochre suspension, or wash, was applied to the vessel surface after firing giving pots a "washed-out" reddish appearance. The color range varies in the same chroma, depending on whether the clay-pigment suspension was applied before or after firing (Munsell 2.5 YR 3-5).

Ceramic Sculpture

Three classes of ceramic sculpture are represented at Ndondondwane: (1) anthropomorphic figurines, (2) zoomorphic figurines and (3) the so-called ceramic "heads" with zoomorphic characteristics described by Loubser (1993). During the 1995–

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1997 excavations, another female figurine and a cattle-like figurine were recovered. The formal and discernable size characteristics of these pieces are summarized in Table 6.8.

Figurines

There are two types of anthropomorphic figurines. Female figurines have exaggerated sexual features that were either formed or marked by lines of punctation (Figure 6.9, 1–3). Two other varieties of human-like form include roughly rendered human-like "heads": one is elongated, or dolichocephalic (Figure 6.9, 4) and the other is rounded (Figure 6.9, 5). There is one type of animal figurine (Figure 6.9, 6). The type of animal is not easily discernable, but it is cattle-like.

Ceramic Heads

Iron Age terracotta heads are considered an art form and those from Ndondondwane are the most complete group of sherds belonging to such objects in the eastern lowlands dating to the EIA (Figure 6.10-11). The heads are inverted Class 6 (Spherical) jars with seven kinds of appliqué. These sherds are fragmentary and no one head could be entirely reconstructed. Loubser's reconstruction of the largest head may come closest to a likeness of what they would have originally looked like, although not all the heads would have been identical (Figure 6.12). His reconstruction of the largest head that, beginning at the bottom (mouth of pot), it at least was composed of seven decorative components: (1) molded ridges applied to half of the neck, (2) clay lugs applied to the mid-body, (3) a crocodile-like beak with teeth is set below (4) a nose with (5) eyes to each side of the nose that are pierced through, possibly right through to the vessel interior, (6) horns resembling those of cattle and/or antelope are placed at each site of the base (or top), and (7) a "crown" at the base or "apex" of the head. Whatever the original form, rim sherds could be reconstructed from four heads (Table 6.8). The three smaller heads had rim diameters from 26 to 36 cm and could be placed in Size Category II, while the large head with a rim diameter of 44 cm falls into Size Category III. Along with the difference in size, the "antelope" and "cattle" horns suggest there

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were at least two "styles" of terracotta heads. However, because of their highly fragmented state, it proved difficult to determine which horns belong to which heads.

Other Ceramic Objects and Observations

Several other ceramic objects were identified in the Ndondondwane assemblage. These include a star-shaped object, clay disks (which are modified body sherds), clay coils, two kinds of cylindrical-shaped objects, and lugs.

Miscellaneous Objects

A number of other objects were recovered during the Ndondondwane excavations (Figure 6.13; Table 6.15). The star-shaped object from Midden 1 is a pinched lump of clay that was (perhaps inadvertently) fired and then discarded in the livestock enclosure (Figure 6.12, 1). Clay coils (Figure 6.12, 2) and disks (Figure 6.12, 3) were found in domestic and Central areas (Table 6.15).

Loubser (1993:132–133) identified one group of cylindrical shaped objects from the Mound as legs of figurines (Figure 6.13, 4). While one is straight and may have supported a figurine, the others are curved, some have one end flattened and splayed, and all are narrower than the figurines. They would have made rather unstable bases for any object, so it is unlikely they were legs. Unless other objects like these are reconstructed, their function will remain ambiguous.

Ceramic Ecofacts

Numerous unusual specimens (n_s = 150) of baked clay-rich soil were identified from the most recent excavations at Ndondondwane. The objects fall into two morphologically distinct groups. The first group was identified as fired casts of earthworm fecal matter (Figure 6.13, 5; Fowler *et al.* 2000). They are identical with consolidated soil of unfired earthworm fecal casts. Their diameter varies around a mean of 6 mm, which is slightly smaller than the mean size of adult earthworms in this region (Edwards and Lofty 1977). We suspect casts of consolidated soil became incorporated in fires and/or charcoal/ash dumps (Fowler *et al.* 2000). In the following chapter, I discuss how the preferred movement and other behaviors of various earthworm species can help

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isolate those that were present in and contributed to the formation of Early Iron Age soils and stratigraphy.

The second group of objects was identified as soil baked after accumulating in plant stalks (Figure 6.13, 6; Fowler *et al.* 2000). Similar objects were found in the Riet River excavations (Dreyer 1996: 101–102, fig. 5), which fit the interstitial spaces in modern reed (*Phragmites* sp.) stalks growing near the site. Therefore, the outer surfaces of these objects are casts of the interior of the particular plant in which they formed. The Ndondondwane specimens did not match the morphological characteristics of modern reeds in the basin or the morphological characteristics of the interstitial space in modern maize stalks (cf. Freeling and Walbot 1994), but would best fit the size and shape of the interstitial spaces of sorghum stalks. We have argued that the composition and morphology of these terracotta objects represent soil baked while within the stalks of a *Sorghum* sp. stand (Fowler *et al.* 2000), carried up the stalk by termites while creating runnels (termite burrows). Once abandoned by the termites, these accretions remain within the stalk of the plant. If fired at sufficiently high temperature, the soil-filled stalks bake and drop to the ground. The evidence for termite activity at Ndondondwane is extensive and I consider the effects of termite burrowing on site formation and the preservation of cultural material at Ndondondwane in Chapter 7.

Other Observations: Impressions

A number of sherds had rhomboidal and oval impressions on their exterior surface. The rhomboidal-shaped impressions are likely of small stones. Maggs (1984c) described the oval marks as seed impressions that closely conformed to the morphology of carbonized millet seeds identified at Ndondondwane. These sherds were re-identified during the restudy of the collection in the Natal Museum and one new specimen from the 1995–1997 excavations was added (Figure 6.14). The seed impressions are interesting because they indicate that pottery was in a soft state when small grains were impressed on exterior surface. Grain storage pits and grinding stones are found exclusively in domestic contexts. It is therefore possible that clay was fashioned in domestic areas where grain was being stored and processed.

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Fabric Types

Defining "fabric types" consists of a study of the clay matrix and inclusions found in the matrix, which are visible macroscopically and microscopically. This analysis focused on identifying the primary mineral constituents and organic materials in vessel fabrics. Six fabric characteristics were considered in analysis: (1) the properties of mineral inclusions (types, frequency, size, sphericity and roundness), (2) hardness, (3) texture, (4) fracture, (5) color and (6) the analysis of core patterns. Two sub-samples of sherds were chosen randomly from different activity loci for analysis. A sample of 11,618 sherds (24% of the total sample) was used for the analysis of mineral properties, which were identified using standard manuals (e.g., Adams *et al.* 1984; PCRG 1997; Peacock 1971). A sample of 7,623 sherds (16% of total sample) was chosen for the core pattern analysis. The analysis of fabric types presented here aimed at answering whether there was significant variation in the use of raw materials during the occupation of Ndondondwane.

Mineral Constituents

Seven kinds of mineral inclusions were identified in the Ndondondwane assemblage (Table 6.9). Five minerals were identified based on their presence in the fabric: quartz, gneiss, mica, clay pellets and oxidized iron pellets. The presence of diagnostic voids (hollows spaces) in the fabric of most sherds indicates that calcite and organic material was originally present before firing: calcite is indicated by rhomboidal voids, while organic material is represented by elongated voids (Peacock 1971). These voids are not discernable in all sherds because some pores had vitrified (when silicate materials and oxides in clay bodies turn to glass, thus closing the pores). However, many sherds had not progressed to vitrification, and the pores in most specimens instead exhibit "bloating" caused by the gases in them being released during firing. Bloated pores may look similar to irregular voids, and this is why only the regular shaped voids left by calcite (when not present) and organic materials could be identified. The negative effects that quartz and calcite can have on pottery firing are discussed in Chapter 7.

The density of inclusions covaries with the texture (or feel) of fabrics and fracture patterns (Table 6.10). Inclusion density combines measures of inclusion frequency, grain roundness and grain size (see also Appendices 2 to 4). The texture of sherds varies

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amongst three categories: smooth (small size of sand inclusion), sandy (sand-papery texture) and granular (more gravelly feel than sandy). Fracture patterns are fine or irregular: fine fractures have a small, closely spaced porous structure, while irregular factures typically have larger, more widely spaced gaps or porosities. These two fracture patterns are a function of the types and density of mineral inclusions. The properties of the mineral inclusions form 11 distinct combinations that have two general sets of characteristics:

(1) Fabrics with a smooth or sandy texture, fine fracture patterns, and minerals with grain sizes of less than 0.25 mm that compose less than 20% of the clay matrix.

(2) Fabrics with inclusions greater than 1.0 mm (but less than 3.0 mm) that make up 20 to 30% of the clay matrix, giving them a granular texture, and when broken they have an irregular fracture pattern.

Organic Constituents

In cross-section, non-industrial ceramics often have a distinct "core" that is different from the coloring of the surface or sub-surface layers, known as the *core effect* (Rye 1981: 114–115). Core effects result from the removal of carbon by oxidization or the deposition of carbon. The chemical reactions involved in the deposition of carbon and oxidization of organics in clay bodies is related to the temperature and atmosphere of firing, and some kinds of post-firing use (e.g., cooking). In this section, I examine core patterns to infer the presence of organic materials in the Ndondondwane fabrics. These data will subsequently be used to investigate the reaction of organic and other materials under different firing conditions in the discussion of ceramic production in Chapter 8. However, below I do make some preliminary observations regarding the relationship between core patterns and decoration technique.

Four attributes of core effects were considered in this analysis: (1) color,[2] (2) core position in cross section, (3) core width, and (4) the nature of the core margins.

[2] Potentially three colors will be recorded for each sherd if they are different: (1) the color between the core and exterior surface), (2) the color between the core and interior surface), and (3) the core color. The first two may differ from the color of the exterior and interior surfaces of the object (i.e., they are heterogeneous rather than homogeneous).

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Although Rye (1981: 114–118) developed a straightforward visual identification system for estimating certain aspects of firing conditions based on the reaction of different minerals and organics in the clay matrix, there is no standard to encode information about the last three attributes. I developed a *core pattern visual estimation chart* as a coding standard to record and interpret the range of core effect patterns. To classify the variation in core effects, core width (ranging from 1–4) is matched against core position (ranging from A–G) in cross section. The range of core patterns observed in the Ndondondwane assemblage is presented in Figure 6.15. Positions A and G are constant in the identification matrix. In position A, the core covers most of the cross-section, while at position G no core is visible.

The observed cores (except position G) are black or gray in color. Reddish (including brownish-red) colored cores following the same patterns were also observed. Shepard (1995: 150) has discussed how the reddish color of vessel exteriors may result from the presence of small percentages of alumina, lime, magnesia and iron oxide in the clay. Presumably, the presence of these minerals would also affect the coloring of the fabric as well. As the chemical analysis of the ceramics is not yet complete, it is unknown if these minerals were present in the clay or in what quantities. Despite the absence of these data, it is probably that the minerals were present in the clays used at Ndondondwane and variations in core patterns were a result of their reactions during firing. Rye (1981: 115-116) reports that sherds with a reddish core with black/gray bands on either side (patterns 1B to 1E in Figure 6.15) result from pottery fired in a reducing or neutral atmosphere and organic material is absent. However, the Ndondondwane sherds with reddish cores did not have black/gray bands on either side. It may therefore be tentatively suggested that these sherds were incompletely oxidized and once contained organic materials. Other irregularly fired sherds were described as a combination of two (or more) core pattern and color categories. In Figure 6.16, I summarize the conditions that can be inferred from core pattern data, based largely on the observations in Rye (1981: 114-116), which allow significant conclusions to be made about the composition of Ndondondwane fabrics and decoration techniques.

First, the core pattern data support the conclusions of the mineralogical analysis (Table 6.11). A study of the core patterns of 7,623 sherds reveals that most may have had organics present before firing (n_s = 7,238, 94.9%). A small proportion of sherds had

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no evidence of organic material (n_s = 385, 5.05%). Organic material is found with most other mineral inclusions (Appendix 5). Organic material appears to be randomly distributed in the fabric of objects. It may be present in some parts of ceramic objects, but not in others, and may differ throughout the same object. However, it is unlikely that organic material was present in only certain fabrics. Instead, small amounts of organic material were probably present in the clay deposits used by potters, and were not removed during the preparation of clay.

Second, Group 4 exhibits core patterns that would result from smudging. As discussed above, smudging is evidenced by the presence of dark organic matter visible in the cross-section of sherds just below the surfaces. It is therefore unlikely that black-burnished pottery was decorated by potters applying and then burnishing graphite. Instead, black-burnished pots were left to "smudge" after being fired and subsequently burnished to a high sheen.

Fabric Groups

The quantitative and qualitative analyses of the properties of the clay matrix and inclusions permit three broad fabric groups to be identified (Table 6.12). Classification of the groups is based on the dominant inclusions in the matrix and their varieties.

Group 1: *Quartzitic*. Sherds with white only quartz are the primary type. Those with silver and/or gold mica flakes are a less frequent subgroup. Most sherds would have organics occurring in quantities less than 5%. Group A comprises most of the sample (n_s = 6614, 56.93%).

Group 2: *Gneisseous*. Sherds with predominantly degraded gneiss are more common, while the combination of gneiss with silver mica is a subgroup. Organics also occur in frequencies of less than 5% in most sherds. The fewest sherds were assigned to this group (n_s = 59, 0.51%)

Group 3: *Mixed*. This group is composed of sherds with greater proportions of quartz to gneiss, but both are consistently present. Subgroups (categories) are defined by the presence of silver and/or gold micaceous flakes, small clay pellets and iron oxide nodules (FeO_2). The nodules include both iron oxides in a ferrous state (e.g., sulfides, carbonates and silicates) and in a ferrous-ferric state (e.g., magnetite and Fe_3O_4). Both are common in the geology of the region. All

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secondary minerals occur in quantities of less than 1%, while organics certainly less than 5%. This is the second most frequent group (n_s = 4645, 42.56%).

These three fabric groups may have been the basic "recipes" used in making ceramics at Ndondondwane. Like all recipes, the proportions of ingredients, or ratios of the types of inclusions to clay, varies. Different forms do not have specific fabric types (Table 6.13). However, there are two consistent patterns. (1) Sherds with large and densely packed inclusions (primarily quartz) have greater wall thickness. A large majority of these sherds exhibited use traces consistent with vessels used for cooking (see below). (2) Sherds with red- and black-burnish have smaller, less densely packed mineral inclusions, or a generally finer fabric.

In summary, the clays used to make Ndondondwane pottery are relatively fine-grained and normally have organic content. The primary mineral constituents of Ndondondwane fabrics are quartz, mica and gneiss. Limestone (dolerite) and iron oxides are very rare constituents of the Ndondondwane fabrics, but are characteristic of the geology of the Thukela Basin. The significance of these different fabric groups is difficult to determine, primarily because there is no correlation between the fabric groups and vessel form, size, or decoration. The only consistent pattern is that larger, thicker-walled vessels often have larger quartz inclusions. The possibility of quartz being used as a tempering material and the effects this and other minerals identified in the fabrics may have on forming and firing practices at Ndondondwane will be considered further in Chapter 8.

TYPOLOGY

In this section, I outline the final classification of the Ndondondwane ceramic series. The characteristics discussed above provide the basis for deriving final analytical classes. However, I also considered it important that this classification reflect the way potters and consumers may classify ceramics, especially a vessel series. Such an exercise may lead to justifiable arguments as to whether a typology is "real" or "actual" (Rice 283-285), but, in my opinion, a typology should have some general correspondence to the principles of categorization used by potters and/or consumers when archaeologists

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attempt to reconstruct the ceramic *chaînes opératoires*. I considered the following factors important in arriving at a final classification. (1) Potters do not necessarily classify ceramics to a greater number of categories or types using attributes that reflect technical differences between categories than would non-potters (e.g. Gosselain 1992; Kempton 1981). (2) Ethnotaxonomic, or folk classification, research has shown that consumers stress functional attributes such as shape, handles, and the like, which distinguish pots used in different activities on a daily basis (e.g, Kempton 1981). (3) The same or similar pots may be used in many activities during their life span. (4) Classifications of cultural material are generally based on dichotomies or sets of oppositions that are often linked to structural differences of the non-material world, both of which are significant to potters and consumers (e.g., Kaplan and Levin 1981). With these thoughts in mind, I drew upon the limited ethnographic observations about how potters and consumers categorize ceramics in southern Africa in formulating a final taxonomic classification of the Ndondondwane ceramics.

An Ethnographic Perspective on Ceramic Categorization

Krause's (1984, 1990) research on categorization amongst Tswana, Ndebele and Venda potters demonstrated that ceramic forms were sorted according to the following criteria:

- Vessel size, rim shape and/or bottom shape are used to distinguish morphological types and vessels of different function. The Bantu potters gave more weight to function (corresponding to size) and secondary features (form elements, including rim shape, rim angle, bottom shape) and less to overall shape in classifying vessel drawings (Krause 1990: 723-725), as do potters from Tlaxcala, Mexico (Kempton 1981).
- There is a general distinction between bowl and jar (necked) forms, and shape varieties within these broad categories are classified by secondary elements such as rim angle and length.
- Decorative properties do not always distinguish pots of different size, shape or function. For example, Venda meat and vegetable cooking pots are distinguished by their size, although they can have identical decoration.
- Individual perceptions of vessels sizes are relative (cf. also Gosselain 1992).

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Ceramic classifications of Zulu speakers from eastern South Africa (Reusch 1998) and Shangane and Chope speakers from southern Mozambique (Morais and Cruze e Silva n.d.), which are illustrated in Figure 6.17, yield the following insights:

- There is a general distinction between restricted and unrestricted containers irrespective of secondary features (such as differences in rim or base type, decoration, and size). However, there are exceptions, as the Zulu *umcakulo* refers to both an unrestricted and restricted form.
- Vessel size and form are used to distinguish function. Different names are given to different sizes of a vessel form even though they may have the same decoration and function.
- Large pots are more often used for transport and storage, small pots for serving and cooking.
- Decoration may instead be used to distinguish specific uses within a broad category such as cooking or serving vessels.
- Tempering material does not covary with vessels of different function.

Thus, the restrictedness, size and decoration of vessels may be used as basic criteria to generate a final classification of the Ndondondwane ceramics. The analytical classes outlined above may be arranged by form (shape and rim morphology), size and decoration, with size and form treated as primary dimensions for classification and decoration viewed as a secondary dimension. Below I define both morphological and decorative typologies. Using this system, the following analytical distinctions may be grouped:

- Analytical size classes can be grouped to represent relative size categories based on volume: small (Category I, <2 L), medium (Categories II and III, >2-16 L) and large (Categories IV and V, 17 to 49 L).
- Unrestricted, spherical bowls are considered a single class. Variations in rim morphology, body form and size distinguish types.
- Restricted bowls are kept in three classes, and types are defined by variation in rim morphology, depth (or height), body form and size.

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- Jars are retained as a distinct group, but classes and types are distinguished by variations in body form and size.
- The cup and pinch-pots may be grouped under one class based on size and similar morphological attributes. This distinguishes them from bowls and jars, and this class will be referred to as "cups."
- The container, sculpture and miscellaneous categories can be considered as a single *series* of ceramic objects and the typological classes should extend through the entire series.

Based on these revised criteria, I attempted to devise an open-ended typological scheme that would be cover the range of ceramic morphological variation exhibited at Ndondondwane, which could also be expanded in the future to the classification of other EIA assemblages for intra-site comparisons. The benefits of such a system are that new types can be added sequentially. The downside of such a system it that the assemblage used must be large and representative of the period under study (Orton *et al.* 1993: 78). Fortunately, Ndondondwane is the type-site for the Ndondondwane phase, and has forms intermediary between the earlier Msuluzi phase and subsequent Ntshekane phase (Maggs 1984c). As well, the assemblage is quite large in comparison to other collections currently available for analysis. This assemblage is therefore representative of the Ndondondwane ceramic phase and many earlier and later forms.

The scheme is composed of the following categories using an alphanumeric coding system:

Level 1: Category. Membership for inclusion is defined by same criteria for classification of ceramic categories outlined at the beginning of the chapter. The categories of concern here include containers, sculpture and miscellaneous objects. These are given no alphanumeric code, just the group label.

Level 2: Class. Membership for inclusion is gross morphology, which is designated by a Arabic numeral (1, 2, etc.). Classes therefore refer to Form Classes defined above with the revisions discussed in this section.

Level 3: Type. Membership defined by codependent variations in body shape and rim morphology within a Class, designated by a letter (A, B, etc.). If no significant codependent variation can be demonstrated in body shape and/or rim

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morphology, such as in the case of Ellipsoidal bowls and jars, the membership for inclusion in a type drops to the fourth level criterion, vessel size.

Level 4: Sub-type. If codependent variations in body shape and/or rim morphology distinguish a type, sub-types are defined by variation in size designated by an Arabic number (1, 2, etc.).

Level 5: Sub-type. If codependent variations in body shape and/or rim morphology distinguish a type, sub-types are defined by variation in size designated by a subscript Roman numeral (I, II, etc.).

A type would therefore be referred to by Class, Type, Sub-Type, and variety (sub-sub-type) and coded, for example, as $1.A.2_{I}$.

Morphological Typology

Following these membership criteria, eleven classes can be distinguished for the Ndondondwane ceramic series (Table 6.14). Class 1 includes all unrestricted bowls, which are separated into three types based on differences in body form, rim morphology and size (Figure 6.18). Class 2 includes two types of Ellipsoidal bowls differentiated by variations in body form and size (Figure 6.19). Class 3 includes Pyriform bowls (Figure 6.19). Bi-conical bowls are placed in Class 4 and are differentiated by the symmetry of the body form and rim morphology (Figure 6.20). Jar forms are placed into three classes (5 to 7) set apart by body form and size (Figure 6.21). Class 8 includes the "cups" (handled cup and pinch-pots) (Figure 6.6). Sculpture is placed in Classes 9 and 10. Figurines make up Class 9 and are distinguished by body morphology and decoration (see Table 6.14 and Figure 6.9), while the terracotta heads are placed in Class 10 and types are defined by size (Table 6.14). Class 11 is a catchall category for all other ceramic objects identified during analysis (Table 6.13 and Figure 6.13).

This typology appears have some parallels with some of the principles southern Bantu speakers use in categorizing ceramics:

- In this classification, fabric type was not considered useful for categorizing variation in the ceramic assemblage.
- Variations in size, rim type and body form serve to differentiate types and varieties.

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- Unrestricted and restricted containers have very different characteristics. Unrestricted spherical bowls, the cup and pinch-pots are small and seldom have elaborate or complex decoration (i.e., black- or red-burnished). Restricted forms, including ellipsoidal bowls, bi-conical bowls and jars, tend to vary more greatly in size and are more often elaborately decorated.
- Different sized vessels of the same form tend to be decorated differently. Except for one type of indeterminate jar, the larger vessels never have complex decoration (addition of pigment and burnished). The possible functional significance of these characteristics is discussed below.

Spatial Distribution of Ceramic Classes

The vessel classes are not randomly distributed between activity areas at Ndondondwane (Table 6.15). Certain classes appear to be restricted, but not exclusively found, in the Central or Peripheral Zones. Over 90% of Classes 3 (Pyriform bowls), 7 (Ovoid jars), and 8 (Cups) come from the Central Zone. Most of the vessels assigned to each class come from the Mound Area: over 70% of Class 2 bowls, 85% of Class 7 (Ellipsoidal jars), and 66% of Class 8 are from the Mound. Likewise, the Peripheral Zone has greater numbers of Classes 1 (Unrestricted bowls), 4 (Bi-conical bowls), 5 (Spherical jars) and 6 (Ellipsoidal jars). However, no class appears to be restricted to the Central Zone. The exceptional nature of Midden 3 is emphasized by this observation, as it is the only domestic complex to have all classes of containers present. This non-random distribution of vessel classes is highly significant, for it implies that specific classes were used in activities that occurred primarily or exclusively in central and domestic activity areas.

Container classes are present but disproportionately represented at various activity areas throughout Ndondondwane, and the distribution of ceramic sculpture follows the same general pattern. Figurines are found in both domestic and central areas (Table 6.16). One type was found in Midden 1 (6.9, 2), while another was found in the human activity zone of the Dung in Horizon 2 (Figure 6.9, 3). The other figurines come from the Mound and are associated with the terracotta heads. Both the Type A female figurine and the human-like heads date to Horizon 2 and 3 and have the same distribution as the terracotta head fragments.

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Most sherds belonging to the four heads came from the Mound Area and over 60 other body sherds and possible horns were found in the Dung Area (Table 6.16). One "horn" was found in Midden 3, but this later proved to be a fragment of a terracotta coil after comparison between the horn and coil specimens. Sherds belonging to two heads were found scattered along the southwest quadrant of the Mound Area in a line closely following the wall of the rectangular structure, dating them to Horizon 2. The fragments from two other heads are associated with the smelting and *daga* debris near the furnace area or with the horizon above it. This places the second group of heads in Horizon 3 concurrent with the use of the furnace and the apparent abandonment of Ndondondwane (see also Loubser 1993: 217–32).

Decorative Typology

The previous section outlined a morphological standard against which variation in EIA ceramics may be evaluated. In this section, I define a decorative standard. As discussed in the section on decoration classes above, objects that fall into the three surface finish classes may also have ZIC (cut) or ZIP (displaced) decoration; thus, surface finish is unique to these classes, not cut or displaced decoration. The twelve-class system could therefore introduce a classificatory muddle because the intention of defining decoration classes was to group together objects with similar decorative attributes that cross cut morphological types. To avoid this potential problem, the presence or absence of burnishing and the type of colorant used in decorating vessels were used as first-order criteria to distinguish decoration classes. To differentiate the decoration typology from the morphological one, I will refer to the decorative types as *wares*. The term *ware* may be used to refer to "stylistic" categories. As defined in Rice (1987: 484), a ware refers to "a class of pottery whose members share similar technology, fabric and surface treatment." I argue that the term is appropriate in this case because the classes are defined in terms of different surface treatments, each of which resulted from different a distinct combination of techniques (see pp. 140-143). Further, it was noted above (p. 149) that vessels with red- and black-burnish generally have a generally finer fabric than other objects. For these reasons, only six decoration classes are proposed here.

Class 1. Plain Ware. These vessels did not receive any surface treatments.

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Class 2. ZIC (Zone-incised) Ware. Vessels that received only zone-incised decoration (surface smoothed, not burnished).

Class 3. ZIP (Zone-impressed) Ware. Vessels that received only zone-impressed decoration (surface smoothed, not burnished).

Class 4. Brown Ware. Vessels with a brown (buff), matte finish that may be plain, or have ZIC, or ZIP decoration.

Class 5. Black Ware. Graphite-burnished vessels in plain, ZIC, or ZIP varieties.

Class 6. Red Ware. Burnished vessels with an ochre slip applied before firing or an ochre wash applied after firing, in plain, ZIC, or ZIP varieties.

Vessel Use Categories

The interpretation of vessel function utilizing complete vessels can be problematic and such interpretations are even more difficult when using sherd material. Due to expense, residue analysis was only conducted on a small sample of sherds (n = 5). Instead, I had to rely on morphological and geometric characteristics, use traces (when evident) and analogies with contemporary vessels forms produced in the region, only few of which parallel Ndondondwane vessel forms.

Inferring Vessel Use

Several properties of ceramics provide indirect or direct evidence of their past function and use. Compositional attributes that can provide indirect sources of evidence of past use include such variables as wall thickness, mechanical stress properties (e.g., ability to withstand movement and dropping), permeability, porosity, and density, surface treatments. Other indirect evidence for inferring use can be provided by a study of vessel shape, capacity (volume), and stability, accessibility of contents, and transportability. More direct evidence of use comes in the form of use-wear patterns (abrasions, scraping, pitting), residues of use (sooting, burning, fabric vitrification), visible food residues, and perforations on vessel surface such as those used to repair cracks.

The use of ethnographic analogy would be valuable for inferring the use of Iron Age pottery, but is poorly investigated amongst Bantu speakers in southern Africa.

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Existing summaries, while few and often unpublished (e.g., Morais and Cruze e Silva n.d.; Reusch 1998; Schofield 1948), rarely describe pottery in ways that would be useful to archaeological analyses of function. Discussion is commonly limited to vessel shape, decoration and qualitative estimates of size (photographs or line drawings are rarely to scale). Nevertheless, these data are valuable at a general level.

Another useful criterion for inferring ceramic function is data on the life span of pottery containers. There are numerous studies of the life span of non-African and African ceramics of different functions. Data on use life of pottery were considered from censuses carried out in Africa (Cameroon, Mali), the Philippines, Central America (Mexico) and South America (Peru), and are compiled in Table 6.17. These data provide a range of use life data for pottery made by both specialist and non-specialist potters that share similar functions to those identified at Ndondondwane. Other data available from several African societies were omitted from consideration because of small sample sizes (often two or three vessels). These data are therefore not representative of the ceramic series in use for that group. The Kalinga, Mexican and Shipibo-Conibo data sets were included to broaden the comparative data available. These data sets were subject to some selection, however, and I only included use life data for ceramic forms that are generally comparable to EIA forms; griddles, braziers and other specialty ceramics that have no parallels in the EIA are not included in the use life calculations.

A significant obstacle faced here was how to estimate the use life of archaeological ceramics and compare them with census data. One analysis by Shott (1996: 477) showed that the relationship between vessel height and use life "is highly significant" but only "modestly predictive" in general terms. While he demonstrated that regression analyses do not yield predictive results for entire vessel series, height and use life covaried most strongly when considered by functional class (Shott 1996: 478). I expanded upon Shott's analysis to see if the linear regression formula could provide an estimate of use life. Using the same census data, I divided each vessel series into function classes, plotted vessel height data against the number of vessel types identified to a class and ran a linear regression on the distribution. A linear regression calculates the least squares fit for a line represented by the following equation: $y = (m \times x) + b$ where m is the slope, x is the number of cases or observations and b is the intercept. For example, Figure 6.22 shows plots for cooking and storage vessels in the Dogon series (for data see Table 6.18). These plots show a strong predictive trend with storage vessels ($r^2 = 0.93$),

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a poor trend with cooking vessels ($r^2 = 0.36$) and a strong trend with both classes combined ($r^2 = 0.88$). If the regression formula could be transformed to give an estimate of use life, the slope and intercept must be treated as a function of the number of use categories. In mathematical terms, we are left with the formula

$$y = \frac{m + b}{x}$$

where m is the slope, b is the intercept and x is the number of types in a use category.

If this modified formula is applied to ethnographic data, it provides a relatively close estimate of the actual use life of vessels, regardless if use life is given as a mean or median. As shown in Table 6.18, when the formula is applied to the Dogon data it yields a result of 3.09 years for the cooking vessel series, 5.25 years for the storage vessel series and 2.96 years if both series are combined. The deviation of these results is never more than two years lower or higher than the use life values given in the census. I would therefore suggest that this formula provides a reliable determination of use life to examine how use life covaries with function.

However, when this formula is used to estimate use life using raw vessel height data at the highest taxonomic (category) level, the number of types does not have to be considered, so x can be held constant at 1 (i.e., there is only one type). Furthermore, the formula was applied to mean and median use life data from ethnographic censuses, and as such the slope (m) was added to the intercept (b) following the normal regression formula. When using raw height data, the intercept will have tend to have a higher score because use categories are composed of differently-sized vessels, and because of this the slope will be predictably "flatter." This characterizes the regression calculation of use life categories identified in the Ndondondwane series (Figure 6.23). Therefore, when calculating use life from the regression of raw vessel height scores, the slope should be multiplied with the mean to generate more accurate use life estimates. Using these guidelines, the above formula can be transformed to

$$y = \frac{m \cdot x}{b}$$

where y = use life, m = slope, b = intercept and x = number of use types, which is held constant at 1.

Another possible complication is that my calculations also included *estimates* of vessel height. Therefore, I performed two tests as a means of checking the reliability of

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the estimates. First, I ran R-squared trendlines on the regression calculations on my determinations of use life using height data. The R-squared value (r^2), the coefficient of determination, ranges in value from 0 to 1 and reveals how closely the estimated values for the trendline correspond to the actual data. A trendline is most reliable when the r^2 value is at or near 1. These data are presented in Figure 6.23, and only one category, storage vessels, has a comparably low r^2 value. For this reason, the calculations given for this vessel class is somewhat less reliable. In general, I consider the values presented in Table 6.20 as *underestimations* of actual use life, because the calculations using ethnographic data were typically lower than the actual values. Thus, as a second way of checking the validity of the estimates, I compared the use life ages arrived at through the liner regression calculation against the range of ages given in the ethnographic literature. The closest matches are given in Table 6.20.

Definition and Distribution of Vessel Use Categories

The 2,211 containers identified from large vessel fragments (n_e = 2,000) and reconstructed vessels (n_e = 211), as well as the 350 sherds identified to the Sculpture class, were examined in the classification of vessel use. However, adequate provenience data was only available for 1,641 containers and sculptures. This sample was classified into nine functional categories that can be grouped under six headings (Table 6.19): (1) cooking vessels, (2) serving and eating vessels, (3) storage and transport containers, (4) tools, (5) sculpture and figurines, and (6) toys. The criteria for inclusion in each category are discussed below.

COOKING VESSELS

Cooking vessels were inferred on the basis of vessel size, form, burning (vitrification) of the exterior surface, sooting, visible food residues and abrasions on the interior surface (Table 6.19). Analysis of the fatty acid contents of sherds with burning, sooting, and visible sheen on the interior of surface confirmed the presence of fatty acid chains consistent with meat and vegetables. Sherds from one vessel also had a lipid signature very similar to peanut oil. Peanuts were not present in the region during the EIA, but nuts from the marula tree (*Sclerocarya caffra*) may be the most similar in composition. Marula nuts have been identified at Ndondondwane (Maggs 1984c: table 5,

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see also Chapter 5). Marula have edible fruit, are widely used for fuel, making charcoal, and the nuts are today privately and commercially brewed to make a sweet-tasting beer.

With the exception of cups (Class 8), all vessel classes were used in cooking (Table 6.19). All of these vessels had burned exterior surfaces and, in many instances, soot was still deposited on the exterior surface resulting from direct contact with fire. Burnt patches and sooting either covered most of the exterior surface (Figure 6.24, 1-3), or was concentrated at the base (Figure 6.24, 4-5). The capacity of vessels does not appear to have been a major criterion for differentiation pots used in cooking, as volume sizes range from 0.5 to 39 L. The forms used in cooking have some ethnographic parallels. Shangana and Chope speakers in southern Mozambique have used jars and a bi-conical looking vessel for cooking (Figure 6.17). Although they are very different forms, both are referred to by the same term (Shangana: *mbita*, Chope: *chikayana*).

Use life estimates indicate that cooking pots may have varied widely in their life spans (Table 6.20). Small pots may have been used for up to two years, while larger pots may have been replaced every four or five years. These use life ranges fall within those of the Shipibo-Conibo, Kalinga and Mexican data but are appreciably shorter than data from African series.

Pots used for cooking are found in most deposits (Table 6.21; Figure 6.25). They are twice as common in the Central Zone than in domestic complexes. However, the proportion of cooking vessels to other use categories is much lower in the Central Zone: in the Dung Area less than 15% and only 0.2% in the Mound Area. The opposite pattern is found in domestic complexes, where cooking vessels make up 30 to 40% of each sample. The exception is Midden 3, which has a very small proportion of cooking vessels. In the Central Zone, most cooking vessels are found in the Dung Area during Horizon 1 and 2 and not near the house in the Mound Area. In contrast, cooking vessels are deposited near the house in Transect 1. Interestingly, the Charcoal Preparation area is the only locus that does not have any sherds from cooking pots.

The number of pots identified as cooking vessels does raise some concern. The frequency of cooking pots at Ndondondwane is remarkably low when compared with ethnographic census data (Table 6.22). Between 29% and 87% of the pots in these systemic contexts are used for cooking, but this use category only makes up 8% of the Ndondondwane assemblage. There are a number of reasons why cooking pots could be

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underrepresented at Ndondondwane, and these stem from problems with misidentification or the differential breakage of pots by use category.

The criteria used to identify cooking pots are clear and the assemblage was carefully studied for the presence or absence of these attributes; thus, preservation and recovery techniques would have been the two major problems lending to the misidentification of cooking vessels. Preservation was noticeably better in the Central Zone and over 60% of cooking vessels were identified from deposits in this area. Yet, although fewer cooking pots were found in the Peripheral Zone, they make up a large proportion of the use classes identified in domestic areas. Furthermore, domestic areas have comparable number of sherds in the fresh and average categories (Table 6.2). One cannot imply from these data that preservation factors would warrant such a low figure. It is also difficult to argue that recovery techniques heavily influenced the proportion and distribution of identifiable cooking pots. If this were case, we would expect fewer cooking vessels from areas where earlier, less intensive, excavations took place. Again, most cooking pots were identified from areas excavated between 1978 and 1982. Another explanation is that the rate and extent of breakage of cooking pots is fundamentally different from other use categories and this would appear in the calculation of EVEs for different categories. This may very well be the case at Ndondondwane because only rim-EVEs were used to calculate container frequencies. The problem here is that cooking pots can be identified principally by burning marks and sooting, which may occur only on the body of certain vessel types (e.g., see Figure 5.24). In these instances, the rim sherds exhibit no signs of being subjected to heat, only that portion of the vessel below the maximum diameter. If the body sherds cannot be associated clearly or reconstructed with other parts of the same vessel (especially rims) then the EVE calculations would underestimate the number of pots in a category.

A disproportionate number of cooking pots also introduce behavioral rather than identification and preservation issues. In the first place, assigning vessels to a "cooking" category implies they were utilized primarily if not exclusively for cooking. However, the frequency of Ndondondwane cooking pots is more similar to the "storage/cooking" category recorded by David and Hening (1972) in their census amongst the Fulani (at 13%). We therefore entertain the possibility that cooking pots served more than one function during their use life and that many may have been broken off-site.

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SERVING AND EATING VESSELS

Vessel size, form, abrasions, decoration, the presence or absence of food residues, and the absence of burning traces, were the main criteria used in identifying serving and eating vessels (Table 6.19). Only small spherical bowls, bi-conical bowls, a jar and the handled cup were identified as containers that may have been used in both serving and eating. The cup was probably used for drinking. The other vessels are small bowls and jars that have abrasions on the interior. The abrasions likely resulted from stirring or scooping. Most serving/eating vessels are decorated, and small proportions of burnished (brown-buff, black, and red) vessels occur in this category.

Because serving and eating vessels are used often and are constantly being moved, it follows they would have had relatively short life spans. However, because they are typically small, the use life estimate is high at around 11 years. Ceramic containers used for eating or serving are not differentiated in the available ethnographic use life data. The improbably long life span estimated for these vessels only finds parallels with Fulani storage/cooking pots (at 10.2 years) and Dangtalan large cooking pots (at 12.3 years) (Tables 6.17 and 6.20). It is therefore more likely that the life span of serving vessels was less than that estimated here (Table 6.17).

Like cooking vessels, pots used for eating are not common in the assemblage and most were recovered from the Central Zone (Table 6.21, Figure 6.25). Serving/eating vessels are seldom found in domestic areas where they may have been used most often.

Vessels that may have been used exclusively for serving are less than 20 L in capacity, are not burned, and do not have the abrasions on their interior, all attributes which are typical of containers used in food preparation (Table 6.19). Most of the Class 1-7 vessels with these characteristics are highly decorated. The Ndondondwane series of serving vessels has numerous parallels with the Shangana and Zulu vessels used for serving and drinking beer and serving food (Figure 6.17). In particular, the Shangana *dumela* looks remarkably like the Class 4.A. (Bi-conical) bowls.

The use life calculated for serving vessels indicates they would have survived for much less than a year. This life span is only comparable to the Shipibo-Conibo range, and is quite low compared to the Mexican and Fulani data. However, serving vessels dominate the functional categories identified in the assemblage, comprising over 50% of the sample (Table 6.21, Figure 6.25). Almost three quarters of serving vessels are found

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in the Peripheral zone, and they generally comprise 30 to 40% of the sample in each area. Again, Midden 3 is the exception at 75%. In contrast to the cooking vessels, the number of serving vessels is quite high when compared to census data—over twice as high as the average (24.3%). This frequency more closely matches that of cooking vessels in modern systemic contexts (Table 6.22). This again raises questions of misidentification. However, it must be noted that serving vessels were primarily identified by the absence of features that characterize other use categories, such as burning, sooting, vessels with sharp changes in curvature that are seldom characteristic of cooking or storage pots (because they easily tip over), and large-sized vessels which are heavy and make serving awkward. If the inferences are reasonably based, then why are there such a large number of serving vessels that have no analog with modern-day census data? One explanation involves life span and how the vessels were used. The low use life calculation may be accounted for by the high quantity of serving vessels identified in the assemblage. It may be that serving vessels were simply replaced more often. As noted above, serving vessels are often highly decorated and such pots are more often used in public than in private. Considering life span and the potential contexts of serving vessel use, the spatial distribution of serving and eating vessels does not seem as significant as *when* they occur in different activity loci over time (Table 6.21, Figure 6.25). Most are found in Horizons 1 and 2 of the Dung and Mound Areas. Each of these horizons coincides with high volume depositional episodes of all use categories in Central Zone. In Chapter 8, I consider the possibility that certain types of serving vessels were made and used exclusively in public ceremonies.

MULTIPURPOSE STORAGE AND TRANSPORT VESSELS

Storage is a very broad functional category that encompasses a wide range of behavior: contents may be liquid, dry, or both; they may be stored for long or short durations of time; and containers may be stationary, or rarely moved, while others may serve to transport contents over short or long distances. I inferred vessels used for these purposes based generally on vessel size and form, and the absence of burning, visible residues and abrasions (Table 6.19). I have divided containers that may have served in different storage or transport capacities into three sub-categories, which reflects the difficulty of classifying vessels to this functional class: (1) storage vessels, (2) serving/storage vessels, and (3) storage/transport containers. Breakage patterns,

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capacity, and decoration were further criteria I used to distinguish between these sub-categories.

Long-Term Storage. The large Class 6 jars and Class 2B bowls identified to this use category exhibit horizontal and vertical step-like breakage patterns at or just below the maximum circumference and have no discernable use wear patterns (e.g., Figure 6.24, 6). Unlike other jars, the thickness of the body walls can be twice that of the neck. It is possible that many of these vessels broke due to an impact on their side (e.g., being thrown into a rubbish area). The spherical and ellipsoidal jars have an average height of 63 cm and range from 17 to 49 L in capacity, and may have been used for the long-term storage of dry contents. The Shangana and Chope make vessels of similar size and shape for water storage (Figure 6.17). Smaller ellipsoidal bowls (average height 53 cm) with smaller capacities (11-30 L) could have been used for shorter-term storage of liquid or dry contents. This bowl form is also stackable and smaller Class 2B bowls were identified as serving vessels. All forms are undecorated or brown-burnished, and the jars may have very limited ZIP or ZIC neck decoration.

The life span of large storage vessels is calculated to be over seven years (Table 6.20). This figure is comparable to the storage vessels at Tzintzuntzan (at 6.3 years), and otherwise falls between the mean use life for the African series (9.2 years) and all cases (5.3 years) (Table 6.17). It is therefore quite likely that a life span of around 7 years for storage vessels is a reasonable estimate.

Sherds from storage vessels are found in all activity loci, with the exception of Horizon 3 at the Mound and Transect 1 (Table 6.21, Figure 6.25). Most storage vessels (n_s = 24) come from the Dung Area (n_s = 11, 33% of total) and Midden 3 (n_s = 13, 40% of total).

Serving and Short-Term Storage. Other large storage jars (Class 5.A.3) and bowls (Class 2.B.2-3) may have been used for both short-term storage and serving liquid or dry contents (Table 6.19). Like storage jars, these vessels have vertical and step-like fracture patterns. These patterns may indicate that vessels broke because there were dropped on the bottom or side of their bases, shattering vertically and laterally along the weak points of the body. Although they fall into the large size category, they are have smaller capacities (9–20 L), and are either undecorated or burnished. They have shorter life-use than the large storage vessels and may have been replaced about every two years

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(Table 6.20). When compared to the ethnographic data, this use category has a life span that is more similar to serving than storage vessels (Table 6.17).

Short-term storage vessels found only in the Central Zone (Table 6.21, Figure 6.25). Several examples come from Horizon 1 in the Dung Area and Horizon 2 in the Mound Area. Most were found at the lower plow zone—Horizon 3 contact in the Mound Area.

Short-Term Storage and Transport. Over 500 examples of Class 5 and 6 jars have similar breakage patterns to serving/storage jars, but have smaller capacities (1 to 14 L), and are decorated in a similar fashion to storage jars (Table 6.19). These jars may have served to transport and store water or other liquids. If vessels were carried on the head, the raised decoration around the throat and neck would have served as grip for the carrier. Similar attributes are discernable in the ethnographic literature. Shangana and Chope water carrying jars have either incised decoration around the neck or lugs at the shoulder that may have served a similar function (Figure 6.17), while the Zulu *uphisto* and *incgazi* water carrying vessels have small bodies and very high necks, which prevent water from spilling.

Estimates for the use life of these vessels is around two years, which falls within the low end of the range from ethnographic censuses (0.8 to 7.2 years). These vessels may have been in use longer than two years, as fresh water was only 600 m from the furthest domestic area at Ndondondwane. Surprisingly, storage/transport jars compose only 10 to 26% of the vessels from domestic areas, and are slightly more frequent in the Dung and Mound Areas (27 to 36%) (Table 6.21, Figure 6.25).

TOOLS

A bowl-like object with open perforations resembling "notches" in the vessel wall was found in the northeast corner of J10 in the Mound Area, near the rake pit of the furnace (Horizon 3). This object may have been used for clearing the furnace bowl, but this function is speculative. It is unlikely that this object was used for removing bloom from the furnace bowl because there are no slag residues or accretions on the surface. However, Loubser (1993: 146, fig. 14, 7) reports one sherd that may have had slag attached to the inner surface that may have been used for this purpose. A small number of ceramic fragments with slag adhering to them have been found at LIA sites in the Limpopo-Shashe basin (Calabrese 2001). These have been interpreted as "skimmers"

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used to remove slag after smelting. Loubser (1993: 146) also mentioned this residue may have resulted from cooking cereals at very high temperatures. However, one would wonder why this is the only sherd with such a residue and what would have been the benefit of burning cereals. If this residue resulted from a cooking accident, other sherds from this pot with similar residues should have turned up during analysis.

TOYS

A number of ceramic objects at Ndondondwane do not have a function that is readily discernable from their physical properties. A number of objects may have been children's toys, perhaps made by children themselves. Zoomorphic figurines during the EIA, many of which appear to represent cattle, may be such toys. They could have been used in cattle-herding game, similar to one played by young boys in southern Africa today (Maggs and Ward 1995). The clay coils and disks may also have been used in such a game as representations of houses or other animals. As well, the disks could have been used as pieces for a game similar to *mankala* (similar in principle to backgammon). A possible *mankala* board, though not certainly dated to the EIA, has been found at Wosi, down river from Ndondondwane (van Schalkwyk 1994b). An early version of the game, using even rows of small dug out pockets of earth, may have been played at Ndondondwane and other EIA settlements. Most of these objects appear to have been discarded in central areas, although there are examples from household middens (Table 6.21).

While the pinch-pots may have been used to for drinking or to store herbs and other medicines, these explanations are unlikely. Gourds, baskets or leather pouches could have served the same function. These objects are lighter, more easily covered and carried, can be stored by hanging them on the wall or roofs of huts, if, of course, EIA houses were constructed at least remotely similar to structures documented ethnographically (e.g., Dreyer 1972). Although not all the pinch-pots had identifiable fingerprints, it may very well be that children made them. They could have been made for fun, but because they were fired, they may also have been part of the instruction of novice potters, after which they would have been used in play.

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RITUAL SCULPTURE AND FIGURINES

The sculpture and figurines found exclusively in the Central Zone were classified as ritual objects based on Loubser's (1993) initiation hypothesis. Considering the ritual significance of lizard and crocodile symbolism to Bantu speaking groups in southern Africa (e.g., Huffman 1996), the ovoid jars with lizard-like appliqué associated with the sculpture from the Mound Area were also interpreted as ritual objects. In the following chapter, the validity of the initiation hypotheses is considered against the depositional contexts of the heads and figurines, and the time-line of events at Ndondondwane.

CHAPTER SUMMARY

In this chapter, I presented taxonomic and functional classifications of the Ndondondwane ceramic data designed to investigate ceramic production, use, discard and site formation processes at Ndondondwane. Seven vessels classes were identified, which could be further categorized according to their size and decorative characteristics. Although differences in fabric composition were noted in the assemblage, this variation is not particular to vessels of different size, form or function.

Indirect and direct evidence for the use of ceramic objects at Ndondondwane permitted the identification of six use categories at the site: (1) cooking vessels, (2) serving and eating vessels, (3) storage and transport containers, (4) sculpture, figurines, and vessels with zoomorphic decoration that all may have served in some ritual capacity, (5) tools, and (6) toys. There is little indication that specific ceramic forms were designed to serve in one functional capacity. Many vessel classes have traces of use resulting from more than one activity. For this reason, the vessel classes and types do not often correlate with a single functional category. Ceramic vessels at Ndondondwane were clearly designed as multifunctional containers.

Three trends are discernable from an analysis of the spatial distribution of ceramic classes at Ndondondwane. (1) Most sherds were recovered from Central activity areas (60%). (2) Ceramic classes are not randomly distributed at the site. Instead, certain classes are restricted to specific activity loci. (3) Functional types commonly assumed to have been most widely used in household contexts are poorly represented in domestic middens. For this reason, differences in ceramic use are not easily linked to the spatial contexts in which pots are found. Many vessels that one would typically associate

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with domestic activities, such as food preparation, short-term storage, and transport, were recovered from the livestock enclosure in the Dung Area and the Mound Area where ivory bangle production, the processing of wild game, and other activities occurred. Thus, it may not be possible to infer the function of containers or other ceramic objects at EIA sites by relying primarily upon the spatial context of finds and indirect evidence for use.

Further, an understanding of the interrelationships between the uses of different areas over time appears to be vital for understanding the non-random distribution of ceramic types and use categories at Ndondondwane. Certain distribution patterns, such as the low frequency of cooking vessels in Midden 3 and the restricted distribution of certain ceramic classes to central areas (e.g., Class 2B) or households (e.g., Class 1), require explanation. It cannot be assumed that ceramic objects at EIA sites were used at or near places they were recovered during excavation. Yet, this very assumption underlies many behavioral interpretations of EIA social and ritual behavior, such as Loubser's (1993) argument that the Mound Area served as an area for EIA initiation rituals because the ceramic heads and figurines were deposited there. These assumptions make it necessary to begin developing middle-range interpretive principles that would serve to relate spatial patterns in artifact distributions to current models of EIA community organization. As a first step towards this objective, in the following chapter I attempt to explain the spatial distribution of ceramics in terms of site formation processes.

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Table 6.1. Total frequency of sherds recovered from major activity areas at Ndondondwane (1978–1997)

		Central Zone				Peripheral Zone					Total
Horizon	Data	Dung	Mound	T 1	T 2	M 1	M 2	M 3	M 4	CP	
Uncertain[a]	N_s	218	67			451	439	10,589	63	11	11,838
	% Area	1.7	0.5			100.0	100.0	100.0	100.0	100.0	
	% Horizon	1.8	0.6			3.8	3.7	89.4	0.5	0.1	100.0
	% Total	0.5	0.2			1.1	1.1	26.2	0.2	0.0	29.3
3-4[a]	N_s	1,341	6,075	57	173						7,646
	% Area	10.3	47.3	2.4	27.9						
	% Horizon	17.5	79.5	0.7	2.3						100.0
	% Total	3.3	15.0	0.1	0.4						18.9
3	N_s	587	103	0	312						1,002
	% Area	4.5	0.8	0.0	50.4						
	% Horizon	58.6	10.3	0.0	31.1						100.0
	% Total	1.5	0.3	0.0	0.8						2.5
2	N_s	4,987	3,931	773	104						9,795
	% Area	38.4	30.6	32.3	16.8						
	% Horizon	50.9	40.1	7.9	1.1						100.0
	% Total	12.3	9.7	1.9	0.3						24.2
1	N_s	5,852	2,664	1,565	30						10,111
	% Area	45.1	20.7	65.3	4.8						
	% Horizon	57.9	26.3	15.5	0.3						100.0
	% Total	14.5	6.6	3.9	0.1						25.0
Total	Total N	12,986	12,840	2,395	619	451	439	10,589	63	11	40,394
	% Area	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
	% Total	32.1	31.8	5.9	1.5	1.1	1.1	26.2	0.2	0.0	100.0

Abbreviations: N_s = number of sherds, Dung = Dung Area, Mound = Mound Area, T = Transect, M = Midden, CP = Charcoal Preparation Area.

[a] Combines sherd count data from Horizon 3 and the lower plow zone (5-10 cm depth in Peripheral Zone). Excludes sherds collected as surface finds and during systematic surface survey and auguring.

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Table 6.2. Condition of sherds recovered from major activity areas at Ndondondwane

	Central Zone				Peripheral Zone					Total
Category[a]	Dung	Mound	T 1	T 2	M 1	M 2	M 3	M 4	CP	
Fresh	58%	61%	42%	24%	32%	37%	43%	12%	65%	42%
Average	29%	23%	12%	15%	50%	43%	41%	17%	33%	30%
Worn	13%	16%	26%	61%	18%	20%	16%	71%	2%	27%
Total	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%

[a] Frequency of sherds for each horizon of the major activity areas is given in Table 6.1. Abbreviations as per Table 6.1. Excludes ceramics collected as surface finds, during systematic surface survey and auguring.

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Table 6.3. Frequency of form elements with high and low identifiability in major activity areas

Area	Horizon	Data[b]	Level of Identifiability[a] High	Low	Total
Dung	1-5	N_s	403	1506	1909
		% Horizon	21.11%	78.89%	100.00%
		% Assemblage	0.9%	3.2%	4.0%
	3	N_s	127	458	585
		% Horizon	21.71%	78.29%	100.00%
		% Assemblage	0.3%	1.0%	1.2%
	2	N_s	1667	3077	4744
		% Horizon	35.14%	64.86%	100.00%
		% Assemblage	3.5%	6.5%	10.0%
	1	N_s	1928	3904	5832
		% Horizon	33.06%	66.94%	100.00%
		% Assemblage	4.1%	8.3%	12.3%
Dung N_s			4125	8945	13070
Dung % Horizon			31.56%	68.44%	100.00%
Dung % Assemblage			8.7%	18.9%	27.6%
Mound	1-5	N_s	3146	8891	12037
		% Horizon	26.14%	73.86%	100.00%
		% Assemblage	6.7%	18.8%	25.5%
	3	N_s	12	91	103
		% Horizon	11.65%	88.35%	100.00%
		% Assemblage	0.0%	0.2%	0.2%
	2	N_s	603	3287	3890
		% Horizon	15.50%	84.50%	100.00%
		% Assemblage	1.3%	7.0%	8.2%
	1	N_s	834	1829	2663
		% Horizon	31.32%	68.68%	100.00%
		% Assemblage	1.8%	3.9%	5.6%
Mound N_s			4595	14098	18693
Mound % Horizon			24.58%	75.42%	100.00%
Mound % Assemblage			9.7%	29.8%	39.5%
Transect 1	1-5	N_s	51	21	72
		% Horizon	70.83%	29.17%	100.00%
		% Assemblage	0.1%	0.0%	0.2%
	2	N_s	390	377	767
		% Horizon	50.85%	49.15%	100.00%
		% Assemblage	0.8%	0.8%	1.6%
	1	N_s	240	1324	1564
		% Horizon	15.35%	84.65%	100.00%
		% Assemblage	0.5%	2.8%	3.3%
Transect 1 N_s			681	1722	2403
Transect 1 % Horizon			28.34%	71.66%	100.00%
Transect 1 % Assemblage			1.4%	3.6%	5.1%

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Table 6.3. (continued)

Area	Horizon	Data	Level of Identifiability High	Low	Total
Transect 2	1-5	N_s	32	136	168
		% Horizon	19.05%	80.95%	100.00%
		% Assemblage	0.1%	0.3%	0.4%
	3	N_s	46	266	312
		% Horizon	14.74%	85.26%	100.00%
		% Assemblage	0.1%	0.6%	0.7%
	2	N_s	14	90	104
		% Horizon	13.46%	86.54%	100.00%
		% Assemblage	0.0%	0.2%	0.2%
	1	N_s	16	7	23
		% Horizon	69.57%	30.43%	100.00%
		% Assemblage	0.0%	0.0%	0.0%
Transect 2 N_s			108	499	607
Transect 2 % Horizon			17.79%	82.21%	100.00%
Transect 2 % Assemblage			0.2%	1.1%	1.3%
Midden 1	1-5	N_s	719	542	1261
		% Horizon	57.0%	43.0%	100.0%
		% Assemblage	1.5%	1.1%	2.7%
Midden 2	1-5	N_s	185	127	312
		% Horizon	59.29%	40.71%	100.00%
		% Assemblage	0.4%	0.3%	0.7%
Midden 3	1-5	N_s	3855	7161	11016
		% Horizon	35.0%	65.0%	100.0%
		% Assemblage	9.7%	16.3%	26.0%
Midden 4	1-5	N_s	--	30	30
		% Horizon	0.00%	100.00%	100.00%
		% Assemblage	0.0%	0.1%	0.1%
Charcoal Preparation	1-5	N_s	28	33	61
		% Horizon	45.90%	54.10%	100.00%
		% Assemblage	0.1%	0.1%	0.1%
Pump House	1-5	N_s	123	22	145
		% Horizon	84.83%	15.17%	100.00%
		% Assemblage	0.3%	0.0%	0.3%
Total N_s			14234	33052	47,286
Total % Horizon			30.10%	69.90%	100.00%
Total % Assemblage			30.1%	69.9%	100.0%

[a] High identifiability includes combinations of rim, neck, shoulder sherds, sherds with >50% of the profile present, and complete (intact) vessels. Low identifiability refers to highly fragmented sherd material of indeterminate form. Although the vessel part could sometimes be distinguished, (e.g., rim, part of neck) this category predominantly includes undiagnostic body sherds.

[b] Excludes ceramics collected as surface finds and auguring.

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Table 6.4. Comparison of vessel size categories derived from analysis of rim diameter and volume

Rim Diameter Category (Range in cm)		Volume Category (Range in liters) I (0.1-1.9)	II (2.2-8.1)	III (9.0-17.8)	IV (18.8-24.2)	V (25.9-48.8)
A	(2-12)	0.1–1.8				
B	(13-25)	0.2–1.9	2.2–7.8			
C	(26-35)	1.9	2.4–8.1	9.0–17.8	18.9	26.0
D	(36-48)		5.9–8.1	9.6–17.0	18.8–24.2	28.3-48.9

Table 6.5. Variation between rim diameter and volume categories

Volume Category	Volume Range (in liters)	Rim Diameter Range (in cm)
I	< 2	02-26
II	>2–8	18-42
III	9–18	28-46
IV	19–24	35-46
V	26–49	34-48

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Table 6.6. Frequency and formal characteristics of the Ndondondwane ceramic form series

Form Class Number, Code and Descriptive Name	N_s	N_e [a]	% of N_e Analyzed	Wall Thickness (range in cm)	Rim Diameter (range in cm)	Volume (range in L)	Size Category[b]
Unrestricted Vessels							
1 UV1. Spherical	119	16.0	0.8%	0.5–1.35	10–44	0.1–20.5	I–IV
2 UV2. Hemispherical	558	190.0	8.9%	0.55–1.20	12–40	0.5–19.2	I–IV
3 UV3. Handled bowl	1	0.5	0.0%	0.25	–	–	I[c]
4 UV4. Cup	1	0.6	0.0%	0.75	6	0.2	I
Unrestricted Total	679	207.1	9.7%				
Restricted Vessels							
Restricted Bowls							
5 RV1. Ellipsoidal							
A. Wide-mouthed	226	112.0	5.3%	0.6–1.85	8–48	0.1–21.4	I–IV
B. Narrow-mouthed	80	33.0	1.5%	0.72–1.35	8–42	0.2–30.1	I–V
6 RV2. Ovaloid (Pyriform)	2	2.0	0.1%				
7 RV3. Bi-Conical							
A. Symmetrical	83	0.8	0.0%	0.50–0.78	14–24	1.2–3.6	I–II
B. Asymmetrical	9	2.0	0.1%	0.60–1.23	14–34	0.9–5.3	I–II
Bi-Conical (Ind.)	1,153	236.0	11.1%	0.11–1.75	6–46	0.2–9.6	I–III
Restricted Bowls Total	*1,553*	*385.8*	*18.1%*				
All Bowls Total[d]	*2,231*	*592.9*	*27.8%*				
Jars							
8 RV4. Spherical	131	27.0	1.3%	0.25-1.82	6–44	0.5–19.6	I–IV
9 RV5. Ellipsoidal	26	8.0	0.4%	0.8–1.35	10–42	0.7–36.2	I–III, V
10 RV6. Ovoid	429	27.0	1.3%	0.57–1.14	6–28	0.8–14.5	I, III
Jars (Ind.)	8,271	1314.0	61.6%	0.30–4.00	2–48	0.2–48.8	I–IV
Jars Total	*8,857*	*1,376.0*	*64.6%*				
Restricted Vessels Total	10,410	1,761.8	82.7%				
Other							
Pinch-pots[e]	10	8.0	0.37%	0.74–3.82	2-10	0.1-0.25	I
Totals			% Total N_e	% Total N_s			
Identifiable Vessels	11,089	1,969.5	92.4%	22.7%			
Unidentifiable Vessels	37,712	162[f]	7.6%	77.3%			I–V
Analyzed Sample	48,804	2,131.5	100.0%	100.0%			
Unanalyzed Sample	355	79.5					
Total Sample	49,156	2,211.0					

[a] Rim-EVE scores greater than one are rounded up to the nearest whole number.
[b] See Table 6.5.
[c] Size class estimated.
[d] Excludes cup (n_e = 0.6).
[e] Count not included in final tally because extracted from totals for Forms 1, 5, 8 and 10.
[f] EVE scores from rims 10-20% preserved which could not be placed in one of the form classes.

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Table 6.7. Surface treatment classification

Surface Finish (color spectrum/surface finish)	Cut (Incised) and Displaced (Impressed) Decoration		
	None	Zone–incised (ZIC)	Zone–impressed (ZIP)
Variable/ None	01. Undecorated	02. ZIC	03. ZIP
Brown/ Burnished	04. Brown–burnished	05. Brown–ZIC	06. Brown–ZIP
Black/ Burnished	07. Black–burnished	08. Black–ZIC	09. Black–ZIP
Red/ Burnished	10. Red–burnished	11. Red–ZIC	12. Red–ZIP

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Table 6.8. Formal and decorative characteristics of Ndondondwane ceramic sculpture and other objects

Class and Type		N_s	N_e	Dimensions				Size Category	Decoration			
				Height	Length	Wall Thickness	Rim Diameter		Plain	ZIP	Black	Red
Sculpture												
1. Figurines												
Female Figurines	Small, steatopygic	1	1	4.08					•			
	Large, steatopygic	2	2	–						•		
	Impressed features	1	1	–					•			
Figurine Heads	Dolichocephalic	1	1	–					•			
	Rounded	1	1	–					•			
Zoomorphic	Cattle-like figure	1	1	1.3	3.90				•			
2. Terracotta Heads		265	4			3.91	26-44	II-III	•			•
Other Objects												
1. Other	Star-shaped figure	1	1		2.93				•			
2. Clay Disks		72	72				0.55-1.61		•		•	
3. Terracotta Coils		5	5						•			
4. Ecofacts	Earthworm casts	124	124									
	Sorghum stalk casts	26	26									

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Table 6.9. Mineral and organic inclusions identified in the Ndondondwane ceramic assemblage and their characteristics

Material Type	Characteristics[a]	Color	Frequency[b]	Sorting[c]	Roundness/Sphericity	Size (mm)
Quartz	glassy, harder than metal	White/gray	5 – 20%	parallel surface	Low/angular – high/rounded	≤0.1 – >3.0
Gneiss	opaque	Black	5 – 20%	parallel surface	High/rounded	≤0.1– ≤3.0
Mica	glistening flakes	Silver/gold	<5 – 30%	parallel surface	Low/angular	0.25 – >3.0
Limestone (calcite)	rhomboidal voids		< 10%	parallel surface	High/angular to rounded	≤0.25
Clay pellets	Clay–like	brownish	< 1%	–	High/rounded	0.25 – ≤1.0
Organic material	elongated voids		< 2%	parallel surface	–	≥0.1
Iron oxides[d]	slightly magnetic	reddish	< 1%	parallel surface	angular/well–rounded	≤0.25

[a] Identifications based on data in Peacock 1977.
[b] The frequency of inclusions in the clay matrix given as a percentage.
[c] Examined with a hand-held lens using x20 to x40, depending upon inclusion size. Refers to the dominant arrangement of most particles. There is some randomness with larger grain sized minerals, but most particles, irrespective of type, are sorted parallel to the surface of the vessel wall.
[d] This includes iron oxides in a ferrous state (e.g., sulfides, carbonates and silicates) and in a ferrous–ferric state (e.g., magnetite and Fe).

Table 6.10. Characteristics of the mineral inclusions in the Ndondondwane ceramics

Density (%)	Grain Size (mm)				
	Very Fine ≤0.1	Fine 0.1 – 0.25	Moderate 0.25 – 1.0	Coarse >1.0 – <3.0	Very Coarse >3.0
Sparse (< 5%)	•	•	—		
Rare (5–9%)	•		—		
Moderate (10–14%)	•	•	—		
Common (15–20%)		•	—	•	•
Very Common (21–30%)			—	•	•
Abundant (>30%)			—	•	
Feel and Texture	Smooth or sandy			Granular	
Fracture Pattern	Fine			Irregular	

Table 6.11. The presence and absence of organic material indicated by core pattern data

Core Pattern Group	N_s	% of Classified	% All Sherds	Organics[a]
Group 1	1012	13.28%	2.06%	±
Group 2	1051	13.79%	2.14%	±
Group 3 A	3566	46.78%	7.25%	+
Group 3 B	58	0.76%	0.12%	+
Group 4 A	5	0.07%	0.01%	
Group 4 B	8	0.10%	0.02%	–
Group 5 A	767	10.06%	1.56%	+
Group 5 B	120	1.57%	0.24%	+
Group 6 A	371	4.87%	0.75%	–
Group 6 B	64	0.84%	0.13%	+?
Group 7	591	7.75%	1.20%	±
Group 1 and 2	1	0.01%	0.00%	±
Group 3A and 6A	9	0.12%	0.02%	+?
Total	7623	100.00%	15.51%	

[a] Organics present (+), possibly present (+?), indeterminate (±), not present (–).

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Table 6.12. Fabric groups identified in the Ndondondwane assemblage.

Fabric Group	Category [a]	N_s	% Group	% All Groups
1. Quartzitic	A. quartz only (+, –, ±)	4130	62.44%	35.55%
	B. quartz, silver mica (+, –, ±)	2482	37.53%	21.36%
	C. quartz, silver and gold mica (±)	2	0.03%	0.02%
	Total	6614	100.00%	56.93%
2. Gneisseous	A. gneiss only (+, –, ±)	21	35.59%	0.18%
	B. gneiss and silver mica (+, ±)	38	64.41%	0.33%
	Total	59	100.00%	0.51%
3. Mixed	A. quartz and gneiss only (+, –, ±)	3263	65.99%	28.09%
	B. and silver mica (+, –, ±)	1582	31.99%	13.62%
	C. and silver and gold mica (+)	97	1.96%	0.83%
	D. and clay pellets (–)	1	0.02%	0.01%
	E. and FeO2 nodules (±)	1	0.02%	0.01%
	F. and FEO2 nodules and clay pellets (+)	1	0.02%	0.01%
	Total	4945	100.00%	42.56%
Total		11618	100.00%	100.00%
Sample of Assemblage		23.64%		

[a] Organics present (+), not present (–), indeterminate (±).

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Table 6.13. Variation in the fabric characteristics of ceramic form classes

Form Group, Class and Descriptive Name	Fabric Group		
	Quartzitic	Gneisseous	Mixed
Bowls			
01. Spherical	•	•	•
02. Hemispherical	•	•	•
03. Handled bowl	•	•	•
05. Ellipsoidal Bowl	•	•	•
06. Pyriform	•	•	•
07. Bi-conical bowl A and B	•	•	•
Jars			
08. Spherical Jar	•	•	•
09. Ellipsoidal Jar	•	•	•
10. Ovoid Jar	•	•	•
Indeterminate Jars	•	•	•
Other Containers			
04. Cup	•	•	•
Pinch-pots	•	•	•
Indeterminate Vessels	•	•	•
Sculpture			
01.Figurines	•		•
02.Mask	•		•
Other Terracotta Objects			
01.Other Figures (star-shaped)	•	•	
02.Terracotta disks	•	•	•
03.Terracotta coils	•	•	•

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Table 6.14. Final classification of the Ndondondwane ceramic series

Class 1. Unrestricted bowls (Figure 6.18)

Type A. Spherical	1. small vessels, undecorated, ZIC, ZIP, burnished (buff, black, or red)
	2. medium size vessels, undecorated
	3. large vessels, undecorated
Type B. Hemispherical	1. small, vessels, undecorated, ZIC, ZIP, burnished (buff, black or red)
	2. medium size vessels, undecorated
	3. large vessels, undecorated
Type C. Handled	1. small, handled bowl, ZIP

Class 2. Ellipsoidal bowls (Figure 6.19)

Type A. Wide-mouthed	1. small vessels, undecorated
	2. medium sized vessels, undecorated
	3. large vessels, undecorated
Type B. Narrow-mouthed	1. small vessels, undecorated, ZIC, ZIP, burnished (buff, black, or red)
	2. medium size vessels, undecorated, ZIC, ZIP, burnished (buff, black, or red)
	3. large vessels, undecorated, burnished (buff)

Class 3. Pyriform bowls (Figure 6.19)

Type A	1. small vessels, undecorated
	2. medium sized vessels, undecorated

Class 4. Bi-conical bowls ("Msuluzi bowls") (Figure 6.20)

Type A. Symmetrical	1. small vessels (I), burnished (buff, black, or red)
	2. medium sized vessels (II), undecorated, burnished (black or red)
Type B. Asymmetrical	1. small vessels (I), burnished (buff, black, or red)
	2. medium sized vessels (II), undecorated, ZIC, ZIP, burnished (buff)
(Indeterminate)	medium sized vessels (II-III), undecorated, burnished (black)

Class 5. Spherical jars (Figure 6.21)

Type A	1. small jars (I), undecorated, ZIC, ZIP, burnished (buff, black, or red)
	2. medium sized jars (II-III), undecorated, ZIC, burnished (buff)
	3. large jars (IV), ZIC

Class 6. Ellipsoidal jars (Figure 6.21)

Type A	1. small jars (I), undecorated
	2. medium sized jars (II-III), undecorated, ZIC
	3. large jars (V), undecorated, ZIC

Class 7. Ovoid jars (Figure 6.21)

Type A	1. small jars (I), undecorated, ZIC, burnished (red)
	2. medium sized jars (III), undecorated ($A.2_i$) or with modeled and applied zoomorphic decoration ($A.2_{ii}$)

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Table 6.14 (Continued).

Class 8. Cups (Figure 6.6)	
Type A	small, conical, lug-handled cup , burnished (buff)
Type B	1. small pinch-pots , undecorated
	2. small pinch-pots, ZIP
Class 9. Figurines (Figure 6.9)	
Type A. Female	1. small steatopygic (Figure 6.9, 1)
	2. large steatopygic (Figure 6.9, 2)
	3. impressed (Figure 6.9, 3)
Type B. Anthropomorphic "Heads"	1. dolichocephalic (Figure 6.9, 4)
	2. rounded (Figure 6.9, 5)
Type C. Zoomorphic	bovid-like (Figure 6.9, 6)
Class 10. Terracotta Heads (Figure 6.10-12)	
Type A	medium sized (26 to 35 cm rim diameter, Size III)
Type B	large (44 cm diameter, size IV)
Class 11. Other Terracotta Objects (Figure 6.13)	
Type A	star-shaped figure (6.13, 1)
Type B	coils (6.13, 2)
Type C	disks (modified body sherds) (6.13, 3)
Type D	cylindrical coils with impressed ends (6.13, 4)
Type E	earthworm fecal casts (6.13, 5)
Type F	*Sorghum* sp. stalk casts (6.13, 6)

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Table 6.15. Frequency of ceramic vessel classes by activity area

		Central Zone					Peripheral Zone					Total
Class	Data	Dung	Mound	Transect 1	Transect 2	Total	Midden 1	Midden 2	Midden 3	CP	Total	
Class 1	Total N_e	26.7	1.3			28.0	5.8	2.3	170.4		178.5	206.5
	% of Class	12.9%	0.6%			13.6%	2.8%	1.1%	82.5%		86.4%	100.0%
	% of Area/Zone	4.3%	0.2%			2.2%	8.1%	11.1%	22.9%		21.1%	9.9%
Class 2	Total N_e	6.2	111.4	0.7		118.2	0.1	1.2	30.5		31.9	150.1
	% of Class	5.4%	73.2%	0.4%		78.8%	0.1%	0.8%	20.1%		21.0%	100.0%
	% of Area/Zone	1.1%	19.4%	1.4%		10.7%	0.2%	5.9%	4.1%		3.8%	13.6%
Class 3	Total N_e		2.0			2.0						2.0
	% of Class		100.0%			100.0%						100.0%
	% of Area/Zone		0.3%			0.3%						0.3%
Class 4	Total N_e	43.3	35.6	12.5	2.7	94.1	4.1	2.6	121.0		127.7	221.8
	% of Class	19.5%	16.1%	5.6%	1.2%	42.4%	1.9%	1.2%	54.6%		57.6%	100.0%
	% of Area/Zone	7.4%	7.7%	28.3%	26.7%	8.5%	5.9%	12.8%	16.5%		15.4%	11.5%
Class 5	Total N_e	6.3	4.3	0.7		11.2	11.1	2.1	1.9		15.1	26.4
	% of Class	23.8%	16.1%	2.6%		42.5%	42.0%	8.1%	7.4%		57.5%	100.0%
	% of Area/Zone	1.1%	0.9%	1.5%		1.0%	15.9%	10.6%	0.3%		1.8%	1.4%
Class 6	Total N_e	0.7	1.1	0.1		1.9			6.5		6.5	8.4
	% of Class	8.2%	13.1%	1.2%		22.5%			77.5%		77.5%	100.0%
	% of Area/Zone	0.1%	0.2%	0.2%		0.2%			0.9%		0.8%	0.4%
Class 7	Total N_e	1.8	23.2	0.8		25.8	0.5		1.0		1.5	27.2
	% of Class	6.4%	85.4%	2.8%		94.7%	1.7%		3.7%		5.3%	100.0%
	% of Area/Zone	0.3%	5.0%	1.7%		2.3%	0.7%		0.1%		0.2%	1.4%

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Table 6.15 (continued)

Class	Data	Central Zone: Dung	Central Zone: Mound	Central Zone: Transect 1	Central Zone: Transect 2	Total	Peripheral Zone: Midden 1	Peripheral Zone: Midden 2	Peripheral Zone: Midden 3	Peripheral Zone: CP	Total	Total
Jar (Ind.)	Total N_e	499.2	283.7	29.6	7.4	819.9	47.9	11.9	401.5	6.2	467.4	1,287.3
	% of Class	38.8%	22.0%	2.3%	0.6%	63.7%	3.7%	0.9%	31.2%	0.5%	36.3%	100.0%
	% of Area/Zone	85.0%	61.3%	66.8%	73.3%	74.3%	69.0%	59.1%	54.8%	100.0%	56.4%	66.6%
Class 8	Total N_e	0.9	2.1			3.0			0.2		0.2	3.2
	% of Class	27.6%	66.2%			93.7%			6.3%		6.3%	100.0%
	% of Area/Zone	0.1%	0.5%			0.3%			0.0%		0.0%	0.2%
Total N_e		586.9	462.8	44.3	10.1	1,104.1	69.4	20.1	733.1	6.2	828.8	1,932.9
Total % of Area/Zone		30.4%	23.9%	2.3%	0.5%	57.1%	3.6%	1.0%	37.9%	0.3%	42.9%	100.0%
Total % of Area/Zone		100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%

Abbreviations: CP = Charcoal Preparation Area.

Table 6.16. Frequency of ceramic sculpture, figurines, and other objects by activity area

			Sculpture and Figurines			Other Objects			
Area	Horizon	Data	Heads	Fem Figs	Zoo figs	Disks	Star figure	Coils	Ecofacts
Dung	4	N_s	60			1			
		N_e				1.0			
		% in Horizon				1.55%			
		% Type				1.41%			
	3	N_s							
		N_e							
		% in Horizon							
		% Type							
	2	N_s	1	1		49	1	5	61
		N_e		1.0		49.0	1.0	5.0	61.0
		% in Horizon		0.30%		14.65%	0.30%	1.50%	18.24%
		% Type		50.00%		69.01%	100.00%	100.00%	41.78%
	1	N_s	1			1			18
		N_e				1.0			18.0
		% in Horizon				0.31%			5.58%
		% Type				1.41%			12.33%
N_s			62	1		51	1	5	79
N_e				1.0		51.0	1.0	5.0	79.0
% Type in Area				0.13%		6.87%	0.13%	0.67%	10.64%
Total % Type				50.00%		71.83%	100.00%	100.00%	54.11%
Mound	4	N_s	154	1		4			
		N_e		1.0		4.0			
		% in Horizon		0.48%		1.92%			
		% Type		50.00%		5.63%			
	3	N_s				1			
		N_e				1.0			
		% in Horizon				44.66%			
		% Type				1.41%			
	2	N_s	40			2			
		N_e	4.0			2.0			
		% in Horizon	4.18%			2.09%			
		% Type	100.00%			2.82%			
	1	N_s	7			3			
		N_e				3.0			
		% in Horizon				2.07%			
		% Type				4.23%			
N_s			201	1		10			
N_e			4.0	1.0		10.0			
% Type in Area			0.89%	0.22%		2.22%			
Total % Type			100.00%	50.00%		14.08%			

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Table 6.16 (continued)

Area	Horizon	Data	Sculpture and Figurines Heads	Fem Figs	Zoo figs	Other Objects Disks	Star figure	Coils	Ecofacts
T 1	3	N_s			1				
		N_e			1.0				
		% in Horizon			100.00%				
		% Type			100.00%				
Central N_s			263	2	1	61	1	5	79
Central N_e			4	2	1	61	1	5	79
% Type in Zone			99.6%	100.0%	100.0%	85.9%	100.0%	100.0%	54.1%
M 1	1-4	N_s				1			1
		N_e				1.0			1.0
		% in Horizon				2.96%			2.96%
		% Type				1.41%			0.68%
M 2	1-4	N_s							
		N_e							
		% in Horizon							
		% Type							
M 3	1-4	N_s	1			9			65
		N_e				9.0			65.0
		% in Horizon				1.11%			8.00%
		% Type				12.68%			44.52%
Peripheral N_s			1	0	0	10	0	0	66
Peripheral N_e			0	0	0	10	0	0	66
% Type in Zone			0.4%	0.0%	0.0%	14.1%	0.0%	0.0%	45.2%
Total N_s			264	2	1	71	1	5	146
Total N_e			4.0	2.0	1.0	71.0	1.0	5.0	146.0
% of Type in Assemblage			0.19%	0.09%	0.05%	3.35%	0.05%	0.24%	6.89%
Total % of Type			100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%

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Table 6.17. Ceramic use life data for different functional types from major ethnographic censuses

Region/Country	West Africa		Philippines		Peru	Mexico		
Society	Fulani[a]	Dogon[b]	Kalinga[c]		Shipibo/Conibo[d]		Maya	
Community			Dangtalan	Dalupa		Tzintzuntzan[e]	Tzeltal[f]	Tarahumara[g]
Use Category[h]								
Cooking								
General	2.5	2.8			0.88	(0.5)	0.94 (0.9)	(1.5)
Large			(12.3)	(9.0)	1.38	(40.5)		
Medium/Small	2.7		(3.4)	(4.5)	1.1	(0.7)		
Storage/Cooking	10.2							
Storage	12.5	3.8 (5.8)	(~30)			(6.3)		(4.0)
Serving	2.7				(0.42)	(3.8)	1.3 (1.4)	
Storage/Transport			(7.0)	(7.2)	0.8	(4.0)	1.7	

a David and Hening (1972: table 3).
b Bedaux (1986: table 4, 1987: 144-145, tables 1A and 1B).
c Longacre (1985: table 13.1, 1982: 63-64); Neupert and Longacre (1994); Tani and Longacre (1999: table 1 and 2).
d DeBoer and Lathrap (1979: tables 4.2-4.5); Deboer (1985: table 14.1).
e Foster (1960)
f Deal (1983: table 2, Appendix B).
g Pastron (1974:108-109).
h Numbers without brackets refer to median use life, those in brackets are mean use life. Both are given in years.

Table 6.18. Application of the modified regression formula to use life and height data for Dogon cooking and storage containers (from Bedaux 1986: table 5; 1987:144-145, tables 1A and 1B)

	Height (cm)	Use Life (yrs.)
Cooking Vessels		
Lajiru dei	15.50	2.00
Joni	14.50	2.20
Ninge dei	21.50	2.80
Pana dei	31.20	3.70
Dei juno	19.70	4.50
Mean		3.04
Median		2.80
Regression formula result[a]		3.09
Deviation[b] from mean		+ 0.05
Deviation from median		+ 0.29
Storage Vessels		
Tegere	9.80	3.50
Dei sire	17.80	7.50
Dei no	20.10	6.50
Dei dam	22.50	2.80
Dei pogo	23.70	3.00
Ibonu ogono	29.00	4.00
Ogono neu	38.00	9.90
Ogono seme	46.80	9.70
Mean		5.86
Median		5.25
Regression formula result		5.25
Deviation from mean		- 0.61
Deviation from median		0.00
Combined Data		
Mean		4.78
Median		3.70
Regression formula result		2.96
Deviation from mean		-1.82
Deviation from median		-0.74

[a] $y = \frac{m+b}{x}$ where *m* is slope, *b* is the intercept and *x* is the number of types in a use category.

[b] The deviations are all less than two years: 0.05 yrs = <1 month, 0.21 yrs = ~ 3 months; 0.61 yrs = ~7 months; 1.82 yrs = 1 year and ~10 months; 0.74 yrs = ~ 9 months.

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Table 6.19. Attributes utilized in the identification of the Ndondondwane ceramic use categories

Use Category	Size[a]	Form[b]	Burning			Food Residues[d]	Abrasions	Decoration	Type Identified to Use Category
			Burned[c]	Sooted	Sooting/Vitrified				
1. Cooking	+	+	+	±	±	+	+	-	Class 1.A-C; Class 2.B; Class 4.A; Class 5.A.1-2; Class 6.A.2-3; Class 7.A.1
2. Serving/ Eating	+	+	–	–	–	±	+	+	Class 1.A.1; Class 2.A-B.1; Class 4.A.1-2; Class 4.B.1; Medium Jar (Ind.); Class 8.A?
3. Serving	+	+	–	–	–	±	+	+	Class 1.A-B; Class 2.B.1-2; Class 3; Class 4.A.1-3, 4.B.1; Class 5.A.1; Class 6.A.1-2; Class 7?
4. Serving/ Storage	+	+	–	–	–	±	±	+	Class 2.B.2-3; Class 5.A.3; Class 7.A.2?
5. Storage/Transport	+	+	–	–	–	–	–	+	Class 5.A.1-2; Class 6.A.3; Medium Jar (Ind.)
6. Storage	+	+	–	–	–	–	–	+	Class 2.B.2-3; Class 6.A-B; Large Jar (Ind.)
7. Tool	+	+	–	–	–	–	±	+	"Notched" bowl
8. Sculpture	–	+	–	–	–	–	–	+	Classes 9 and 10
9. Toy	+	+	–	–	–	±	–	+	Class 8.B

[a] Attributes states were coded as required/present (+), not required/absent (-), or variable (±), and, as shown in this table, different combinations of attributes states were used to infer use categories.

[b] Form attributes examined include general form, height, wall thickness, and fabric composition, which were used to infer mechanical stress properties, stability, accessibility of contents, and transportability.

[c] Burned category includes burn markings on the surface and vitrified patches or sections of the exterior surface. Burn marks from repeated use over fires cover large sections of pots. These were distinguished from fire clouding, which are small and/or isolated patches of burned surface (not vitrified). Some pots have both kinds of markings (e.g, Figure 6.24, 2).

[d] Food residues were identified as a visible sheen on the shoulder or lower body of sherds and through an analysis of fatty acids (Malainey n.d.). The fatty acid (lipid) analysis confirmed that visible residues might result from cooking (coincident with other traces of cooking) or from other uses such as storage of wet contents.

Table 6.20. Use life data for the Ndondondwane ceramic use categories

Use Category	Analyzed Specimens (N_s)[a]	Analytical Sample (N_e)[b]	Mean Height[c]	R^2	Use Life (yrs.)	Closest Ethnographic Comparison
Cooking						
All	194	150	29.19	0.94	1.7	Tarahumara (1.5)
Small	74	72	20.06	0.71	1.9	Shipibo/Conibo (1.1)
Medium	120	78	37.96	0.87	4.6	Dalupa (4.5)
Serving/ Eating	9	85	19.34	0.97	11.1	Fulani, storage/cooking (10.2) and Dangtalan large cooking (12.3).
Serving	425	1,056	20.11	0.92	0.4	Shipibo/Conibo (0.42)
Serving/Storage	6	26	27.36	0.84	2.2	None
Storage	109	39	53.79	0.63	7.6	Tzintzuntzan (6.3)
Storage/Transport	282	517	36.75	0.96	2.1	Tzeltal (1.7)

[a] This refers to the reference collection of sherds diagnostic of morphological types that exhibited could be identified to a use category. These specimens were used as a standard to evaluate other sherd material in the collection. These are counted as "number of observations" in Figure 6.23.

[b] Number of rim-EVES represented in the assemblage that had attributes which allowed them to be positively identified to a use category.

[c] Vessel height was determined by both direct measurement of vessels with complete profiles and estimated from scale illustrations.

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Table 6.21. Spatial and temporal distribution of ceramic use categories

Activity Area	Horizon	Data	Cooking	Serving/ Eating	Serving	Serving/ Storage	Storage	Storage/ Transport	Tool	Toy	Sculpture	Total
Dung		EVE/EOE	45	62	36	0	4	98		1		247
	1	% Class in Horizon	18.38%	25.05%	14.50%	0.18%	1.67%	39.82%		0.40%		100.00%
		% Class in Area	33.48%	73.61%	4.20%	22.36%	12.66%	21.78%		1.35%		15.07%
		EVE/EOE	28	2	92		3	51		55	1	232
	2	% Class in Horizon	12.25%	0.67%	39.47%		1.42%	22.06%		23.69%	0.43%	100.00%
		% Class in Area	20.96%	1.86%	10.72%		10.12%	11.33%		74.42%	16.67%	14.15%
		EVE/EOE	1		6		2	2				11
	3	% Class in Horizon	11.14%		51.32%		22.71%	14.83%				100.00%
		% Class in Area	0.89%		0.65%		7.53%	0.35%				0.66%
		EVE/EOE	7		11		1	2			1	22
	1-4	% Class in Horizon	31.13%		49.28%		3.93%	11.06%			4.61%	100.00%
		% Class in Area	4.97%		1.25%		2.62%	0.53%			16.67%	1.32%
Total EVE/EOE			82	64	144	0	11	154		56	2	512
Total % of Class in Area			15.99%	12.41%	28.07%	0.09%	2.10%	30.02%		10.94%	0.39%	100.00%
Total % of Class in All Areas			60.30%	75.47%	16.82%	22.36%	32.92%	33.99%		75.78%	33.33%	31.19%
Mound		EVE/EOE			48		3	65		3		119
	1	% Class in Horizon			40.45%		2.59%	54.43%		2.52%		100.00%
		% Class in Area			5.63%		9.47%	14.32%		4.06%		7.25%
		EVE/EOE	1		22	1	1	32	0	3	4	64
	2	% Class in Horizon	1.17%		34.89%	1.87%	1.51%	50.12%	0.32%	3.89%	6.23%	100.00%
		% Class in Area	0.55%		2.62%	60.23%	2.97%	7.11%	100.00%	3.38%	66.67%	3.91%
		EVE/EOE				0		1		1		2
	3	% Class in Horizon				7.58%		40.85%		51.56%		100.00%
		% Class in Area				7.38%		0.18%		1.35%		0.12%

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Table 6.21 (Continued)

Activity Area	Horizon	Data	Cooking	Serving/ Eating	Serving	Serving/ Storage	Storage	Storage/ Transport	Tool	Toy	Sculpture	Total
Mound Area		EVE/EOE		19	7	0	2	4		1		33
(con't)	1-4	% Class in Horizon		56.56%	22.23%	0.60%	5.02%	12.00%		3.59%		100.00%
		% Class in Area		22.46%	0.87%	10.04%	5.14%	0.89%		1.62%		2.04%
Total EVE/EOE			1	19	78	2	6	102	0	8	4	218
Total % of Class in Area			0.34%	8.65%	35.67%	0.71%	2.62%	46.55%	0.10%	3.52%	1.83%	100.00%
Total % of in All Areas			0.55%	22.46%	9.12%	77.64%	17.59%	22.49%	100.00%	10.42%	66.67%	13.31%
Transect 1		EVE/EOE	6	0	3		0	3				12
	1	% Class in Horizon	49.65%	2.22%	21.11%		1.58%	25.44%				100.00%
		% Class in Area	4.40%	0.32%	0.30%		0.58%	0.68%				0.73%
		EVE/EOE	10		10		0	1				22
	2	% Class in Horizon	46.24%		47.41%		1.73%	4.61%				100.00%
		% Class in Area	7.34%		1.19%		1.14%	0.22%				1.31%
		EVE/EOE	0				0					0
	1-4	% Class in Horizon	70.59%		0.00%		29.41%					100.00%
		% Class in Area	0.18%		0.00%		0.32%					0.02%
Total EVE/EOE			16	0	13		1	4				34
Total % of Class in Area				0.79%	37.59%		1.97%	11.95%				100.00%
Total % of Class in All Areas				0.32%	1.49%		2.05%	0.90%				2.07%
Transect 2		EVE/EOE	1									1
	1	% Class in Horizon	100.00%									100.00%
		% Class in Area	1.03%									0.09%
		EVE/EOE	1					0				1
	2	% Class in Horizon	90.00%					10.00%				100.00%
		% Class in Area	0.66%					0.02%				0.06%
		EVE/EOE	0					4				4
	3	% Class in Horizon	3.71%					96.29%				100.00%
		% Class in Area	0.12%					0.90%				0.26%
Total EVE/EOE			2					4				7
Total % of Class in Area			37.05%					62.95%				100.00%
Total % of Class in All Areas			1.81%					0.92%				0.40%

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Table 6.21. (Continued)

Activity Area	Horizon	Data	Cooking	Serving/ Eating	Serving	Serving/ Storage	Storage	Storage/ Transport	Tool	Toy	Sculpture	Total
Midden 1		EVE/EOE	21	1	23		2	17		1		65
	1-4	% Class in Horizon	32.31%	1.50%	35.64%		2.88%	26.14%		1.54%		100.00%
		% Class in Area	15.47%	1.16%	2.71%		5.74%	3.76%		1.35%		3.96%
Midden 2		EVE/EOE	7		9		1	2				18
	1-4	% Class in Horizon	40.57%		46.21%		3.93%	9.28%				100.00%
		% Class in Area	5.51%		1.00%		2.22%	0.38%				1.12%
Midden 3		EVE/EOE	6	1	588		13	170		9		787
	1-4	% Class in Horizon	0.76%	0.06%	74.78%		1.63%	21.58%		1.17%		100.00%
		% Class in Area	4.43%	0.59%	68.86%		39.48%	37.56%		12.45%		47.94%
EVE/EOE			136	84	854	2	33	452	0	74	6	1641
Total % of All Classes			8.27%	5.13%	52.06%	0.12%	1.99%	27.55%	0.01%	4.50%	0.37%	100.00%
Total % of All Class in All Areas			100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%

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Table 6.22. Comparison of the frequency of objects identified to ceramic use categories at Ndondondwane to data from selected ethnographic censuses

Group	Cooking										Serving		Storage		Storage/ Transport		Other		Total	
	General		Small		Large		Storage/ Cooking		Total Cooking											
	N_e	%	N_e	%	N_e	%	N_e	%	N_e	%	N_e	%	N_e	%	N_e	%	N_e	%	N_e	%
Ndondonwane	136	8%							136	8%	940	57%	35	2%	452	27%	81	5%	1644	100%
Fulani[a]			180	69%			34	13%	214	82%			27	10%			19	7%	260	100%
Gisiga[a]			20	35%			12	21%	32	56%	8	14%	14	25%			3	5%	57	100%
Danglatan[b]			303	46%	268	41%			571	87%			52	8%			33	5%	656	100%
Dalupa[b]			255	66%	33	8%			288	74%			87	22%			14	4%	389	100%
Conibo[c]			30	25%	10	8%			40	33%	38	32%	37	31%			5	4%	120	100%
Shipibo[c]			25	15%	18	11%			43	26%	68	41%	48	29%			7	4%	166	100%
Zunil[d]	6	32%	4	21%	1	5%			11	58%	5	26%	1	5%			2	11%	19	100%
Tarahumara[e]	3	75%							3	75%			1	25%					4	100%
Huichol[f]	8	13%	15	24%	11	18%			34	55%	13	21%	2	3%			13	21%	62	100%
Metepec[g]	89	29%							89	29%	123	40%	70	23%			24	8%	306	100%
Chanal[h]	1885	57%							1885	57%	269	8%	343	10%			836	25%	3333	100%
Aguacatenango[h]	2435	57%							2435	57%	505	12%	389	9%			937	22%	4266	100%

[a] David and Hening (1972: table 3).
[b] Longacre (1985: table 13.1, 1982: 63-64).
[c] DeBoer and Lathrap (1979: tables 4.2-4.5); Deboer (1985: table 14.1).
[d] Reina and Hill (1978: 246-247).
[e] Pastron (1974:108-109).
[f] Weigand (1969: 29)
[g] Kirkpatrick (1979: 49).
[h] Deal (1983: table 1).

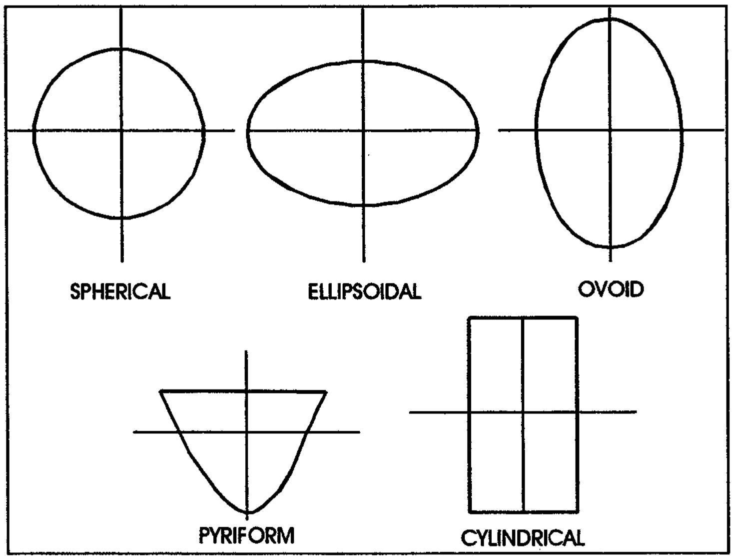

Figure 6.1. Idealized geometric body forms of the ceramic vessel series.

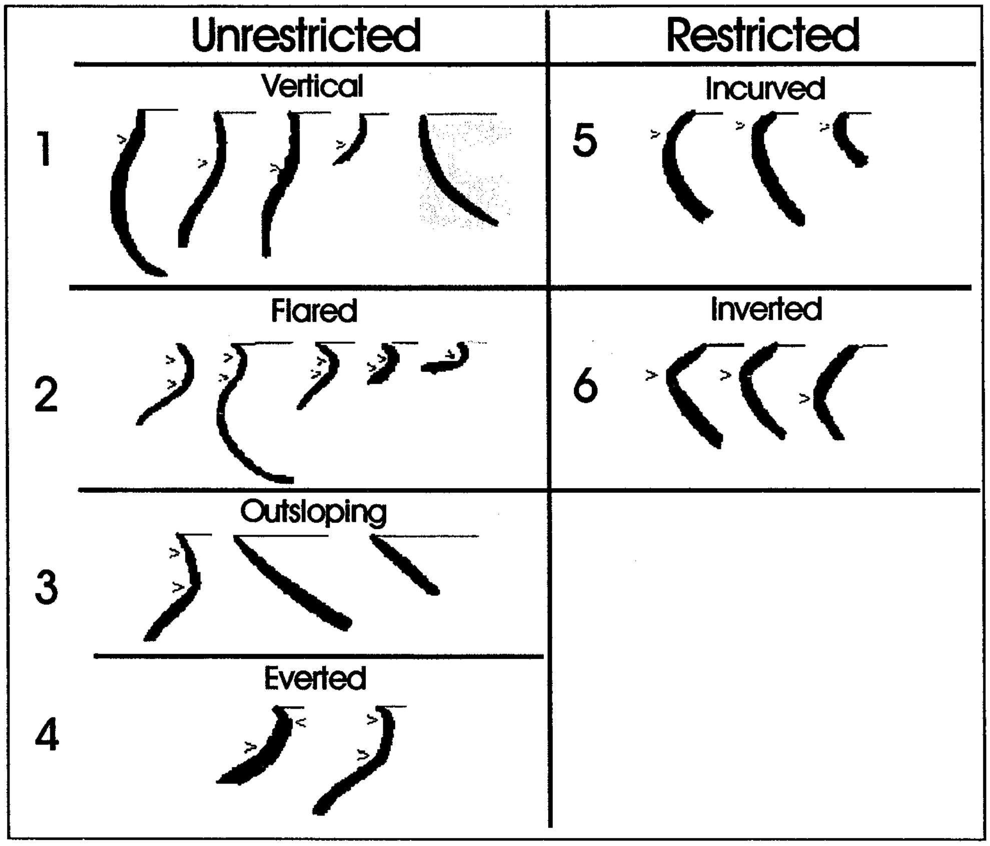

Figure 6.2. Rim types identified in the vessel series.

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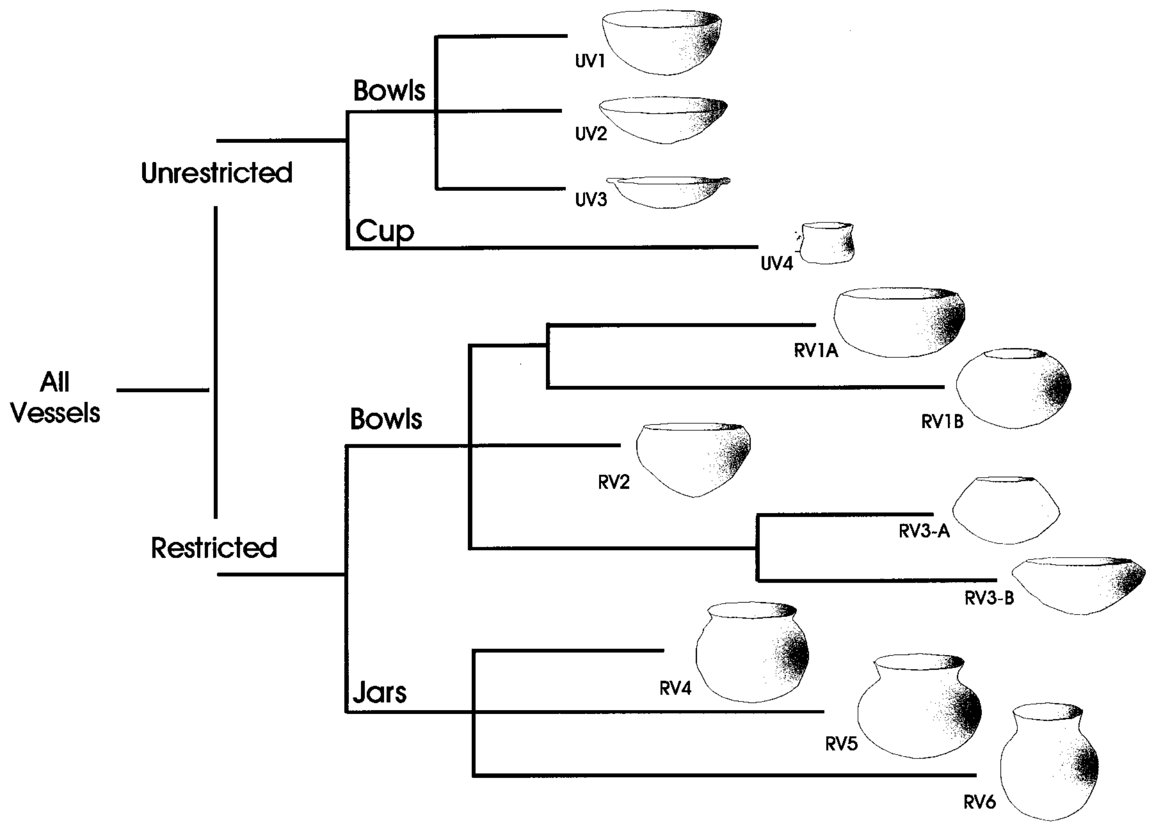

Figure 6.3. Ndondondwane vessel form series. Unrestricted vessel (UV) classes: (UV1) Spherical bowls, (UV2) Hemispherical bowls, (UV3) Handled bowl, (UV4) Cylindrical-handled cup. Restricted vessel (RV) classes: (RV1) Ellipsoidal bowls (RV1A, Wide-mouthed; RV1B, Narrow-mouthed); (RV2) Pyriform bowls, (RV3) Bi-conical bowls (RV3A, Symmetrical; RV3B, Asymmetrical), (RV4) Spherical jars, (RV5) Ellipsoidal jars, (RV6) Ovoid jars.

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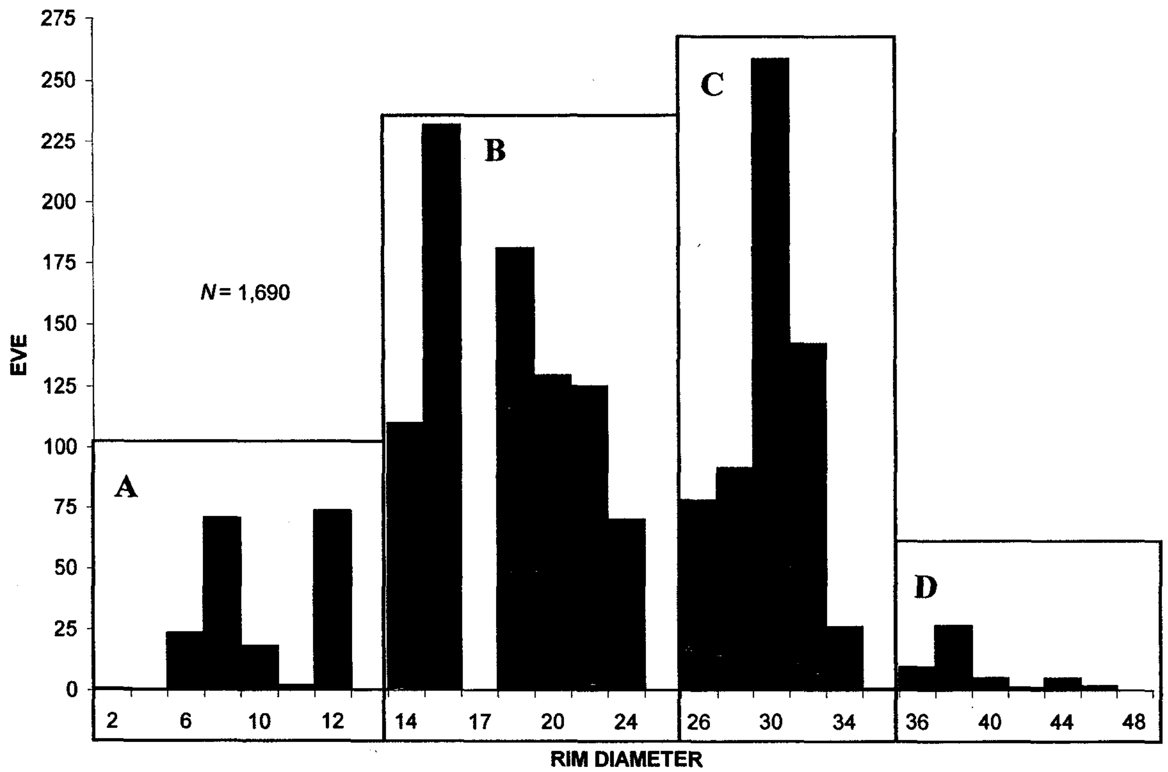

Figure 6.4. Vessel size categories determined from rim diameter measurements (given in cm).

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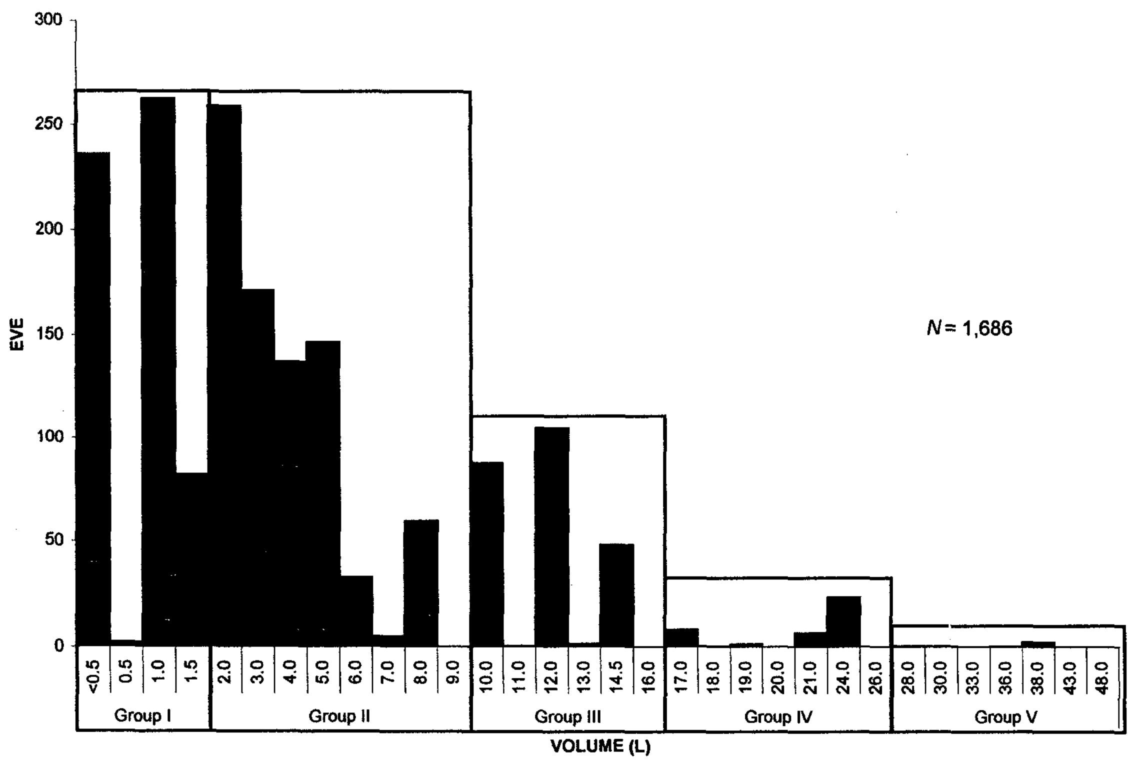

Figure 6.5. Vessel size categories determined from volume calculations (given in liters).

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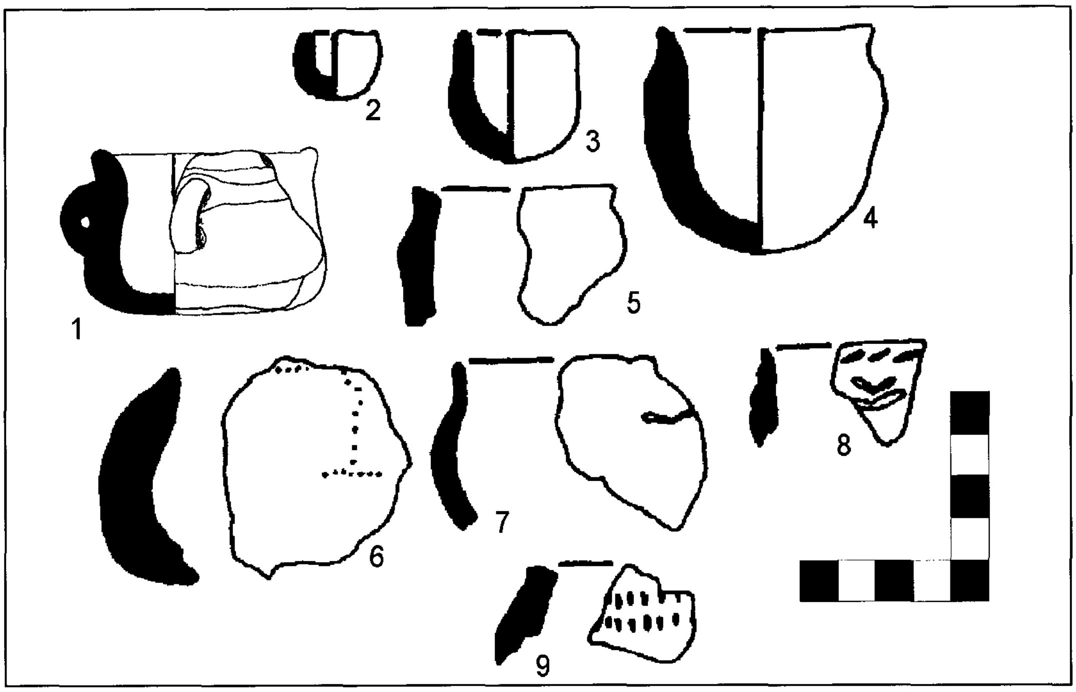

Figure 6.6. (1) Handled cup (Form UV4). (2–9) Plain and decorated pinch pots (after Loubser 1993: fig.37). Scale in centimeters.

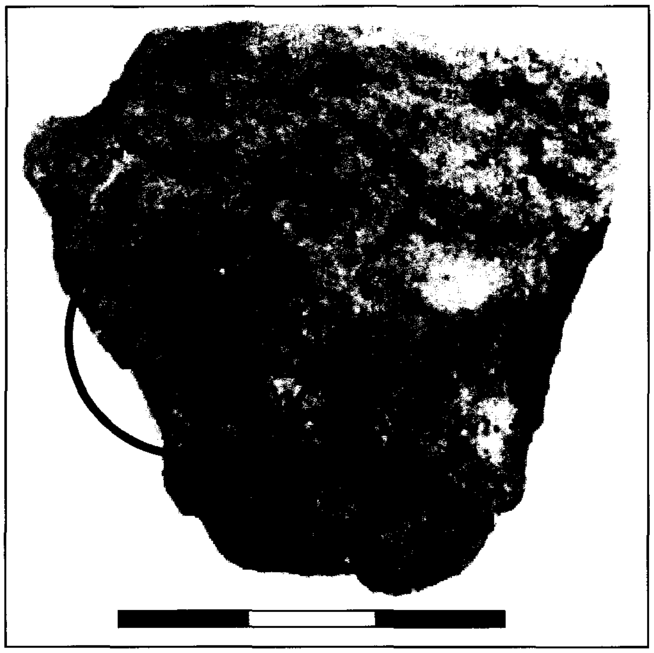

Figure 6.7. Ceramic pinch-pot with a partial fingerprint on the exterior. Scale in centimeters.

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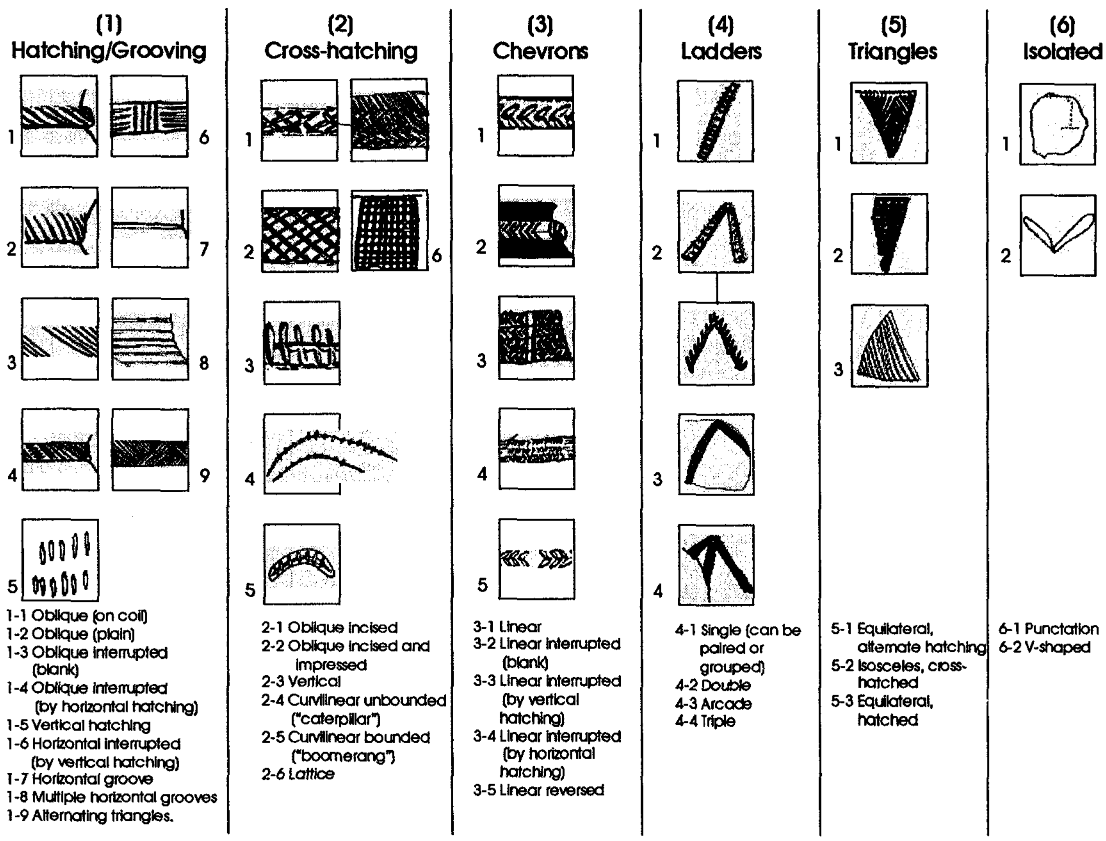

Figure 6.8. Ndondondwane motif classification.

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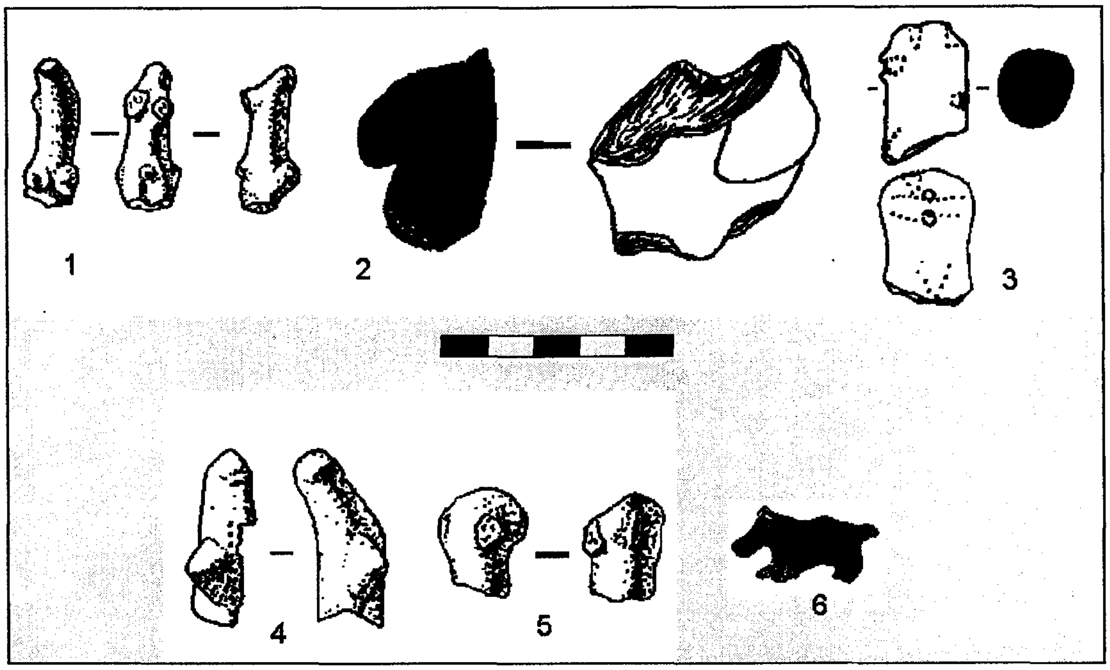

Figure 6.9. Figurines. (1–3) Female figurines. (4–5) Figurine "heads." (6) Cattle-like figurine. Scale in centimeters (illustrations 1 and 3-5 after Loubser 1993: fig.36).

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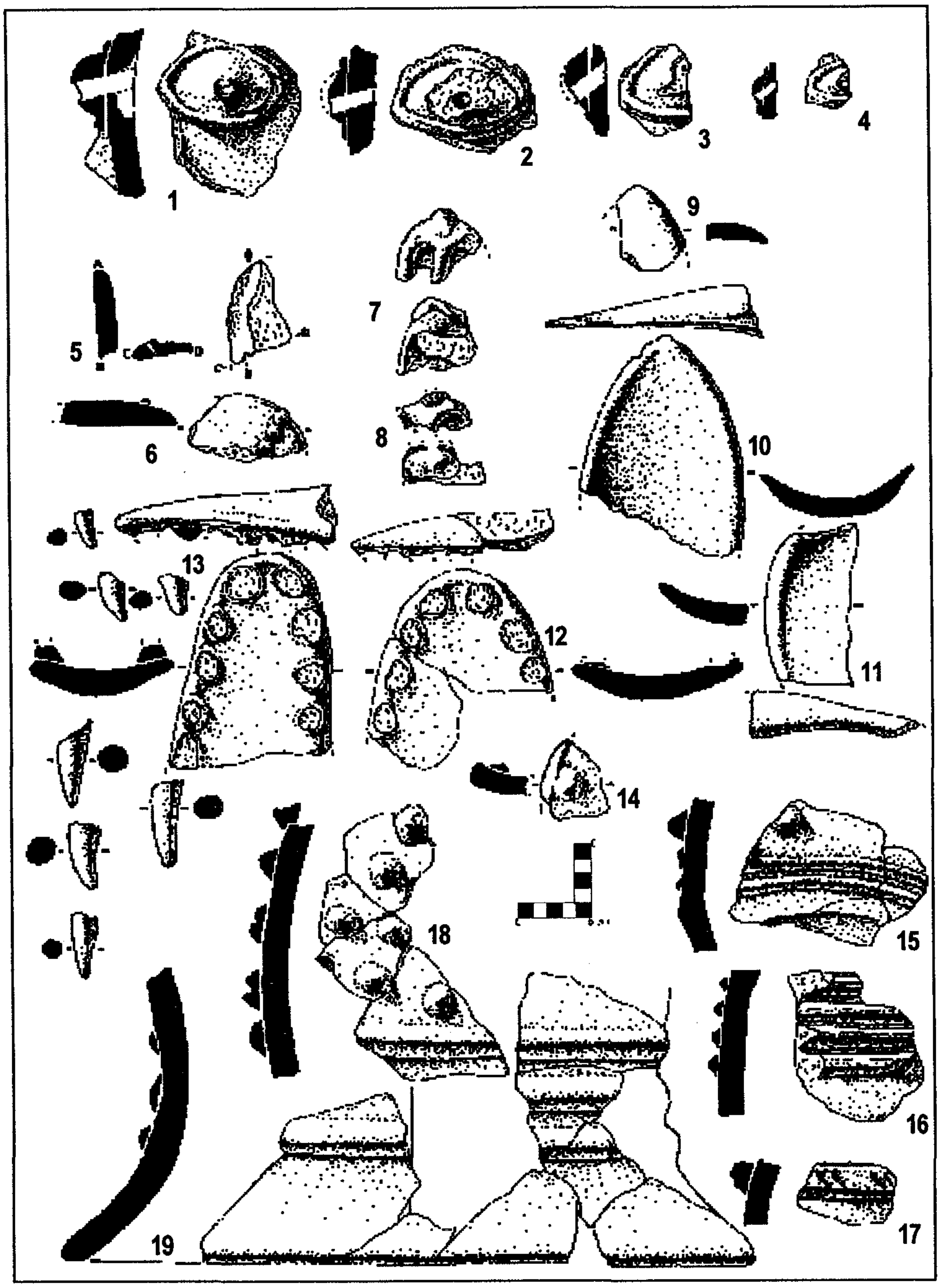

Figure 6.10. Terracotta head fragments. (1–4) Pierced eyes. (5–8) Nose fragments. (9–13) Crocodile-like snout fragments and teeth. (14–18) Body sherds with coil and conical appliqué. (19) Neck and rim sherds of inverted Class 4 (spherical) jar. (after Loubser 1993: fig.). Scale in centimeters.

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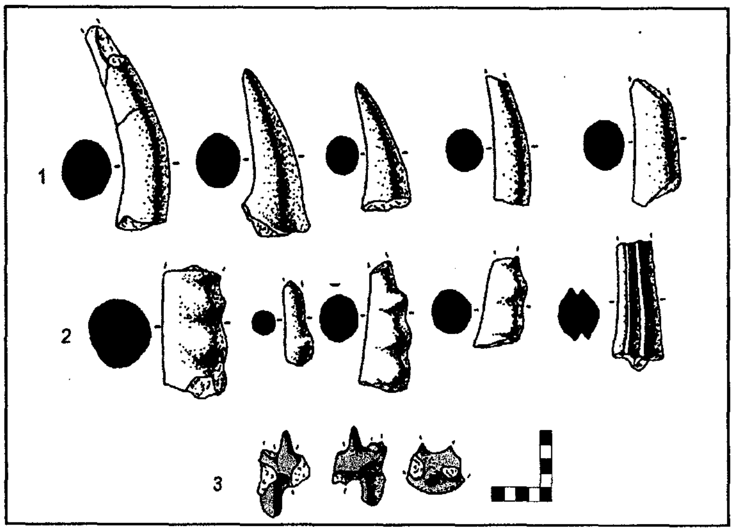

Figure 6.11. Terracotta head fragments (continued). (1) Cattle–like horns. (2) Antelope–like horns. (3) Red–burnished "crown" (after Loubser 1993: fig. 34). Scale in centimeters.

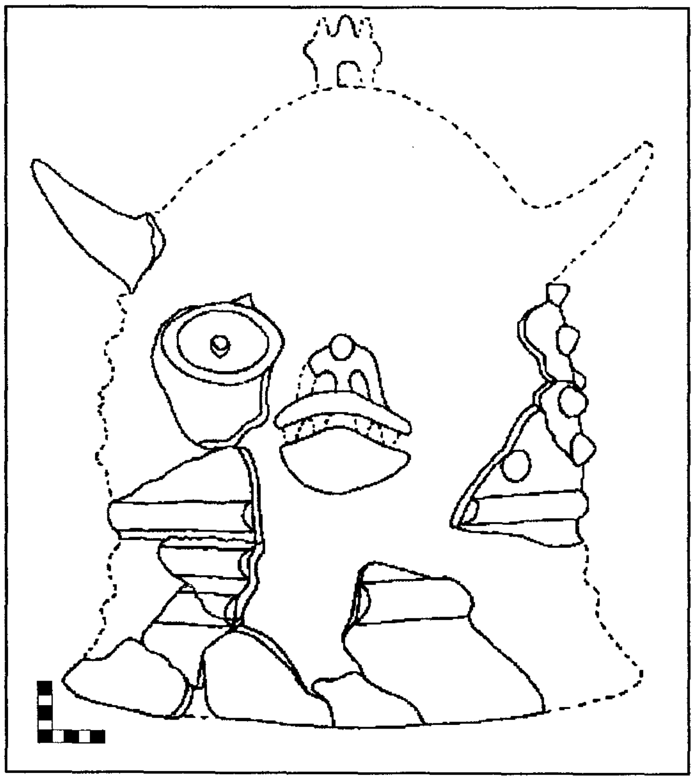

Figure 6.12. Reconstruction of the largest Ndondondwane terracotta head (44 cm rim diameter). After Loubser 1993: fig. 35. Scale in centimeters.

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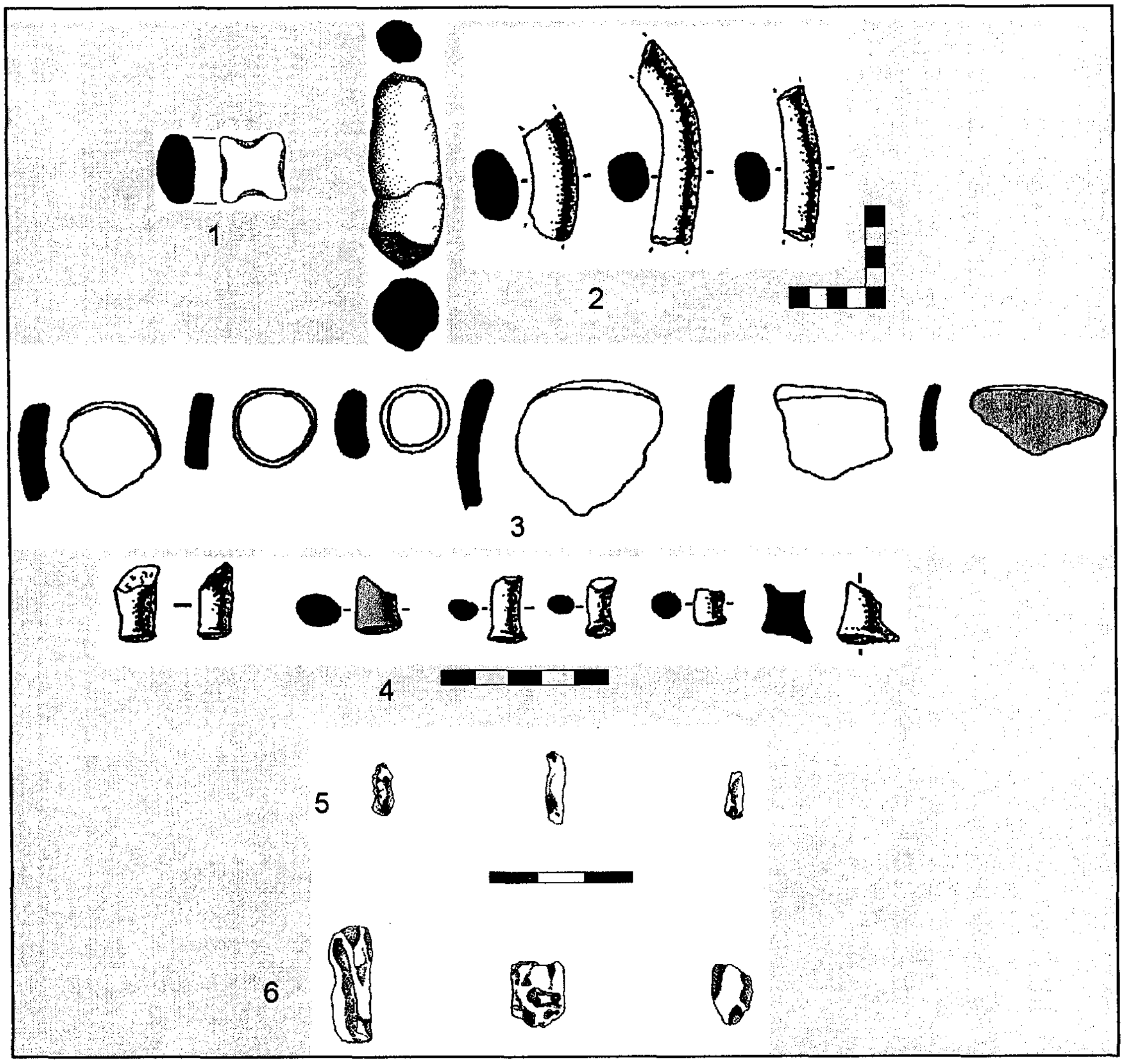

Figure 6.13. Other ceramic objects identified in the Ndondondwane ceramic assemblage. (1) Star-shaped figure. (2) Clay coils (after Loubser 1993: fig. 37). (3) Clay disks (modified after Loubser 1993: fig. 37). (4) Cylindrical coils with impressed ends (after Loubser 1993: fig.36). (5) Earthworm fecal casts. (6) *Sorghum* sp. plant stalk casts. Shading indicates red burnish. Scale in centimeters.

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Figure 6.14. Impression in vessel base that conforms to the size and morphology of mature carbonized millet seeds found at Ndondondwane. Scale in centimeters.

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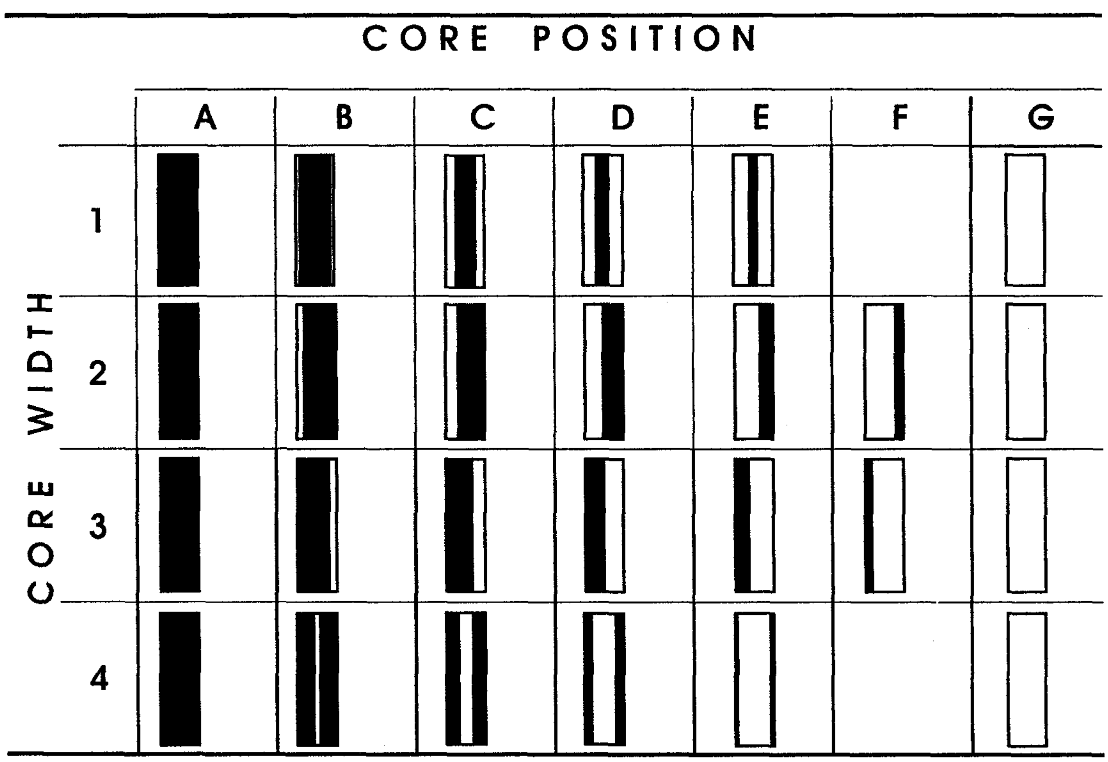

Figure 6.15. Core pattern visual estimation chart: stylized cross sections compare variations in the position and width core effects. Dark shading indicates a black/gray *or* reddish core effect. Left of box is exterior sherd surface, right is interior sherd surface.

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Group	Core Pattern Classification				Description
1	A				Complete reduction, no core effect, organics may or may not be originally present.
2	G				Complete oxidization, no core effect, organics may or may not be originally present.
3	1B	1C	1D	1E	A. Black core: incomplete oxidization, sharp core margins, organics likely present. Oxidized subsurface layer results from rapid cooling after firing. B. Reddish core: complete oxidization, sharp and diffuse core margins, organics originally present.
4	4E	4D	4C	4B	A. Parallel black layers: completely oxidized then submitted to reducing or neutral atmosphere (cf. Rye 1981:Fig. 104, 11). B. Parallel reddish layers: complete oxidization, diffuse core margin, no organics. Only in fine clays, the "reverse core effect" (Rye 1981:115-116).
5	2E-F	2D	2C		A. Black core: reducing/oxidizing atmosphere, sharp core margin, organics present. B. Reddish core: oxidized, sharp core margin, organics possibly present, ferric iron oxidizing.[a]
6	3E-F	3D	3C		A. Black core: complete oxidization, sharp core margin, no organics present. B. Reddish core: oxidized, sharp margin, organics possibly present, ferric iron oxidizing.
7	2B	3B			Complete reduction, sharp core margins, organics may or may not be present. Effect in 2B result of exterior oxidized by rapid cooling because interior was less or not accessible to air. Opposite effect seen in 3B.

Figure 6.16. Stylized cross sections comparing variations in the appearance of core patterns in the Ndondondwane assemblage. Dark shading indicates black/gray or reddish colored core effect. Top of box is outer sherd surface, bottom is the inner sherd surface. Inferences of firing conditions (atmosphere) and presence/absence of organic material follow Rye (1981: 114-116).

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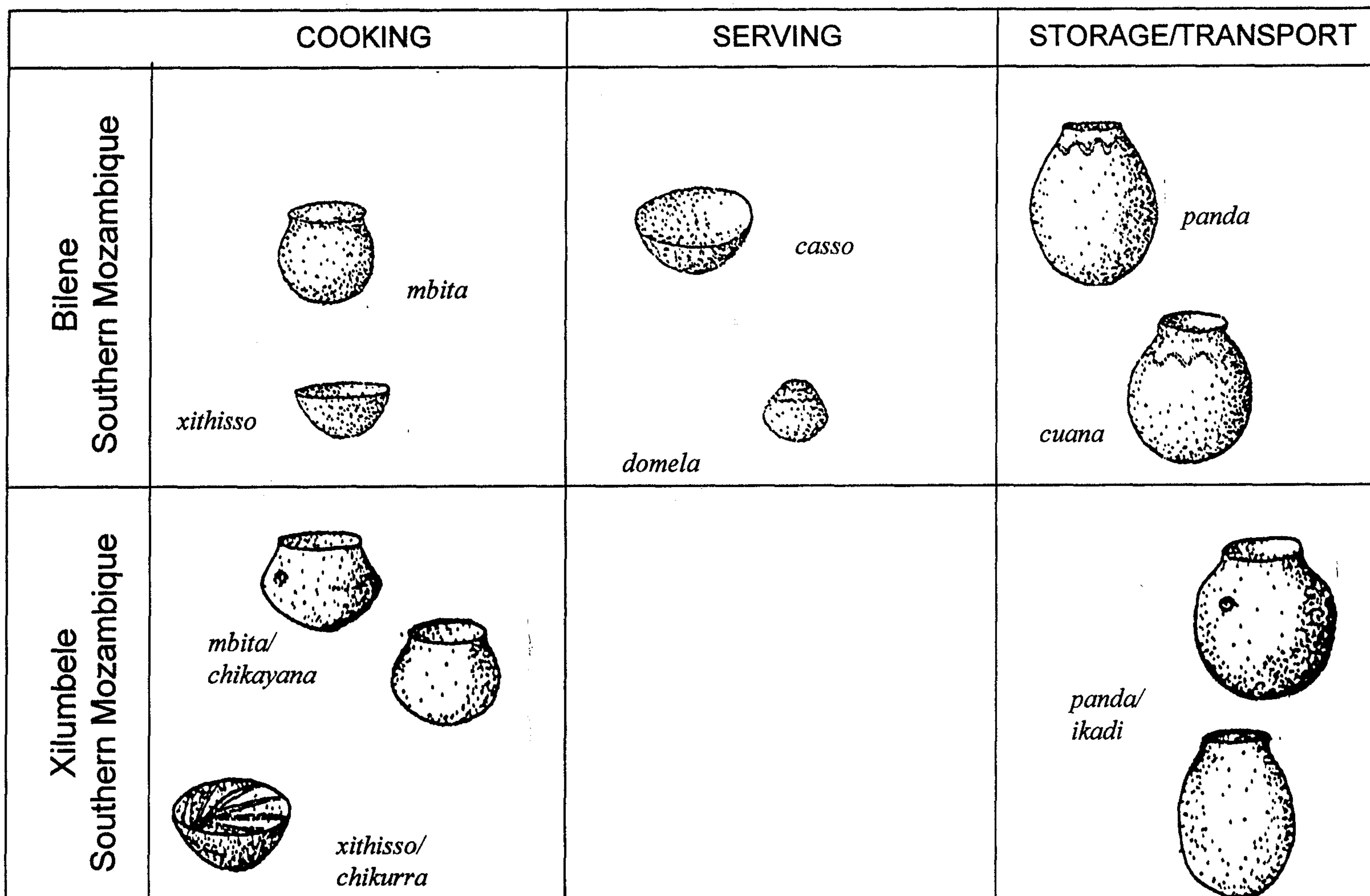

Figure 6.17.

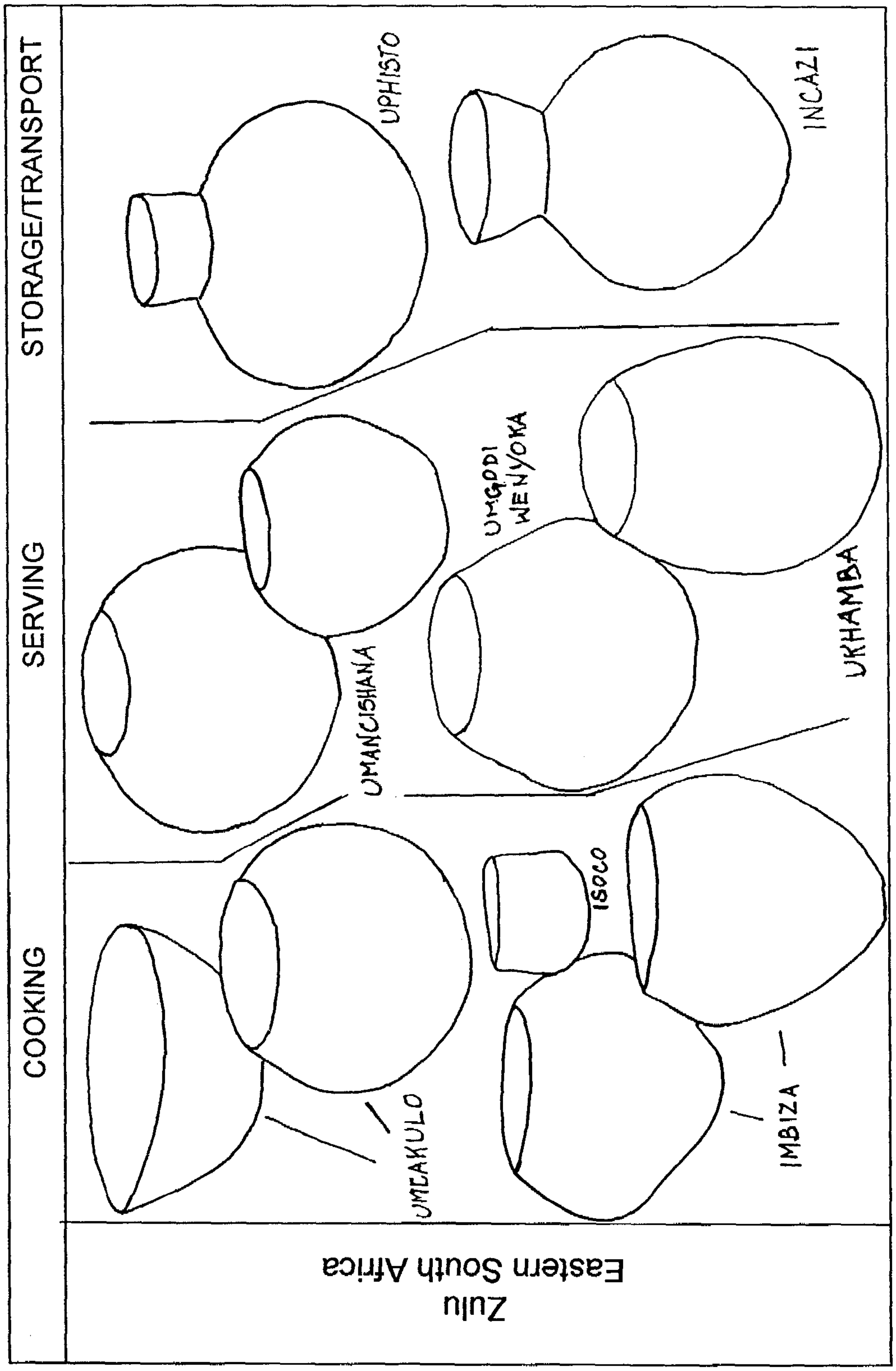

Figure 6.17. Traditional ceramic use categories from the eastern lowlands of southern Africa.

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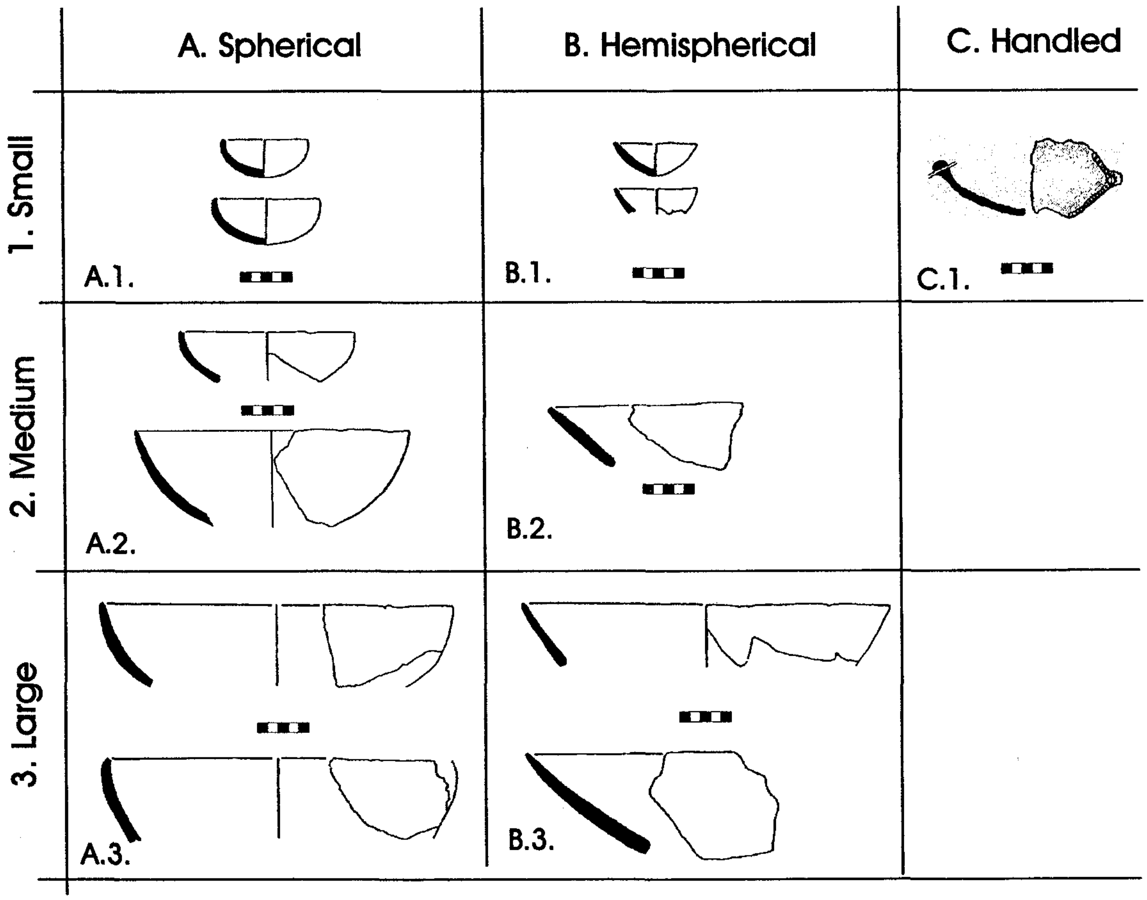

Figure 6.18. Class 1, Unrestricted bowls (Types A and B modified after Loubser 1993: fig. 24). Scale in centimeters.

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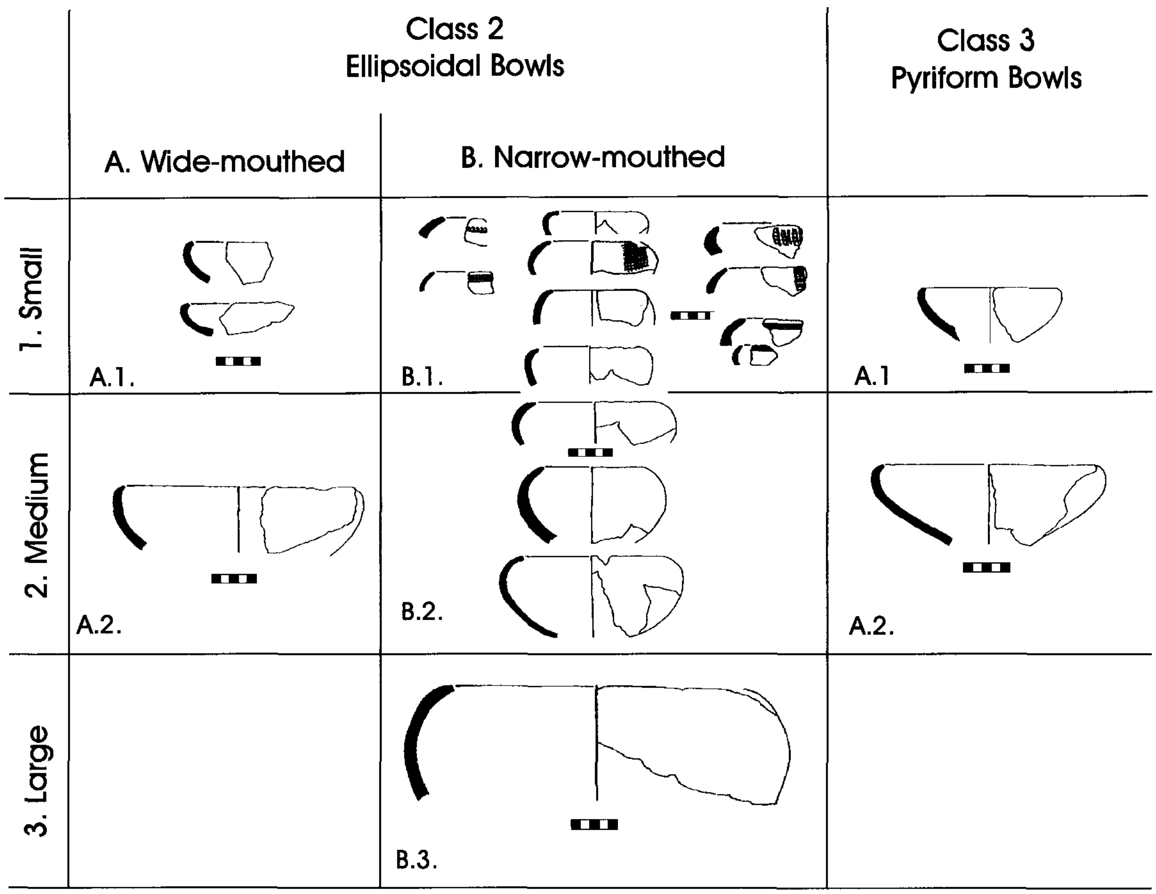

Figure 6.19. Class 2 Ellipsoidal bowls and Class 3 Pyriform bowls (modified after Loubser 1993: fig. 23). Shading indicates red burnish. Scale in centimeters.

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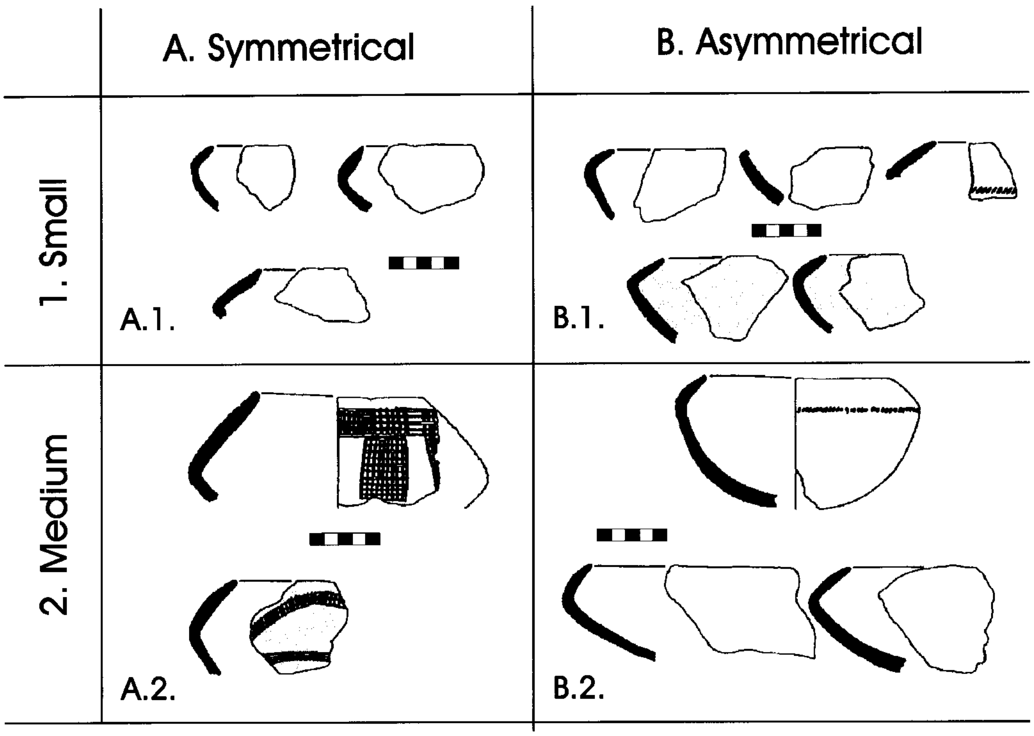

Figure 6.20. Class 4 Bi-conical (Msuluzi) bowls (modified after Loubser 1993: fig. 22). Scale in centimeters.

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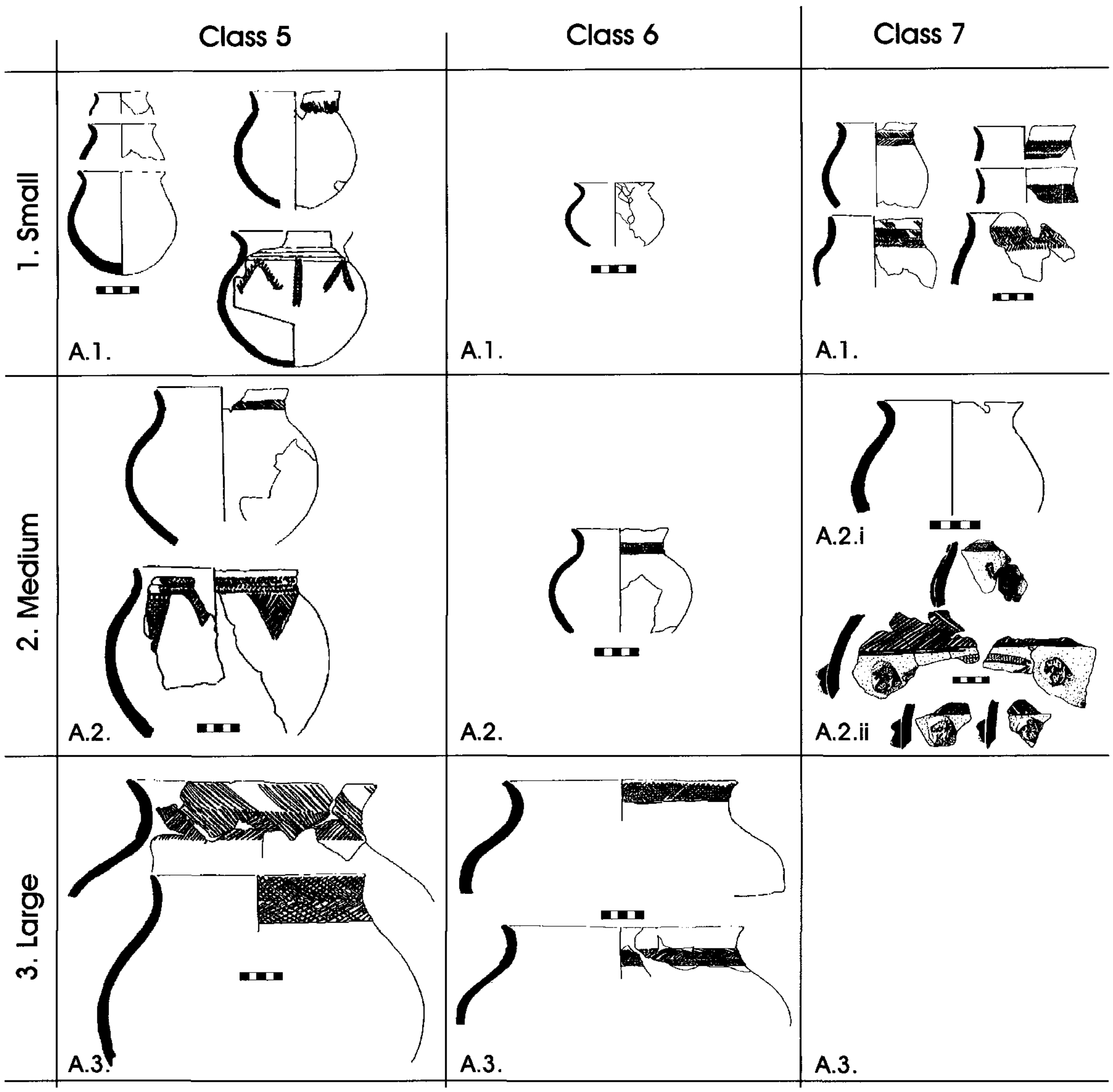

Figure 6.21. Class 5 (Spherical jars), Class 6 (Ellipsoidal jars) and Class 7 (Ovoid jars). (Modified from illustrations in Loubser 1993: figs. 12, 14-16, 18-20).

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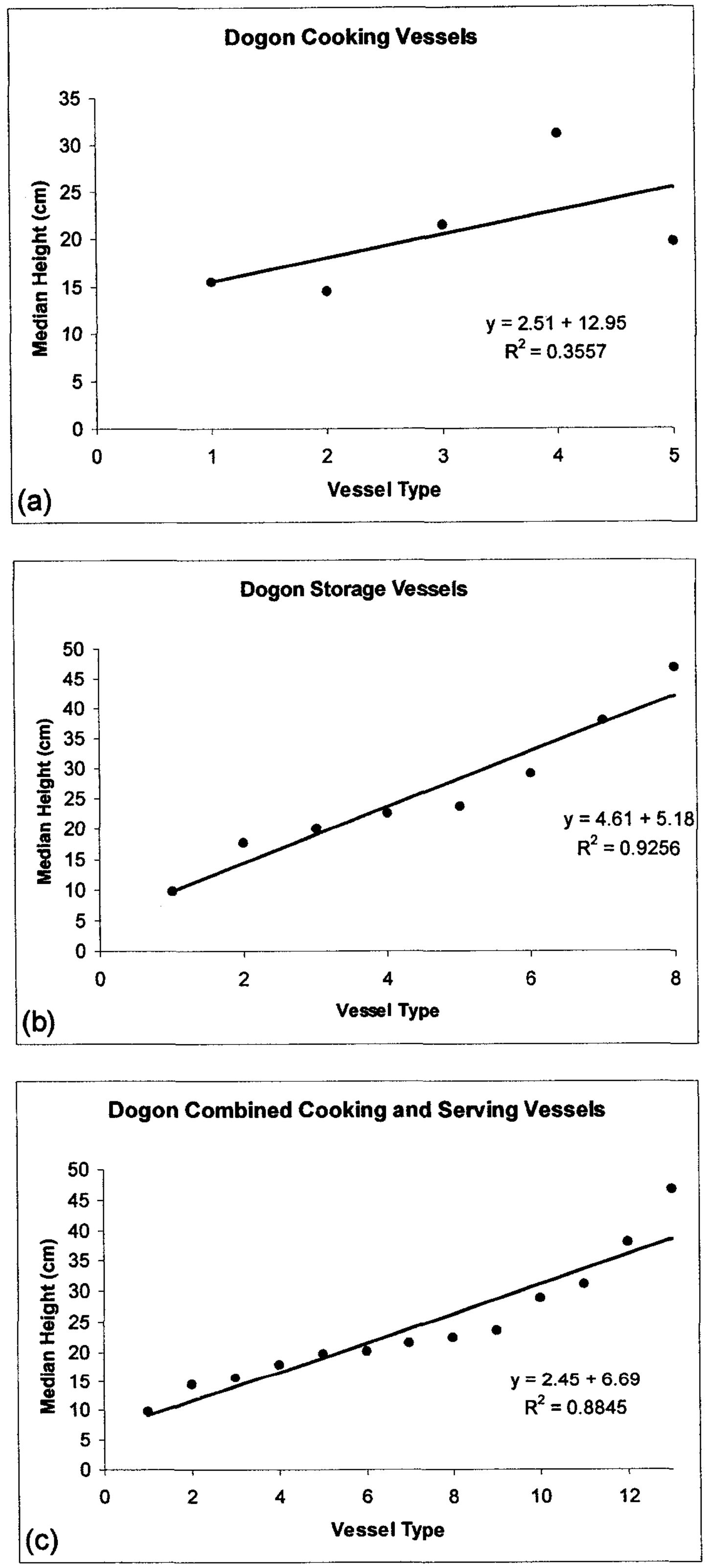

Figure 6.22. Plots of median height for types of Dogon cooking and serving vessels.

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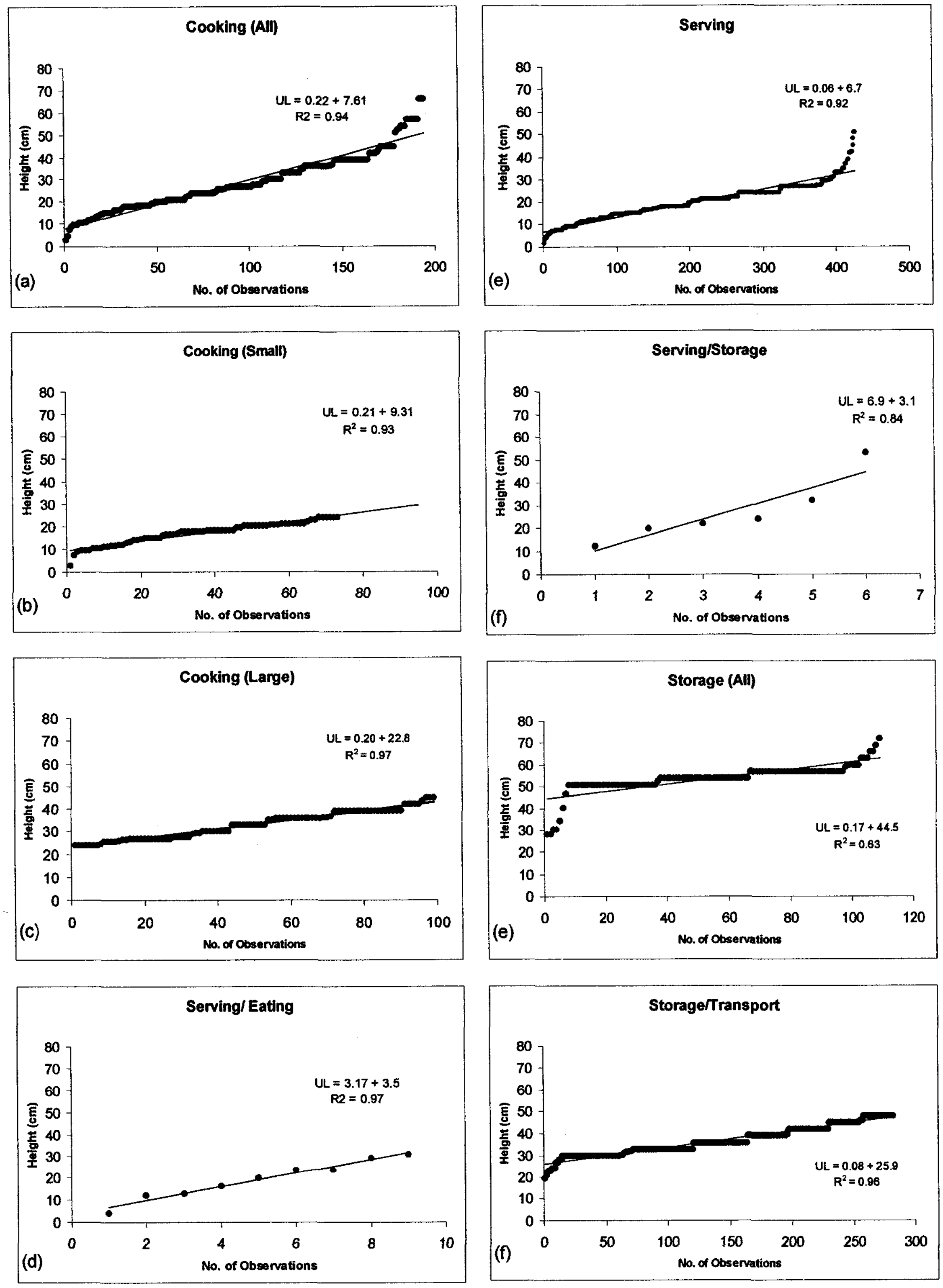

Figure 6.23. Plots of raw vessel height measurements for the Ndondondwane ceramic categories.

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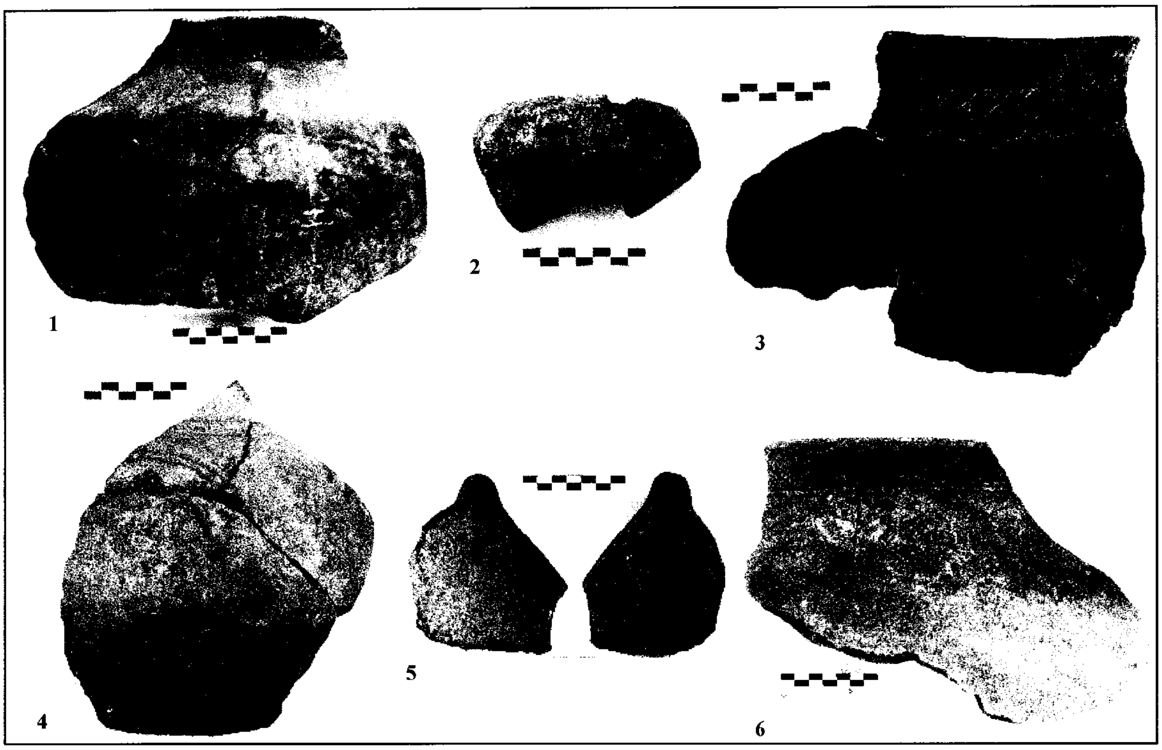

Figure 6.24. (1-5) Cooking vessels. (6) Storage jar.

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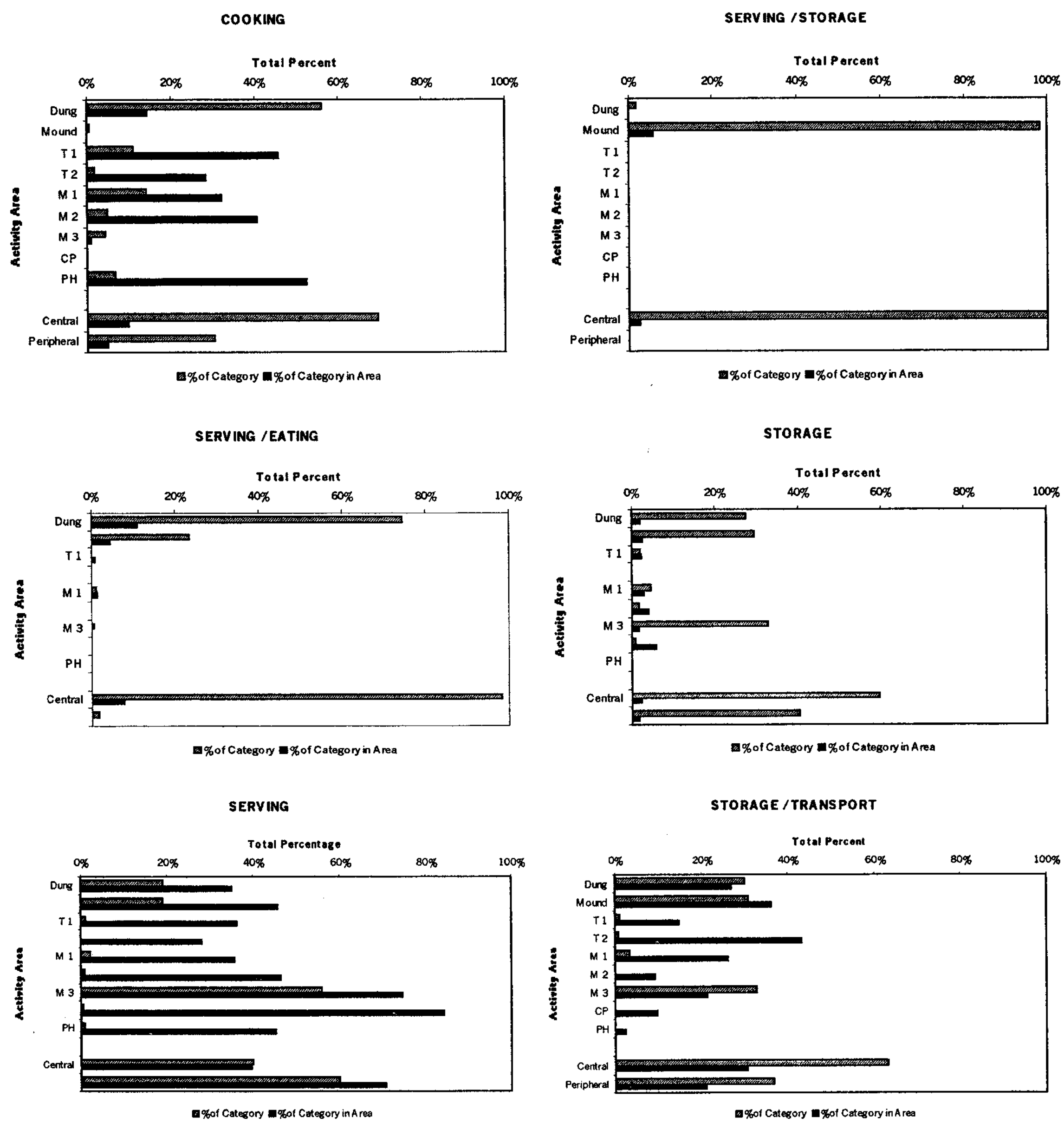

Figure 6.25. Frequency distribution of ceramic use categories in the major activity areas at Ndondondwane. Abbreviations: Dung = Dung Area, Mound = Mound Area, T1 = Transect 1, T2 = Transect 2, M1 = Midden 1, M2 = Midden 2, M3 = Midden 3, CP = Charcoal Preparation Area, PH = Pump house, Central = Central Zone, Peripheral = Peripheral Zone.

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CHAPTER 7

SITE FORMATION AND CERAMIC DISCARD

Interpretations of the spatial organization of past settlements must be grounded in an understanding of the formation of the archaeological record. In southern Africa, the natural and cultural factors that can contribute to the distribution of artifacts and features at EIA settlements are poorly understood. As a result, archaeologists are constantly confronted with the problem of relating cultural deposits at sites that cannot be associated stratigraphically. Because Ndondondwane is a single-phase settlement occupied for a comparatively short duration of time, it has not experienced many of the same post-depositional processes typical of other EIA settlements (e.g., Feely 1987; Hall 1981, 1984; Marker and Evers 1976). In particular, the site exhibits less pronounced settlement drift (Greenfield *et al.* 1997), or temporal and spatial changes in activity areas, than other EIA settlements in the region (e.g., Lane 1998; Maggs 1984b; Whitelaw 1994). Ndondondwane therefore holds great potential for examining how site formation processes and the deposition of refuse during the EIA contribute to ceramic variability and interpretation of the organization and use of space.

To frame the discussion in this chapter, I draw upon Deal's (1985) model of settlement use and abandonment. In a study of ceramic disposal in the Maya Highlands, Deal (1985) suggested that archaeological assemblages are the result of an evolutionary sequence with three behavioral stages: pre-abandonment, abandonment, and post-abandonment. The pre-abandonment stage can include an historical sequence involving settlement establishment and occupation. Each stage has a different set of depositional modes. For instance, in the pre-abandonment stage, discard may be provisional and broken objects will serve some secondary purpose; caching items in anticipation of return may be practiced during abandonment; and scavenging or the retrieval of cached items may affect the nature of archaeological deposits in the post-abandonment stage. In the following discussion, I investigate a range of natural and cultural factors that have affected the preservation of artifacts and features during the post-abandonment stage at Ndondondwane. I then move on to analyses that attempt to identify and differentiate

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pre-abandonment and abandonment behaviors at the site. First, however, it is necessary to outline several important inferences that have been reached about how artifacts entered the archaeological record at Ndondondwane, which may be summarized as follows:

(1) Previous excavators have suggested that the Mound and Dung Areas are central dumping areas during the occupation of the site (Loubser 1993; Greenfield *et al.* 1997).

(2) Loubser (1993: 147) proposed that the structure in the Mound Area was used for initiation rituals because it is associated with figurines and ceramic heads.

(3) Interpretations of the recent excavation data (Greenfield *et al.* 1997) suggest open middens in domestic areas were used exclusively for the discard of secondary refuse from household activities;

(4) pits in domestic areas were filled with domestic debris *during* the abandonment of the settlement; and

(5) the rapid abandonment of the burned hut in Transect 1 is a case of *de facto* refuse disposal.

The first two conclusions concern the nature of the depositional episodes documented in the Central Zone. Based on the quantity of debris recovered from the Central Zone, the excavators have implicitly assumed that artifacts used in the zone and at other locations at the settlement were discarded in these areas. The CCP model predicts that the function of discrete central activity loci will remain constant during the occupation of a settlement. The kinds and quantities of artifacts recovered from central areas will reflect the intensity of male-related activities that occur there, while those from outside this area will be representative of the activities restricted to the domestic periphery. However, neither ethnoarchaeological nor archaeological research in southern Africa has *explicitly* established the kinds and quantities of artifacts one would expect in central and peripheral activity areas of settlements organized according to the principles of the CCP. Determining the nature of discard practices in these areas is clearly important for understanding their function during the occupation of the settlement. The last three conclusions raise behavioral issues concerning the kinds of activities that occurred in domestic complexes as opposed to elsewhere at the site and a chronological

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issue which involves understanding how long different domestic complexes were in use. The large accumulation of debris in Midden 3 is unlike other household complexes and we may expect either that it was occupied for much longer than other households or that the intensity of activities in this complex was greater. It is not possible to determine the nature of this area or the relationships it may hold between other areas because it is unknown precisely how long domestic complexes were in use during the occupation of the settlement.

In the following discussion, I first address the post-abandonment disturbance processes that have affected the integrity of deposits at Ndondondwane. Having taken into account how these processes may contribute to ceramic variability, I then address the spatial and temporal variation in the discard of ceramics. The results of this analysis allow me to consider the sequence of occupation at Ndondondwane and propose a provisional model of EIA settlement maintenance and abandonment.

POST-ABANDONMENT DISTURBANCE PROCESSES

Many natural processes, only some of which are well understood, affect the movement and positioning of artifacts, ecofacts and features within the three-dimensional context of a site (Butzer 1982; Nash and Petraglia 1987; Schiffer 1987; Woods and Johnson 1978; cf. also Wandsnider 1996). The ceramic data indicate that disturbances caused by plowing, erosion, and animal burrowing have affected the integrity of archaeological deposits at Ndondondwane.

Plowing

While cultivating an old field in 1977, a local storeowner at Middledrift uncovered ceramic sculpture and bone in the Mound Area. This material was reported to the Natal Museum and led to the excavations by Maggs in 1978 (Maggs 1984c). The cultivator made northwest to southeast passes following the river, subsequently affecting the top 10 to 15 cm of deposit throughout the southeastern half of the site, including the areas of Midden 2, the Mound Area, the Dung Area, the Charcoal Preparation Area, and the artifact cluster near the old pump house (Figure 7.1).

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Plowing tends to dislocate objects from their horizontal context more extensively than their vertical context (Rick 1976; Roper 1976). Smaller objects would not become entangled in the tines of a cultivator, but larger objects such as lower grindstones and large pottery fragments could be moved some distance. Through this process, high-density artifact clusters become dispersed or deflated and larger artifacts are moved away from the concentration. If plowing extensively disturbed the integrity of the archaeological deposits at Ndondondwane, we would therefore expect a dispersed pattern of large and small objects around a core concentration that follows the northwest to southeast direction of plowing and not the SSW slope of the land when examining the density and size distributions of ceramics from affected areas.

In this analysis, the size and density of ceramics from the plow zone and from surface collection are considered. Surface material was collected during an intensive survey within the established grid for the site. The grid was divided into 2x2 m squares and all cultural material was collected from every second square in a checkerboard pattern across the site. Different classes of cultural material (bone, ceramic, lithic, daga, etc.) were then separated, counted and the volume of each class was taken for every square. Fine mesh nets and graduated containers of the same size and shape were used to measure displacement volume of all artifact classes. The nets had a negligible displacement volume so their weight was not subtracted from the measures. In a subsequent analysis, the surface area of the sherds collected from the surface survey and the plow zone was calculated. The smallest of the calculated units included sherds 5 cm^3. However, this unit did not included smaller fragments less than 5 cm^3 that were included in the measurement of displacement volume. These sherds were grouped together in another unit labeled < 5 cm^3 for the purpose of generating Figure 7.2 and 7.3.

The effects of plowing should be most visible when the density distribution of ceramic material from the upper plow zone and the surface is examined at the site-wide level. If plowing did not substantially affect deposits at Ndondondwane, the density of ceramics should gradually decrease following the SSW slope of the land towards the river from the high concentrations that identify each main activity locus. However, the slope pattern is not typical of the sherd distribution clusters (A to I) that are illustrated in Figure 7.1. The pattern is best exemplified in the Midden 1 area (Figure 7.1, A and B) and the concentration around Midden 4 (Figure 7.1, SE of D). In the southeastern end of

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the site, several other patterns are apparent. Around the large activity areas, there are two different patterns: a southeasterly density gradient characterizes the Mound Area (Figure 7.1, C) and a southwesterly density gradient is found in the Midden 2 area (Figure 7.1, D). There are no dense concentrations of ceramic material in SSE between -60 North and 45 East where plowing was intensive. Here, a northwest to southeast gradient, which follows the direction of plowing, characterizes the Charcoal Preparation Area (Figure 7.1, F) and the area around the pump house (Figure 7.1, H and I). Two other concentrations of sherd material have different distribution patterns. No features were identified during sub-surface reconnaissance in either of these areas, so their detection in this analysis here presents something of an enigma. To the east of Midden 2, a large concentration is distributed in three directions (Figure 7.1, E): upslope, across the slope to the west and downslope. To the SE of "Midden 4," another concentration has a gradient that moves upslope (Figure 7.1, G). Clearly, the effects of plowing are not apparent in the north and northeast of the site. However, the southeasterly, southwesterly, northwest to southeast, westerly and northeasterly gradients strongly suggest extensive plowing disturbance at the site in at least two directions: northwest to southeast following the river and northeast to southwest perpendicular to the river. The northeast to southwest direction provides the best plausible explanation for sherd distributions that increase in density as ones moves *upslope.*

At the activity area level, the impact of plowing on the nature of deposits is even more visible, but each area was affected differently. Loubser's (1993) excavations revealed that plowing seriously damaged features at the southern end of Midden 2. However, the positioning objects in the Mound and Dung Areas below 10 cm was not substantially affected by plowing. Even material from the damaged section of Midden 2 was not displaced to such a distance that its original context could not be reasonably demonstrated. The surface distribution data also show that plowing did not displace material extensively everywhere at Ndondondwane, such as around the Mound Area and in the northeast. The deposits most affected by plowing are in the peripheral zone where the cultural horizon begins between 5-10 cm below the surface. While plowing affected Midden 2 the most, other processes must have also affected artifact distribution in this zone as well. It is therefore possible to make two assumptions about the deposition of

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EIA material culture in these areas: artifacts from the plow zone (1) date to the EIA occupation of Ndondondwane and (2) were originally deposited in Horizon 3.

This being the case, it is rather interesting that the densest ceramic concentrations correspond poorly with the distribution of excavated activity areas (Figure 7.2). No surface collection was done in the northwest and SSE portions of the site and would account for the absence of any ceramic surface concentrations in these areas.[1] However, it would appear that the extensive concentration "behind" Midden 2 is linked to the Midden 4 area. No sub-surface artifact concentrations were found in the Midden 4 area and none were detected behind Midden 2. Given that the surface material can be associated with Horizon 3 and at the very least the occupation of Ndondondwane, it may well be that the Midden 2 area was once far more extensive than previously considered. A troublesome consequence of this analysis is that we cannot explain the southerly to southwesterly distribution of ceramics in several areas of the site, such as the Charcoal Preparation Area and Middens 1 to 4. As these distributions patterns follow the slope of the land, erosion may be investigated as one explanation for the distribution.

Erosion

Erosion is a broad term that includes a number of processes responsible for the mixing and movement of soil and rock downslope (Woods and Johnson 1978). Two processes of soil movement are discernable at Ndondondwane: soil creep (graviturbation) and water drainage (aquaturbation). These actions have affected the entire excavation area. Upslope, cultural deposits are very shallow (within 5 cm of the surface), while downslope they can be buried as deep as 1 m. These patterns are most apparent in the distribution of surface material at the site, particularly in midden areas.

Loubser (1993: 112 and fig. 1) observed that two drainage gullies transected the terrace, one at about 10 N following the slope from Midden 3 and the other at –130 North following the slope from Midden 2 (see Figure 7.2), and a small number of sherds were noticed along the bottom of the terrace. While some attention was paid to the role

[1] The NW part of the site was not surveyed intensively because a very sparse distribution of artifacts were spotted during repeated walking of the area, and it was also in this area that part of the camp during the 1982-1983 excavations were set up. The area in the SSE was not surveyed because it was still covered by dense acacia thicket.

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of plowing in the distribution of cultural material at the site, little attention was paid to the effects of erosion. I examined the condition and distribution of ceramics in Middens 2 and 3 to investigate potential damage caused by erosion processes.

In Midden 2, surface material is displaced to the south and southeast in two concentrations (Figure 7.3(a)). Plowing may have moved some material southeast to "Midden 4" and further to the southeast. A plot of the sherd size distribution in the area reveals that the largest sherds are found downslope while the smallest are nearest the buried deposits (Figure 7.3(b)). One would expect the opposite effect with an erosion pattern, where smaller sherds would be moved further downslope because they are lighter. Plowing, in contrast, tends to move larger material creating a linear distribution of both large- and small-sized sherds. This did not occur in the Midden 2 and 4 areas. Therefore, the distribution of surface material around "Midden 4" did not result from the deflation of Midden 2 or plowing. This being the case, Midden 4 should not be treated as a distinct domestic complex, but an open midden that is an extension of the Midden 2 domestic complex. Plowing does not, however, explain the southwesterly spread of debris from Midden 2, and a combination of soil creep and water drainage may better account for the pattern.

The effects of both soil creep and water drainage are not apparent in Midden 3. Here, a far greater density of sherds is concentrated around the main middens and near the house floor (Figure 7.4(a)). As well, the size distribution of surface sherds indicates that each midden in the area is different (Figure 7.4(b)). The Western Midden and the space between the Western and Central middens show a fan-shaped distribution of sherd material to the south and SSE, while the Central Midden has a denser concentration of debris that extends to the east and then curves downslope. The distribution of material beneath the plow zone is almost identical to the surface pattern. The Western Midden and inter-midden space are both textbook examples of talus creep (Wood and Johnson 1978; Waters 1992).

The size and spread of the Central midden indicates it was used longer and accumulated in a different fashion from the Western Midden. The decrease in the size of sherds follows a gradient that does not align with the topography. This suggests that the way materials were deposited in the midden may have contributed as strongly to its character than the subsequent effects of soil creep. Two scenarios, neither of which is

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more plausible than the other, may explain the nature of this midden. Both depositional scenarios were tested using daily debris at the excavation camp in July of 1997, once the nature of the midden began to take shape. The first scenario involves the differential distribution of large and small refuse in an open midden when they are deposited together: when mixed refuse is thrown, smaller and lighter materials (e.g., organics, small bone and pot sherds) tend to fall shorter than larger, heavier material. The Central Midden may have accumulated in this fashion: large, heavy refuse was tossed into the center of the midden while the smaller debris did not travel as far. Over time, the smaller debris would have been more easily moved downslope by soil creep, resulting in a core of large dense material and a distribution of smaller debris downslope. Alternatively, in the second scenario, both large and small debris were deposited separately and over time the small, light debris moved downslope creating a large deflated oblong-shaped midden rather than the fan-shaped middens located further downslope. Both scenarios may account for the formation of the Central Midden (and possibly others not yet envisaged), but more important is that the Western and Central Middens do not contain the same kinds of pit features or the same quantity of debris, and they did not accumulate in the same fashion. The implications of the differential formation of these middens are taken up below.

Burrowing

Burrowing animals are another factor affecting the formation of deposits at Ndondondwane. Many burrowing animals can potentially displace cultural material and alter stratigraphy at archaeological sites in southern Africa, although the identification of burrowing activity and the effect that different burrowing species may have on the nature of EIA sites is poorly understood. Work to date on biotic disturbance processes at Ndondondwane has explored the effects vertebrate and invertebrate burrowing. Particular attention has been paid to the action of rodents, earthworms and termites (Fowler *et al.* 2000). Burrowing activity at Ndondondwane was identified using both direct and indirect sources of evidence. Rodent burrows and *termitaria* (termite mounds) provided direct evidence, while the ceramic ecofacts have provided indirect evidence.

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Rodent Burrowing

Burrows and faunal remains commonly found during excavation provide direct evidence of rodent activity at Ndondondwane. Rodent burrows could be distinguished from postholes by a variety of characteristics, including their spatial distribution, angle of penetration, depth, and the nature (including color) of the soil fill. For example, Maggs (1984c: 74 and fig. 2) described a number of small holes (less than 4 cm in diameter) in his excavations of the Mound that were animal burrows; there was a mouse still living in one. In the northeast corner of the same area, Loubser (1993: 117 and fig. 6) described two shallow channels and small pits (50 cm deep by 30 cm wide). Some of the pits contained rodent teeth and bones, and he attributed these pits and certain channels to rodent activity. Subsequent excavations in the Dung Area identified the presence of numerous rodent tunnels and burrows and several were also noted in Midden 3.

Earthworm Burrowing

A general understanding of earthworm behavior yields some insight into the transformation of the fecal casts from soil to ceramic. In the process of feeding, earthworms (*Oligochaeta* sp.) ingest soil in order to process organic material. Some species of earthworms live in deep soils and tend to move vertically to and from the surface (e.g., *Lumbricus* sp.), others live within the top 10 cm of soil and prefer horizontal movements, rising only to drop fecal matter and during rains (e.g., *Aporrectodea* sp.). When earthworms rise to the surface to deposit fecal matter, the resulting casts of consolidated soil can become incorporated in fires and/or charcoal/ash dumps. If a fire is built over the casts, they become trapped within the hot embers. The heat produced under these conditions would be sufficient to bake the consolidated soil. The fecal matter is baked because it is deposited on the surface and is therefore preserved in a terracotta form. The preferred movement and other behaviors of various earthworm species can help isolate those that were present in and contributed to the formation of soils and stratigraphy during the EIA.

The provenance of the terracotta earthworm casts is important for reconstructing pedogenic changes at the site. The fecal casts recovered during excavation were found at

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different depths and locations. A total of 38 fecal casts were found in the plow zone (n =37) and cultural horizon (n =1) of Midden 3. There is no preserved evidence of cultural stratigraphy in this area and it is difficult to confidently assign any of the ecofacts found outside pits to the ancient occupation at the site. The single specimen found in the cultural horizon may also be intrusive.

A further 64 fecal casts were recovered from depths between 30-40 cm in the human activity zone of the livestock enclosure in the Dung Area. The fecal casts therefore occur within the lower depths of the Middle horizon (ca. 30 cm) and the Lower horizon in the eastern Dung Area (ca. 35-60 cm). Each of these horizons are linked to two phases (Upper and Lower) in the development of the livestock enclosure. The presence of earthworm activity is documented for the entire formational history of this area of the site.

Earthworms conduct a delicate balance between temperature, oxygen, nutrition, and density requirements by moving from oxygen deprived environments or inhabiting locales where the topsoil is occasionally mixed, allowing gas by-products to escape. The activity of earthworms would not be out of place in the nutrient rich environment of a livestock enclosure, but it is interesting to observe that the casts are found only in the area with human activities. While the levels of carbon dioxide and other gases may have inhibited earthworm activity in the animal zone where the dung was thickest, particularly on the edges of the enclosure, this is unlikely for two reasons. First, livestock would have mixed the upper layer of the dung as they moved about the byre, thus releasing gaseous by-products. Second, earthworm fecal casts were not preserved in the livestock zone because no fires were built there.

Because earthworm casts are only deposited on the surface, and because earthworms tend to displace material towards the surface and not the reverse (Edwards and Lofty 1977), it is very likely that these casts were sealed in an archaeological context concurrent with the occupation of Ndondondwane. The casts were probably burnt in the process of either cooking food or smithing iron in the human activity area of the livestock enclosure. Clearly, these objects provide evidence that earthworms were active in the Dung Area during the occupation (as they are currently), but the unusual relics of their presence were only inadvertently preserved by human activity in the area.

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Earthworms did not substantially alter the cultural stratigraphy. In fact, the species identified in the area have more likely helped preserve the systemic integrity of deposits rather than destroyed them (Fowler *et al.* n.d.). This is because earthworms affect archaeological deposits in four ways. They may create false artifact concentrations by moving archaeological debris down to the bottom of the zone they live in (Butzer 1982; Limbrey 1975). They may bury objects by depositing fecal casts on the surface, slowly burying debris lying on the surface (Butzer 1982; Limbrey 1975; Stein 1983). Some estimates suggest that earthworms can drop as much as 9,600 kg of casts annually on a hectare of surface (Wood and Johnson 1982: 548, 552). Such action is capable of burying surface material rapidly, preserving its original location. However, this behavior does not have the same effect on the displacement of heavier objects as it does on soil. Other field research suggests that certain species of earthworms will blur the distinctions between different sediments and deposit boundaries, but they will not substantively displace material greater than 10-20 mm in diameter (Stein 1983: 284, 286). Additionally, earthworms alter texture and chemistry of soils and can destroy ecofacts, such as seed remains, by eating them as they move through soils (Stein 1983). In some cases, this may explain the paucity of certain seed types recovered in Iron Age archaeological contexts.

Despite the fact that earthworms can move substantial quantities of soil in an area over time there is little evidence for the formation of overlying sediments above the final occupation. This is simply due to the ecology of the species present. Sediment was more often moved laterally than vertically. This is particularly visible in the Dung Area stratigraphy where there was no substantial mixing or blending of the various strata; some damage occurred at the northern edge where a termite mound was found. At this point, the best *direct* evidence for earthworm activity comes from the Dung Area. It is certainly not speculative to infer the importance of earthworm activity in decomposing organic debris in the middens. However, it is unknown what effect such activity would have on the arrangement of debris within storage and refuse pits. Potentially, such biotic activity could inhibit our ability to distinguish between episodes of pit use and the discard of cultural debris, making it difficult or impossible to link the use history of different domestic middens to each other and other activity areas in a site.

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Termite Activity

One phenomenon in particular seems the most plausible explanation for the manufacture of the plant stalk casts. Termites (*Isopteria* sp.) carry soil up the stalk of maize, sorghum or millet plants while creating runnels (termite burrows). Once abandoned by the termites, these accretions remain within the stalk of the plant. If fired at sufficiently high temperature, the soil-filled stalks bake and drop to the ground. They would then be incorporated into the archaeological site by sediment deposition above them. The result is a ceramic object created by termite activity.

Van Schalkwyk and Greenfield observed the results of a similar formation process during the 1995 field season at Ndondondwane. During this first field season, hollow maize stalks still standing in the southeastern area of the site from the 1993-1994 growing season were burnt off prior to survey and excavation. As the stand burned, the soil termites had accumulated in the base of the stalks began to bake and subsequently fell to the ground among the still burning stalks and grasses in the maize stand. The casts were covered over by the maize stalks and grasses creating a rudimentary, but effective, oxygen-deprived atmosphere. Once the fuel was exhausted, the stalk casts rapidly cooled in the open air. This resulted in very same physical properties described for the archaeological examples above. After being fired, the exterior of the casts permanently took on the characteristics of the interior structure of the maize plant.

The evidence for termite activity at Ndondondwane is extensive. Both modern and ancient mounds, or *termitaria*, were found on the site. Large modern termite mounds, probably constructed by *Macrotermes subhyalinus* (Coaton et al. 1972; Meyer 1997), were scattered among the dense brush or at the base of trees covering the eastern half of the site. The bases of ancient *termitaria* were excavated in two areas of the site. Based on their size, they were probably constructed by the same taxon. In the Dung Area at the northeast edge of the human activity zone, the base of a large termite mound extended from just beneath the plough zone deep into the sterile substrate disturbing the cultural horizons in a 2 x 2 m area. It extended to a depth of almost 50 cm beneath the modern surface. The base of another smaller *termitarium* occurred in Midden 3, at the western or down slope edge of the midden. It was found within 10 cm of the surface, and was approximately 1.5 m in diameter. The depth was not ascertained because all cultural debris lay within 20 cm of the surface. It is interesting to observe that both of

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the ancient termite mounds were located on the perimeter of human activity areas (Fowler and Greenfield n.d.). This should not be surprising since termites tend to locate their mounds near the bases of trees or stumps (Ferrar 1982; Meyer 1997), which might have been left around the perimeter of different activity areas within the settlement to provide shade.

The plant stalks may be preserved in much the same way as the earthworm fecal casts if crop stubble was collected for domestic fuel after harvest. In this case, the soil-filled stalks would be subjected to low temperature, oxygen-rich fires for a relatively long duration of time. Such a scenario would account for the differences observed in the colour, hardness, and surface texture of the stalks described above, as well as where they were found (discussed below). Either of these processes, which combine termite activity and heat, can preserve evidence of *Sorghum* production at sites.

The plant stalk casts, which can now be described more properly as fired casts of *Sorghum* stalks, were recovered from two groups of contexts at the site:

- From modern or uncertain provenance in the plough zone of Midden 3. A number of stalk casts found in Midden 3 (n_s = 20) were covered by a shallow plough zone (c. 5 cm). These stalks were found in the same strata as the earthworm fecal casts described above. It is also possible that the stalks in Midden 3 were not originally located in the cultural deposits in the area.
- From stratified contexts at the site. Specifically, stalk casts were found in the cultural horizons of Transect 1 (n_s = 1) 80-90 cm from the surface; the Dung Area (n_s = 1) in the Middle Horizon (30-40 cm from the surface); the cultural horizon (n_s = 2) and Pit 2 (n_s = 1) in Midden 3 (10-15 cm below surface); and in the cultural horizon of Midden 1 (n_s = 1) some 15 cm below the surface. Only the stalk casts from these contexts can be placed with any degree of certainty within the Ndondondwane occupational phase.

Based on these data and observations, I propose that the stalks of *Sorghum* represent the crops cultivated by the inhabitants of Ndondondwane. Regardless if the fields were burnt intentionally or as a consequence of wild fires, the fired sorghum stalks recovered at Ndondondwane were subsequently deposited in nearby charcoal/ash dumps located in the livestock enclosure (e.g., from a thin ash lens in the Upper Compact

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horizon in the Dung Area, Greenfield et al. 1997, 1998; van Schalkwyk et al. 1997) and nearby residential middens, probably after preparing fields for a new planting season.

Termites had more devastating effects on the preservation of cultural deposits in certain areas of the site. While destructive in some cases, termite behavior also preserved evidence of sorghum production at Ndondondwane. This is one of the few EIA sites were multiple grain crops are in evidence (Reid and Young 2000).

Summary

In this analysis, I have considered four natural and cultural taphonomic post-burial processes: disturbance of deposits by animals, soil creep, water and modern land use activities. Each process has affected artifacts, features and the archaeological stratigraphy of the site differently. Beyond the mixing and movement of soil done by burrowing animals, they can also have a profound effect upon the preservation of archaeological artifacts and features. Termites may preserve the general location of artifacts by "freezing" them in place as *termitaria* are built around them. Features, however, are usually destroyed as termites bring up soil and organic material in order to create *termitaria* (McBrearty 1990). They can carry soil grains and similarly sized organic materials to the surface from as far down as 2 m (Wood and Johnson 1978). Although rodents, earthworms and termites were present at Ndondondwane, it appears that their activity did not substantially alter the archaeological stratigraphy of the site.

Other taphonomic processes may mask the nature of activities that took place in certain domestic areas. The forces of downslope erosion have caused the deposition of sediments on the more gently sloping terrain along the river valley bottom. This effect is more pronounced in the Peripheral Zone where cultural deposits are very shallow (within 5 cm of the surface), whereas further downslope in the Central Zone, cultural deposits may be buried as deep as 1 m. For this reason, plowing in the Peripheral Zone of the site has been a substantial factor in the preservation of certain domestic complexes and not the Central Zone.

Ultimately, we cannot assume that there are direct links between the patterning of artifact and feature distributions on EIA sites and human behavior. Such linkages must be demonstrated on a case-by-case basis by considering the physical and biological

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processes that affect the movement and positioning of artifacts, ecofacts, and features within the three-dimensional context of a site. Continuing research on the Ndondondwane material and in the Thukela basin may distinguish the effects that plants, the swelling and shrinking of clays (argilliturbation), and gas, wind and air (aeroturbation) may have on cultural deposits in this region.

PRE-ABANDONMENT AND ABANDONMENT AT NDONDONDWANE

The study of discard behavior at Ndondondwane was concerned primarily with three main questions. (1) Are different types of refuse disposal patterns discernable at the site? (2) If so, what does this tell us about settlement maintenance and abandonment? (3) Is it possible to link spatially discrete deposits on non-stratigraphic grounds? I utilize several complementary analyses of ceramic distribution that are sensitive indicators of discard practices to address the hypotheses proposed by the excavators of Ndondondwane. To determine the nature of depositional areas at Ndondondwane, I analyzed the brokenness and diversity of ceramics within and between activity areas. Based on these analyses, a model of settlement maintenance and abandonment is offered.

Ceramic Completeness and Disposal Behavior

A study of ceramic brokenness provides a way to evaluate how "complete" objects are in an area. In this analysis, completeness was calculated by comparing the total number sherds in a deposit to the actual and/or estimated number of complete objects (or estimated object equivalents, EOE) in the same deposit. These two variables, the frequency of sherds and the number of objects in the fill, can be adapted into a four-cell matrix to discern the relationship between ceramic fragmentation and discard behavior:

		No. of Objects (EOE)	
		Low	High
Fill density	Low	A	B
	High	C	D

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These categories provide four patterns from which hypotheses about the relationship between sherd and object frequency in deposits can be generated. Low scores indicate a greater number of sherds present in the fill in relation to the number of objects, or a *lower* degree of completeness. For example, 30 pots in a fill of 500 sherds would give an index score of 0.06. Higher scores indicate a greater number of pots in relation to sherds in the fill. Fifty pots in a fill of 200 sherds would give an index score of 0.25. A high score, indicated high completeness, suggests that many relatively complete objects were deposited in the fill. A lower score, or low completeness, indicates that more fragmentary objects occur in the deposit. In behavioral terms, we may expect low completeness to reflect less human or post-burial disturbance after deposition through sherd reuse or scavenging, while deposits with higher scores may have resulted from more objects being broken before discard and/or greater reuse of deposited material after initial discard. These are working hypotheses only and must be corroborated with several complementary lines of evidence, such as an understanding of the kinds of debris in deposits and the function and relationships between activity areas. Later in this section, I address questions of function and inter-activity area relationships through a study of the functional range, or diversity, of ceramic objects found in the Ndondondwane activity areas.

To determine the parameters of the four brokenness categories, the number of objects was plotted against the number of sherds found in the deposits that compose the eight major activity areas identified at Ndondondwane. These data are summarized in Table 7.1. The total number of sherds considered (N_s = 44,209 of 49,106) excludes 4,897 poorly preserved sherds and those that have questionable or indeterminate provenience, while the total estimated object equivalents (EOE) used in this analysis excludes 176 EOEs for the same reason (N_e = 2,035 of 2,211). When the number of sherds (N_s) is plotted against the number of EOEs (N_e), two clear groups are apparent. In Figure 7.5, the first group, category A, is clustered in the lower left of the graph and does not extend beyond a maximum of 100 EOE to 300 sherds. Using this maximum as an index limit for category A, categories B and C are not represented, so category D includes any points greater than 100 EOE to 300 sherds, which are clustered in the upper right of the graph. The ratio of EOE to sherds represented by each point in the cross plot was transformed into a Completeness Index (CI) by dividing the number of EOEs by the

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number of sherds. Data from activity areas and features considered in this analysis were multiplied by a factor of 100 to work with an index of whole numbers rather than fractions. The parameter limit, or break point, for the index was set at the site-wide cross-plot ratio of 44,209 sherds to 2,035 EOEs, which equal 0.46 or a CI of 46. Scores less than 46 are considered to have low completeness while those above 46 have high completeness.

When data from all levels of the major activity areas at Ndondondwane are considered, the completeness index ranges from 0 to 76 (Figure 7.6). A score of zero for the Charcoal Preparation Area resulted from an absence of EOEs represented in the deposits. Midden 4 is not evaluated separately here as sherds from this area are now considered part of Midden 2. The index suggests that domestic complexes and the Dung Area are characterized by high completeness, while the Mound Area, Transects 1 and 2, and the Charcoal Preparation Area have low completeness.

Ceramics from the Peripheral Zone, particularly Middens 1 and 3, have much higher scores than those from the Central Zone. These results indicate that the middens and the Dung Area suffered less post-depositional disturbance, and fit with the previous assessment of post-abandonment disturbance processes at Ndondondwane. Alternatively, deposits in Transects 1 and 2, the Mound Area and the Charcoal Preparation Area (having no rim sherds present), may have accumulated from the deposition of many broken or reused objects. The effects of post-depositional processes at Midden 2 may be affecting its score in the index, as it is somewhat lower in the index than other domestic complexes. Thus, inferences made with this smaller sample must be made with caution. Clearly, it needs to be established if this distribution is affected by sample size.

To assess the affect of sample size, I compared the CI score with the number of sherds in the activity area, excluding sherds from coring and surface collection. If the degree of completeness at each locus was affected by sample size, it follows that the CI value should increase with an increase in the number of sherds represented in an area. However, this pattern is not found here (Figure 7.6). Instead, activity loci with many sherds may have lower CI scores than those with fewer sherds. Sample size does not appear to influence the measure at different activity loci. Nevertheless, differences in excavation techniques may have also influenced the quality of samples collected from different areas. If sample quality has affected the analysis, then we would expect

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different proportions of diagnostic object parts to have been recovered from different areas of the settlement. Table 7.2 shows the percentage of sherd extent categories represented in each of the excavation areas. The proportion of body sherds is a key indicator of recovery techniques because they are the least diagnostic of form, size or decoration. The percentage of body sherds ranges from 15 to 80% of the sherds recovered from the excavated areas, with the lowest numbers from the pump house area, the Charcoal Preparation Area and Midden 2. While limited excavations in the old pump house and Charcoal Preparation Area may account for the high percentages of rim and body sherds, it must also be noted that the samples from these areas are very broken; only six jars could be identified from a total sample of 231 sherds recovered from all levels (including surface collection) in both areas. In contrast, Midden 2 has a very low percentage of body sherds, implying selective sherd retrieval during the excavations in this area. However, it has been established that plow affected this area more extensively than others and this is reflected in the sherd extent categories represented in the area. The low proportion of body sherds in this area is offset by comparatively high percentages of neck sherds and indeterminate sherds. These data suggest that post-depositional attrition is the cause of the distribution of sherd extent categories in Midden 2 and not excavation techniques. Thus, completeness must be a result of depositional behavior and not sample size or quality. This being said, limiting the study of completeness to the site-wide level nevertheless obscures important temporal variations in completeness patterns.

Figure 7.7 shows the CI scores for the horizons and principal features in the Central and Peripheral activity areas. At this stage, only the deposits in Central areas can be securely placed within one of the three horizons. Because the temporal relationships between the Central and Peripheral Zones is currently unknown, I have grouped deposits in the Peripheral Zone into an inclusive category designated "Horizon 1-4." The scores from features, such as house floors, pits, and open middens, and the score for entire domestic complexes are also included in Figure 7.7. When the data from the main horizons and activity loci within each area are examined, they reveal clear differences in the completeness levels of ceramics in activity areas during the occupation of Ndondondwane. Several significant patterns depart from the site-wide analysis.

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In the first place, ceramic completeness reflects changes in the function of Central activity areas during the occupation of the site. During Horizon 1, the Dung Area, Mound Area and Transect 2 areas have CI scores similar to domestic complexes. In subsequent horizons, these areas show a pattern of decreasing completeness as the occupation of the settlement progressed. These temporal changes correspond with increasingly specialized use of the areas, such as smithing and episodes of roasting over the bowl depression in the Dung Area, and ivory working and smelting in the Mound. Also interesting is that the domestic complexes have high completeness regardless if they are located in the Central or Peripheral Zone. The exception is the house in Transect 1, perhaps because it was abandoned prematurely. However, scores for the debris in the vicinity of the house and the house floor dating to Horizon 1, have very similar scores to the house floor in Midden 3. Another significant result is that Central activity areas without fixed features, such as structures or hearths, have different completeness patterns than other areas of the settlement. Transect 2 shows a high completeness pattern during Horizon 1 that is very similar to domestic complexes, although no house was found in the area. The presence of a house in this area may be ruled out because the low CI scores of later deposits do not correspond to patterns in domestic areas. Similarly, during Horizon 1, the house in Transect 1 has a score comparable to Midden 3. No score is available for Horizon 3 in Transect 1 because this area of the site appears to have fallen out of use after the house burnt down.

The CI index in the Dung Area also helps to clarify the role animal movement may have played in the completeness of ceramics and other artifacts in the livestock enclosure. A decrease in completeness in the Dung Area coincides with the use of a number of micro-activity areas in the Human Activity Zone and a high volume of disposal during Horizon 2. However, the movement of animals does not appear to have affected the brokenness of ceramics. Instead, it would appear that unserviceable and/or already broken pots were dumped against the walls of the enclosure, mainly in the Human Activity Zone. This formed a semi-circular area used for other activities. At present, and during the LIA, cattle and other livestock are let to pasture either from the downslope side of byres to graze or from the upslope side of byres, through the open area of the settlement separating the byre and households, and then outside the settlement (for summary see Huffman 1986a, b; Kuper 1982: 140-144). It is more likely

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the former scenario occurred at Ndondondwane for two reasons. First, the large bowl depression is roughly central within the Human Activity Zone and animals would have had to been steered around it when exiting the enclosure. Second, over many years one would expect a path of compact earth, at least similar to the compact hut floors found at the site, to form with a constant movement of livestock in an area where dung does not occur. This does not occur in the Human Activity Zone. For these reasons, it is unlikely that the movement of animals in and out of the enclosure at different times of day heavily influenced the management and scheduling of activities within it.

There is also some correlation between CI scores and where craft production occurred. In the Mound Area, there is a dramatic decrease in the completeness of ceramic objects after Horizon 1. The pattern reflects the new use of this area for ivory, bone and metal craft production. We may therefore expect that non-domestic areas with low CI scores may also have been used for such specialized activities, such as the Charcoal Preparation Area.

Lastly, although the peripheral domestic complexes cannot be aligned stratigraphically with deposits in the Central area, they share similar completeness patterns with households established in Central areas. It has been suggested that pits in peripheral domestic areas were filled with ceramics and other debris during Horizon 3, while all other concentrations were from activities that occurred before this. However, it is difficult to read temporal variation in the disposal behaviors that occur in domestic complexes. With the exception of houses, which have very low CI scores (4, 8 and 11), a CI score over 46 characterizes domestic complexes and their associated features. Using this score as a benchmark, Midden 1 has the clearest distinction between pre-abandonment and abandonment refuse patterns. Here, a higher CI score is associated with the open middens and a lower score with the pits. Presumably, this is because debris used to fill the pits was taken from the open middens and other low density concentrations of debris that often accumulate around houses. In Midden 1, the accumulation of the open middens precedes the filling of the pits, of which one contained a bottomless pot (complete pots with portions of their bases deliberately removed) in the upper pit filling and another held an infant burial. If the CI score of these pits typify abandonment refuse then we would expect that domestic middens with a lower CI were used during the main occupation of the settlement and those with

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higher CI scores to typify middens that accumulated around the time of abandonment because they were *not* used to fill the pits. If this was the case, the Central Midden in Midden 3 to precede that of the Western Midden in the abandonment sequence. However, the pit data are somewhat misleading.

First, the refuse in pits and open middens are not directly comparable because the refuse in open middens is more easily accessible to reuse. This would contribute to a lower completeness score, wherein we would have a lower EOE to sherd ratio, or a lower CI score. In Deal's (1985) terms, these middens would be operating in provisional discard mode. Sherds from these middens would be cultivated for reuse and possibly redistributed elsewhere. Thus, higher CI scores would be from middens subject to less or no post-disposal alteration during an occupation; effectively, they would remain largely untouched during or after their accumulation. Second, the pits at Ndondondwane display discard practices atypical of open middens in domestic areas. Similar to Midden 1, one small, black-burnished spherical jar was placed in shallow pit that contained no other debris in the Western Midden, and another bottomless pot was placed in the upper third of a pit filling in the Central midden. Elsewhere at the site, five bottomless pots were recovered from the open midden in the Mound Area during Horizon 2. Thus, these practices and not low completeness differentiate pits from open middens.

From this perspective, the sequence in Midden 3 is different than Midden 1, but the principles are the same. If the same criteria were applied to Midden 3, the Western Midden would have preceded the accumulation of the Central Midden. However, the Central Midden has a considerably lower CI score than the Western Midden. I suggest that the Central midden accumulated during the main occupation of Ndondondwane, while the Western midden, obviously less affected by reuse or other culling practices, represents the phase of abandonment. Following this same pattern, the debris associated with the domestic complex in the Mound Area is similar to the pits in Midden 1 and the Central Midden. This debris reflects the abandonment of the house during Horizon 1. The very low score for the Transect 1 house and the surrounding vicinity reflect the catastrophic ending of this living area also during Horizon 1. It is possible that any goods undamaged by the fire, such as those outside the house, were reclaimed and eventually deposited elsewhere at the site. This practice would contribute to the extremely low completeness of the ceramics recovered from this area.

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An analysis of the "completeness" of ceramics from different activity areas over time suggests several characteristics of the pre-abandonment and abandonment modes of discard at Ndondondwane:

- During the initial establishment of a settlement, Central activity areas have high CI scores, which decrease over time. These decreases correspond to changes in the nature of the activities undertaken in the area, or the changing function of activity areas within the settlement over time.
- Open middens in domestic areas are in provisional discard mode (Deal 1985) during the occupation of a settlement. Sherds may be taken from them and used for other purposes, such as paving, repairing cracks in walls, gaming pieces, or haphazardly deposited when organic debris from domestic middens was gather to fertilizing gardens or fields. Aside from house floors, I suspect that the lowest CI scores in a domestic complex will characterize such behavior.
- House floors and the area immediately around them typically have very low completeness scores. This would indicate that house floors were routinely cleaned up during abandonment, although some debris was often left behind.
- Middens with very high CI scores did not function in provisional discard mode and instead reflect abandonment discard.
- Pit fillings at Ndondondwane accumulated during settlement abandonment and are characterized by atypical disposal behaviors, such as the disposal of bottomless pots. Other bottomless pots occur only in the open midden that accumulated in the Mound Area when it was used as a craft production locus. The burial cannot be seen as typical of abandonment.

Ceramic Use and Activity Distribution

Having established how ceramic fragmentation may relate to disposal behavior at Ndondondwane, in this analysis I consider how the range of activities undertaken in different areas of the site could have contributed to the distribution of ceramics. To do this, I consider the range of use categories in different areas of the settlement over time. I use the concept of diversity to refer to the range of use categories present in different deposits. Those with a wide range of use categories are considered to have high

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diversity, while those with few categories have lower diversity. Similar to the completeness analysis, the parameters of high versus low diversity were established by comparing the ratio of estimated object equivalents (EOE) to the number of use categories present. The variables of object frequency and number of use categories were adapted into a four-cell matrix to examine the relationship between ceramic use and discard behavior: In this instance, the matrix is modified somewhat:

		No. of Objects (EOE)	
		Low	High
No. of use categories	Low	A	B
	High	C	D

Using these categories, hypotheses about the relationship between ceramic use, area function and disposal practices can be proposed. To determine the parameters of the diversity categories, the number of objects was plotted against the number of use classes defined in Chapter 6, which include (1) cooking, (2) serving/eating, (3) serving, (4) serving/storage, (5) storage, (6) storage transport, (7) sculpture (8) tools and (9) toys. These data are summarized in Table 7.1, and Figure 7.8 shows these data in a cross-plot of the EOE for each of the use categories represented in the eight major activity areas. The plot reveals two immediately apparent groups: one cluster with less than seven use categories represented by less than 100 EOE and another cluster with seven or more categories represented by more than 550 EOE. These two clusters can be used to set the limits for the diversity categories at 100 EOE and six use categories. This results in two diversity categories: Category A represented by six or less use categories and less than 100 EOE and Category B represented by more than six use categories and more than 100 EOE. Like the completeness analysis, the ratios were transformed into a Diversity Index (DI) by dividing the number of use types by the EOE. However, in this analysis the scores were multiplied by a factor of 1000 to work with an index of whole numbers. Because the values cluster into only two categories, the index break is set at 6 categories/ 100 EOE = 0.06 x 1000 = DI 60.

When data from all levels of activity areas at Ndondondwane are considered, the DI ranges from 22 to 100 (Figure 7.9). The index suggests that domestic complexes and

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the Dung Area and Mound Area are characterized by high diversity, while Transects 1 and 2, Midden 2 and the Charcoal Preparation area have low diversity. This distribution is quite similar to the CI distributions. I would again suggest that we must rule out sample size affecting the distribution, because Midden 1 with an EOE of only 1,272 has higher or comparable scores to areas with considerably greater samples. In contrast to the completeness analysis, Midden 2 falls 20 or more points below other peripheral domestic complexes. This score again raises the issue of accurately identifying use categories. However, the diversity analysis is concerned with the *presence* and not the *quantity* of use categories in different activity areas. The low DI score for Midden 2 reveals that a low number of use categories ($n = 4$) could be identified from the small sample, and the impact of post-depositional disturbances on the Midden 2 deposits is more evident here. Despite the problems with Midden 2, it can generally be expected that a greater range of activities occurred in the Central Zone than in the Peripheral Zone, and that the activities in different household complexes differed in nature and scale.

When the DI scores for the horizons and principle features in activity areas are considered, there are clear differences in the diversity of ceramics in Central and Peripheral activity areas (Figure 7.10). In the Central Zone, domestic areas and deposits dating to the abandonment horizon have low diversity in relation to the Human Activity Zone of the Dung Area and craft production locus in the Mound Area during the main occupation of the settlement (Horizon 2). A greater range of activities is therefore attested in the Central Zone. If these areas were meeting places for men as predicted by the CCP, and on occasion the community in general, we should expect a complete range of cooking, serving, transport and specialized objects, such as sculpture and tools, in these areas.

Domestic areas in the Peripheral Zone have comparably high diversity scores, although each domestic complex throughout the settlement (designated by circles in Figure 7.10) is somewhat different. The abandoned households in the Mound Area and Transect 1, and the complex in Midden 2 have lower scores than Middens 1 and 3. In contrast, deposits from the Midden 1 and 3 fall within a close range. While it may be argued that the lower scores in the Mound Area and Transect 1 are because the houses were abandoned early in the habitation of the settlement, the scores for these areas are

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comparable to the open midden deposits in the peripheral domestic areas. Thus, the diversity of ceramic objects discarded in the refuse areas of domestic complexes is similar, and the differences between areas appear to be related to how long households were occupied. The low score of Midden 2, although similar to the Mound Area domestic complex, is much lower than those in the Peripheral Zone, and this may again be a result of the damage to this area.

If the diversity index is temporally significant, we would expect an increase in the diversity of household ceramics to correspond to the length of time households were occupied. If this were the case, then the following sequence of house occupation can be suggested:

(1) Mound Area household and possibly the Midden 2 household,

(2) Transect 1 household,

(3) Midden 1 household, and

(4) Midden 3 household.

However, ceramic census data suggest that newly established households, which often with fewer occupants, will have the same range but not the same quantity of ceramics found in older households. For instance, among the Fulani and Gisiga villages in Cameroon (David and Hening 1972), the newly established households at Gisiga have the same kinds of pots but less than a third the number of pots found in Fulani households. The status of the occupants is another factor affecting the apparent relationship between the length of household occupation and the number of ceramic categories represented. Among the Kalinga, for example, households of higher status tend to have greater quantity and diversity of ceramics, including many foreign (not locally made) pots (Longacre 1981). Yet, given these ethnographic cautions, does the sequence make sense within the context of Ndondondwane?

On stratigraphic grounds, the house in the Mound Area was occupied during Horizon 1 and the house that burned down in Transect 1 dates to the same stratum. The problem arises in trying to place the domestic complexes in the Peripheral Zone relative to those in the Central Zone. The DI scores suggest Middens 1 and 3 dates later than houses in the Central Zone, but the problematic data from Midden 2 imply it was established the same time as the first houses in the area. If this were the case, then the inhabitants of the house in the Mound Area may have moved after the initial

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establishment of the village to establish the large Midden 2 domestic complex. The reasons for this are not immediately apparent, but the Mound Area was subsequently used as a craft production area predominated by traditional male crafts. The establishment of the other households is far more difficult place in the sequence because the DI score for the Transect 1 house is identical to the scores for the open middens of Middens 1 and the Central Midden in Midden 3. It is difficult to envision which of the peripheral households the inhabitants of the Transect 1 house would have established, if indeed they stayed on at the village. Complicating matters is the distribution of the ceramics found during the surface survey. Before the excavation of activity areas, clusters of ceramics were a strong indication of the location and relative numbers of household complexes that may one have been in use at Ndondondwane (Loubser 1993: 113). With the new data from the systematic surface survey, there may have been four other households established during the occupation of the site that remain unexcavated (Figure 7.2, A, B, E, and G).

The function of different activity areas over time at Ndondondwane is probably more complicated than has been supposed. Yet, the issue of relating temporal changes in Central and Peripheral activity areas remains. The completeness analysis suggested that the nature of discard practices was different in Peripheral and Central areas and in domestic and non-domestic areas. The diversity analysis, however, suggests that very similar activities occurred in Central and Peripheral zones, and the differences in the composition of domestic assemblages appear to be related to the length of their use. With the exception of the *de facto* refuse found on house floors, the diversity analysis gives us the impression that objects were deposited as secondary refuse in the general activity areas where they were used. It is unlikely that all objects in these different activity areas were used there, and even more unlikely that many objects were not transported to different areas of the settlement during their use life.

SETTLEMENT MAINTENANCE AND ABANDONMENT: A PROVISIONAL MODEL

A consideration of depositional factors affecting the site and the ceramic completeness and diversity data allows a provisional model of ceramic discard at Ndondondwane to be constructed (Figure 7.11). The model must be considered

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provisional because analyses of the spatial patterning of all cultural material at the site are not yet complete.

Domestic Areas

The discard cycle in domestic areas involves four disposal patterns (Figure 7.11). The first involves household maintenance, in which domestic debris, including animal bones, organic debris and sweeping from hearths, is deposited in nearby open middens. At this stage, artifact refuse may be treated as provisional discard. With the second pattern, certain objects may subsequently have been recycled for several purposes. The body sherds that could not be reconstructed on house floors may have been used to repair cracks in walls or decorate the exterior of huts and the ceramic disks may have been used as gaming pieces. Pottery fragments may also have been picked up when gathering organic debris from domestic middens to fertilize fields or household gardens. This suggestion is speculative because the position of gardens and fields in relation to houses during the EIA has not been established. However, this scenario would provide an alternative explanation for the low concentrations of 20 to 45 sherds per m^2 that occur between and behind the domestic complexes at Ndondondwane. Rather than indicating unexcavated parts of domestic complexes, these clusters may instead point to the location of household gardens. The third pattern is a special case and involves the rapid abandonment of the house in Transect 1. The fourth pattern occurs during the final stage of the settlement lifecycle, site abandonment. During abandonment, refuse appears to have been deposited in two ways. First, there are non-routine disposal behaviors, such as filling pits and a slackening of regular maintenance (e.g., accumulation of large amounts of debris to be deposited in pits exemplified by the Western Midden in Midden 3). Second, abandonment also involved other unique discard patterns, such as placing whole and bottomless pots in pits.

Peripheral Activity Areas

Different disposal behaviors occur in the Charcoal Preparation area and the cluster near the old pump house than in domestic complexes (Figure 7.11). Both areas have low completeness and diversity scores, most similar to house floors. However, it is

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unlikely they were maintained in a similar fashion, or even maintained at all. These areas are situated well away from activity areas used on a regular basis and may have served as purposeful or unintentional secondary discard areas. Interestingly, the main use categories identified in these areas include over 240 sherds from cooking, serving and storage/transport containers. Of these, 63% were rim sherds, 22% were neck sherds and 24% were body sherds (Table 7.2). Unlike other areas, there is a high proportion of rim to neck and body sherds, at 63:22:24. All other areas have an average ratio of 23:9:57. These container types are used for gathering water and in daily meals and it is likely that the cooking and serving vessels would have been washed regularly.

The Kalinga of the Philippines provide a useful analog that helps explain this rather light distribution of sherd material at the southeastern part of the site (Longacre 1982). After the evening meal, young girls take the pots down to the river to wash them and then carry water back to fill the water storage jars at home. Many pots are broken in the process, mostly during the rainy season, and sherds are scattered all about the springs and the paths leading to them from the villages. If pots serving similar functions at Ndondondwane were taken down to the river for washing, perhaps filled with water to top up the household's larger water storage jars, over time many pots would have been broken along the way. However, because the slope is not as steep, the water not as far away and the rainy season far less intense, we would not expect the same quantity of broken pots generated by the young Kalinga girls. Also interesting is that we do not find a similar sherd distribution near the terrace edge, and there are remarkably few sherds below this near the river edge. The pattern is only found in the southeastern part of the site. In a direct line about 300 m in this direction, the Thukela sharply changes course from the SSE to the NE. The section of the Thukela River immediately to the southwest of Ndondondwane moves rather quickly. However, today to the southeast of the site there are rapids on the southeast side of the river and slow moving water on the northwest side. Local residents use sections of the southwestern bank for swimming, bathing, fishing and, further downstream, washing clothes. Although the river would have been different about 1200 years ago, the course would have been similar and the southwestern bank would have been an ideal location for washing pots and gathering water. Thus, unlike houses and other areas of the site, discard in the southeastern part of the site may have been unintentional as pots were lost and/or broken while in use.

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Central Activity Areas

A key result of this analysis is that changes in the function of central activity areas inferred by the excavators were detected in the study of ceramic discard. As such, discard patterns in Central areas are far more complex than in domestic or peripheral activity areas. Maintenance patterns in the Central Zone involve the provisional discard of secondary refuse within the confines of the main activity areas or in nearby secondary open middens in Transect 1 and 2 (Figure 7.11). During Horizon 2, the Dung Area has high completeness and diversity and the Mound Area displays low completeness and high diversity. These data suggest several disposal patterns in the Central Zone:

- Primary refuse accumulated from activities in the Human Activity Zone of the Dung Area and craft production in the Mound during Horizons 1 and 2.
- Secondary refuse from domestic areas began to accumulate in the Dung and Mound Areas during the same period.
- The low completeness in the Mound Area also suggests that some refuse, including the ceramic heads, was moved from the Dung Area to the Mound. Unlike other locations at Ndondondwane, space is at a premium in the Dung Area because most activities occurred within the eastern end of the enclosure. Most refuse in the Dung Area was likely deposited temporarily and accessible to anyone. Some artifacts may have been reused, while others were removed to the Mound Area. This movement of refuse coincides with activities in the Dung Area that generate a high volume of debris, such as iron smelting, or requires space, such as food preparation and eating.
- The pattern may have been reversed at the end of Horizon 2, for in the Dung Area there is very low completeness and diversity during Horizon 3. In the Mound during Horizon 2, the northwestern portion of the structure was dismantled and there was a rearrangement and cleaning of the area in preparation for iron smelting.

Thus, in the Central Zone, *activity locus maintenance* within the Dung Area is characterized by secondary discard while *area maintenance* is characterized by the disposal of refuse from one activity area to another. The exception to this pattern is Transect 2. This area has the same discard patterns and types of ceramics found in domestic areas. While a house may also have been situated here, or nearby, early in the site's history, it is more likely the area shifted from an open gathering area where food

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was eaten to a secondary midden. Boys or young men charged with tending the livestock may have initially taken their meals in this area. This being the case, the house in Transect 1 could not have been constructed and occupied when Ndondondwane was first established. The house is securely dated on stratigraphic grounds to Horizon 1, and must therefore date to Horizon 1b, concurrent with the Lower Loose Dung horizon in the Dung Area. After the house burned down at the end of Horizon 1, this area of the village was not longer utilized, and instead served as a causal discard area.

SEQUENCE OF SETTLEMENT OCCUPATION

A major implication of the maintenance and abandonment model is its ability to suggest relationships between activity loci at the settlement that cannot be connected stratigraphically. This refines the temporal scheme outlined in Chapter 5 (see Figure 5.7). Based on these temporal relationships, a revised model of the history of occupation of Ndondondwane can be suggested (Table 7.3).

Horizon 1

The spatial and temporal distribution of ceramics at Ndondondwane indicates changes in the use of these activity areas throughout the occupation of the site. During the initial occupation of the settlement, the livestock enclosure was constructed and a house was built nearby in the Mound Area. Following this, the first house was abandoned, and another house was placed southwest of the enclosure in Transect 1. Not only is this sequence secured on stratigraphic grounds, but the ceramic diversity confirm that fewer use categories ($n = 7$) were in use during this horizon than in later ones ($n = 9$). Unlike later activities, which may have involved the use of sculpture as ritual equipment, the activities that occurred during Horizon 1 were largely focused on the domestic cycle. The end of Horizon 1 is marked by the conflagration involving the house constructed southwest of the livestock enclosure.

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Horizon 2

During the main occupation of the village, the function of Central areas changed. In the Mound Area, a circular structure was constructed after the house was abandoned, and the area was then used for making ivory objects, processing wild game, and a portion of it was used as a refuse area. The eastern portion of the livestock enclosure was used for several activities, such as iron forging, roasting meat over a large open depression, and the discard of animal bones, pottery, ash and other debris resulting from these activities. The analysis of ceramic discard patterns indicates that the ceramic heads and figurines deposited in the Mound were not originally used there. Mask fragments and a figurine were found in both the Mound and Dung Areas, and the sculpture deposited in the Mound was thrown against the outside (NW) wall of the rectangular structure.

Households have a similar array of ceramics characteristic of domestic activities: food preparation, serving, eating, transport and short- and long-term storage vessels. However, each household neither has the same functional classes of ceramics nor do they occur in the same proportions. For instance, toys are only found in Midden 1, and Midden 3 has a disproportionate number of serving and storage-transport vessels. This suggests that utilitarian pottery, which we would commonly expect to find in household contexts, was used and deposited in Central areas during the main occupation of the site. Therefore, the ceramics found in domestic contexts are only partially representative of the total range of ceramic types and the uses they were put to in households during the EIA.

The ceramic data suggest a revision to the house occupation sequence at Ndondondwane. I propose houses were occupied in the following order:

Horizon 1a. Established: Mound Area
Horizon1b. Abandoned: Mound Area. Established: Transect 1, Middens 1 to 3.
Horizon 2. Abandoned: Transect 1. Continued: Middens 1 to 3.

Before abandonment, the function of the Mound Area again shifted. The circular structure was dismantled, and the heads and figurines found in this horizon have associated fragments in the Human Activity Zone of the Dung Area. It is again likely the

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sculpture was originally used in the Human Activity Zone and then later discarded in the Mound.

Horizon 3

Abandonment of the site appears to have been well planned and gradual. Areas were not abandoned rapidly, although abandonment of the site itself may have been a single event. A pure ash horizon indicates a cessation of activities in the Dung Area during Horizon 3. On at least one occasion, iron was smelted in the Mound Area at the time the ash layer was accumulating in the Human Activity Zone of the Dung Area. This would make it appear that smelting occurred after the Human Activity Zone, and presumably the settlement, was abandoned. However, the Upper Loose Dung in the Animal zone and the Upper of the Middle Horizon in the Human zone occur at similar depths, and there is no reason to assume that ash was dumped in the Human zone *after* cattle were moved from the enclosure. As such, iron smelting may have been an event that occurred the complete abandonment of the settlement, although it represents the final activity that occurred in the Mound Area.

In the domestic zone, all the refuse, tools and implements from each household were discarded in open middens and dung-lined pits once used for grain storage. No pits were excavated to hold refuse. The dumping episodes may have occurred over a short period, but discrete microstrata in pits marked by changes in soil color and artifact classes (e.g., grinding stone on the top of pit fill) indicate that abandonment was not a single, massive disposal event (Greenfield and van Schalkwyk n.d.; Greenfield *personal communication* 2002). The evidence for planned and gradual abandonment implies that ecological or economic factors may have played a significant role in the plans to relocate the settlement. As the nutrient levels of the soils around the village depleted (van Schalkwyk 1994/95), the community may have begun to actively seek out locations for a new village. The same pattern of village establishment seen at Ndondondwane may have been repeated. If this pattern of settlement establishment and abandonment was typical during the EIA, it is unlikely that a single village was occupied continuously for more than one ceramic phase.

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CHAPTER SUMMARY

This chapter discusses site formation processes at Early Iron Age Ndondondwane from the perspective of ceramic distribution at the site. Several properties of the ceramic assemblage sensitive to natural and cultural depositional and post-depositional phenomenon were examined: (1) sherd condition, (2) sherd size, (3) the density of ceramics in depositional areas, (4) the diversity and (5) the "brokenness" of ceramics in depositional areas. The analysis indicates that post-depositional formation processes have not damaged the stratigraphic integrity of the site, but certainly played a role in the distribution of material culture in the Peripheral Zone. Discard practices have more strongly influenced the co-occurrence of objects originally used in locations other than where they were finally deposited.

Several disturbance processes were discussed to gain some indication of their affect on ceramic distribution and variability at Ndondondwane. I considered four natural and cultural taphonomic post-burial processes: disturbance of deposits by animals, soil creep, water and modern land use activities. Although each process affected artifacts, features and the archaeological stratigraphy of the site differently, it was suggested that biotic activity did not substantially alter the archaeological stratigraphy of the site and that the effects of downslope soil erosion and plowing had more pronounced effects on domestic deposits located further upslope of river in the Peripheral Zone. It was concluded that plowing substantially affected the preservation of Middens 2 and 4. However, in later analyses, Midden 2 consistently scored lower than other domestic complexes, but not enough that the area could not be identified as a domestic area.

Through an analysis of patterns of ceramic completeness and the diversity of ceramics in different activity loci, it was possible to infer three types of pre-abandonment deposit at Ndondondwane: (1) those in settings where routine, daily and domestic activities occurred in the Central and Peripheral Zones, (2) those resulting from communal activities that occurred in the Central Zone (Dung Area, Horizons 1 and 2), and (3) deposits resulting from specialized activities in both the Peripheral and Central Zones. Five types of "trash" and abandonment deposit may also be distinguished: (1) open middens used as provisional discard areas in the Central Zone (Transect 1 and 2), (2) area where unintentional discard occurred on the periphery of the settlement, (3) *de facto* abandoned house floor debris, (4) domestic grain storage pits used to discard

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household debris during abandonment, and (5) one open midden that accumulated primarily if not exclusively during abandonment. In the following chapters, I discuss these functional inferences derived from the ceramic data in relation to evidence for the organization of other activities at Ndondondwane.

Also significant is that site-wide patterns of ceramic discard at Ndondondwane indicate changes in the function of activity areas in the Central Zone and permit some insight into the management and scheduling of household activities and the clearing of debris resulting from daily activities. The analysis clarifies certain hypotheses about discard practices at the site proposed by the excavators:

- The Mound and Dung Areas were utilized to dump artifacts commonly in use at other areas of the settlement, but the refuse deposited in the Central activities areas was used there. However, there are instances when ceramics used in one activity area was deposited in another. In particular, the ceramic heads and figurines deposited in the Mound Area are secondary discard from the Dung Area. Therefore, they were not used in the Mound Area and are not functionally associated with the circular structure or later deposits in the Mound.
- Domestic middens are in provisional discard mode during the occupation of the settlement. The low frequency of ceramic objects in most domestic middens implies that pottery was regularly culled for reuse.
- Pits in domestic areas were filled with domestic debris before and during abandonment. By the abandonment of the site, all central areas show a mix of primary and secondary discard behavior. This would be expected if the village were abandoned at one time.
- The rapid abandonment of the burned hut in Transect 1 does present a case of *de facto* refuse disposal. A similar pattern was found in Midden 3, although the conditions surrounding each case are different. The Transect 1 house was abandoned rapidly because it burned down, while debris in the Midden 3 house was simply left in the house during the abandonment of the village. In effect, only the material in and around the house structure in Transect 1 approximates "Pompeii premise" conditions, where the everyday functioning of the household was interrupted and items were found where they "dropped" (Binford 1981b).

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Evidence for the changing function of activity areas during the occupation of Ndondondwane contradicts the CCP model, which predicts that the function of discrete activity loci will remain constant during the occupation of a settlement. However, knowledge of discard practices alone cannot be used to evaluate the ideational hypotheses of the model relating to the meaning attached to spaces within settlements. The nature of different activities that occur in areas over time must be considered in more detail. In the following chapters, I consider the organization of production activities at Ndondondwane (Chapter 8) and the ceramic evidence for the organization of social and ritual life at Ndondondwane (Chapter 9).

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Table 7.1. Completeness and diversity measure values for activity loci at Ndondondwane.

Activity Area	Horizon	Sub-Area/Features	N_s	N_e	Completeness Index Score (CI)[a]	Number of Use Categories Present (N_p)	Diversity Index Score (DI)[b]
Dung Area	1-4		1969	87	44	5	56
	3	Ash horizon	587	12	21	4	44
	2	Micro-activity areas	4987	217	44	6	67
	1		5852	303	52	7	78
	Total		13395	621	46	7	78
Mound Area	1-4		9114	242	27	6	67
	3	Smelting	103	1	12	3	33
	2	Craft production area	3931	90	23	7	78
	1	Domestic complex	2664	142	53	4	44
	Total		15812	474	30	9	100
Transect 1	1-4		64	2	31	2	22
	3		0	0	0	0	0
	2		773	30	39	4	44
	1	Domestic complex	1565	13	8	5	56
	Total		2402	45	19	5	
Transect 2	1-4		173	3	17		
	3		312	4	14	2	22
	2		104	1	13	2	22
	1		30	2	53	1	11
	Total		619	10	17	2	
Midden 1	1-4	Domestic complex	1272	72	57	6	67
		Pits	531	26	49	6	67
		Open Middens	741	45	61	5	56
	Total		1272	72	57	6	67

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Table 7.1 (Continued)

Activity Area	Horizon	Sub-Area/Features	N_s	N_e	Completeness Index Score (CI)[a]	Number of Use Categories Present (N_p)	Diversity Index Score (DI)[b]
Midden 2	1-4	Domestic complex	439	20	46	4	44
Midden 3	Levels 1-4		10727	819	76	7	78
		Western Midden	5446	565	104	6	67
		Central Midden	5012	255	51	6	56
		House area	321	4	11	3	33
	Total		10727	819	76	7	78
Midden 4	1-4		63	0	0	–	–
Charcoal Preparation Area	1-4		11		0	3	33
Pan-Site	1-4		23301	1219	52	9	100
	3		1002	18	18	9	100
	2		9795	338	35	9	100
	1		10111	460	45	7	78
	Total		44209	2035	46	9	100

[a] Completeness Index (CI) = N_s (Number of sherds) / N_e (Number of estimated object equivalents) x 1000.

[b] Diversity Index (DI) = N_p (Number of use categories present)/ N_t (Total number of use categories identified in assemblage = 9) x 100.

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Table 7.2. Percentage of sherds extent categories represented in each activity area

	Rim Sherds (R-, R+)[a]		Neck Sherds (N-, N+)		Body sherds (B-, B+)		Base sherds (BA-, BA+)		Nearly complete objects (T-, T+)		Complete objects (T)		Other[b]		Total	
Area	N_s	N_s % Area	N_s	N_s % Area	N_s	N_s % Area	N_s	N_s % Area	N_s	N_s % Area	N_s	N_s % Area	N_s	N_s % Area	Total N_s	Total N_s % Area
Dung Area	3411	25.4%	660	4.9%	8912	66.2%	32	0.2%	47	0.3%	8	0.1%	384	2.9%	13454	100.0%
Mound Area	3760	20.1%	798	4.3%	14098	75.2%			30	0.2%	7		54	0.3%	18747	100.0%
Transect 1	330	13.7%	259	10.7%	1722	71.5%			91	3.8%	1		7	0.3%	2410	100.0%
Transect 2	100	16.2%	8	1.3%	499	80.6%							12	1.9%	619	100.0%
Midden 1	458	36.0%	188	14.8%	542	42.6%			70	5.5%	3	0.2%	11	0.9%	1272	100.0%
Midden 2	84	19.1%	92	21.0%	127	28.9%			7	1.6%	2	0.5%	127	28.9%	439	100.0%
Midden 3	3110	28.8%	337	3.1%	7034	65.1%			210	1.9%	13	0.1%	96	0.9%	10800	100.0%
Midden 4					30	42.3%							41	57.7%	71	100.0%
Charcoal Preparation	28	32.6%			33	38.4%							25	29.1%	86	100.0%
Pump House	117	80.7%	4	2.8%	22	15.2%			1	0.7%	1	0.7%			145	100.0%
Surface Survey	99	64.7%	47	30.7%	7	4.6%									153	100.0%
Uncertain	25	2.6%	2	0.2%	933	97.2%									960	100.0%
Grand Total	11522	23.4%	2395	4.9%	33959	69.1%	32	0.1%	456	0.9%	35	0.1%	757	1.5%	49156	100.0%

[a] See pp. 147-148 for definition of sherd extent categories.

[b] This category includes appliqué fragments, indeterminate sherds and other fragments of ceramic for which this classification was not applicable (such as ceramic coils and ecofacts).

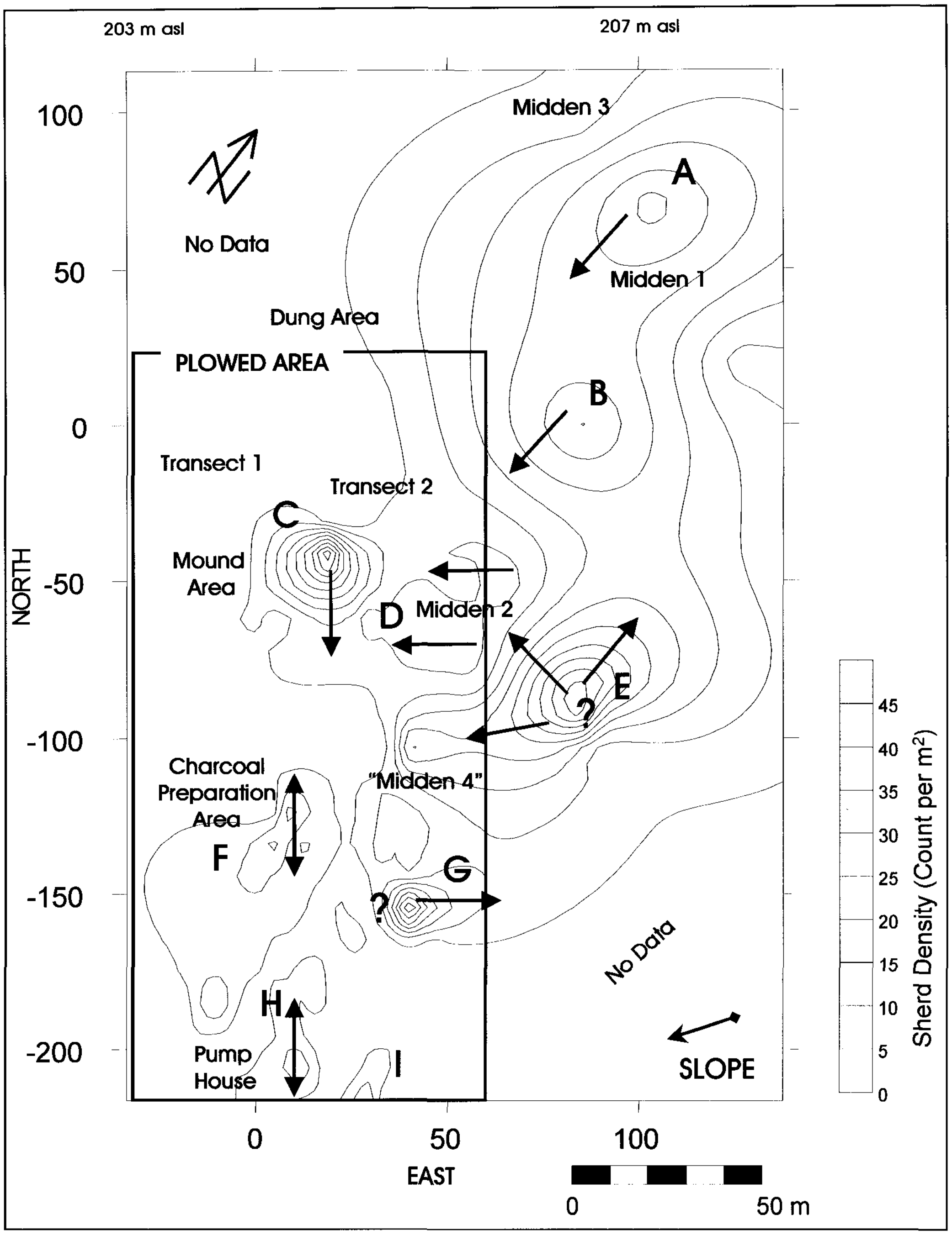

Figure 7.1. Density distribution of sherds collected from the surface and plow zone at Ndondondwane with arrows showing the direction of the gradient away from high-density sherd concentrations labeled A to I. The blocked area shows the extent of the plowed field at Ndondondwane in relation to major activity areas.

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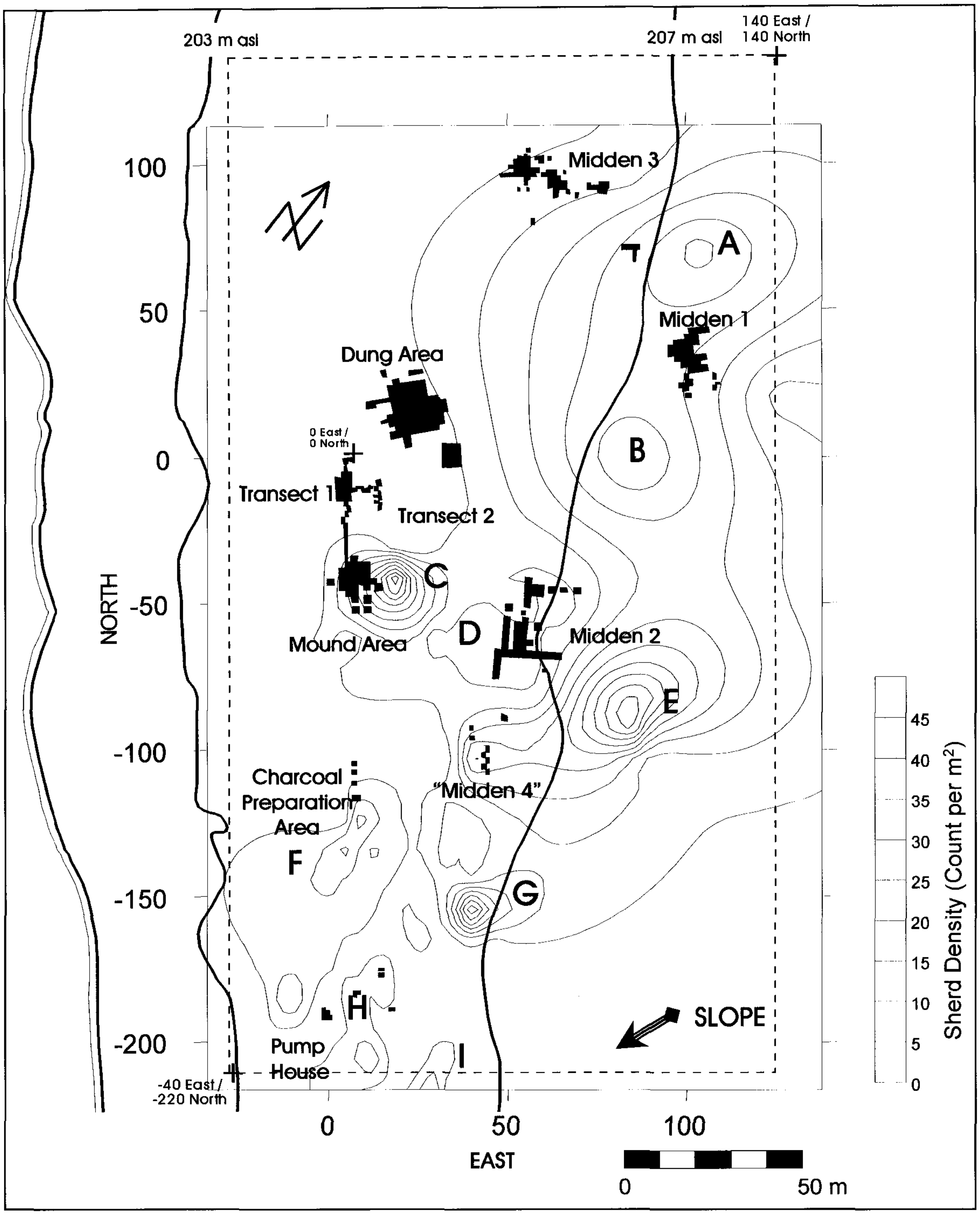

Figure 7.2. The density distribution of sherds collected from the surface and plow zone at Ndondondwane in relation to the extent of the plowed field and location major activity areas.

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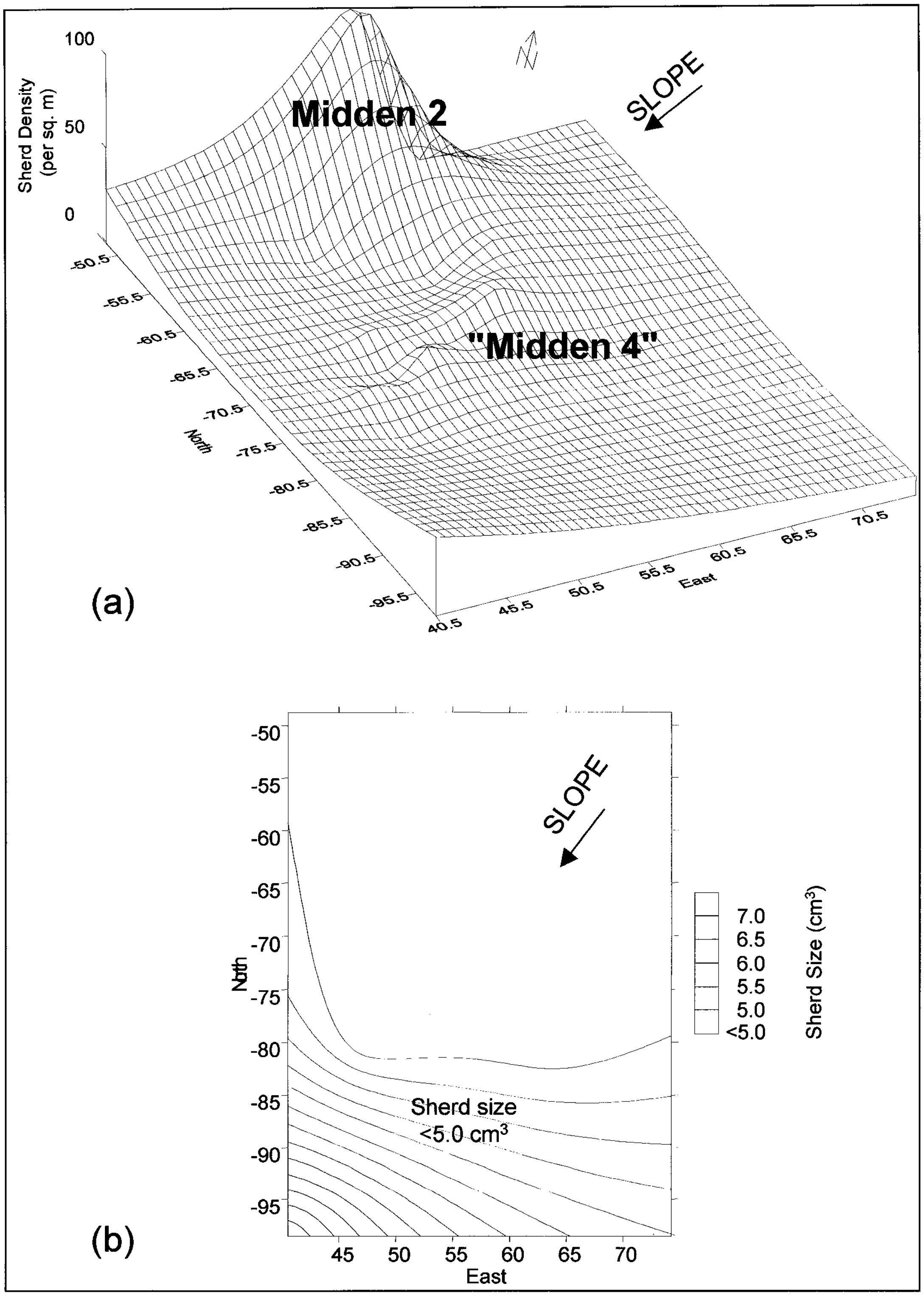

Figure 7.3. Surface distribution of sherds in the Midden 2 area: (a) density distribution (sherd count per m^2), (b) sherd size distribution (size calculated as surface area in cm^3).

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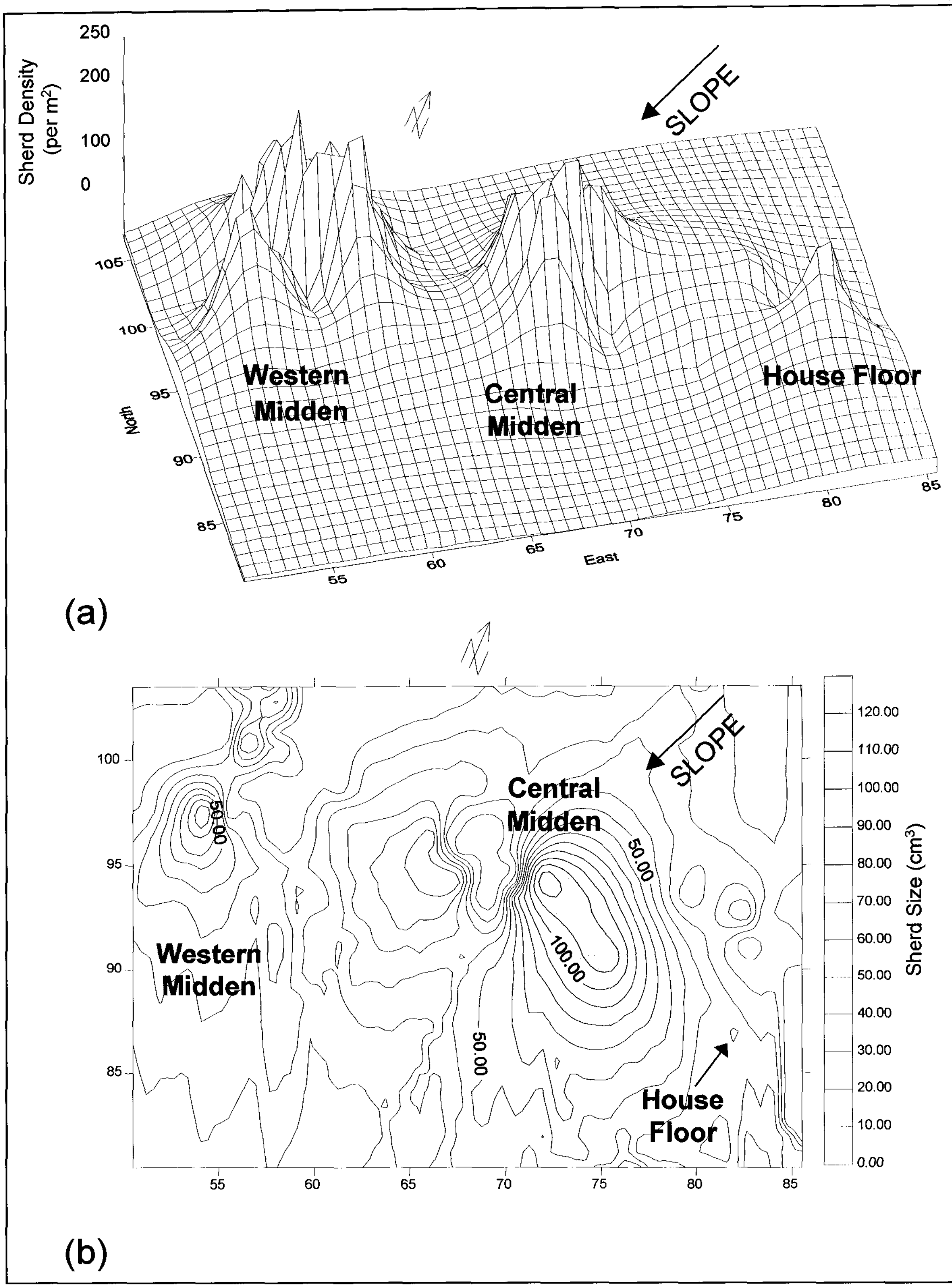

Figure 7.4. Surface distribution of sherds in the Midden 3 area: (a) density distribution, (b) sherd size distribution (size calculated as surface area in cm3).

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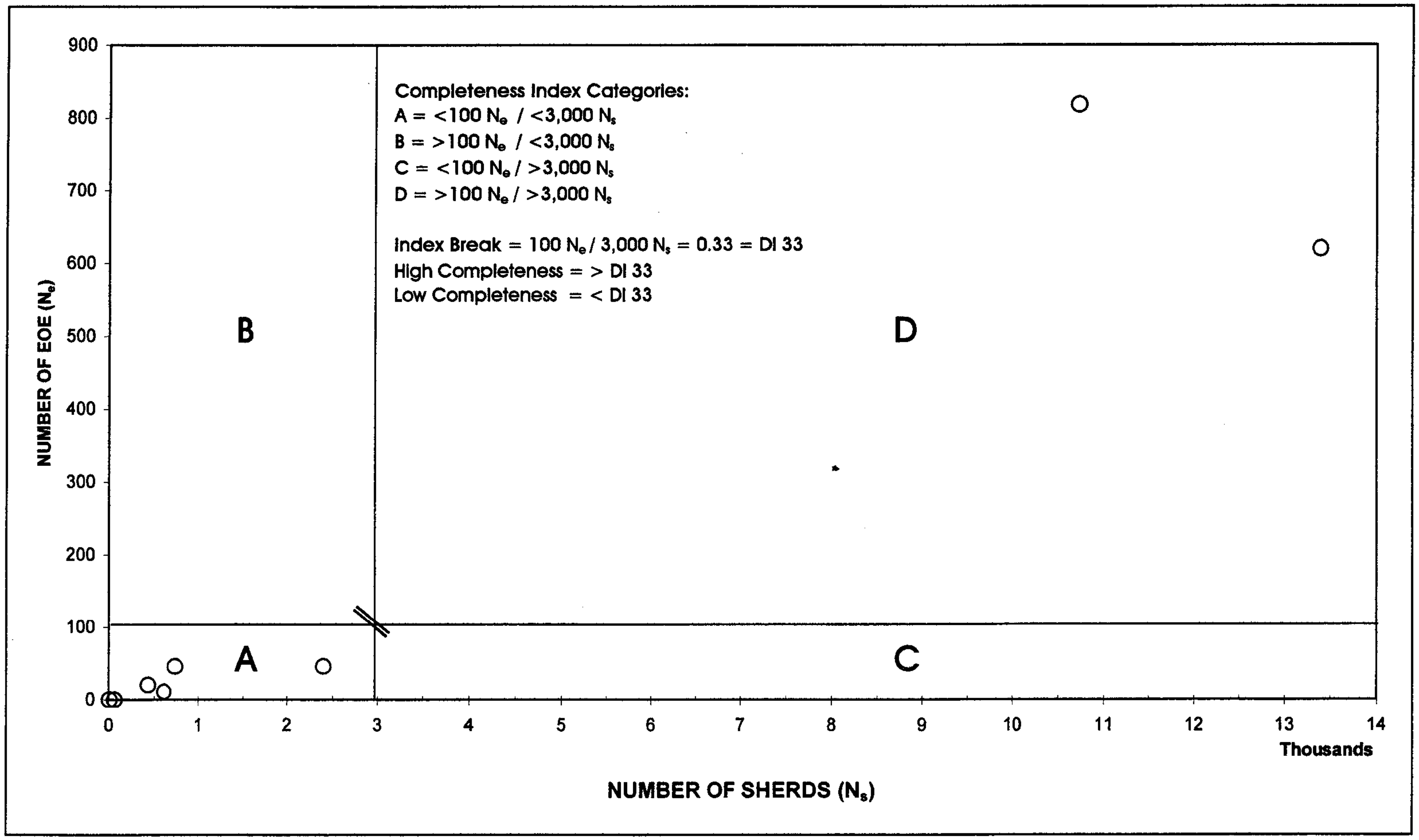

Figure 7.5. Ndondondwane completeness index (CI) categories. Plot shows the ratio of ceramic objects (EOE) to fill-sherds for all horizons at major activity areas (excludes coring and surface collection).

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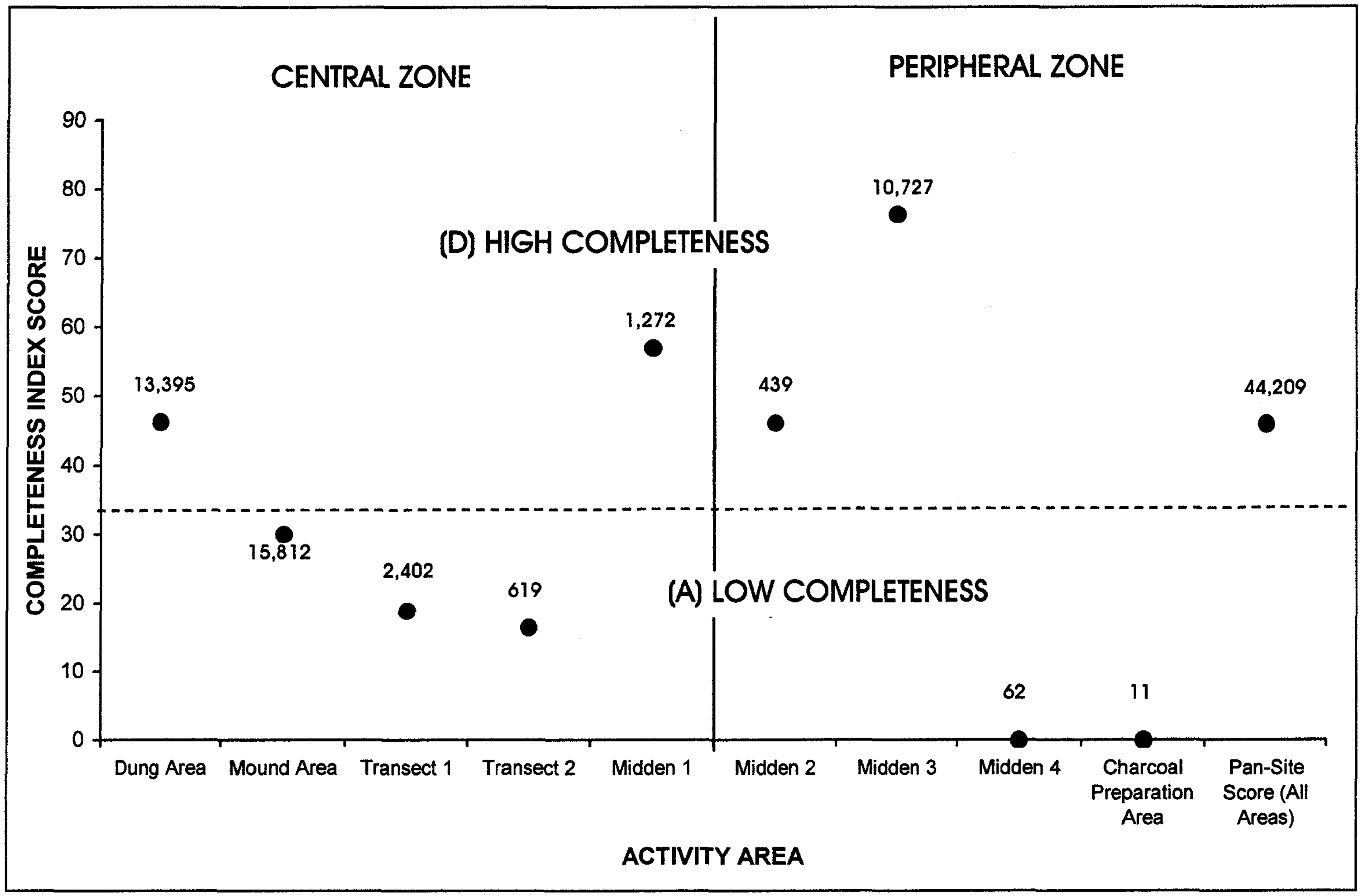

Figure 7.6.Ceramic completeness index (CI) scores for the major activity areas at Ndondondwane Numbers above index scores refer to the total number of sherds recovered from the locus excluding those collected during auguring and surface collection.

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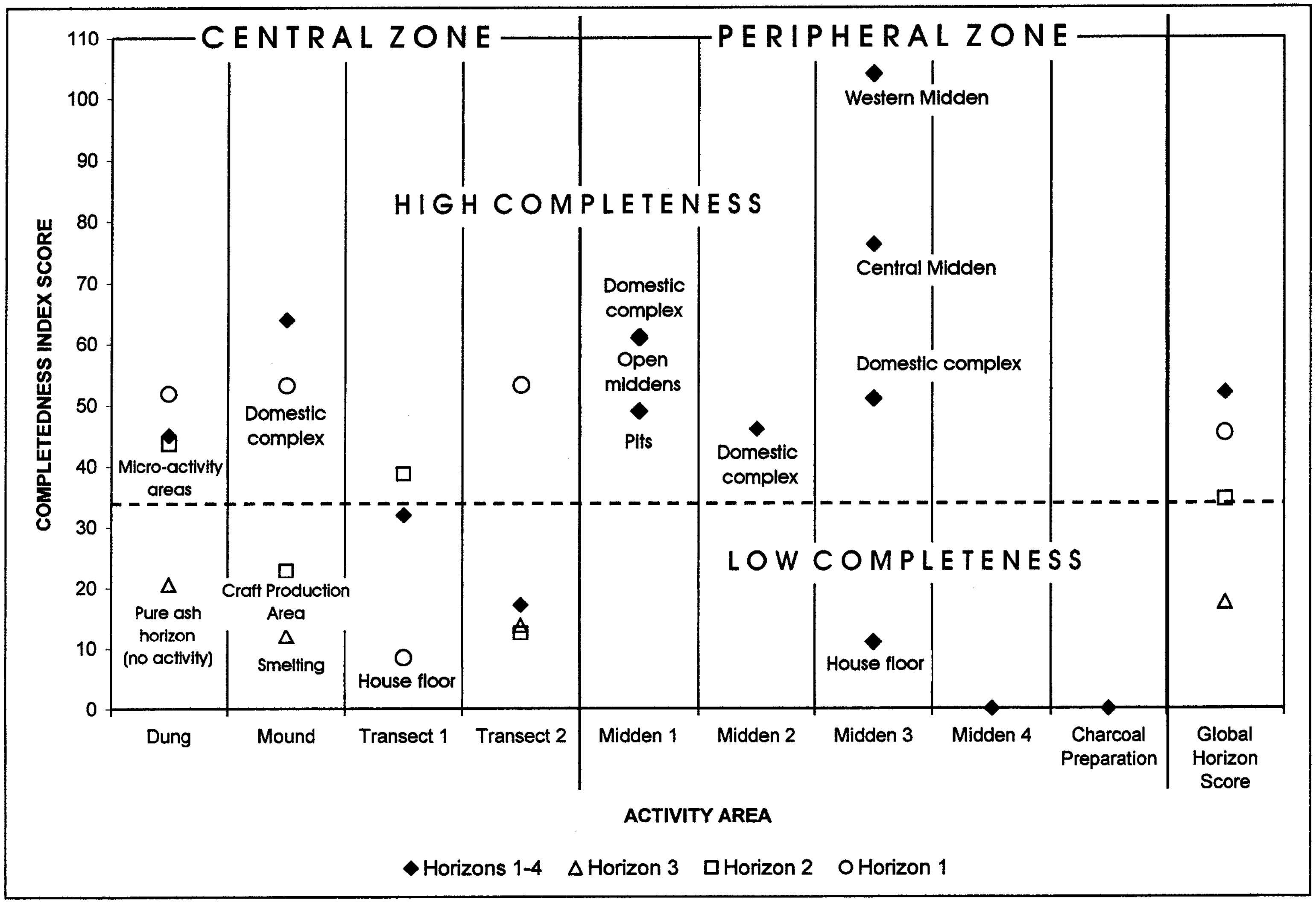

Figure 7.7. Ceramic completeness index (CI) scores for horizons and features at major activity areas.

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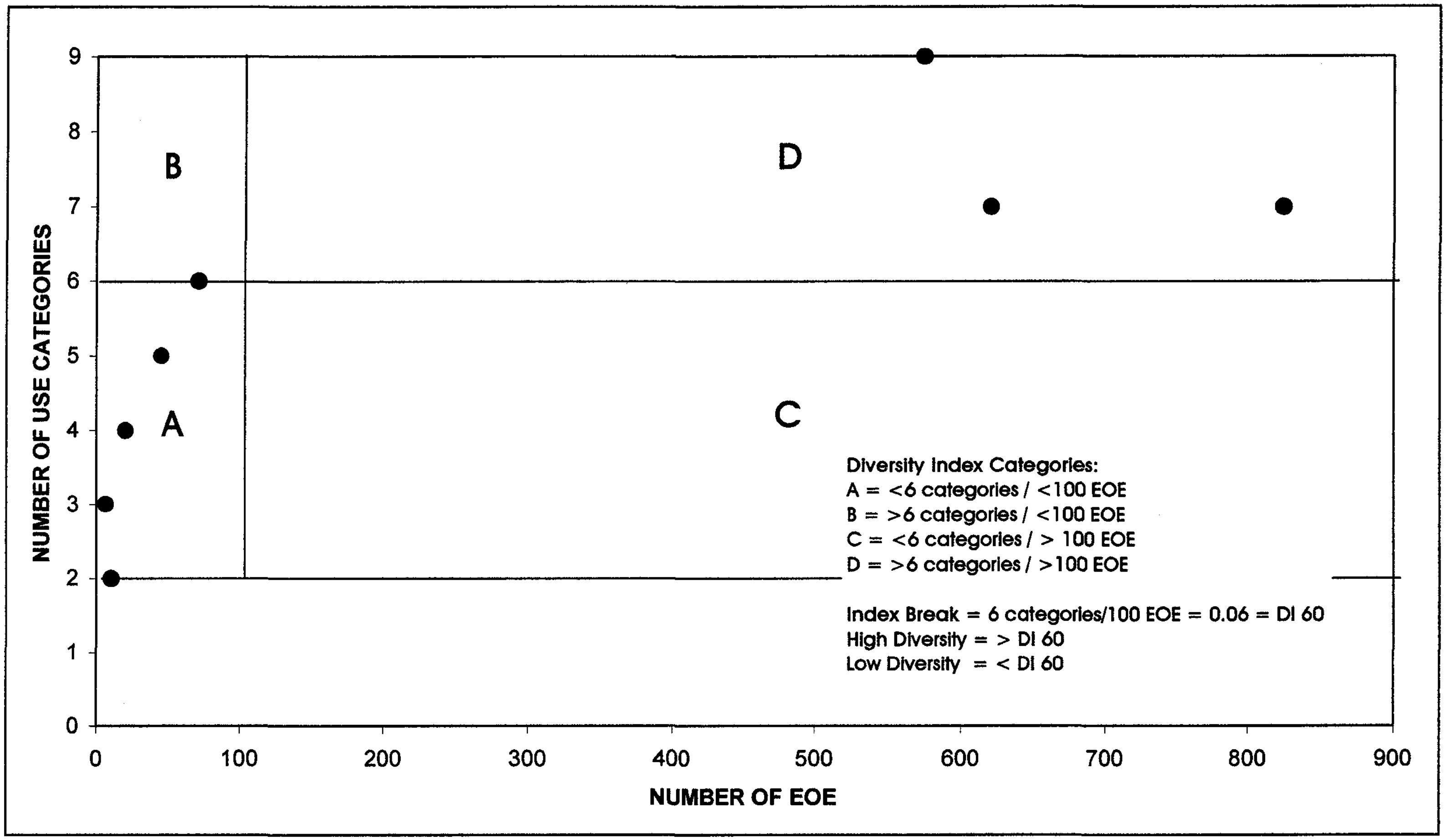

Figure 7.8. Ndondondwane diversity index (DI) categories. Plot shows ratio of ceramic objects (EOE) to the number of use categories identified for all horizons in major activity areas.

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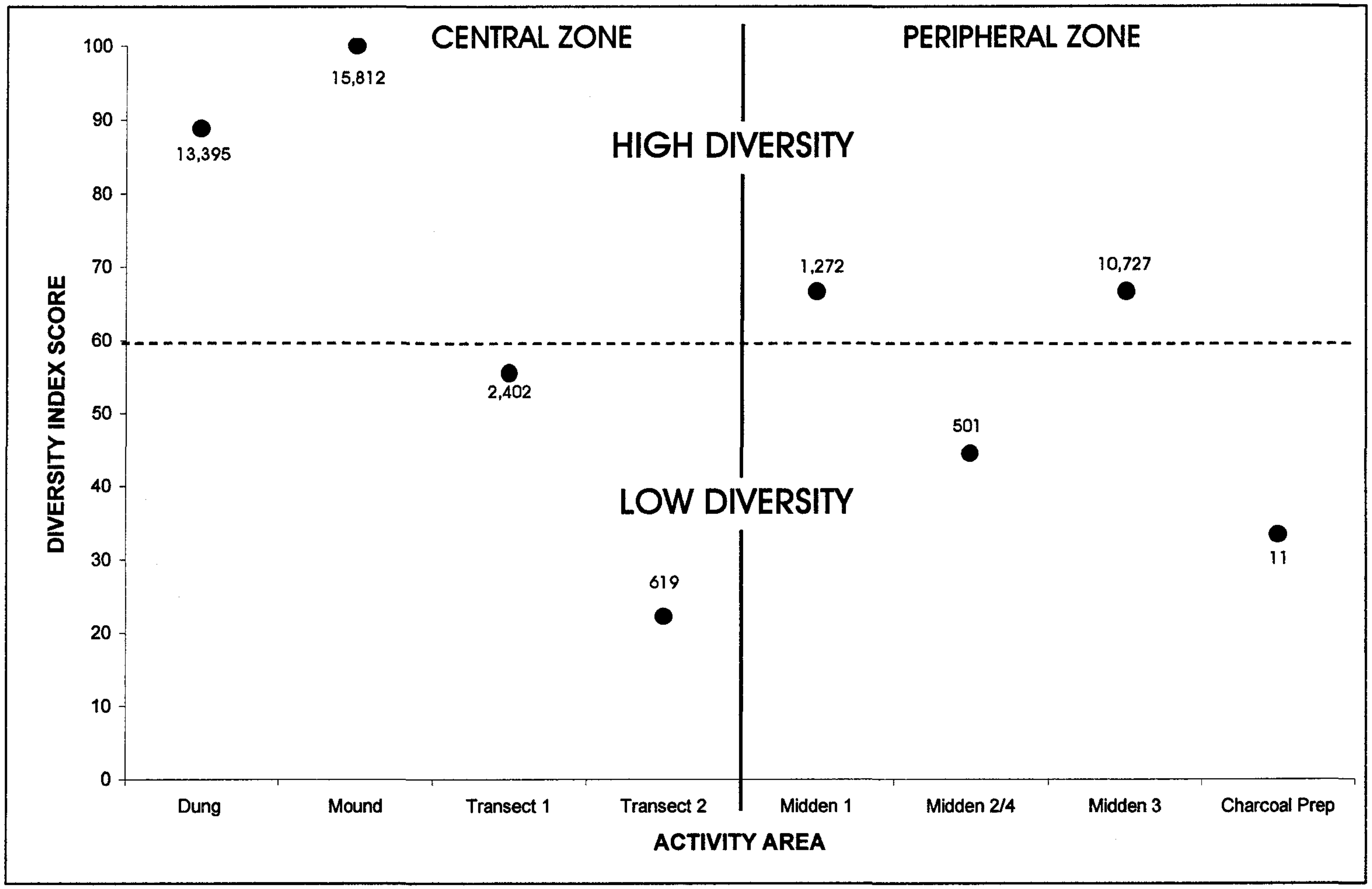

Figure 7.9.Ceramic diversity index (DI) scores for all horizons of major activity areas at Ndondondwane.

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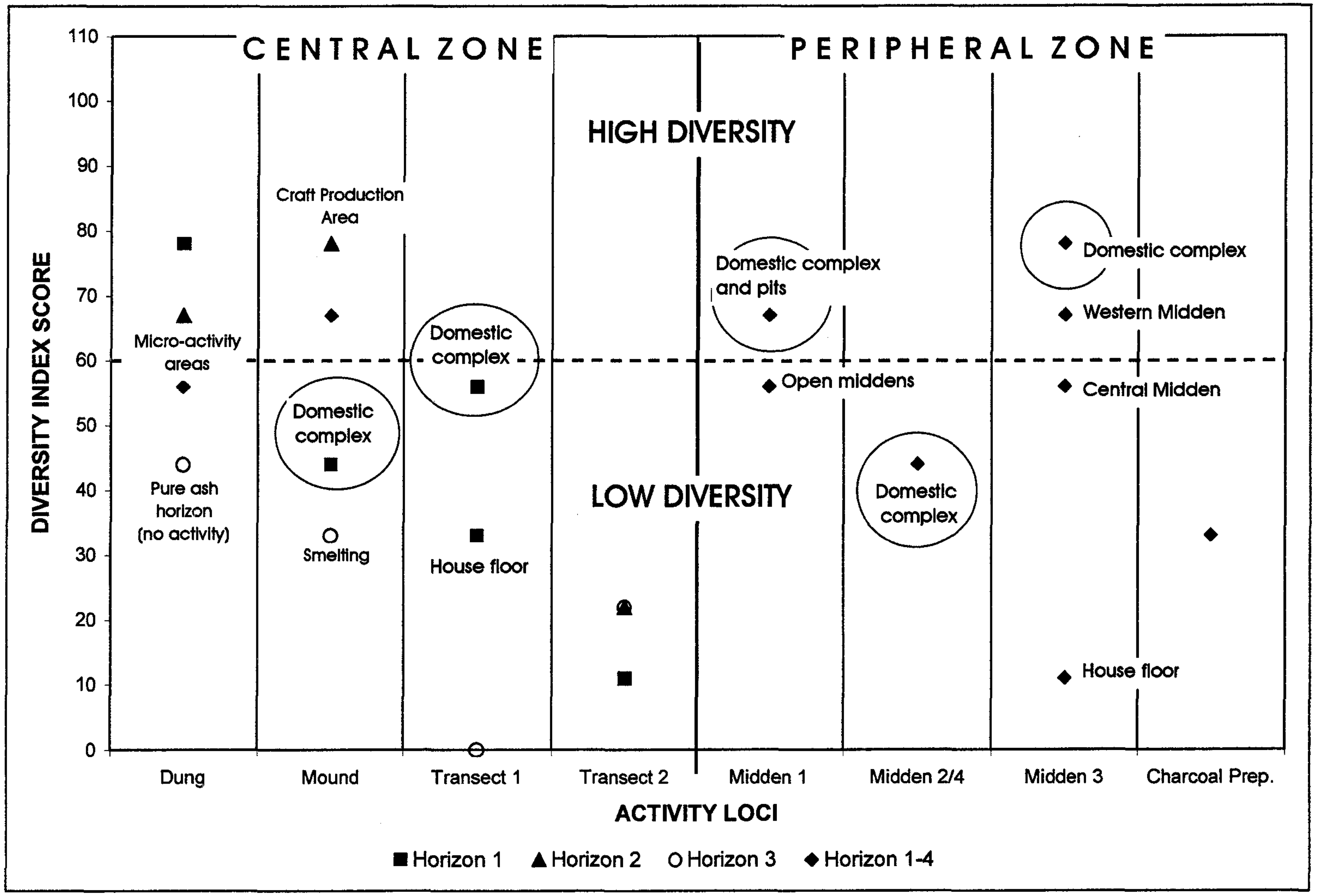

Figure 7.10. Ceramic diversity index (DI) scores for horizons and features at major activity areas.

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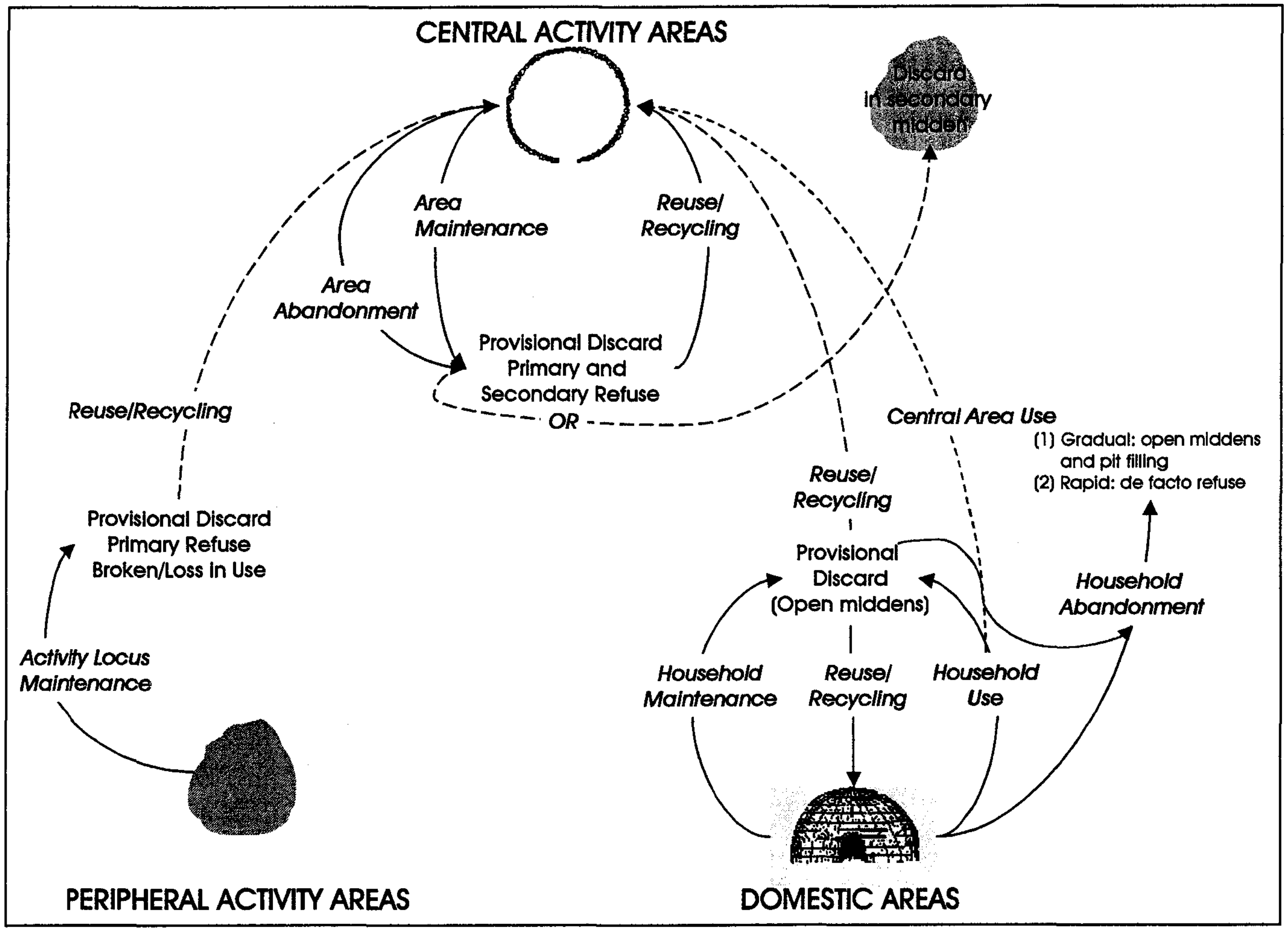

Figure 7.11. A provisional model of activity area maintenance and abandonment at Ndondondwane.

CHAPTER 8

CERAMIC PRODUCTION AND SPATIAL ORGANIZATION

Economic, social and symbolic explanations of the production of goods in EIA communities are implicit in the Domestic Mode of Production (DMP) and Central Cattle Pattern (CCP) models. According to Hall's (1987) model, the economic organization of EIA communities should conform to the expectations of the household, or Domestic Mode of Production (*sensu* Sahlins 1972); the kinds and quantity of goods produced will be geared towards domestic replacement and labor would likely involve the nuclear or extended co-resident family. The CCP implies that labor will be organized according to gender and social standing and this should be visible in spatial terms with male- and female-related production activities being spatially segregated in villages and houses (Kuper 1982). In this chapter, I evaluate these expectations through a study of the social and spatial dimensions of the ceramic *chaînes opératoires* at Ndondondwane. The intention of the ceramic *chaînes opératoires* approach is to investigate basic questions about ceramic production: who did what, where, including or excluding whom, and why. To meet this objective, the production sequence must be examined as a series of economic and socially influenced decisions.

In the first section, the sequence of technical stages that compose ceramic *chaînes opératoires* are reconstructed and described in terms of clay acquisition, preparation, fashioning, decorating and firing. Based on these data, I first attempt to infer the organization of pottery economics at Ndondondwane through a study of ceramic production technology and the scale and intensity of production. In the subsequent section, I endeavor to explain why decisions made in the production process were chosen over other possible alternatives by interpreting the choices made during technical stages as a sequence of socially influenced decisions. The chapter closes with a discussion of the implications this analysis has for understanding production scale and intensity, labor organization, the social context of ceramic production at Ndondondwane, and the spatial organization of crafts production during the EIA.

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THE CERAMIC PRODUCTION SEQUENCE

Clay Acquisition and Preparation

In the eastern lowlands of South Africa, coastal and inland pottery fabrics reflect the local geology. Mzonjani phase pottery is restricted to the coast and was made with local sandy clays characteristic of the Pleistocene dunes underlain by the Berea Red Formation (Maggs 1980c). Mzonjani pottery has low proportions of sand to clay and a high content of organic material. Pottery of the subsequent Msuluzi, Ndondondwane and Ntshekane phases contain minerals characteristic of the inland geological regime, primarily quartz (Maggs 1980a, 1984; Hall 1981: 49; see Figure 5.1).

In order to determine if clays were from local or non-local sources, the petrology and chemical properties of archaeological sherds from Ndondondwane were compared with the work of modern potters in the area. Only the mineralogical assessment of the EIA and contemporary fabrics can be considered at this stage, as chemical analysis of the ceramics is not yet complete. Nevertheless, these data do permit some significant observations.

As suggested in Chapter 6, the clays used to make Ndondondwane pottery are relatively fine-grained and normally have organic content. The only minerals that may be considered candidates as tempering material are quartz, mica and gneiss. Limestone and iron oxides are very rare constituents of the Ndondondwane fabrics, but are characteristic of the geology of the Thukela Basin. While gneiss may be more common, gneiss grains are typically small, have high sphericity and are well rounded. However, the quartz in many specimens is large and angular (Figure 8.1(a)). Mica flakes are also usually small and rare, but there are a few sherds, probably from a single vessel, with high mica content (Figure 8.1 (b)). These data suggest that secondary (sedimentary) clays were used in making pottery at Ndondondwane. Large, blocky minerals are uncommon in secondary clays, so quartz was probably added as temper in some instances. Mica may or may not appear in Group 1 and 3 fabrics and was not likely added as temper. Thus, it is unlikely that potters sought mica-rich deposits. However, the identification of clays to secondary sources also means that clay deposits anywhere along the river could have been exploited. Inferring the location of clay deposits is quite

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problematic without the results of a chemical characterization analysis. However, when the Ndondondwane specimens are compared with modern sherds, the small quantities of silver and gold mica in the fabrics narrow clay sources down further.

Archaeologists working in the Thukela Basin have long recognized gross similarities in the composition of archaeological sherds and sherds from the works of modern potters (van Schalkwyk, personal communication, 1997). During 1997 and 1998, I interviewed potters of two clans in the lower basin to gain a preliminary understanding of modern Zulu pottery manufacture. Part of the interviews focused on resource acquisition of both clay and pigments.

Potters of one family clan obtain iron- (reddish) and organic-rich (blackish) clays from two different alluvial deposits located along the banks of the Nsuzi River within two kilometers of their homesteads. No tempering material is added to the clay, as Zulu potters feel it is unnecessary to add tempering material if one finds the right clay (or *ubumba*). Potters of the other family also obtained reddish and black clays, although from alluvial deposits along the banks of the Wozi River. Potters from both families grind and mix the clays in much the same way and add no tempering material.

In its raw state, the clay used by these potters contains a variety of small and well-rounded naturally occurring minerals typical of secondary alluvial sediments. An examination of the raw clays and the sherds of finished vessels revealed that the primary minerals include quartz, decomposing limestones and granites (like gneiss and dolomite), calcite granules, and mica (both silver and gold), which are typical of the local geology (Brink 1981; du Toit 1954; Luyt 1976). Only the organic-rich clays have mica. The finished products look very similar to the Ndondondwane specimens (Figure 8.2). These ethnographic observations shed new light on the acquisition and preparation of clays used in manufacturing the Ndondondwane ceramics.

The presence of mica in the Ndondondwane fabrics suggests that similar clays were collected and processed during the EIA. A significant number of the sherds examined from Ndondondwane have gold and/or silver mica (n_s = 4,201/ 11,618 or 36.2%). Since mica is only found in black clays used by potters today, the modern comparative data suggest local iron- and organic-rich clay sources were also used during the EIA. However, mica is only found with fabrics that have quartz or gneiss, and it is quite possible that micaceous and non-micaceous clays were mixed. This conclusion is

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somewhat speculative because the presence or absence of mica only implies mixing. This cannot be confirmed without a comparative chemical analysis of both archaeological and modern samples.

Regardless which clays were mixed, the mineralogy does point to the use of clays from differences sources in the valley. It is quite likely that the clays used at Ndondondwane were gained from the more accessible banks of the tributaries of the Thukela, as they are presently, and not the Thukela itself. Ndondondwane is located almost directly between the Nsuzi and Wosi confluences, where the modern clay sources are found. The Nsuzi is further from Ndondondwane (a 5 to 6 km walk). According to local oral history, it has been said that the Thukela could be forded in summer at Middle Drift directly opposite the Wosi confluence (Loubser 1993: 110). At most, the clay sources exploited by potters at Ndondondwane would have been situated within 6 km of the site. If clay was acquired from the tributaries of the Thukela, this probably occurred early in the dry season. In the months of late winter and fall, flash flooding is common along the tributaries and smaller attached drainages, making clay acquisition dangerous.

Fashioning

In a recent paper, Walde (2000) and his colleagues found it extremely difficult to identify the way pots were fashioned even when using a range of analytical techniques, including x-rays and microscopic studies. When examining the Ndondondwane ceramics, I could only rely on macroscopic observations, which has greatly limited the fashioning techniques that could be identified. Nevertheless, the study of several attributes permits some tentative conclusions to be made about the kinds of fashioning techniques used to make the Ndondondwane pottery.

- Coil marks are visible on the interior surface of a small number of sherds as thin, raised lines where coils overlapped, or as very small gaps (fine cracks) between coils that resulted from shrinkage during drying and firing. With jars, these are visible from the neck-body junction to the beginning of the base, while with bowls they occur just below the rim down to the beginning of the base.
- In profile, most sherds have an irregular fracture pattern with a meandering contour.
- Most classes show significant variability in the wall thickness of different vessel parts.

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- There are visible concentric drag marks that encircle the interior surface of the upper body sherds and more rarely the exterior surface of lower body sherds (see Figure 8.2). The interior marks follow the shape of the vessels, and, incidentally, their curvature aids in properly orienting sherd fragments.
- All sherds have mineral inclusions oriented parallel to the surface.

While these characteristics would suggest coiling as a primary fashioning technique at Ndondondwane, inclusions that are oriented parallel to the surface is also typical of other common hand-forming techniques such as pinching, slab building, drawing, and beating (Rye 1981: 66-81). A consideration of dimensional data helps to clarify the range of fashioning techniques used at Ndondondwane.

Shoulders and bases have nearly uniform thickness, seldom varying over 2 mm. However, there is considerable variation between neck and shoulder thickness in some classes (Figure 8.4). Class 1 (Type A and B) and Class 2A (Ellipsoidal) bowls tend to have thicker rims than shoulders (4 to 11 mm), while the jar classes tend to have thicker shoulders than necks (3 to 8 mm). With other vessels types, excluding pinch-pots, wall thickness is less variable (between 1.8 and 2.6 mm). For the most part the differences in wall thickness between adjacent vessel parts, such as rim and necks or necks and shoulders, is quite negligible. However, 163 sherds with profiles greater than 50% have differences of 5 and 10 mm in wall thickness between adjacent vessel parts. This variation is significant because the mean difference between the rim/neck and shoulder of all bowls and jars is only 0.7 mm. I suspect that this variation is related to differences in the fashioning techniques used to make bowls and jars.

Sherds with visible coil marks would be from poorly made pots and are quite rare in the assemblage. Several specimens are decorated with simple incised motifs. These are rendered poorly in comparison to most of the assemblage. The incisions are irregular deep and shallow lines that approximate finer examples. These sherds show an "immaturity" in fashioning and decorative forming techniques and may well represent the work of a novice potter.

The concentric drag marks are interesting because they indicate the secondary techniques used in forming pottery. The drag marks are seldom visible on the exterior, suggesting that smoothing vessels surfaces to give them a consistent texture and matte

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appearance was preferable. While some pottery specialists consider smoothing a decorative forming technique, it is also used to prepare vessel surfaces for more elaborate decoration. It is not always possible to make a clear distinction between fashioning and decorating techniques, both of which modify the texture and appearance of the surface (Rye 1981: 89-90). For this reason, smoothing is not considered a decoration technique, but a "finishing" technique in the fashioning stage.

Based on these limited data, it is only possible to discern a few of the possible fashioning techniques used at Ndondondwane. Four technique combinations are potentially identifiable here (Figure 8.3):

(1) The techniques used to make pinch-pots are the most straightforward to identify and these were drawn and pinched into shape from a single lump of clay.

(2) Presumably, the body of small to mid-sized vessels was made by drawing clay from the base, while a coiling technique was used to make larger vessels (Rice 1987: 125-127). It is unknown how bases were fashioned. They could have been drawn up from a lump of clay, similar to the way pinch-pots were made, and how modern Zulu potters construct the bases of their pottery forms. But they also could have been coiled as well. In the future, x-rays of EIA pots should be able to discern either or both of these techniques. Thus, at this point, I can only assume that the body of small to mid-sized bowls and jars were fashioned using drawing.

(3) Bowls and jars with different rim and body thickness may be accounted for by the amount of clay and the technique used in fashioning the rim. A potter could produce bowls with little variation between the rim and body thickness by drawing thin superimposed coils up from the body or by adding segments of clay (rather than a ring) to the body. The body and rim could then be smoothed, without necessarily needing to trim or scrape excess clay from the body. This would leave drag marks, which are scarcely represented at Ndondondwane. Instead, smoothing could serve the same purpose. Alternatively, thicker coils could have been used to form bowls with substantial differences in thickness. Jars, on the other hand, could have been fashioned in two similar variations because the main difference amongst jars

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is how necks were constructed. Necks were made either by superimposing thick or thin coils at the throat and then pulling them upwards (for vertical and sloping rims) or away from the vessel midline to form everted and flared rims. It is quite likely that the throat and neck were formed at the same time using groups of superimposed coils. This is a variation of the technique used to make the rims of bowls; it just involves more clay.

(4) Except for the building of a basic spherical jar, the ceramic heads were constructed using an entirely different set of techniques. In building the heads, carefully sculptured pieces were formed and then attached to the outside of the jar. This would have been very time-consuming. Each piece had to be formed separately, and the crocodile-like beaks could have as many as 10 or 12 individual teeth to form and attach before being joined to the pot. Considering the length of time it would have taken to make the pot, each separate element, and then successfully attach them together before the jar or the appliqué was too dry, it is unlikely one individual crafted the heads. I would suggest that production of the terracotta heads involved more than one potter, and was perhaps a communal exercise.

Decorative Forming

When one considers that most pottery from the site was decorated, the elaboration of vessel surfaces was the most sophisticated and time-consuming stage in the production process. The decorative forming techniques identified at Ndondondwane involved hand forming (appliqué), small tools (incision, impression, rubbing), the use of carbon (graphite) build up to achieve a black finish, and the use of ochre pigment to impart a red finish. These five basic techniques were combined into thirteen *chaînes opératoires*, which are summarized in Figure 8.3. With the exception of Plain Ware, each of the six wares defined in Chapter 6 was manufactured using one or more *chaîne opératoire*. For zone-incised ware (ZIC), only incision was used and for zone-impressed ware (ZIP), only impression was used to decorate pottery. Brown ware vessels were manufactured by burnishing that could be combined with incision and impression. The combinations used for Black ware involving incision, impression, smudging and rubbing

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(burnishing), and for Red ware the combinations involved incision, impression, the use of an ochre suspension, and rubbing.

These different techniques suggest a range of tools that may have been used in decorating EIA pottery. Most pots that received incised and/or impressed motifs (ZIC or ZIP) were decorated while at the leather-hard stage, although there are examples that show decoration was done when the clay was still quite soft (there many examples of deep, wide grooves with clay curled over the lip of the trough). When incising or impressing motifs, any type of sharpened stick could have been used, but variations in the width, depth, and shape of the trough of incised and impressed motifs indicate differences in tool size and shape (Figure 8.5). Impressed decoration was done with a rounded end, while those used for incised decoration had sharp tips. The thickness of the tip also varies depending upon the motif being made. Fine tips were used in some instances (Figure 8.5 (b, d, e)), while thicker tips were used in others (Figure 8.5 (a, c, f)). This does not appear to only be a function of the potter's skill, but is also partly related to the desired coverage of the design field. For achieving a smooth finish on the pots, and for burnishing, small pebbles were probably used. Several examples of small stones that could have been used in this capacity were recovered from the site, and are strikingly similar to those used by modern Zulu potters (Figure 8.6).

Firing

To assess firing conditions at Ndondondwane, several attributes were examined: core patterns, fabric characteristics and the presence of fireclouds resulting from contact with fuel during firing. Behavioral interpretations using core pattern data require additional information about the quantity and kinds of mineral and organic material in the fabric to infer firing conditions (atmosphere and temperature), firing practices, post-firing uses (such as carbon deposition during cooking), and depositional effects. These data were compiled in Chapter 6 (see Figure 6.16). Core patterns can be placed into seven groups according to core coloring, width and placement, and the patterns in each group likely resulted from different firing conditions, firing practices and post-firing uses.

The core pattern data indicate that ceramics were fired under all possible atmospheric conditions (Table 8.1): oxidizing (oxygen-rich), reducing (oxygen-

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deficient), neutral, and variable (fluctuating between oxygen-rich, neutral, and oxygen-deficient). Most sherds were incompletely oxidized (n_s = 3566, 46.8%), but single sherds and different sherds from the same object had more than one core pattern present. It is unlikely that different types of ceramics were fired under different conditions. Rather, all were fired under variable atmospheric conditions and temperatures, and different parts of objects may even have been subject to varying conditions. This was likely due to variations and fluctuations in temperature and atmospheric conditions and the arrangement of vessels within the fire (see Gosselain 1992; Livingston Smith 2001).

Minimum and maximum temperature ranges are indicated by the rate of mineral (clays, ferrous material, and quartz) and organic decomposition at different temperatures (Table 8.1). A lower limit of 500 °C is probable because most objects had decomposed organic materials indicated by core patterns or voids. The upper limit did not likely exceed 800 °C. A large proportion of sherds were subject to rapid cooling after firing, suggesting they were removed from the fire immediately after the fuel was exhausted. These firing conditions are typical of small-scale, open or pit firings in Africa and elsewhere (Gosselain 1992). Temperatures probably reached between 500-700 °C.

Rye (1981: 115-118) suggests that certain core patterns may also result from cooling methods and post-firing use. The atmosphere during cooling is different than during heating and the rate of cooling can contribute to the deposition or removal of carbon. When pots are removed from immediately after firing to cool, the air tends to oxidize the surface. However, this has no effect if the pottery is already oxidized. Alternatively, if pots were subjected to a reducing (oxygen-deficient) atmosphere and blackened by carbon deposition, rapid exposure to air will result in a lighter-colored oxidized layer below the surface (about 1 mm thick). Smudging and cooking can also produce pots with a blackened outer surface and core patterns where the "core" is actually oxidized and black/gray layers occur beneath the interior and exterior surfaces.

Two core patterns summarized in Table 8.2 may have resulted from these processes. The oxidized subsurface layer in sherds belonging to Group 3A indicates that this effect resulted from rapid cooling after firing as noted above, or by being re-heated to high temperatures, perhaps during cooking. As well, progressive deposition of carbon during cooking and/or burnishing of the vessel surface may have also produced the Group 6A core pattern. Sherds with this pattern may be burnished, have burn marks and

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sooting on the exterior surface, or both. These two core patterns comprise about 52% of the sherds analyzed in the assemblage. These data indicate that more than one firing method may have been used at Ndondondwane: pots were fired and left to cool in the fuel or they were fired and immediately removed once the fuel was exhausted. The duration of the firing and the time of day the pots were fired may also have influenced which method was used. From the data on atmospheric conditions and firing temperature, it is difficult to estimate the duration of firing. The maximum temperatures at Ndondondwane fall within the 500-700 °C range that Krause (1985: fig. 20) recorded for two modern potters in northeastern South Africa, and below the 800 °C maximum reported by Friede (1983) for Iron Age pottery from the same region. The duration of the firings reported by Krause (1985: fig. 20) ranged from two to six hours. The two-hour firing was an open firing that ended during the day and the six-hour firing occurred in a temporary kiln from which pots were removed the following morning. It is likely that the shorter time was typical of firings at Ndondondwane.

Another factor to consider is how ceramics of different composition may have reacted during the drying and firing stages of manufacture. Quartz in particular expands at a faster rate than clays when heated (Rye 1976, 1981). This can lead to spalling (large lens-like portions of walls flake off) or "firecracking" (a network of fine cracks over the surface), which may make vessels unusable. Several specimens in the sample suggest that the presence of quartz and calcite caused some problems for potters. Examples of firing faults at Ndondondwane include lime spalling and fire spalling. Lime spalling is cause by calcium carbonate being decomposed during firing, forming calcium oxide (Rye 1981: 114). Sometime later (weeks or months), the calcium oxide can rehydrate when it is exposed to water or water vapor to form calcium hydroxide. This exerts pressure on the fabric and commonly causes a cone-shaped piece of the wall to flake or spall, leaving a white grain at the apex as shown in Figure 8.7(a). Fire spalling occurs when an object is heated too quickly and moisture in the wall expands causing a lens-shaped piece of the wall to fall off (Rye 1981: 114), and an example from Ndondondwane is shown in Figure 8.7(b). Spalling is common if thick-walled vessels have not been dried completely. Despite these two examples, firing faults are rare in the assemblage, and it appears that Ndondondwane potters had a relatively low rate of firing loss. Neither lime nor fire spalling would have rendered the pots unserviceable. No wasters, or badly damaged

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objects that could not have been used, were recovered from Ndondondwane and none have been reported at other sites in the vicinity. Wasters are usually an indication that pottery was fired at a site. Since it cannot be assumed that all pottery made at Ndondondwane was used or deposited there, pottery from other sites may be present in the assemblage. At present, however, mineralogical analysis and the presence of firing faults imply that all the pottery recovered was manufactured and fired at Ndondondwane.

Given that climatic conditions during the EIA were similar to today, firing had to take place during the dry season at Ndondondwane. During the rainy winter months (especially January and February), pots would have taken an extremely long time to dry before they could be decorated and fired and gathering dry fuel would have been more problematic. There is some indication that both light and heavy fuels were used in firing. Fireclouding on some pots show large, round blotchy patches which is indicative of light fuels (e.g., Figure 8.7(b)), such as dung or straw, coming into contact with the surface of the pot. While dung would have been a readily available fuel, there is no indication that dung was collected or excavated from the livestock enclosure for firing, although the dry dung of livestock could just as easily have been collected from anywhere in the vicinity. Other vessels have long, thin fireclouds, which would have been caused by heavier fuels, such as bundles of sticks or larger branches.

There is no evidence that pits or other structures were used for firing pottery at Ndondondwane. Areas used for firing may have been temporary, but open firings may leave traces archaeologically in the form of patches of vitrified sediment and large accumulations of ash, charcoal and wasters. There are several candidates for firing loci at Ndondondwane: the large depression in the center of the human activity zone of the Dung Area, the patch of vitrified earth in the Mound Area where blocks from the furnace were deposited, and the ash deposits in Midden 1. At each of these loci, there were large accumulations of ash, charcoal and substantial quantities of pottery, although no wasters are in evidence.

There are several reasons why pottery firing did not likely occur in the Dung Area or near household areas. First, firing batches of pottery near huts in domestic areas is hazardous. It is an unnecessary risk, regardless of how well controlled the firing may be (which open firing is not). Second, the human activity zone in the Dung Area is a small

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space for firing. Further, during firing all other activity in the area would have ceased, including the movement of cattle in or out of the livestock enclosure. Other options to this were probably considered. Third, the only patch of vitrified sediment that would have resulted from repeated firing in the range of 700°C occurs in the Mound Area during Horizon 2 or 3, either before or around the same time iron smelting is attested in the Mound Area. Since this feature does not occur in the Dung Area, it is unlikely pottery was fired here. This means that pottery could have been fired at two locations at Ndondondwane: in the Mound Area during Horizon 2 and 3, and in the Charcoal Preparation Area.

There are several reasons why the Charcoal Preparation Area is a good candidate for a pottery-firing locus at Ndondondwane. The area itself has many of the necessary characteristics: large quantities of charcoal and ash, and an extremely large patch of vitrified sediment cover the entire locus. The open firings of modern Zulu potters provide good analogs of what the area may have looked like in the ninth century AD. Figure 8.8 show the firing area used near the residence of a full-time potter I interviewed in 1997, and interestingly, no large sherds are accumulated in the area, which is also characteristic of the Charcoal Preparation Area. In the rare event that a pot does break during firing (this potter has about a 98% survival rate), the larger sherds are picked up and dumped in a nearby open midden and smaller sherds are allowed to accumulate until they become too plentiful. The Charcoal Preparation area is also located away from village in general. If ceramic production took place here, the smoke and heat from the firing would not have disrupted daily activities elsewhere at the site, or placed houses and other structures in jeopardy. As well, this area has low diversity and very high brokenness typical of firing loci.

The Mound Area during Horizon 3 has several characteristics in common with the Charcoal Preparation area: (1) the baked earth locus is oblong and is directly associated with an ash dump a meter to the west, (2) only one fragment of a cooking vessel dates to this horizon, and (3) the area has low completeness and diversity scores similar to the Charcoal Preparation area. Loubser's (1993: 118-119) excavations associated this feature with very large sherds from bowls and jars and furnace bricks dumped on top of it. He argued that the rubble from the smelting furnace baked the soil. This argument is problematic for two reasons. First, the furnace blocks would have had to been very hot

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(upwards of 800 $^{\circ}C$) when they were dismantled and dumped. It is doubtful the furnace was dismantled when the bricks were at these high temperatures. Second, the complex stratigraphy of the Mound does not suggest that the baked earth locus or the ash dump post-date the smelting episode. Thus, pottery may have been fired before smelting took place. Therefore, both the ash deposit and the vitrified soil are contemporaneous with the accumulation of the Grey Midden and the dense concentration of large broken vessels dating to Horizon 2. For these reasons, pottery was probably fired in both locations during the occupation of Ndondondwane, although the size and thickness of the ash and debris in the Charcoal Preparation area indicate that pottery was fired in this location more often.

POTTERY ECONOMICS

Production Scale and Intensity

Scale and intensity reflect a demand for products by consumers, the number of production units filling that demand (e.g., households, workshops, etc.), the availability and organization of labor, the availability of resources and the manufacturing technology used in production. In this analysis, I approach issues of production scale and intensity by examining several factors: (1) manufacturing technology, (2) production volume, or output, and (3) the organization of labor. First, I will review the two modes of production argued to characterize pottery economics during the southern African Iron Age:

(1) Following from Martin Hall's (1987) Domestic Mode of Production model, we would expect pottery manufacture during the EIA to be occasional, aimed at household replacement and domestic self-sufficiency. It should typically in the hands of women and characterized by simple technology (Peacock 1981, 1982: 8-10; van der Leeuw 1977, 1984; cf. also Rice 1987: 184).

(2) Simon Hall (1998) has recently suggested that Sotho-Tswana ceramic production during the Later Iron Age is similar to the Household Industry defined by van der Leeuw (1977, 1984) and Peacock (1981, 1982: 8-10). In this system, production is somewhat more continuous generating a larger

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number of pots, but still involves simple technology and is often in the hands of women. Pottery is still made for household use but has acquired value outside the community and is made for consumers elsewhere. It is an important supplemental income to the household and is often found in areas with poor agricultural potential (Rice 1987: 184).

Manufacturing Technology

The manufacturing technology at Ndondondwane is simple, and from the available evidence, it consisted of small tools, such as sticks and burnishing stones, and open bonfires for firing. Certain tools may be inferred from an analysis of the production sequence, such as sieves for sifting to remove larger mineral and organic debris in the raw clays, but hand sifting would have equally served the same purpose. Other tools could have been used in fashioning vessels. Pieces of hide and old baskets could have been used in smoothing and fashioning vessels, and sharp stones could have been used in trimming excess clay, but these are either archaeologically invisible or difficult to identify. The raw materials required for potting included clay, heavy and light fuels and ochre pigments, all of which are available in the local area. From the standpoint of manufacturing technology, pottery production at Ndondondwane may fit into either the Domestic or Household Industry production models. However, the production arrangements that characterize these modes are differentiated primarily in terms of production volume and labor organization.

Production Volume

Determining the "true" output of a production system is unlikely to be realized. Ethnoarchaeological studies show how the disposal of broken pottery may be widely distributed within and outside the limits of sites (e.g., DeBoer and Lathrap 1979; Kramer 1985; Lindahl and Matenga 1995). This makes it difficult to reliably calculate the total number of vessels in an assemblage. As no comparative data exist for determining the movement of ceramics between settlements during the EIA in southern Africa, this analysis is based on the assumption that ceramics were made for use in the village of origin. Even if all the objects recovered from Ndondondwane were not made there,

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calculations of the total objects in the assemblage are nevertheless indicative of the pottery *deposited* at the settlement.

The sheer quantity of ceramic debris and finished products at Ndondondwane gives us some indication of the scale of ceramic production at the site. In total, 2,211 vessels were recovered from buried deposits at the settlement. To estimate production scale it is necessary to have some idea of the use life of different wares and the duration of occupation. However, use life data are not available for all pots and the occupation of Ndondondwane may cover up to 100 years. Using a sample of 2,023 ceramic artifacts for which there is use life data, I estimated the discard rate, or rate-of-loss through breakage, of use categories over a 100-year period (Table 8.3). Breakage rates were treated as the number of pots entering the archaeological record per year at 25-year time slices with a one hundred year calculation was regarded as the maximum occupation of the site. The following formula was used to estimate the breakage rates for different use categories per year:

$$\frac{\text{Total EOE for Use Category}}{\text{Total Number of Months}} \times 12 \text{ months}.$$

I also estimated the discard rate of pots per year for a maximum of four households in use during the main occupation of Ndondondwane, which included Transect 1 and Middens 1-3 (Table 8.3). At the 25-year interval, discard rates are the highest and each household would have lost 19 pots a year. The figure drops in half at the 50-year interval to 10 pots, does not change substantially at the 75-year interval with 6 pots and is reduced to 5 pots per year at the 100-year interval. Although there is no necessary relationship between the loss rate and replacement rate of pottery, the question that needs to be asked is, in the time frame considered here, do loss rates reasonably correspond the potential replacement rate of household potters?

The most surprising result of this analysis is that the loss rates are well within the production limits of a household potter at all time slices, especially if there was more than one potter per household. The production rates from Negros Oriental in the Philippines reported by van der Leeuw (1984) provide a good baseline for comparison, as four kinds of production arrangements are documented in this small area. Household potters in Negros Oriental produce batches of 6 to 20 pots several times year for household use and occasional barter. Part- and full-time household industry potters

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make 200 to 300 pots per month for sale in the local market while keeping some for household use. These comparative data suggest that even if the estimates for production rates at Ndondondwane are off by several magnitudes, production was extremely low.

Another interesting result is that the production rate of serving vessels is anywhere from 2 to 14 times higher than other use categories. Even if we consider that the sample for each use category would be underestimated by several magnitudes, more serving vessels entered the archaeological record per year than any other use category, and they may very well have been made for use outside the scope of domestic activities. Besides this special case, the scale of production was low and very likely a part-time seasonal activity at Ndondondwane. Potters appear to have been concerned with replacing domestic losses through daily use. However, it is not possible to determine from the scale of production if potters worked independently or in groups. This requires a better understanding of the context of production.

The temporal implication of the analysis is that Ndondondwane may have been occupied anywhere from 25 to 100 years. However, with a replacement rate of less than 20 pots per year for the entire settlement at the 100-year time slice is unlikely. Making so few pots a year, potters would not be able to keep up the skills and recapture the rhythm necessary for making the fine ceramics found at Ndondondwane. Indeed, there are imperfectly made pots in the assemblage and examples of "sloppy" decoration, but there are many other factors besides production scale which may account for these vagaries of skill. Again, to adequately interpret these data knowledge of the organization of production arrangements is necessary, and it to this topic we now turn.

Labor Organization

In pottery studies, inferences about how work is organized are primarily grounded in an understanding of the scale of production. However, there is no direct relationship between the scale of production and the ways work is organized (Costin 1991). With archaeological cases, this issue is more problematic because samples are never representative of the total volume of ceramics produced, and even if they are, current ceramic quantification methods will still likely underestimate the number of vessels because of fragmentation issues. Furthermore, for the EIA the distribution of

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goods, and pottery in particular, is poorly understood. It is unknown whether pottery was distributed amongst settlements in the valley and, if so, what kinds of pottery may have been exchanged. All of these factors constrain the depth of the inferences that can be made about pottery economics in general and labor organization specifically. However, this does not inhibit investigating the household as the basic unit of labor in EIA society. In this analysis, I approach the study of labor organization indirectly by considering the most labor-intensive and time-consuming *chaînes opératoires* at Ndondondwane—decorative forming.

STYLISTIC VARIATION AND THE ORGANIZATION OF PRODUCTION ARRANGEMENTS

There is substantive variation within the main decorative ware categories identified at Ndondondwane. As discussed in Chapter 6 (p. 157), the term *ware* is used here to refer to "stylistic" categories that are defined in terms of different surface treatments, each of which resulted from different a distinct combination of techniques (see pp. 142-145 and above). If we accept that "A style is a polythetic set of attributes present by virtue of common descent from an identifiable artifact-production system" (David 1992: 345), then, for ceramics, we may define style by redundant patterns in sets of morphological and decorative attributes. To examine stylistic variation within the Ndondondwane assemblage, I classified decorative variance through a more detailed study of the design structure of surface finishes and motifs on different vessel classes.

Design structure is the arrangement of decorative elements on the surface of a decorated object (the design field) (Rice 1987: 475). The minimum elements of a design structure in the Ndondondwane assemblage are surface finishes and motifs, and both are arranged in different ways across design field of different vessel form classes. Surface finishes are arranged in three ways on vessel surfaces. Brown, black- and red-burnish typically cover the entire exterior surface, but may also cover all or part of the interior surface of jars and bowls. The design structure of motifs is more complex. Motifs occur at four discrete zones on vessel surfaces: the lip, the rim and neck (for jars), upper body (girth to lip for bowls or girth to body-neck junction for jars), and lower body (girth to base). Variation in the type(s), combinations and layouts of surface finishes and motifs on the design field of different vessel classes were classified using the following system:

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Design Field Layout. A design field layout refers to the variation in the placement of motifs at different positions in a design field. Three surface finish layouts and 32 motif layouts were identified in the assemblage. Motif layouts were considered more representative of the variation in design structure.

Design Modes. Motif layout groups are defined as a design mode. A mode is the most complex combination of decorative elements (in this case motifs) in a layout for a vessel or complete profile. For example, the minimum requirement for inclusion in Mode 1 was geometric motifs covering the entire neck of jars (Figure 8.9). The first variety or layout of Mode 1 (1A) is the most complex, as decoration covers the entire neck and two thirds of the total possible design on the body. Other Mode 1 layouts (1B-D) involve different numbers and combinations of motifs on the neck design field, and represent only part of the most complex classification in a mode. The different design field layouts were classified into seven design modes. Modes 1 to 5 are found on jars while Modes 6 and 7 only on bowls (Figure 8.7). An additional 6 motif layouts were included to classify decorated form elements that could not be placed in a form category (i.e., indeterminate jar, bowl, or vessel). In these cases, the partial layout observed could not be placed with confidence on of the other 32 layouts. The minimum requirements for inclusion in a mode include:

Mode 1: full neck decoration on jars.

Mode 2: decoration covering ¾ of the neck of jars.

Mode 3: decoration covering ½ of the neck of jars.

Mode 4: decoration covering ¼ of the neck of jars.

Mode 5: decoration at the rim of bowls.

Mode 6: decoration along the lip of bowls.

Mode 7: included to classify decorated neck and body sherds.

Micro-variations in the decoration of different vessels classes were defined by isolating combinations of surface finish and motif micro-layouts represented on different vessel forms. A micro-layout refers to the types and combinations of motifs at positions

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in a particular design field layout. For example, in Figure 8.10, registers (bands) of linear motifs limited to the body-neck junction defines layout 4F, which is a layout used only for jars. Two variations of this layout, or micro-layouts, are shown in Figure 8.10: the first with oblique hatching (Motif 1-1) and the second with one register of oblique incised-impressed cross-hatching (Motif 2-2). Below this example is one variation in layout 3G, where one register oblique incised cross-hatching (Motif 2-1) covers the entire neck of the jars. In total, 267 micro-layouts were defined at Ndondondwane. These may be regarded as minimal distinguishable decorative treatments, and I will refer to these as *micro-styles*. From the examples in Figure 8.10, it is evident that different sized vessels of the same class may share identical micro-styles. Thus, a micro-style refers to a *minimal decoration unit* characteristic of vessel classes, not specific vessels. The number of micro-styles identified for each vessel class at Ndondondwane is given in Table 8.4. Vessels that are plain or only have brown-, black-, and red-burnish are single micro-styles. The greatest variation occurs in the layout and combination of ZIC and ZIP decoration alone or within the brown-, black- or red-burnished decoration.

To determine the similarity in micro-styles between areas, I first generated a large table listing the 267 micro-styles and their presence and absence in each of the activity areas. The micro-styles shared between each and exclusive to each area were then summed. The occurrence of micro-styles in the major activity areas at Ndondondwane is summarized in Table 8.5. The table displays figures comparing the similarity of micro-styles from the perspective of each area. For example, the Dung Area shares 26% of the microstyles found in Mound Area, while the Mound Area shares 43% of those found in the Dung Area. These proportions differ because the number of microstyles is not the same in each area. The ceramics in all deposits should have some relationship to the area with the greatest number of micro-styles represented, but the reverse may not be true.

Several patterns emerge from this analysis. First, all the micro-styles identified in the assemblage are not found in each activity area at Ndondondwane. Over half of the micro-styles identified at Ndondondwane are represented in the Dung Area (55%), while less than 34% are found in all other areas. Only a proportion of these are exclusively found in each area. A very large proportion of the micro-styles represented in the Dung and Mound Areas are not found elsewhere at the site. Other activity areas have far lower

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percentages of exclusive micro-styles, ranging between 25% and 38%. A second pattern is that there are a number of micro-styles shared between activity areas. All areas do share micro-styles with other areas, but the percentage shared varies widely. Thus, the micro-styles at Ndondondwane are either exclusive to an area or are shared between areas. There is a high degree of similarity between ceramics deposited in the Central Zone and other areas of the site. However, the Central areas have little similarity to those in the Peripheral Zone. The third pattern is that peripheral domestic areas have low similarity with each other, around or less than 30%. Not only does this imply that certain ceramic micro-styles are exclusive to households, but that these are analytically distinguishable through detailed a study of micro-variation in decoration.

There are a number of possible reasons for the distribution of ceramic micro-styles at Ndondondwane, and each explanation must be grounded in the formational history of the site and must account for the similarities in micro-styles between activity areas and why certain micro-styles are exclusive to activity areas.

To begin, we may consider that the high degree of stylistic similarity between activity areas is a result of the movement of people and objects between them. As proposed in Chapter 7, objects were certainly moved between each zone, and the high degree of stylistic similarity between Central and Peripheral areas could be a result of ceramics from household areas being taken to a Central area, used and deposited there. As well, the low degree of stylistic similarity between households may reflect a lack of movement of objects between them. While it may be possible that pottery used in one domestic complex was deposited in the midden of another, it must be remembered that domestic complexes are 40 to 60 m away from each other. Transect 1 is over 100 m away from the peripheral areas. This is some distance to go in order to dump pots in another person's midden. I do not mean to imply that pots were *never* moved between domestic areas by gift exchange, lending or otherwise. The similarity data show, however, that this was probably not common at Ndondondwane.

Nevertheless, the movement of ceramics from one household to another does not explain the disproportionate number of types represented in domestic assemblages. For instance, almost 69% of the serving vessels identified at Ndondondwane was recovered from Midden 3, and most of these are from the Western Midden. Why so many serving vessels would be deposited in Midden 3 is not clear, yet, the stylistic data do not suggest

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that a disproportionate number of micro-styles come from this area. Clearly, the main obstacle facing this interpretation is that it does not explain why ceramic micro-styles are *exclusive* to areas. An explanation for the degree of stylistic similarity between areas based on the movement of pottery and people is fundamentally flawed because the unit of analysis is the micro-style not individual pots. While discard practices may partly explain the stylistic connections between households and activity areas in the Central Zone, it does not adequately account for similarities and differences between households. An explanation that takes the stylistic similarities and differences observed between activity areas requires that the people "behind" the pots—those who made them—be considered.

The *degree* of similarity is then key to understanding why certain micro-styles are represented in domestic complexes and not others. If we abridge the data presented in Table 8.5, we find that the minimal distinguishable decorative treatments, or micro-styles, have an average similarity to dissimilarity ratio of about 26:74:

	Similar / Dissimilar
Midden 1–Midden 2:	24% / 76%
Midden 2–Midden 1:	30% / 70%
Midden 1–Midden 3:	26% / 74%
Midden 3–Midden 1:	32% / 68%
Midden 2–Midden 3:	21% / 79%
Midden 3–Midden 2:	21% / 79%

If we accept the argument that the residents of households at Ndondondwane were co-resident kin and potters were operating within the same socially acceptable parameters for decorating vessels, the question is why are the pottery micro-styles found at households so dissimilar?

In attempting to answer this question, we must make several well-founded assumptions. First, we may consider that "style" is a way of expressing symbolically loaded information. As Weissner (1984) observed, style may be both emblematic and assertive. Emblematic style refers to a repertoire of symbols, motifs and forms that express group identity, while assertive style combines symbols, motifs, decorative themes and forms in ways that reflect the expressions of individuals within groups. As well, Sackett (1981,1982) has noted that artifact styles may have no "meaning" in a symbolic

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sense, and "style" as it pertains to morphological characteristics, may be purely functional in nature. Thus, while the procedures used to generate artifact styles may differ (i.e., they result from different choices in the *chaînes opératoires*), the artifacts themselves may serve the same function. It may therefore be said that style resides in the form of objects (and the adjunct properties of form, such as decoration) and may communicate different information to people in different contexts. Conversely, style also resides in function because in using artifacts information is communicated between individuals and groups (Lemmonier 1986). In terms of form, the high degree of macro-stylistic similarity between ceramics from domestic refuse assemblages is a consequence of the Ndondondwane potters operating within a common production system. Subtle differences in the way different forms were decorated have been detected as variants in the Ndondondwane assemblage.

Second, it is overwhelmingly likely that women made pottery during the EIA, for in no small-scale, non-industrial African societies do men practice potting (e.g., Balfet 1981, 1982; Barley 1994; Vincentelli 2000; and see Rice 1987: 183-191). They may help in the production process, but are never in control of it.

Third, it may be assumed that women taught pottery making to young novices, likely their daughters and/or nieces. While young women are known to be taught by potters they are not related to in Africa today (Gosselain 1995), it is unlikely that this occurred during the EIA if a household production system was in place.

Given these assumptions, we would expect to cohorts of potters in any EIA village: experienced potters and young potters. A similar system in found among the Kalinga of the Philippines, where mother teach daughters to pot and each belongs to an age-status cohort, or age sets which are associated with lifelong expectations of support (Longacre 1991; Longacre and Stark 1992). In an extensive study of pottery production, use and discard of household potters, Longacre and his students demonstrated that the greatest similarities in decoration were between young female age cohorts and not their mothers (Longacre 1991; Longacre and Stark 1992). If this were the case at Ndondondwane, it would certainly explain the similarities in micro-styles between households. As well, the differences in ceramic styles between households could be explained as differences in the assertive styles of household potters. The similarities in ceramic styles produced by young female age mates were, in Weissner's terms

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emblematic, distinguishing them both as a group and from their "teachers," their mothers and possibly their aunts. At the same time, the micro-styles generated by the more experienced potters of each household were assertive, expressing the distinctiveness of themselves and their household within the community, while at the same time working within the range of variation still acceptable to the community as a whole.

This interpretation sheds new light on several aspects of the ceramic *chaînes opératoires* at Ndondondwane. It helps explain many aspects of pottery production that cannot be explained in "economic" terms.

- First, is the presence of pinch pots, one of which has a child's fingerprint, was tentatively interpreted as evidence of pottery instruction at the site. On the strength of the Kalinga analog, we may expect a third cohort of very young novice potters at Ndondondwane. This implies at least three generation inhabited the site during its occupation, which is a situation reminiscent of the size of Tsonga homesteads reported by Junod (1927) at the turn of the 20th century.
- Second, this helps explain why such a limited range of forms was produced using very similar manufacturing techniques. However, it does not explain why potters chose to elaborate decoration instead of shape and size, but I will take this up below.
- Third, it also may explain the low frequencies of high quality Black and Red ware serving vessels at Ndondondwane, which would have been made by the most talented and experienced potters.

What is missing, however, from this interpretation is the reasons explaining why potters made particular choices in the *chaînes opératoires* in relation to the demands set by the containers needs of the community. Dean Arnold (1985: 127-128) once suggested that the demand for ceramic vessels is governed by several factors, which include: (1) the container needs of a population, (2) the utilitarian and technical advantages of particular vessel shapes, (3) the rate containers are broken, (4) the size, density and growth rate of the population, (5) how ceramic objects are tied into the symbolic system, and (6) the nature of the distributive system which move ceramics from producers to consumers.

To this point, I have suggested that the demand for pottery containers was low at Ndondondwane, which is directly related to the number of households and number of

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people in the settlements. In Chapter 7, I suggested that only four households were occupied during the main occupation of the settlements, and only three for the latter part of the occupation. This interpretation complements the suspicions of the excavators, which have suggested that only 30 or 40 people lived at Ndondondwane during the ninth century AD. However, while the size of the population and the scale of production are important factors for trying to understand the organization of production at Ndondondwane, they do not explain the need for the range of ceramic objects recovered from Ndondondwane or the symbolic dimensions of production. In the following discussion, I offer a number of social motivations that may have influenced the production of ceramic artifacts at Ndondondwane by considering the need for ceramic objects at the site and the symbolic dimensions of production. I begin with the choices made in the selection of raw materials and fashioning of pottery, and end with the ways ceramics were fired.

TECHNICAL PRACTICE AND SOCIAL CHOICE

Needful Things

Pottery in EIA society was certainly a needful thing, and here I discuss how potters were influenced in their choice of raw materials, processing techniques and the forms they produced in meeting the demand for ceramic containers.

To begin, we may ask why the clays used by the potters at Ndondondwane are so variable in their composition. In contrast to the Zulu potters who spend more time prospecting for good clay sources rather than process poorer more readily available clays, the Ndondondwane potters appear to have been less concerned with finding "good" clays. Three main fabric groups were recognized in the composition of ceramics at Ndondondwane: one primarily composed of quartz fragments and other secondary mineral such as gold and silver mica, another composed of primarily of well-rounded gneiss particles, and a mixed group with roughly equal proportions of quartz and gneiss particles, sometimes with smaller amounts of mica. All three groups have inclusions consistent with those found in present-day pottery and it is quite likely they were gained from similar clay beds. However, the vessels walls of modern vessels are typically thinner

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and the size of the inclusions are often smaller and less frequent than those observed in the archaeological specimens (see Figure 8.2). Within the range of variation at Ndondondwane, I noted a consistent relationship between wall thickness, the size of inclusions in the fabric and decoration: thicker walled pots have larger quartz inclusions and less complicated decoration, while thinner walled pots have fine fabrics and are brown-, red- or black-burnished (often with ZIC or ZIP decoration) (see discussion on pp. 149). The mineralogical differences in the Ndondondwane assemblage could relate to both the clay sources that were exploited and the processing techniques employed.

The presence of quartz grains from primary (large, low sphericity, angular) and secondary (small, spherical, well-rounded) deposits in the same sherds indicate that quartzitic clays from different sources were mixed. Quartz and other "impurities," such as organics, clay pellets and iron oxides were not removed during clay processing. In contrast, the more finely decorated pottery in the assemblage, the Black and Red wares, do not exhibit the same fabrics. However, Plain, ZIC and ZIP wares are coarse and Brown wares may have both coarse and fine fabrics. It is therefore unlikely that different clays were specifically sought out to make different kinds of pots. Unlike modern potters who choose clays that do not need to be processed (for which they use the specific term, *ubumba*), the Ndondondwane potters instead choose to expend more effort in processing clays from a variety of sources rather than exploiting clay sources with specific properties. This assessment agrees with ethnoarchaeological work showing how African potters tend to use readily available materials irrespective of their properties, choosing instead to modify those properties by altering the manufacturing process (clay processing, fashioning, and firing techniques) (see Gosselain 1994, 1995, 1999; Livingstone-Smith 2000; Walde *et al.* 2000). These practices imply that potters at Ndondondwane were not socially influenced in their *selection* of clay sources, but they instead choose to modify the properties by sifting, pounding, kneading and mixing clays from different sources to develop certain "recipes" that were designed for fashioning different qualities of pottery (Figure 8.3). Without comparative data from other EIA sites, and compositional data in particular, it is not possible to say anything about how the choice of clays may have been influenced by who collected them. Clays are collected by non-potters in the course of other activities that take them near clay sources, which

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may lend to their poor quality (Rice 1987: 120-124). Likewise, taboos and rituals, which can scarcely be inferred from the present data, may surround the act of obtaining clay.

Clearly, it is the quantity and not the types of inclusions in the Ndondondwane pottery that influence which clays are used to make certain pots. What is interesting is that the fashioning techniques observed by other researchers studying EIA pottery were not discernable in the Ndondondwane assemblage. Krause (1984, 1985) has documented the use of a slab building technique in his study of EIA pottery from Phalaborwa. The shoulder is made by joining the ends of a rectangular slab together to form a cylinder, while the rim and base are constructed by adding coils to the top and bottom of the cylinder. I have not detected the joining seam noted by Krause in the study of the Ndondondwane pottery, or any other EIA pottery I have examined from the eastern lowlands of South Africa.

Given the small range of fashioning techniques identified at Ndondondwane and the limited study of EIA vessel fashioning it is difficult to evaluate why these techniques were selected amongst a number of possible alternatives. The hand building techniques that could be inferred are flexible, insofar as they can be used to produce a variety of vessel shapes of different sizes. As well, it is possible for a potter to pause at different stages in fashioning using these techniques without jeopardizing the quality and appearance of the final product. If left to dry for too long, however, the joins to subsequent sections will be weaker and may result in a poorer quality pottery. Because this repertoire of fashioning techniques can be integrated into the demands of daily household life, I argue that these social pressures influenced the choice of techniques over more sophisticated, time-consuming ones. More effort, it seems, was expended in the preparation of clays, not in using elaborate fashioning techniques. Clay preparation can be done in work groups, while vessel fashioning is often an individual activity in small-scale production systems.

This limited fashioning repertoire is typical of small-scale potters, but one may wonder if all the forms at Ndondondwane could have been generated using such a small range of techniques. In Chapter 6, I arrived at a final classification comprised of eight classes and 29 distinct types for the Ndondondwane container series. While this may appear to be a large number of types, an analysis of the use-related attributes of the container series showed that many of these types served the same function, and

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sometimes more than one, during their use life. The Ndondondwane containers were therefore multifunctional, adaptable and easily utilized in a variety of tasks, from serving to storage to transport. There was a demand at Ndondondwane for multifunctional containers, which could easily be used in a variety of daily, domestic activities. The fashioning of these vessels must have been influenced by a demand for versatility. I would suggest this is why most classes are variations of a basic spherical body form (spherical, ellipsoidal and ovoid), while those with angular (Bi-conical) and conical (pyriform) shapes are rare. The limited number of forms may also explain why there is more variation in the rims of unrestricted bowls, ellipsoidal bowls and jars than any other part of the vessels because this is the easiest to manipulate without severely altering the ability of the pot to act as multipurpose containers.

Symbolism: Craft Production and Spatial Boundaries

The identification of the CCP at EIA sites implies that the spatial segregation of gender-specific tasks was a basic feature of the earliest agropastoral societies. More generally, it is assumed that women would have been makers of pottery in domestic contexts. However, as no archaeological research in the region has addressed this topic specifically, Iron Age archaeologists have a limited understanding of the relationships between the organization of labor and how space was utilized in settlements. In this section, I consider how conceptions of space influenced the spatial organization of ceramic and iron production at Ndondondwane. Two forms of evidence are drawn upon in this analysis. Direct evidence for the spatial organization of ceramic production comes in the form of the positioning of firing loci at the site, while indirect evidence comes in the unlikely form of potting marks.

Clay could have been gathered and processed at two optimum times in the year: in spring before the rainy season and planting and in the fall at the beginning of the dry season after harvest. The seed impressions on the bottoms of some pots indicate that forming took place in areas where grain was stored and processed, and this would have been in household areas. The seasonality of pottery making cannot be inferred from the seed impressions because grain can be threshed at any time of the year. It is unlikely all pottery was made around domestic complexes, and it could have taken place anywhere

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in the open spaces in front of or between domestic areas or in shaded areas around the site. Once the pots were dried and decorated, the potters would have prepared to fire the pottery at the southeastern end of the village in the Charcoal Preparation Area. This could have done individually, depending upon the requirements of each household, or the works of many potters could have been fired together. Whatever the exact scenario, pottery was made seasonally by a small group of potters in both domestic and in other peripheral areas of the village, and it is quite likely that different stages of the *chaîne opératoire* were allocated to different spaces of the village.

In general, these data fit the expectations of the domestic mode of production model. However, the large number of serving vessels at Ndondondwane does not fit the model unless the seasonality of potting is taken into account. I would suggest that the high production rates of serving vessels were part of the seasonal production cycle, linked to the harvesting of crops. The many serving vessels produced after the crops had been taken off and prepared for storage could have been made specifically for use in communal feasting. Such feasting would likely have taken place in the eastern end of livestock enclosure where the large depression was used for roasting meat. The production of serving vessels may have been designed to meet special extra-household demands.

Likewise, the spatial evidence for pottery production occurring outside Central activities areas falls in line with the predictions of the CCP model. If potting were a female activity at Ndondondwane then it would have been limited to household and peripheral activity areas. However, the firing locus in the Mound does not fit the model. The CCP does not account for this specific pattern. To understand the possible reasons for situating a pottery production locus in a "male" area of the settlement, I suggest we turn to the connections between male- and female-related activities in African societies, and specifically iron production and pottery making.

Explaining why pottery and iron production occurred in the same space at Ndondondwane is a two-part problem. First, there is considerable controversy over the spatial organization of iron production during the EIA, and this must be dealt with before the relationship between the two crafts can be examined. At a regional level, the distribution of EIA sites is closely linked to the location of ore sources and large quantities of wood fuel. In eastern South Africa, both Whitelaw (1991) and Maggs

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(1992) have shown that sites with iron smelting residues occur near hematite outcrops in the proximity of the Pietermaritzburg Shale and Vryheid Formations. There is variation in the location of smelting sites however as some are situated directly beside ore outcrops while others are close to a day's walk away (Maggs 1992). Within settlements, there is a poor understanding of the organization of EIA iron production. The problem lies in identifying where smelting and forging occurred. Smelting areas can be identified by large clay bricks used to make furnace walls, tuyères (long, hollow ceramic tubes that let air into the furnace), iron ore, large pieces of charcoal, and vitrified earth (Maggs 1992). In contrast, forging areas, where bloom is worked, are more difficult to identify because the small slag residues produced by forging deteriorate rapidly. However, furnace and bloom slag can be identified through a variety of petrographic, metallographic, and chemical analyses (Bachman 1982). A third area, used to prepare charcoal (carbon) used in smelting, was also inferred at Ndondondwane. According to ethnographic accounts (), we would expect to find evidence of iron smelting and charcoal preparation outside or on the periphery of settlements and forging debris within settlements. With this in mind, I will briefly review the archaeological evidence from eastern South Africa.

Recent research, mainly in the Thukela Basin, which composes about a third of the province of KwaZulu-Natal, had confirmed early accounts (e.g., Laidler and Scot 1936; Schofield 1948) associating EIA sites with extensive iron working (Maggs 1984a). Some 250 sites dating from AD 400 to the1900s have evidence of iron production. Almost a third of these sites belong to the EIA and another third of these are found in the Thukela Basin. Older site reports mention slag, tuyères, furnace blocks and iron ore, but recently excavated sites have yielded more direct evidence for the spatial location of iron production.

In the upper Thukela Basin, Msuluzi had a number of metalworking areas with large deposits containing slag and other debris near the center of the site (Maggs 1980b). The largest slag scatter also had several large furnace blocks, while another had a mound of raw iron ore. A short distance to the southeast, the site of Magogo had two large slag heaps near the middle of the site: one was six meters long and had furnace blocks, while another was scattered over a twenty-meter area (Maggs and Ward 1984).

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In the lower Thukela Basin, survey and excavation has identified ten sites with iron smelting debris. At Ndondondwane, several different areas have been associated with iron production. Smelting and forging debris were found at the eastern end of the livestock byre (Greenfield *et al.* 1997), an area also used for a host of other activities. Some forty meters to the southeast of this, remains of a smelting furnace, slag, and forging debris were found in an area where elephant and hippopotamus ivory were worked (Loubser 1993; Maggs 1984b). Another fifty meters southeast of this, is a rather large space that was devoted to making charcoal (Greenfield *et al.* 1997). These data will be reviewed in more detail below.

Across the Thukela River at the site of Wosi, furnace blocks and large chunks of flow (i.e., furnace) slag located at several locations within the site have been interpreted as smelting debris (van Schalkwyk 1994b). Further downriver at Mamba I, large dumps of smelting debris occurred in both central and peripheral areas of the site, and what is probably the base of a furnace was found in the central area (van Schalkwyk 1994a). At nearby Mamba II there were several scatters of slag, tuyères, ore, and furnace blocks within the confines of the settlement.

In southern KwaZulu-Natal, recent excavations in the Mngeni valley have identified smelting debris at several sites threatened by dam construction projects. At the rich site of Kwagandaganda, Whitelaw (1994) was able to document furnace debris, vitrified earth, broken tuyères, iron ore and large pieces of charcoal found clustered together at various places within the site that accumulated over three hundred years of occupation. Furnace wall blocks, tuyère fragments and slag were found at the nearby sites of 2930DB 48 and Inanda Quarry, while only slag and tuyères were found at Nanda (Whitelaw and Moon 1996).

The evidence from these sites suggests overwhelmingly that *residues* from iron smelting and forging were commonly deposited within the confines of EIA settlements. Only more rarely did smelting occur on the periphery of a village when exposed ore sources were nearby (van Schalkwyk 1994a). The location of iron production within settlements was not "fixed" in space but changed over time. It does not appear that smelting was segregated to a secluded place outside EIA settlements. Furthermore, no pits or pottery containing organic residues matching known medicinal plants were detected beneath or beside furnace debris, suggesting that medicines were not placed

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near or under furnaces, as is common practice in eastern Africa (Schmidt 1997). The absence of organic remains may be due to preservation factors, and although the thick ashy deposits characteristic of the areas where smelting occurs may preserve botanical remains against the acidic southern African soils in rare cases, the temperatures reached during smelting would likely have incinerated any organic material not placed in a ceramic container. Perhaps most intriguing is that during the 700 years that make up the EIA in eastern South Africa, there is clear evidence that iron smelting and forging commonly took place within early villages with spatial patterns of features otherwise organized like the CCP (such as Ndondondwane, Kwagandaganda, and Nanda).

The evidence for the location of iron and ceramic production at Early Iron Age settlements in eastern South Africa is at odds with many aspects of the CCP model. Claims for iron smelting within settlements have been challenged in two ways. First, such behavior goes against the very ideational principles outlined in the CCP. In particular, it challenges ethnographic accounts of the taboos and pollution dangers associated with iron smelting (e.g., Huffman 1990; Whitelaw 1994/95). Smelting takes place outside the village or homestead because it is symbolically associated with taboos surrounding sexual reproduction and because it incorporates the same dangerous power shared with witchcraft, death and mystical pollution (e.g., Berglund 1976; de Barros 2000; Raum 1973; Schmidt 1997). In this way, iron working is linked to medical practices and conceptions of life and health (Ngubani 1977). In eastern Africa, this connection is expressed by placing medicines in bundles or in pottery either beside or in holes beneath smelting furnaces (Schmidt 1997), which is not in evidence archaeologically in southern Africa. Instead, for southern Africa, Huffman (1990) has argued that similar prohibitions and restrictions associated with smelting are not associated with forging, so it could take place within settlements. Iron production is therefore characterized by a dispersed pattern, wherein each village makes iron objects for its own use, and smelting is spatially segregated from forging.

As far as distribution is concerned, there is increasing evidence that by AD 800-900 iron was made for both domestic consumption and exchange in the Thukela basin (van Schalkwyk 1994/95). However, pottery appears to have been made for use in villages until the 1200s. During this time, new finely made wares were produced for the elite of the fledgling Zimbabwe state (Garlake 1982a, 1982b). What is becoming clear is

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that a wide variety of production arrangements developed during the Iron Age at different times and places throughout the region.

Second, the evidence for clay bricks, tuyères, iron ore and charcoal associated at deposits in settlements is not considered *direct* evidence that iron smelting occurred within the confines of EIA settlements. The reasons for this are not at all clear. Huffman (1993) has pointed to the difficulties in differentiating the slag resulting from iron smelting and forging at EIA settlements (cf. also Miller 1995), while others (e.g., Whitelaw 1994, 1995) simply cite the overwhelming evidence from the LIA for the spatial segregation of smelting and forging activities. However, Ndondondwane may present a special case in this debate.

Data from Loubser's (1984) original site report of the Ndondondwane excavations, some of which did not appear in the later 1993 report, provide the best evidence to date for the construction, use and dismantling of an iron-smelting furnace within a settlement during the EIA. Since this report has not been disseminated, it is worth citing Loubser's remarks in full:

> Iron production marks the final activity on the mound. A forty-centimeter deep depression on the western interior of the enclosure had a lining of slag some twenty centimeters thick. The depression was filled with khaki [colored]-ash, slag and pieces of tuyeres. It had an oval shape and a maximum diameter of 125 centimeters. There was no slag lining on the southern side of the depression where it joined with the secondary depression. This second depression was sixty centimeters deep and was filled with khaki-ash, chunks of slag and bone. The slag-lined depression could have been the base of the furnace, while the second depression could have [been] the rake-hole (1984: 6).
>
> The brick-like blocks from the furnace debris heap have a lumpy texture with smooth interior surface is striated by deep fine impression. A crust of glassy slag is attached to the interior surface of most blocks. The slag crust is thickest near the tuyere end port (1984: 14).
>
> We reconstructed the furnace after numbering the in situ daga blocks. Blocks from within the cluster joined firmly, but did not fit blocks from the opposite cluster. This indicates the presence of two entry holes. [T]he entry port had a spout-like shape (1984: 14).

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> The furnace had a maximum diameter of one metre and···a circumference of roughly three meters, the furnace wall height would be slightly over a metre above ground level. (1984: 14).

> Some 300, 000 cubic centimeters of slag came from the mound. Lumps of slag comprise two phases: oxide ($Fe_3 O_4$) particles which remained unreduced and/or undissolved while in the furnace and dendrites of oxide indicating a liquid state. An x-ray florescent test of the slag shows the presence of magnetite, vanadium and titanium [the closest source is Mamba, some 6 km upriver] (1984: 14; Loubser 1993: 110, 119).

Based on this evidence, and new data from the 1995-1997 excavations, there is little doubt that iron smelting and forging occurred "within" the settlement and forging occurred near domestic areas (Greenfield *et al.* 1997). Evidence for different stages of the ceramic production *chaîne opératoire* comes from the same spatial contexts.

Despite differences that exist in iron and ceramic production arrangements in the recent past and during the Iron Age throughout sub-Saharan Africa, the two crafts appear to be indelibly linked. De Barros (2000: 178-179) has recently described a number of these links that would help explain a spatial connection between iron and pottery production. First, the knowledge of clay deposits is important for both potters and ironworkers because clay is used to make vessels, tuyères, portions of the pot bellows used in forging, and the furnace itself. Second, both potters and ironworkers use pyrotechnology to transform their media—potters transform clay to pottery while ironworkers transform ore to bloom and bloom to iron tools. Third, at a symbolic level, both are involved in the irreversible transformation of the earth using heat (clay to pot, ore to bloom). Lastly, the busiest period for potters and ironworkers is during the dry season. The nature and scheduling of their work make them a natural pair, and perhaps this is why in many places in sub-Saharan Africa the wives of ironworkers are potters.

Given these connections, it would not be unusual to find iron and ceramic production associated spatially. What is clear is that the particular spatial arrangement of iron and ceramic production found at Ndondondwane is not characteristic of the LIA or that documented in southern Bantu ethnography. What is key to this debate is *when* iron production occurred at Ndondondwane. If the excavators are correct in placing iron smelting activity in Horizon 3, smelting may have occurred after Ndondondwane was abandoned. The argument that iron smelting occurred near living areas is then moot, but

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this would explain the range of evidence from southeastern African for the occurrence of iron smelting debris *within* the confines of a settlement.

Thus, this new evidence requires an alternative reading of the organization of EIA craft production, and a reconsideration of the meanings EIA peoples ascribed to space in their villages. At this point in the analysis, I would only like to offer the notion that the conceptions of boundaries within EIA villages may have been quite different from that documented during the LIA or ethnographically. The ideational conceptions of activity segregation proposed in the CCP model may have been solved in another way than spatial distancing. Other mechanisms may have been in place during the EIA.

CHAPTER SUMMARY

In this chapter, I examined the organization of ceramic production at Ndondondwane through a study of the ceramic *chaîne opératoire*. Based on this analysis, a model of EIA ceramic craft production was proposed, which is summarized below and in Table 8.6. At Ndondondwane, pottery output was low and a limited range of vessel classes was made, primarily to serve as multifunctional containers. Ecological data suggest that pottery was made seasonally during the dry summer months (October-February). The stages of the production process occurred at different locations in the settlement. Clay was acquired from deposits within 6 km of the site, and obtaining it may have been a communal activity. Fashioning and decoration was the most time consuming stage of the process and was the responsibility of potters from each household. While each potter worked within a broadly similar technological and stylistic repertoire, individualism, or assertive style, is expressed in the microstylistic characteristics of the pottery. Firing locations are found both in an area peripheral to the settlement and in an area otherwise devoted to iron smelting and ivory working. While each stage of the ceramic *chaîne opératoire* could have involved different forms of labor organization, production was geared towards the replacement of domestic pottery. There is little evidence to suggest that the scale of production was such that pottery was exchanged outside the settlement, although the microstylistic data do imply that pots may have been exchanged between households in the settlement. In general, however,

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these data support Hall's (1987) contention that EIA economics were organized at the household level, or domestic mode of production.

The spatial organization of production activities at Ndondondwane has several important implications for understanding the social context of ceramic production during the EIA. In particular, the positioning of traditionally male and female activities in the same spaces within EIA settlements required further explanation. In the LIA, the physical and symbolic bounding of spatial domains clearly defined where men and women could exercise social and economic control. Suggestions by anthropologists and historians that the oppression and subordination of women during the nineteenth and early twentieth centuries is reflected in similar house and settlement layouts are debatable (Hall 1998; Lane 1998). Equally, it would appear that an analogous situation in EIA societies should also be called into question, as the simple matching of spaces and objects to either men and women in the archaeological record greatly oversimplifies what are far more complex and variable phenomenon. In the following chapter, I examine how ceramic use at Ndondondwane also alters the current understanding of the use of space in villages during the EIA.

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Table 8.1. Firing conditions indicated by core pattern analysis

Atmospheric Conditions [a]		Organic Matter [b]	Iron Content [b, c]	N_s	% Atmosphere Type	% Total N_s	Temperature Range (°C)
Oxidizing	Complete oxidization	-	-	376	6.88%	4.93%	400-585 [d]
	Complete oxidization	+	+	58	1.06%	0.76%	400-900 [e]
	Complete oxidization	+?	+	65	1.19%	0.85%	"
	Complete oxidization	?	+	1050	19.20%	13.77%	"
	Complete oxidization, reoxidized	?	+	226	4.13%	2.96%	"
	Incomplete oxidization	-	+	8	0.15%	0.10%	"
	Incomplete oxidization	+	-	3563	65.16%	46.74%	400-585 [d]
	Incomplete oxidization	+?	-	122	2.23%	1.60%	"
Total				5468	100.00%	71.73%	
Reducing	Complete reduction	?	+?	1376	99.93%	18.05%	400-900 [e]
	Complete reduction	?	+?	1	0.07%	0.01%	"
Total				1377	100.00%	18.06%	
Variable	Complete reduction and oxidization	?	+	1	0.75%	0.01%	400-900 [e]
	Incomplete oxidization and oxidization	+/-	-	9	6.77%	0.12%	400-585 [d]
	Incomplete oxidization and oxidization	+/?	-	1	0.75%	0.01%	"
Total				11	8.27%	0.14%	
Indeterminate	Reducing or oxidizing	+	-	764	99.61%	10.02%	400-585 [d]
	Reducing or oxidizing	+?	-	2	0.26%	0.03%	"
	Reducing or oxidizing	+/?	-	1	0.13%	0.01%	"
Total				767	100.00%	10.06%	
Total				7623		100.00%	

[a] Clay mineral decomposition for all clays at 400-850 °C and kaolinites at 550-585 °C.
[b] Present (+), possibly present (+?), indeterminate (?), not present (-).
[c] Ferrous material decomposition occurs at 573 °C.
[d] References: Searle and Grimshaw (1959: 657); Grim (1962: 98-101).
[e] References: Rye (1981: 106); Duma and Lengyel (1970).

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Table 8.2. Summary of the firing conditions and evidence for post-firing use of ceramics indicated by core pattern data

Core Pattern Group[a]	Firing Conditions	Post-firing Use
Group 1	"Complete" reduction, no core effect, organics may or may not be originally present[a]	
Group 2	Complete oxidization, no core effect, organics may or may not be originally present	
Group 3A	Black core, incomplete oxidization, sharp core margins, organics likely present. Oxidized subsurface layer result of rapid cooling after firing.	
Group 3B	Reddish core, complex oxidization, sharp and diffuse core margins, organics originally present. Reddish interior a result of ferric iron oxidizing in quanitities of 3% or greater.	
Group 4A	"Natural" core and parallel black layers, completely oxidized then submitted to reducing or neutral atmosphere.	
Group 4B	"Natural" core and parallel reddish layers, complete oxidization, diffuse core margin, nor organics present. The "reverse core effect."	Effect produced by surface blackening and carbon deposition during cooking.
Group 5A	Black core, reducing and oxidizing atmosphere, sharp core margins, organics present.	
Group 5B	Reddish core, incomplete oxidization, sharp core margin, organics possibly present, ferric iron oxidizing.	
Group 6A	Black core, complex oxidization, sharp core margin, no organics present.	Effect produced by progressive deposition of carbon during cooking and/or burnishing of surface.
Group 6B	Reddish core, incomplete oxidization, sharp core margin, organics possibly present, ferric iron oxidizing.	
Group 7	Complete reduction, sharp core margins, organics may or may not be present. Exterior or interior oxidized by rapid cooling because exterior or interior was less or not accessible to air after firing.	
Group 1 and 2	Solid black core due to object nested in fuel.	
Group 3A and 6A	Black core, incomplete oxidization, variable core margins, organics likely present. Pattern possibly due to variation in reoxidization of surface after firing.	

[a] See Figure 6.16 for illustration of core patterns identified in the Ndondondwane assemblage.
[b] Only kiln-fired pottery can be completely reduced. This pattern indicates extensive deposition of carbon during firing.

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Table 8.3. Estimated breakage rates for different use categories during the occupation of Ndondondwane

Category	Sample (N_e)	Use Life (yrs.) (see Table 6.20)	Breakage Rate Per Year [a]	Breakage Rate of Pots Per Year at 25 Year Intervals[b]			
				25 yrs.	50 yrs.	75 yrs.	100 yrs.
Cooking							
All	150	1.70	0.6	6.0	3.0	2.0	1.5
Small	72	1.90	0.5	2.9	1.4	1.0	0.7
Medium	78	4.60	0.2	3.1	1.6	1.0	0.8
Serving/ Eating	85	11.10	0.1	3.4	1.7	1.1	0.9
Serving	1,056	0.40	2.5	42.2	21.1	14.1	10.6
Serving/Storage	26	2.20	0.5	1.0	0.5	0.3	0.3
Storage	39	7.60	0.1	1.6	0.8	0.5	0.4
Storage/Transpo rt	517	2.10	0.5	20.7	10.3	6.9	5.2
Total	2,023		5.0	75.0	37.0	25.0	19.0
Total loss of pots per household per year [c]				20.0	10.0	6.0	5.0

[a] Breakage rate per year = use life in months/ 12 months.

[b] Refers to the number of pots entering the archaeological record per year at 25 yr intervals with a total sample size of 2,023 ceramic objects. Calculation is based on the following formula: $\frac{\text{Total EOE for Use Category}}{\text{Total Number of Months}} \times 12 \text{ months}$.

[c] The loss of pots per household during the 25 year time slices is based on an estimate of four households (i.e., Transect 1 and Middens 1-3) occupied per year during the main occupation of the settlement.

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Table 8.4. Number of micro-styles identified in the Ndondondwane vessel series

Ceramic Class	Ware												Total Number of Micro-styles
	Plain	ZIC	ZIP	Brown			Black			Red			
				Plain	ZIC	ZIP	Plain	ZIC	ZIP	Plain	ZIC	ZIP	
Bowls													
01. Spherical Bowls	2	2	2	2			1			1			10
02. Ellipsoidal Bowls	1	1	1	1	1								5
03. Pyriform bowls	1												1
04. Bi-conical Bowls	2	3		2	2		3	2		1	1		16
Jars													
05. Spherical Jars	1	17	4	1	1	1		2		1	5		33
06. Ellipsoidal Jars	1	6			1								8
07. Ovoid Jars	1	1									1	1	4
Indeterminate Jars	1	95	22	1	10	3	1	7	2	1	13	4	160
08. Cups	1		1	1									3
Indeterminate Vessels	1	13	3	1	1	1	1	1		1	4		27
Total Microstyles	12	138	33	9	16	5	6	12	2	5	24	5	267

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Table 8.5. Similarity in the micro-styles recovered from major activity areas

Area[a]	Dung	Mound	Transect 1	Transect 2	Midden 1	Midden 2	Midden 3
Dung	—	43%	62%	75%	54%	39%	49%
Mound	26%	—	36%	58%	33%	25%	43%
Transect 1	19%	20%	—	66%	26%	18%	32%
Transect 2	6%	6%	17%	—	11%	8%	8%
Midden 1	28%	28%	43%	66%	—	30%	32%
Midden 2	16%	17%	26%	42%	24%	—	21%
Midden 3	21%	30%	43%	42%	26%	21%	—
Total Micro-styles in Area	147	89	47	12	76	61	63
Total % of Micro-styles in Area[a]	55%	33%	17%	4%	28%	23%	23%
Total Micro-styles Exclusive to Area	76	46	14	3	29	22	21
Total % of Micro-styles Exclusive to Area (No. exclusive to area/ Total no. in area)	52%	52%	30%	25%	38%	36%	33%
Total % of All Micro-styles (No. exclusive to area/ Total no. in assemblage)	29%	17%	5%	1%	11%	8%	8%

[a] Numbers are arranged as the percent of microstyles shared between areas in the row and then the column (i.e., Dung area has 26% affinity with the Mound while the Mound has 43% affinity with the Dung area).

Table 8.6. A model of domestic ceramic production at Ndondondwane

Dimension of Production	Household Production Model[a]	Ndondondwane
Technology		
Raw materials		
Clay	< 1 km (local)	< 5 km? (local)
Temper	< 1 km (local)	None?
Fuel	–	Heavy and light fuel (local)
Pigments	<10 km (local)	Graphite, ochre (local)
Tools	–	Sticks, burnishing stones (local)
Firing technology	–	Open
Scale		
Range of functional types	Narrow	Narrow (cooking, serving, storage, transport)
Range of wares	Wide	Wide
Volume of finished goods	Low	Low
Intensity		
Distance to raw materials	< 5 km (local)	2 to 6 km (local)
Density of debris produced	Low	Low
Size and elaboration of production facilities	Small, unelaborated	Small, unelaborated open firing loci
Intensity of work effort	Occasional/part-time	Part-time, seasonal
Concentration		
Market	Home use	Home use; intra-community
Spatial extent of distribution	Local	Settlement? Intra-household?
Context		
Labor organization	Unspecialized, kin-based, work separately	Unspecialized, kin-based, older potters work separately, younger potters in age cohorts
Identity of potters	More often women	Women
Social setting of production	Dispersed among multiple locations (i.e., settlements)	Dispersed. Annual domestic replacement activity. Symbolically associated with the cycle of iron production.

[a] Arnold (1985: 35-57 and tables 2.1–2.7), Peacock (1981), Rice (1987: 183-191), van der Leeuw (1977).

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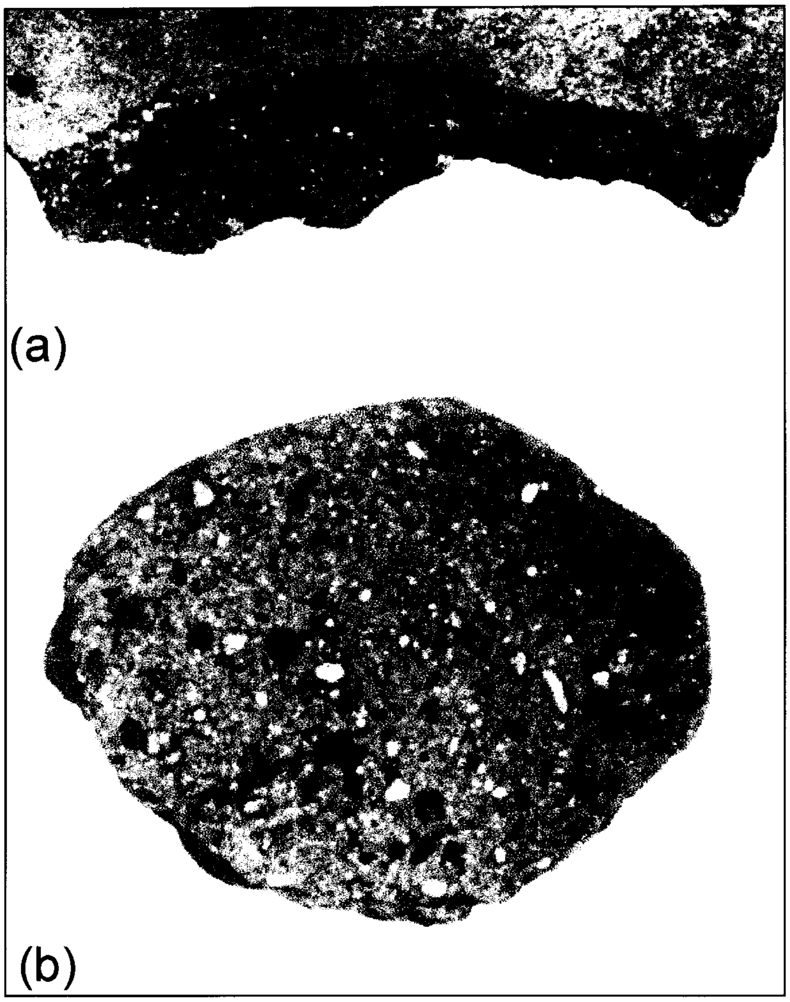

Figure 8.1. Fabric characteristics of the Ndondondwane ceramics. (b) Fabric Group 1 sherd showing quartzite and calcite (white) inclusions. (b) Example of sherd with high silver mica content and rhomboidal voids left by decomposed calcite.

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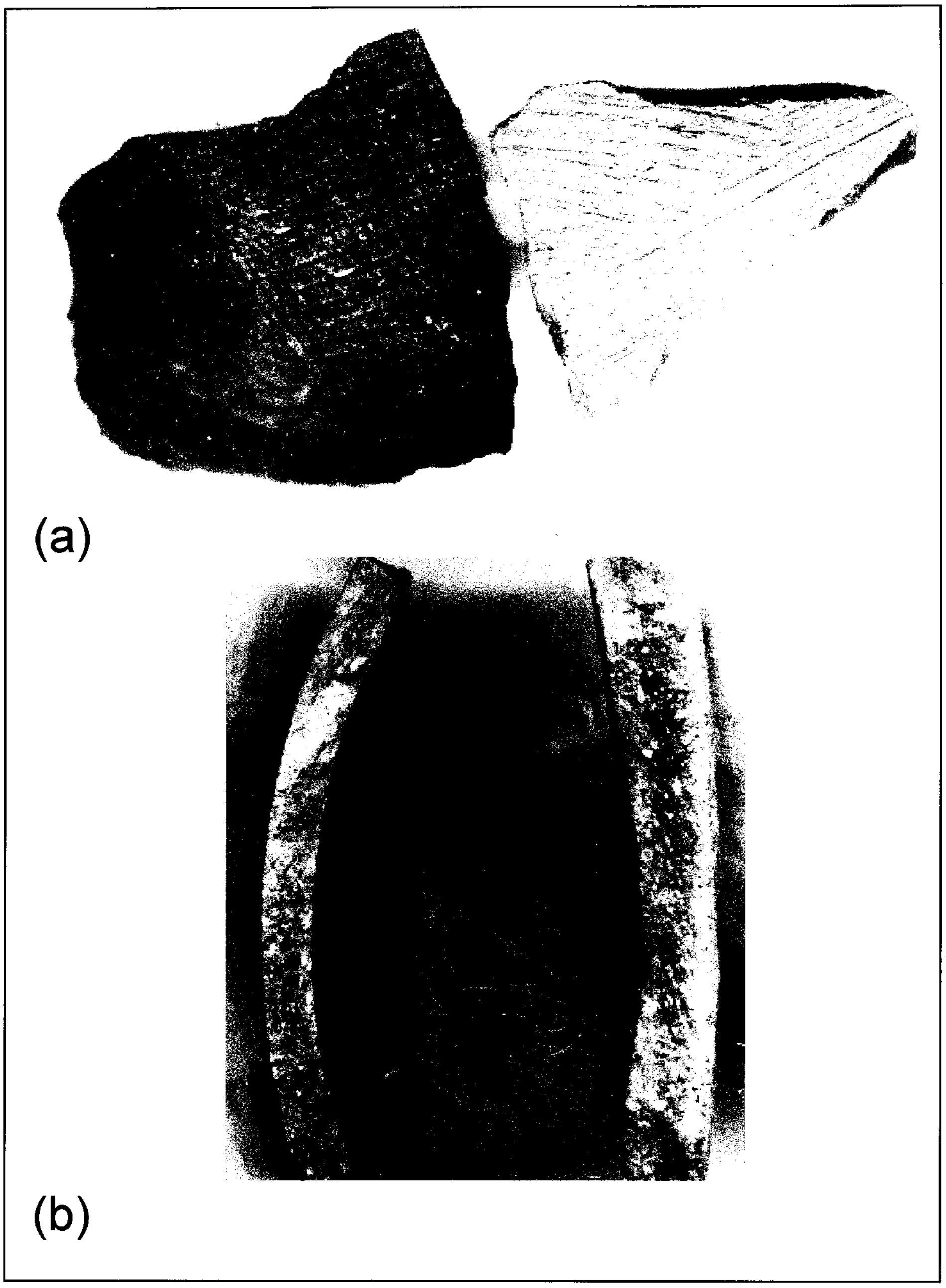

Figure 8.2. Comparison of modern Zulu pottery from the local area (left) to a sample from Ndondondwane (right). A) Exterior surface of sherds. B) Sherds in cross section. The black surface of the Zulu sherd is due to smudging during firing and subsequent addtion of graphite. The coloring of both sherds in cross section is in the same hue and chroma despite different surface colors and treatments (Munsell 5YR, reddish yellow).

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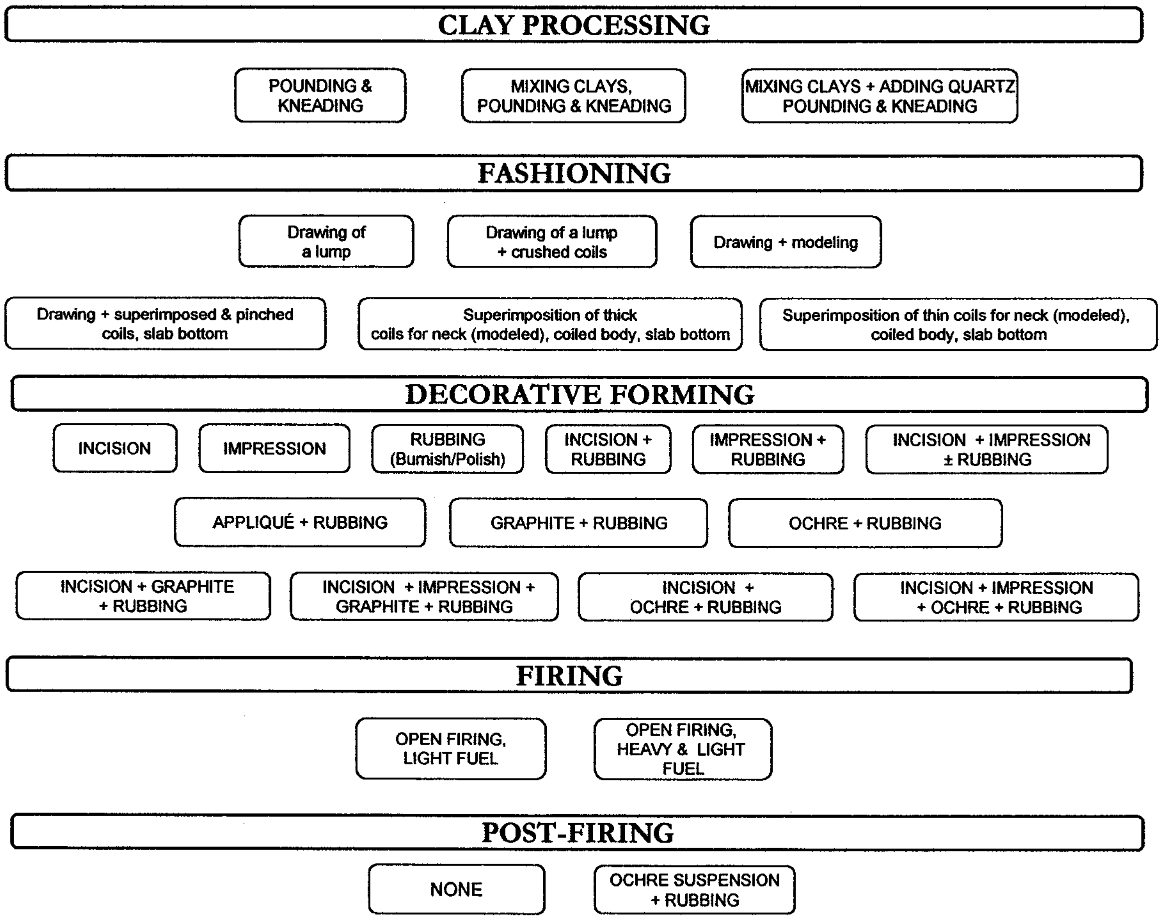

Figure 8.3. Techniques and materials used in the main stages of the ceramic manufacturing process at Ndondondwane.

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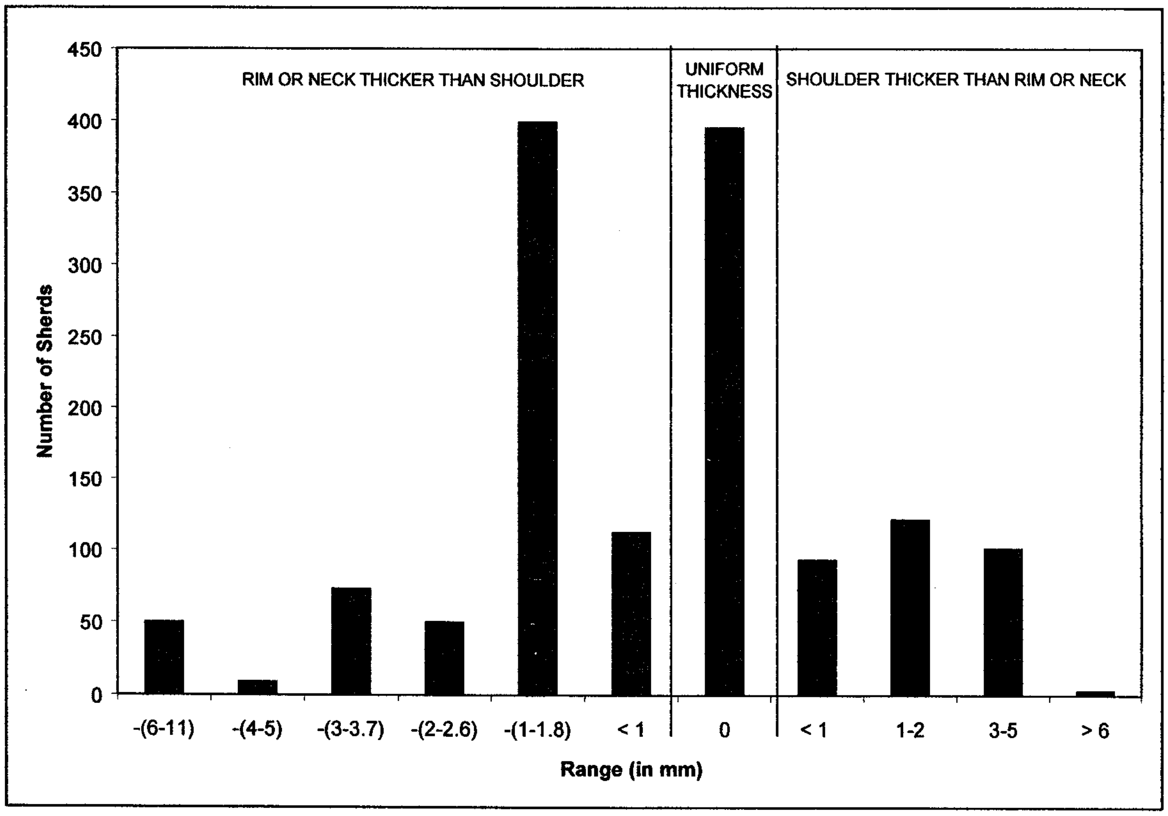

Figure 8.4. Differences in the comparative thickness of rim, neck, and shoulder elements of jars and bowls.

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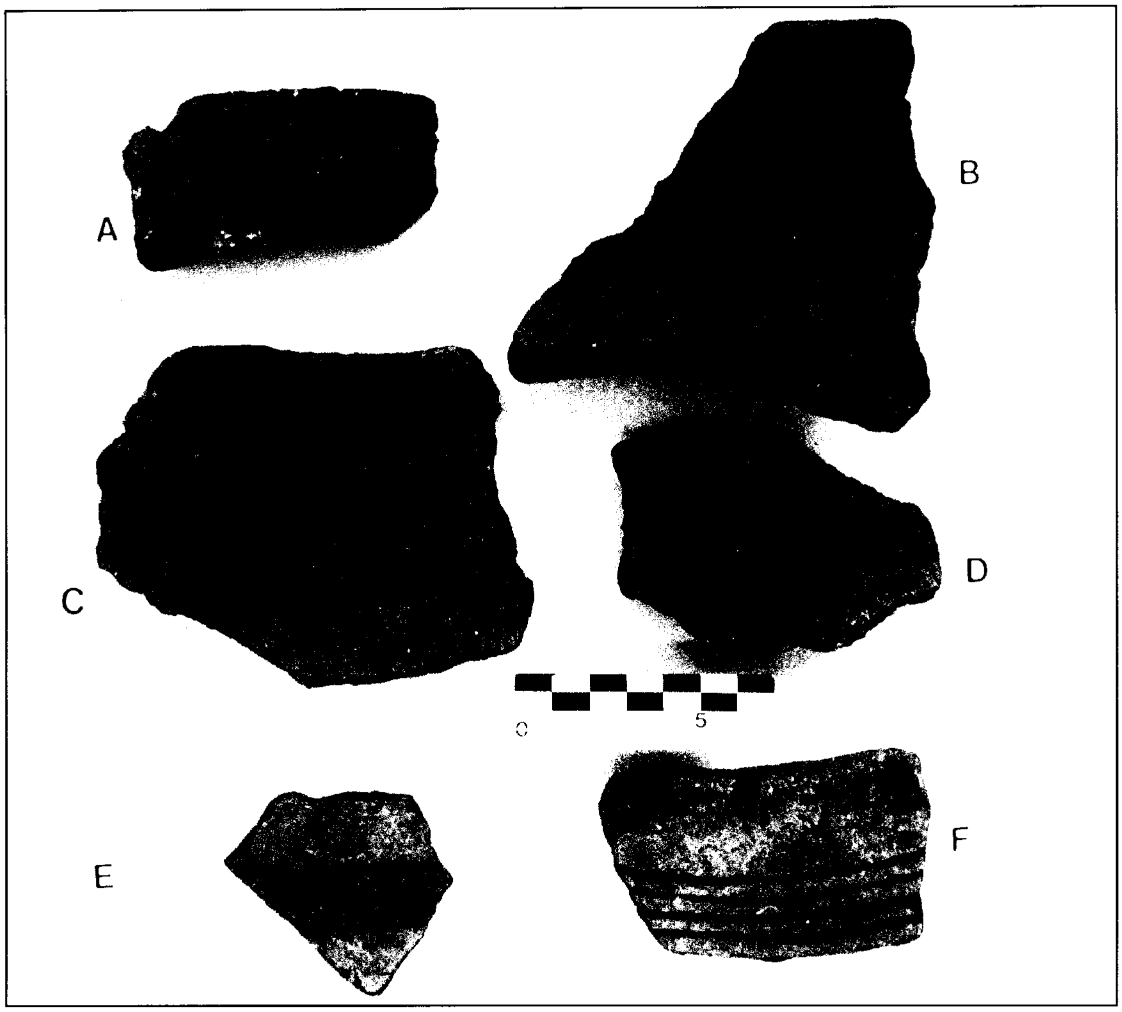

Figure 8.5. The kinds of tools used to decorate the Ndondondwane ceramics indicated by variation in the width, depth, and trough-shape of incised motifs: (a, c, f) thick, rounded; (b) thin, rounded; (d) thin, straight; (e) very thin, straight.

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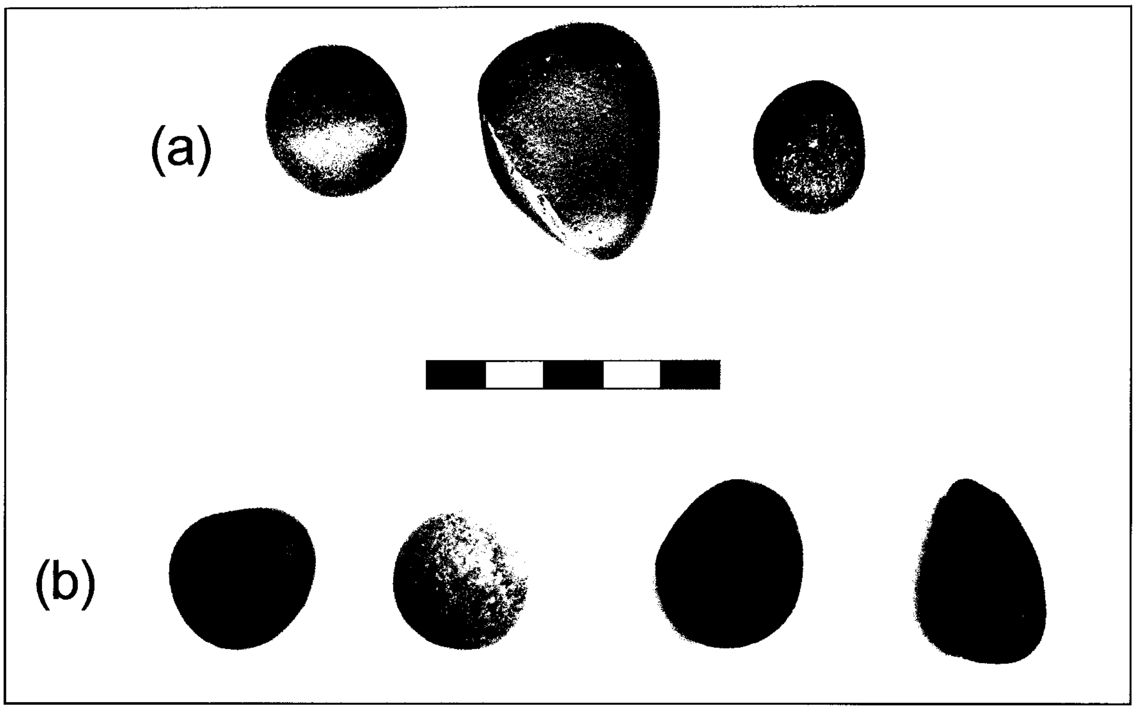

Figure 8.6. Burnishing stones: small, well-rounded dolerite pebbles (a) used by modern Zulu potters and (b) similar stones recovered from the Ndondondwane excavations.

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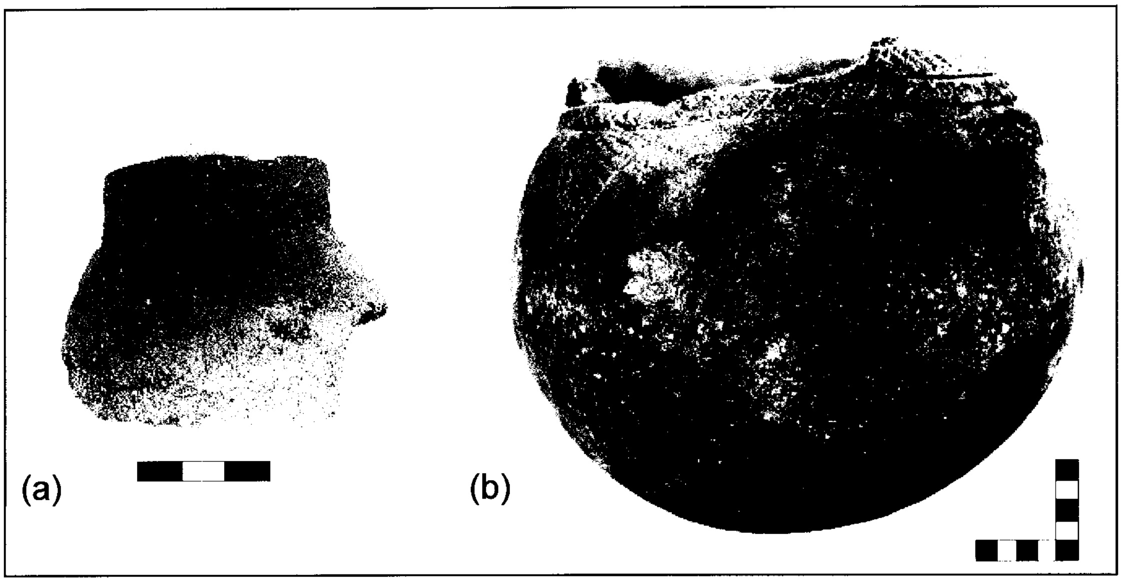

Figure 8.7. Example of firing faults: (a) lime spalling, (b) fire spalling. Scale in centimeters.

Figure 8.8. Open firing loci used by a modern Zulu potter.

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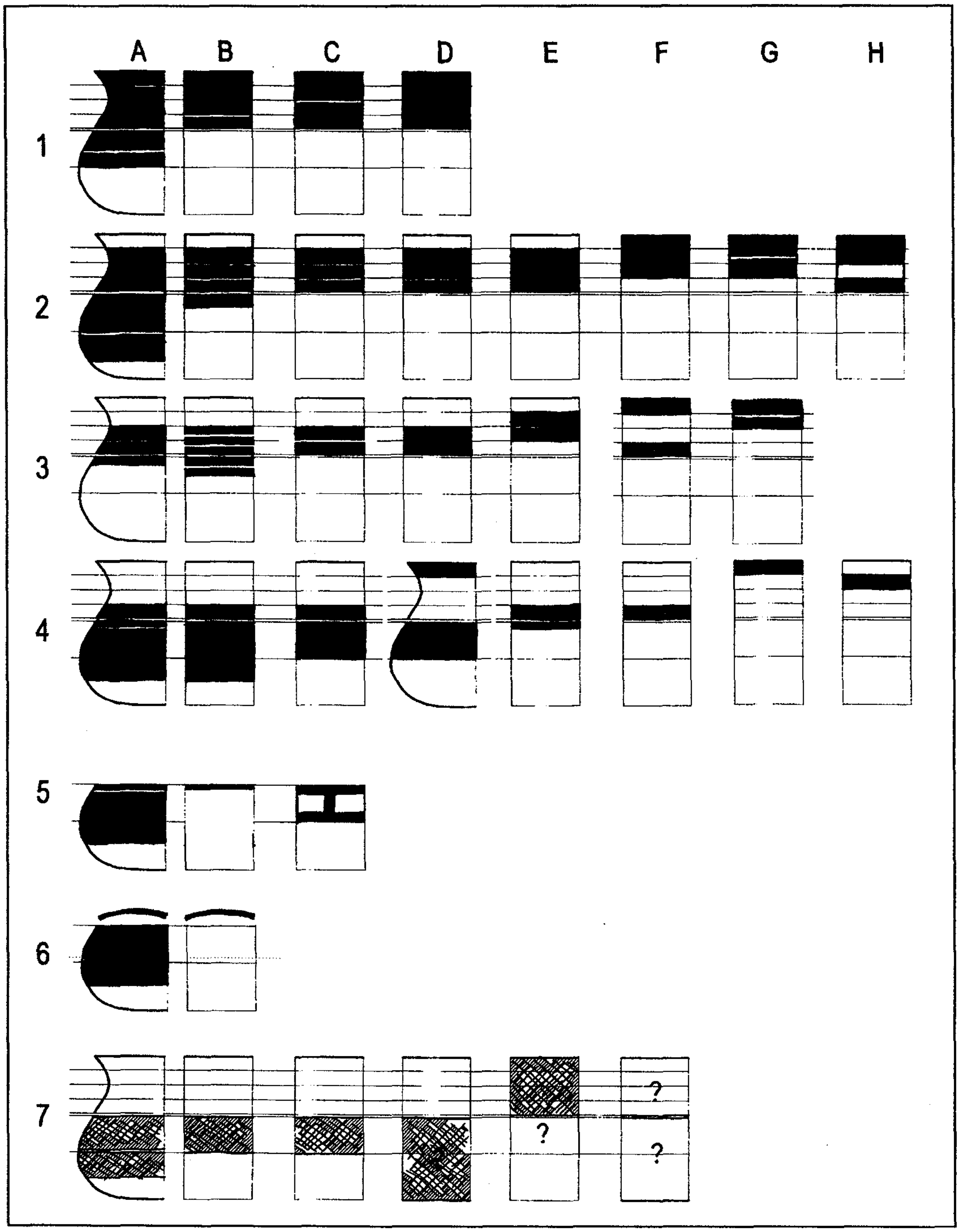

Figure 8.9. Vessel design modes (1–4 jars, 5 and 6 bowls) and layouts (A–H). Mode 7 was used to record decoration on a section of the design field where the exact position and/or extent of decoration was uncertain. Discrete horizontal registers of decoration are designated by white bands within a section of the designed field (e.g., Mode 1B).

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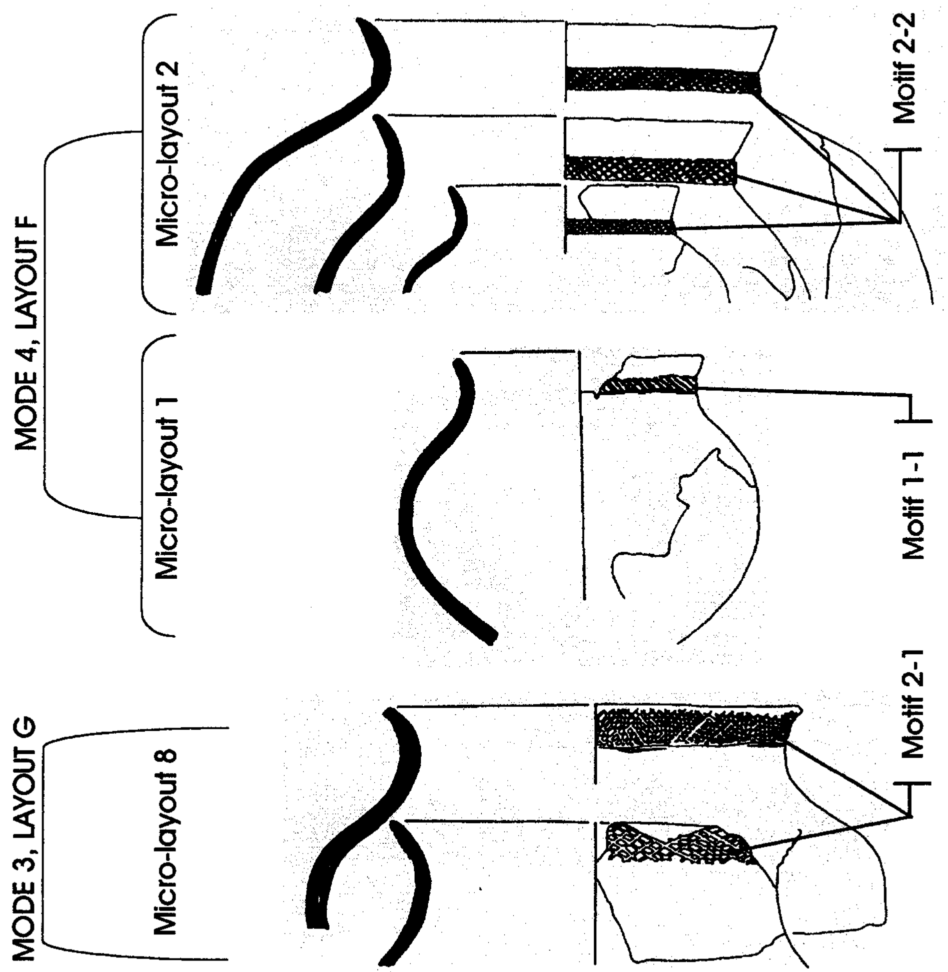

Figure 8.10. Micro-stylistic variation of Ndondondwane vessel classes. Decoration mode and layouts are given in Figure 7.7, and ML refers to the number assigned to micro-layout identified within a layout.

CHAPTER 9

THE CULTURAL CONTEXT OF CERAMIC USE

Huffman (1996, 1997, 1998) has repeatedly argued that the CCP captures the main rules governing the layout and use of space in Iron Age settlements. As such, the "rules" are the focus of research and not the variation in the way the structure is presented. To evaluate whether these rules apply to EIA settlements archaeologists must be more concerned with the use and meaning of space than the exact matching of settlement layouts. Analyses should therefore attempt to discern whether analogous economic, social and ideational processes were governing the use of space in EIA settlements. In the previous chapter, an alternative interpretation of settlement space was offered by refocusing attention away from allegedly male and female spatial domains and onto allegedly male- and female-associated production activities. In this chapter, I address several other organizing principles proposed by the CCP that may be evaluated using ceramic data.

The first deals with storage. Although the economic and social importance of cattle have seen primary attention in debates about the CCP, a key correlate of the model also involves grain storage. Several studies (Evers 1984; Huffman 1982: 140) suggest grain pits will be situated in or just outside livestock byres, reflecting control over the production and distribution of grain by the settlement head or an external central authority. Grain may be placed in baskets or pottery vessels in pits or stored in dung-lined pits. The possibility of central storage will be explored below.

Two other principles concern social organization at the settlement level. In CCP settlements, there is an outer arc of houses with the principal house upslope from the central area and opposite to the main entrance to the central complex. The main implication of this layout is that there are clearly defined public (central) and private (domestic) areas within settlements where only a limited range of activities is permitted. The function of different activity loci at Ndondondwane is suggested by the ceramic data and the social implications of this functional model are discussed here. The second

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principle concerns the social standing of individuals in the community. Households are also ranked in order of declining status right and left of the principal house. However, it has not been explored if the material culture from household complexes reflects the status of their occupants.

While not made explicit in the CCP model, in the past decade several other principles have been advanced about the importance of ritual in social maintenance and changes in status. A number of archaeologists have inferred the existence of initiation ceremonies and other rituals that involved ceramics during the EIA (e.g., Loubser 1993; Whitelaw 1994/95). However, few have considered the historical contexts of initiation rites during the EIA or the political ramifications of them. Ceremonies involving community-wide recognition of a change in social standing must be managed and scheduled and are usually under the control of some local authority, such as a settlement head or ritual specialist. As well, the exchange of cattle for wives is an important aspect of the political structure implicit in the CCP. If bridewealth was as important to the formation and continuation of political alliances during the EIA as Huffman (1990, 1993, 1998) contends, then the cycle and timing of the initiation process that brought young girls to marriageable age would have been politically loaded. To date, these practical and political dimensions of ritual practice during the EIA have not been fully explored.

STORAGE VERSUS "TRASH"

During the excavations at Ndondondwane, no storage pits were found in or around the livestock enclosure (Greenfield *et al.* 1997; Greenfield and van Schalkwyk n.d.; and Greenfield, personal communication, 2000, 2001). Dung-lined storage pits were only found near domestic residences. A granary was possibly located near the house in Midden 2, and another behind the house in the Mound Area (Loubser 1984: fig. 2). While the excavations in the Dung Area were extensive, the full extent of the livestock enclosure was not excavated, nor the entire area around it. The possibility still exists that pits were not recovered during excavations. However, if pots were used for grain storage in the enclosure, they may have been deposited there or moved to the Mound sometime during Horizon 2.

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Because of the complex disposal patterns in the Central Zone, a consideration of this issue involves separating the "trash" from the storage. A key problem involves distinguishing between storage vessels that were used and those that were discarded in the Dung Area. Morphological criteria are ill suited for making this distinction because large storage vessels are restricted to spherical jars and ellipsoidal bowl vessel types. Instead, only storage vessels with identical micro-styles may reflect those used exclusively in the Dung Area. In this analysis, I consider only pots with micro-styles exclusive to the Dung Area and those that share micro-styles with pots in the Mound Area because they may have been used in the Dung Area during Horizon 2 and later discarded in the Mound Area.

Of the 36 storage vessels identified at Ndondondwane, approximately seven storage jars meet these criteria (Table 9.1). A large jar with 20% of the rim still intact is the only storage vessel with a micro-style exclusive to the Dung Area. Two other sherds of storage jars from the Mound shared micro-styles with the Dung Area. Their rim-EVEs total less than one vessel (more of the body was preserved than the rim). These numbers are quite low for an area that would have been used for communal storage for a 25- to 100-year period. Clearly, large ceramic containers were not used for the long-term storage of grain at Ndondondwane. Pits or granaries would have taken up this function. We must therefore rely on the excavation data, which suggest that each household stored and processed its own grain. This does not imply that grain was never a pooled resource. Rather, it suggests there was little need for a *central authority* to govern its storage and be responsible for its redistribution.

DOMESTIC AND PUBLIC SPACE: A MODEL OF AREA FUNCTION

Because the deposits at many sites date to different phases of the EIA, another topic of considerable controversy is the identification of discrete domestic/private and central/public areas in settlements (Lane 1994/95, 1998). In part, this problem can be addressed through a study of the function of areas in settlements because only a specific range of activities are permitted in domestic and public space in settlements organized according to the CCP. In this analysis, I first combine the completeness and diversity indices to evaluate the hypotheses of area function offered in Chapter 7. By considering

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the detailed history of each activity locus in this analysis, I then propose that activity areas at Ndondondwane fall into three functional classes.

Ceramic Use, Discard and Area Function

A plot of the completeness and diversity index data was used to evaluate the relationship between patterns of ceramic discard and the kinds of ceramics used in different activity areas over time. Figure 9.1 shows the distribution of the scores for the horizons and features in activity areas. The index limits for high and low completeness (CI = 33) and diversity (DI = 66) serve to break the plot into four quadrants: (A) refers to areas with high brokenness and low diversity, areas in (B) have low brokenness and low diversity, those in (C) have low brokenness and high diversity, while those in (D) have high brokenness and high diversity. Only categories A, B and C are represented in this distribution.

This plot takes on a different form if each area is instead grouped by function and placement in the stages of pre-abandonment or abandonment (Figure 9.2). Clustered in the bottom left of the plot are the scores of activity areas during the abandonment horizon in the Central Zone and two of the three living floors of abandoned houses. The house floor in Midden 3 and the Horizon 3 deposits in the Central Zone accumulated during the abandonment stage at Ndondondwane. The Transect 1 house floor and surrounding area represent an abandonment of a living area within the settlement during its occupation, but interestingly are found within this cluster. This suggests that archaeologists may have difficulty distinguishing area and settlement abandonment debris unless areas can be related on stratigraphic grounds. The score for the Charcoal Preparation Area falls outside this cluster and will be discussed further below. These "abandonment" deposits are linked to the Midden 1 pits and the Western midden in Midden 3, which are also trash areas that accumulated during abandonment. These areas occur differently in the plot because the ceramics in these deposits are very well preserved.

In the bottom center of the plot are functionally ambiguous horizons in the Transect 1 and 2 areas, and I argue that Horizons 1 to 2 in Transect 2 and Horizons 2 to 3 in Transect 1 were "trash" areas during occupation. Ceramic debris may have

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accumulated from casual use of these areas, which have resulted in a ceramic "signature" that sets them apart from the specific and redundant sets of activities found at other locations.

The structure and craft production area in the Mound during Horizon 2 stands out in the high completeness and diversity area of the plot, while the Charcoal Preparation area is isolated in the low completeness and diversity section. I consider both areas to be special function areas. The activities that occurred in these settings involved the production of specific goods (ivory, iron and pottery) or specific by-products (carbon) for use in smelting, neither of which occurs at any other locations in the settlement.

A most interesting result of this analysis is the clustering of scores for deposits in the Human Activity Zone of the livestock enclosure and the domestic complexes and their associated middens. Between 40 and 80% of the ceramic use categories were deposited in these areas, and it is in these settings where the majority of daily activities would have taken place at Ndondondwane. The kinds of ceramics deposited during Horizons 1 and 2 in the Central Zone are more restricted than domestic complexes. Vessels used for cooking, serving and storage-transport account for 98% of the ceramic use categories from these horizons of the Dung Area (see Table 6.21). Their association with the large depression used for cooking and the high volume of ash and bone during these horizons may have resulted from communal feasting during the main occupation of Ndondondwane. Thus, with the exception of the domestic complex in the Mound Area, it is also possible to distinguish the ceramic fragmentation and use category "signatures" of activity areas situated in the Central and Peripheral Zones. It is also noteworthy that the atypical scores of the Midden 2 domestic complex that occurred in the analyses presented in Chapter 7 do not appear anomalous here. It is therefore quite likely that sherd selection either did not occur during the excavation of these areas or has not proved a significant variable in this analysis. Below, I examine how the size of houses may otherwise account for the variation in scores from peripheral domestic complexes.

In sum, by examining the degree of ceramic fragmentation and the functional diversity of ceramics from different deposits it has been possible to account for the spatial and temporal distribution of ceramics at Ndondondwane that cannot be explained in terms of natural formation processes. This analysis confirms the expectation

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of area function at Ndondondwane predicted in Chapter 7. Three clear types of pre-abandonment deposit were identified:

(1) those in settings where routine, daily and domestic activities occurred in the Central and Peripheral Zones,

(2) those resulting from communal activities that occurred in the Central Zone (Dung Area, Horizons 1 and 2), and

(3) deposits resulting from specialized (but perhaps not specialist) activities in both the Peripheral and Central Zones, which are distinguished by high fragmentation-low diversity or low fragmentation-high diversity patterns, respectively.

As well, five types of "trash" and abandonment deposit were also distinguished:

(1) open middens used as provisional discard areas in the Central Zone (Transect 1 and 2),

(2) casual discard areas on the periphery of the settlement,

(3) *de facto* abandoned house floor debris,

(4) domestic grain storage pits used to discard household debris during abandonment, and

(5) open middens that accumulated primarily if not exclusively during abandonment.

Together, these data suggest that activity areas at Ndondondwane were divided into three functional classes: (1) communal areas, (2) domestic areas and (3) special function areas.

Communal Areas

Present data indicate that ceramics were used for cooking, serving and storage in both domestic and Central areas, and although it cannot be accurately determined which objects were used in multiple areas of the settlement, I would consider this evidence for the fluid movement of objects but not people within and between different areas of the site. It is therefore possible to suggest that access to certain areas of the settlement may have been restricted to certain members of the community even though similar activities

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occurred within them. I will refer to these "unrestricted" areas as, for lack of a better term, communal areas.

Communal areas are multipurpose activity loci that are freely accessible to all members of the community, but the activities in these locations are spatially fixed and do not occur elsewhere at the site. This type of area is limited to Horizons 2 and 3 in the Dung Area. Activities in and outside the enclosure are spatially restricted, and include at least cattle tending and episodes of mass food preparation (butchering and roasting in the depression of the human activity zone of the enclosure). The occurrence of ceramic sculpture in the livestock enclosure also implies it was used for ceremonies involving the entire community (cf. Whitelaw 1994/95). However, because the area also served as a communal dumping area, the nature of the activities that occurred there can be masked by secondary disposal practices. Therefore, the serving/eating, water transport and short-term storage vessels deposited in the area may have been originally used there. It is very difficult to separate the actual objects used in Central areas and those used elsewhere and later deposited in the Dung and Mound Areas. This is because serving/eating, water transport and short-term storage are spatially flexible activities—they are not bound to a specific area of the settlement. Above, however, I argued it is been possible to distinguish primary and secondary discard to some degree based on stylistic variation.

Domestic Areas

Domestic complexes at Ndondondwane are true multifunctional areas. Many activities took place in and around households, many of which also occurred in other areas of the settlement (i.e., they are spatially flexible). All the domestic complexes fall in this range.

In households, some activities can occur simultaneously, others on a rotating basis: food preparation, eating, discussion, hide cleaning, tool repair, and children playing may all be occurring in an area at the same time. Other activities, such as iron forging in Midden 1, may occur near a house complex after which certain residues from the activity are deposited in household middens. As such, some classes of material

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culture may be secondary refuse in the same deposits where other materials, such as pottery, bone and ash, are primary refuse.

While this pattern characterizes open middens, the debris from house floors and pits in middens is an exception. The few house floors in evidence at Ndondondwane have low diversity and completeness. Houses were clearly emptied before abandonment, but fragments from a few pots were left behind. The *de facto* refuse in the Transect 1 house is interesting because even though the house was abandoned rapidly it still exhibits the same brokenness and diversity patterns as other households. Only two storage pots were found in situ on the house floor, and if this is house is typical, it gives us some insight into the use of ceramic containers in household areas on a daily basis. As indicated by the Transect 1 case, we may expect pots containing grain or meal, for instance, to have been stored inside against the walls of the hut. On a temporary basis, certain containers may have been stored and used outside. Here, they were easily accessible to outside cooking areas and could be placed up against houses, covered, or stacked, so as not to interfere with other activities taking place around households. Undamaged pots do not occur outside the hut because they were probably retrieved for use elsewhere.

Unlike other domestic deposits, pits have a higher diversity of ceramics, which reflects their accumulation during the abandonment of the settlement. The regularly used middens do not have this pattern because all the ceramics used in households were not deposited in their associated middens. The common Central middens and pits filled during abandonment are representative of the ceramics that would have been used in areas of the settlement where daily and domestic activities occurred. Thus, central deposits are useful for addressing issues about site-wide technological and stylistic variability in EIA ceramics. In contrast, the *de facto* and abandonment refuse in domestic areas is typical of the domestic pottery used in households prior to settlement abandonment, and is therefore more representative of domestic ceramic assemblages.

Midden 3 presents a clear exception to this pattern. Almost 69% of all the serving vessels identified at Ndondondwane and only one fragment of a cooking vessel were recovered from this domestic complex. This represents a remarkably disproportionate number of serving vessels to other use classes in domestic areas. There was a great deal of serving and very little, if any, cooking happening in this domestic complex. In the

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normative view presented by the CCP, the side/outer half of the side/outer:center/inner opposition is associated with wives, the living, raw grain, and low status, as typified by the symbolic dimensions of Swazi homesteads (Table 9.2). The rules of house placement are responsible for wives of decreasing status to be situated to the left and right of the principal house. As well, the huts of young, unmarried men are placed furthest away and down slope of the principal house. While bachelors live away from their mothers' house, it is the responsibility of women to provide the food for their families. This situation may well explain the anomaly of Midden 3 at Ndondondwane, and it is quite likely that low status, unmarried men occupied this household. Although I have not found a parallel in the ethnographic literature, at Ndondondwane it may have been inappropriate for young men to cook their own meals. It may have still been the responsibility of the young men's mothers to provide their meals, although they ate them away from their mother's house. This interpretation may not represent an exception to the normative pattern, but merely a transformation of it. As we have seen above, other symbolic dimensions associated with Swazi houses are not in evidence at Ndondondwane, such as the threshed grain:raw grain or the dead:living oppositions. If Midden 3 was home to unmarried men at Ndondondwane, this would however indicate that the sides/outer/low status:center/inner/high status opposition was in place.

Special Function Areas

Special function areas are places within the settlement set off for a specific, limited range of activities. Like communal areas, these activities are spatially fixed and do not occur elsewhere at the site. This type of area is limited to Horizons 2 and 3 in the Dung Area, Horizons 2 and 3 in the Mound and the Charcoal Preparation area.

During the occupation of the site, the Dung Area is associated with the activities that occur in the livestock and human activity zones. While activities in the human zone are multifunctional, the primary function of the livestock enclosure—containing cattle and other livestock—is spatially restricted because no other livestock byres are present at the site. This situation is very different from other EIA settlements, which have more than one byre. At Kwagandaganda, Whitelaw (1993, 1994) assigned seven byres to the Ndondondwane-phase settlement and four to the Msuluzi phase. He offered two

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explanations for the number of byres. Either "they belonged to different families within the settlement" as Huffman (1986) suggested, or as Denbow (1982) has documented, they "may be the result of new byres being established adjacent to old ones, perhaps because the dung deposits became too deep. Cattle penned on excessively deep dung are more prone to diseases such as enteritis, gastritis and diarrhoea" (Whitelaw 1993: 79). The presence of multiple byres is key evidence for the private ownership of cattle by families during the EIA (Huffman 1990, 1993). The absence of such evidence at Ndondondwane suggests three possibilities: (1) individual families did not own cattle, (2) cattle owned by all families were penned together, or (3) only one family inhabited Ndondondwane.

The Mound Area was also used for a series of spatially restricted activities. Horizon 2 is associated with the processing of wild game, ivory bangle production and ceramic production, while iron smelting occurred in the area during Horizon 3. Throughout most of the occupation of the site, the Mound was a special function area and the objects deposited reflect the limited range of activities that occurred there. A key feature of the Mound at this time was the large accumulation of ash middens. Ethnographically, these are related to the "court" or "men's assembly area" (Kuper 1980, 1982). As Huffman (1986: 316) explains:

> the court midden in the Bantu Cattle culture may comprise broken beer pots, the ash from the council fire, the remains of cattle slaughtered as fines or tribute, and the remains of wild animals shared among men or given as tribute to the chief. Alternatively, the central midden may be formed by the refuse from all the families that use the court.

There is abundant evidence for assembly-area middens with large ash deposits situated away from livestock byres at Iron Age settlements (Denbow 1982, 1986; Eloff and Meyer 1981; Huffman 1986; Loubser 1993). In settlements organized according to the CCP, the size of middens is directly related to the political importance of the site (Huffman 1986: 316), and Loubser (1985: 85) has described how ash may play a symbolic role in political debate for the Kgaga by acting as "a cooling agent in 'hot' situations." Water and ash are but two of a series of cooling agents linked to healing and fertility that are opposed to "hot" dangerous, sterilizing forces in southern Bantu speaking societies (Table 9.4). While the cooling agents are associated with men and the down/center/inner spatial opposition, hot agents are associated with women and the

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up/outer opposition. These symbolize proscriptions for behavior that are linked to the movement of men and women in settlements and the nature of the activities they undertake in different settings. While the ceramic evidence presented in the previous chapter and in the previous section has questioned the strictness of these proscriptions at Ndondondwane, and if indeed all of the symbolic dimensions of the CCP were present at the site, there is greater evidence for a low status:high status distinction. An inversion of this is the down/liminal:up/normal opposition. Symbolically, political debate can be associated with the concept of liminality and opposed to normality because the subject of debate has not been resolved and therefore has a liminal status.

By its position in the settlement, the circular daga structure in the Mound may also be linked to political activity at Ndondondwane. Ndebele chiefs in the northern Transvaal held secret meetings in a grass hut situated in the assembly-area or in the cattle byre (Loubser 1981: 13). The structure in the Mound may be the remains of such a meeting place. The presence of only one cooking vessel in the Mound implies that food was eaten but not prepared here. The abundant eating and serving vessels discarded along the wall of the structure may have been used for meals eaten in the structure during meetings. At Kwagandaganda, Whitelaw (1991: 81) has also described similar features in Byre 1, where a depression could have served as a hearth and channels similar to the ones at Ndondondwane could have acted as a foundation for a shelter or palisade.

The Charcoal Preparation Area has ceramic disposal patterns similar to the Mound Area, which would indicate that spatially restricted, special function activities also occurred here. I have argued in the previous chapter that the Charcoal Preparation Area was a space devoted to charcoal production and ceramic firing.

Given the characteristics of special function areas at Ndondondwane, and analogous processes that led to their formation documented ethnographically, the use of these areas were likely restricted to certain members of the community. Men clearly would have been the primary, if not the sole, users of the Mound if it acted as an assembly area and a site for men's craft activities and political discussion. As well, charcoal preparation and pottery firing is the responsibility of women (Childes 1999; Collett 1985; Schmidt 1996, 1997). This spatial patterning of activities at Ndondondwane generally conforms to the central/public/male:peripheral

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(domestic)/private/female dichotomy predicted by the CCP. However, the presence of a pottery-firing locus in the Mound still confounds interpretation. At this point, I shall consider another fundamental principle of the CCP model: differences in social status amongst residents of the community.

CERAMIC USE AND SOCIAL DIFFERENTIATION

An important aspect of the CCP model lies in establishing the positioning of the principal house and whether households are arranged in relation to it on the basis of status differences. The mere positioning of houses in relation to each other and central areas, while important, is only one line of evidence that may be drawn upon to understand the relationship between spatial and social organization in EIA settlements. Another way is to determine if there are differences in the material culture from households that may be related to social standing in the community. One aspect that has not been explored for EIA communities is the relationship between the utilitarian and symbolic functions of ceramics in households.

Most archaeologists would accept that styles are imbued with content and meaning. Yet, style presents a knotty problem in ceramic analysis principally because the meaning(s) carried by decorative elements and motifs and their arrangements may be viewed as the primary reason for their creation. To adequately discuss the function of pottery decoration involves speaking about its symbolic meanings, and this requires knowledge of the systems of values in which the pots are themselves embedded.

The symbolism of pottery is a consequence of many factors ranging from the mundane to the phenomenal. For instance, in their study of the pottery of the Mafa and Bulahay of Cameroon, David, Sterner and Gavua (1988) suggested that the use of the black and red surface treatments are "especially attractive to the ancestors" and offer protection for the weak and the spirits of the dead in their journey to the afterlife. While more work has since been done on situating pottery within different meaning systems, rarely have the relationships between pottery symbolism and space use been a focus of study. Space introduces another set of factors influence the symbolic meanings of pottery, such as the social rank of the people who use different kinds of pottery, the social space where vessels are used or stored, and who has access to them. In one of the

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more lucid papers on this topic, Yentsch (1991: 193) has argued that the uses of domestic space are

> Critical to understanding the symbolism associated with different functional sets of household ceramics [···]. The appearance of specific ceramic forms and ware-types in different household areas is not accidental; rather, ware-type, decoration, and forms signal who uses particular vessels and what their uses are. Both the who and the what are related to the cultural restriction of household space.

From this standpoint, the structuralist framework offered by the CCP provides a way to understand the distribution of common and uncommon ceramics because "structuralist analyses highlight how people use objects symbolically to speak about other aspects of social life by reinforcing social principles with physical analogies" (Yentsch 1991: 193). In communities organized according to the social principles of the CCP, we may expect individuals to express status through the ownership and display of objects, and differences in how ceramics were used in households. Thus, it may be suggested that status was denoted in the social display of high quality ceramic wares and the quantity and use of pots between households of differing status. To test this assertion, I consider two hypotheses that can be examined using ceramic data from Ndondondwane: (1) higher status households have greater quantities of fine ceramic wares than lower status households and (2) the quantity of utilitarian ceramics (cooking, serving, storage, and transport) in domestic complexes and the size of households is a reflection of the higher social standing of its occupants.

In considering the first hypothesis, I assumed that the infrequent and most elaborate types of vessels—the fine Black and Red wares—were not used in normal daily meals and other activities. It follows that households with greatest proportion of these wares would have more occasions to use them. The ceramic data from households clearly show differences in the ratio of plain, decorated, and fine wares that occur in household middens (Table 9.4, Figure 9.4). There are three discrete groups: (1) Transect 1 and Midden 2 have low quantities of pottery in relation to the size of the house floors, (2) the Mound Area and Midden 3 have a low proportion of decorated wares and the Mound has no fine wares, and (3) Midden 1 falls between these extremes. Interestingly, although Midden 2 has the fewest number of pots represented, the proportion of fine wares is almost twice that of Midden 1 (Table 9.4).

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Following Huffman's (1986a, b) observations that household size is indicative of social status in the community, we would expect to find that the largest households also had the largest quantity of ceramic debris. However, at Ndondondwane, the largest households, which are over 14 m^2 (Transect 1 and Midden 2), have the least amount of debris (Table 9.4, Figure 9.4). With the exception of Midden 1, smaller households that are half the size of the larger ones (Mound Area and Midden 3), have 20 to 30 times the number of vessels in the house floor fill and associated middens. Clearly, large houses are not associated with the greatest amount of ceramic debris. Why this may be so requires a far better understanding of the relationship between housed hold size, breakage rates and ceramic use in ethnographic contexts.

Two potential problems with this analysis need to be considered. The first has to do with the quantity of vessels represented. Certainly, Midden 2 has the greatest proportion of fine wares, and on this basis, we may suppose it was the principal house because the proportion of fine wares reflect higher status of the occupants. However, we are dealing here with *three* pots, which, as one committee member remarked in reviewing this chapter, this is "not much to boast about and hardly enough for a party." Statistically, the difference between areas with respect to the proportion of differently decorated wares is insignificant ($x^2 = 3.597, p = 1.0$). The location of households, not their contents, may be better indicator of status.

Yet, this suggestion is also problematic in terms of the CCP. Since Middens 1 and 2 are closely matched in terms of relative house size to the quantity of ceramic debris, either may have been the principal house and home to the settlement head. Midden 1 is located directly upslope of the livestock enclosure, as is documented ethnographically, and at first glace would be the best candidate for a principal house. However, Midden 2 is a better candidate because it is the largest house situated upslope of the men's assembly area and is closer to the livestock enclosure. Further, if we consider the possibility of household gardens in the vicinity of each complex, Midden 2 potentially covered the largest area of any domestic complex at around 900 m^2 or slightly less than one hectare.

Figure 9.4 also proposed some temporal relationships between households as well. The large house in Transect 1 may have originally been the principal house at Ndondondwane, which shifted to Midden 2 after it burned down. The other households

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would have held a secondary status. The domestic complexes in the Mound and Midden 3 are similar in many respects, and the house in Midden 3 may have been constructed and inhabited by the occupants of the Mound household after it was abandoned in Horizon 1a.

RITUAL PRACTICE AND SYMBOLISM

While the above analysis was concerned with how people use objects symbolically to speak about other aspects of social life, I have said little about the use of ceramic objects in ritual activities. Ceramic or wooden figurines are used in the initiation schools of Bantu-speaking groups in southern Africa today (Mönnig 1967, Nettleton 1989, Richards 1945, Stayt 1968), and several scholars have argued that EIA ceramic sculpture was associated with rites of passage (e.g. Evers and Hammond-Tooke 1986, Inskeep and Maggs 1975, Loubser 1993). In the following sections, I consider this initiation hypothesis for the use of ceramic sculpture at Ndondondwane.

Since the discovery of the seven Lyndenburg heads in the 1960s, archaeologists have suggested that people used the heads, and other kinds of ceramic sculpture, in ritual contexts (Inskeep and Maggs 1975). In a more detailed interpretation based on the Ndondondwane sculpture, Loubser (1993) drew parallels between the reed and grass masks used during Venda and northeastern Sotho initiation schools, and the hollow ceramic heads found at EIA sites in the eastern lowlands. Loubser drew attention to the crocodile symbolism common to both the Ndondondwane heads and masks of recent times. The initiation hypothesis proposes that social initiates in early agropastoral societies took part in highly ritualized events at which they were taught proper adult behavior and the mysteries of life. Through this process, they symbolically attained socio-political maturity.

Human figurines may also have played a key role in this change of status. Several Bantu-speaking groups today employ ceramic or wooden figurines in an educational role in initiation schools, and some scholars have suggested that figurines from EIA sites served a similar purpose. The exaggerated sexual features probably served a didactic (instructional) function, as did a penis-shaped object from Kwagandaganda (Whitelaw 1994). Impressions and incised marks may have represented cicatrisation, part of the

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initiation ordeal among some groups today. Parts of human figurines are often found at different locations in settlements. This strongly indicates they were deliberately broken before being discarded, which is a behavior often associated with rites of passage, since destruction typically symbolizes an irreversible change in status (Whitelaw 1994/95).

While Loubser has made interesting connections between the use of masks and figurines during the EIA and similar objects used in modern Venda and northeastern Sotho initiation schools, his interpretation does not fully consider the nature of the medium, the depositional history of ceramics, and historical context of the occupation of Ndondondwane.

First, the materials used to make masks during the EIA and those documented ethnographically. The masks in Venda and Sotho initiation schools are made of grass and are anthropomorphic or anthropomorphic representations of animals (Loubser 1991). Likewise, the Lyndenburg heads are clearly anthropomorphic and very similar to those in south-central Africa (Inskeep and Maggs 1975; Evers and Hammond-Tooke 1986), and are now dated several centuries later (possibly the 11th century AD) than originally thought (Whitelaw 1996). The Ndondondwane masks are clearly zoomorphic and, as discussed in more detail below, the medium of clay, not grass, has far greater symbolic continuity in southern Africa. The absence of these associations in modern societies questions whether the occurrence of mask use alone, irrespective of the media used, is adequate to suggest the existence of EIA initiation schools.

A second, and very important, point relies on the depositional history of the masks and figurines. I have established that the masks and figurines were deposited in the Mound from the Dung Area, and that they are only associated with the daga structure in the Mound as secondary discard (pp. 245). Loubser's (1993: 147) suggestion that the structure was used to house initiation ceremonies must be called into question because the "initiation" paraphernalia were not used there.

The third point concerns the historical context in which the ceramic sculpture was used. During the Ndondondwane phase, there was a large increase in the number of sites in the lower basin (see Chapter 5). Van Schalkwyk (1991, 1994/95) has suggested that a fission-fusion process provides a parsimonious explanation for the development of a new socio-political mosaic in the basin. However, it is quite unclear whether the increase in the number of settlements and the dispersed settlement pattern was related

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to political factioning, whether the smaller settlements merely represent newly established family homesteads, or if the survey was able to detect a far greater number of settlements in the lower basin than had been previously suspected. Whatever explanation may be given for this pattern in the future, it is also interesting that ceramic heads first appear in the archaeological record during this time of dispersed settlement. No ceramic heads have been securely data to the previous Msuluzi phase, and the best-preserved examples from Ndondondwane date to Horizon 1b, 2 and Horizon 3—the main occupation and abandonment stages of the settlement. There are two possible explanations for this distribution. First, the heads were used in some sort of community ceremony in the livestock enclosure on at least three occasions, broken and deposited in the Mound Area before and after the use of the furnace. Second, we may envision that the heads were used in a way similar to the Lyndenburg Heads, which could have been placed on poles (Inskeep and Maggs 1975). At Ndondondwane, the four heads could have been used as finials to adorn the tops of houses, with the largest belonging to the most senior man of the settlement. There are five houses in evidence at Ndondondwane, however the one possibly occupied by unmarried men can be discounted because it is not a "real" household; that is, a man did not establish this household by bringing in a wife. This leaves four households and four heads that can be dated to a horizon after the abandonment of every household: the finial of the Mound Area house dates to Horizon 1b, that in use at Transect 1 dates to Horizon 2 and those used for Midden 1 and 2 date to Horizon 3. This sequence, however, does not explain why the heads were deposited in the Dung and Mound Areas.

At this stage in the analysis of EIA ceramics in the Thukela basin, archaeologists are poorly equipped to venture too far into the metaphors and symbolism of ceramics. But at this point, I would like to consider one explanation that connects the Ndondondwane heads with a powerful set of symbols recognized by Bantu speakers in the region today.

First, at a broad level, we must recognize that the organization of many activities in African societies is strongly connected to conceptions of health and fertility and pollution and danger. If we take pottery and iron working for example, at a symbolic level, potters and ironworkers are involved in the irreversible transformation of the earth using heat (clay to pot, ore to bloom). In many societies in Sub-Saharan Africa, pottery is

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also often equated with people (David *et al.* 1988: 366). In southern Africa, pots may symbolize women, or more specifically, the womb (Aschwanden 1982; Evers and Huffman 1988). Among Karanga speakers in Zimbabwe for instance, parallels are drawn between girls, women and pottery at various stages in manufacture (Aschwanden 1982). Likewise, iron production is linked to fertility, sexual reproduction and childbirth (e.g., Collett 1993; Schmidt 1997). The construction of furnaces for smelting and the furnace itself is a symbolic representation of the anatomy of women, the cycle of work is often equated to the menstrual cycle, and the production of bloom is compared to giving birth (Berglund 1976: 360). For these reasons, iron working involves the same dangerous power associated with witchcraft, death, and mystical pollution (e.g., Maggs 1992; Raum 1973: 21), and smiths follow many ritual observances during the smelting process (e.g., Berglund 1976: 360; Ngubani 1977; Raum 1973).

Given these connections, the Ndondondwane pottery can be associated with "hot" or dangerous, polluting forces (Table 9.3): the color red, which characterizes an entire class of pots at the site as well as the so-called "crown" that was part of the largest Ndondondwane head, fire, women and horticulture, and metal. The symbolism represented on the masks themselves can also be associated with "cool" agents promoting healing and fertility: the crocodile motif that is well documented in southern Africa (Huffman 1996); cattle are always a cool, healing and fertilizing (Kuper 1982: 20). The grooves below the rim of the heads are a common motif on pottery (Evers 1988), and multiple grooves known in Shona as *mihombwe,* represent "furrows in a field" or female deities which, according to (Aschwanden 1982: 181), symbolize how "metaphorically women are fields to be cultivated." Fields are connected to agriculture, women and "hot" agents, all of which contrast the other symbolism on the heads.

While the precise meaning of the heads will never be known, these connections may capture pervasive metaphors about male and female status, labor organization, deities and the ancestors, and the social and symbolic significance of cattle shared by many Bantu speaking societies in eastern and southern Africa. Further consideration of the symbolism of the heads is well beyond the scope of this thesis and must await detailed analysis of other EIA sites with evidence of ceramic heads.

All in all, the political and ritual dimensions of ceramic use do not deny the possibility that public puberty-related initiation ceremonies took place in EIA

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communities. However, there are alternative explanations for this, supported by much broader understanding of Bantu social organization. While, it is not implausible that ceramic sculpture played a role in initiation ceremonies that occurred at Ndondondwane, it is increasingly unlikely that the ceramic heads figured prominently in these ceremonies.

Rituals of Abandonment

Pottery may have also functioned in other symbolic roles during the EIA, especially when the widespread metaphorical links between pots and people (particularly women) in southern Africa and elsewhere are considered (Aschwanden 1982; David *et al.* 1988; Whitelaw 1994/95). Many EIA sites have deep pits, filled with debris (broken pottery, bones, ash, broken grindstones) that often accumulated gradually at first, before being dumped *en masse* to fill the pit completely. These pit fillings contain pots buried after their bases had been broken and discarded elsewhere. The breakage was clearly deliberate; though in some cases the hole has a ragged edge, in others the hole has been carefully rubbed smooth. Whitelaw (1994/95) has observed that bottomless pots and pots with holes are of three kinds: some pots have small neat holes at the base; in others, the base is broken away around the girth of the vessel; and on some examples it appears that holes were carefully made high on the body of the vessel.

Whitelaw (1994/95) proposed that a northeastern Sotho rite suggests a possible explanation for these strange phenomena. The rite involves pouring beer from small pots into the vaginas of girls held head downwards, after which the girls' mothers break the pots. The rite may symbolize sexual intercourse, with beer and semen being seen as analogous, and the breaking of the pots may represent a symbolic defloration. Traditionally, pubescent girls in many African societies were secluded in huts for lengthy periods, after which the hut was cleansed to remove any vestiges of the ritual impurity associated with menstruation. Possibly the pit fillings of the first millennium were the product of similar ritual behavior, carried out to mark the onset of a girl's puberty. During the seclusion, waste generated by the girl (or girls) may have been discarded in pits to prevent its exploitation by witches and reduce the threat of ritual impurity. A

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ceremony, in which the girl was symbolically deflowered through, among other things, breaking and discarding the pot base, may have marked the end of the seclusion. The final act may have been to dispose of the pot in a pit, together with other artifacts (broken to symbolize a change in status) used by the secluded girl. Some scholars feel that EIA farmers produced ceramic sculpture primarily, or perhaps only, for use in rites of passage (Whitelaw 1994/95).

Many of the pots researchers thought were used in these ceremonies can be explained in a very different way. Some vessels referred to by previous researchers were broken near their girth: this is the Type 3 breakage pattern discussed in Chapter 6. This pattern is linked to how pots are manufactured and how they are disposed. The regions below the girth, at the throat, and at the rim are the weakest portions of vessels and tend to break there because the pots are coil made. Fracture patterns depend on how pots are broken: dropped, tossed on their side, kicked, crushed, etc. Since the predominant pattern at Ndondondwane involves vessels with horizontal and vertical step-wise breakage patterns, it is likely most were dropped on their bases or tossed on their sides when discarded. Pots broken at their girth would not restrict the flow of liquids, and would be useless in the rite described by Whitelaw. Only smaller holes would restrict flow, acting like a type of funnel, and one could better control the flow of liquid. If the point was to restrict flow, it is unlikely that pots with large bottom orifices would have been used in initiation rituals of the type Whitelaw describes. With the last type, the holes are located near or right at cracks in vessels, which would indicate they were repair holes. If the data from Ndondondwane are representative of the scale of production, and so few pots were made seasonally at EIA sites, pot repair could have been standard practice.

Another factor complicating the initiation hypothesis is *when* bottomless pots were discarded at EIA sites. At Ndondondwane, several pots that appear to have had their bases deliberately removed occur in the Mound Area as well as in household pits filled during the period of site abandonment. If this were the case at other EIA sites, then many of the initiation rituals involving girls would have occurred in public space or only when sites were abandoned. Since both of these explanations are not supported by the the ethnographic analogy, another must be sought.

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All the bottomless pots at Ndondondwane appear to have been used as cooking pots, which were subsequently discarded in the peripheral middens. Cooking pots may have oxidized bases resulting from prolonged and direct contact with fires, which weakens this portion of the vessel. It would be possible, but not easy, to cut, loosen and punch out (or in) a hole in the base of these pots. This does not imply that bottomless pots were result of non-ritual behavior. I suggest the nature of the ritual is different, and the bottomless pots are instead linked to the abandonment of the site, rather than the initiation of young girls into womanhood.

From a different perspective, it may be suggested that the breaking of the cooking pots may symbolically broke the connection households had to the social life of the village; if people can no longer cook food, eat, or entertain guests, they cannot carry on appropriate social life. Similarly, the use of the old cooking pot to inter the infant may also have symbolic connections to the womb, women, production, the continuity of generations, and social renewal in general. An analogous situation is described by Brindley (1985) in her discussion of the role cooking vessels play in childbirth among the Zulu. In the last trimester of pregnancy, a medium-sized cooking pot, often a *ukhamba*, is used to prepare a medicinal drink for the pregnant women to prevent the birth of a deformed or mentally handicapped child. After the birth of the child, the top half of the *ukhamba* is broken off at the shoulder and used as a support for a dish that holds the baby's bath water. Alternatively, the *ukhamba* may be used to hold the afterbirth, which is taken away from the homestead by the grandmother of the newborn (whom is often ritually pure because she has reached menopause) and buried to prevent harm coming to the child or mother through sorcery. These practices not only link the presence of pots broken at the shoulder to childbirth during the EIA, but also underscore the connections between childbirth, traditional medicine, and the ritual value of pottery.

At Ndondondwane, the loss of the infant may have been viewed as analogous to the loss of everything connected to the perpetuation of life and the future. In this instance, the rather mundane cooking pot may have taken on great symbolic value in expressing the grief, loss, and hopelessness experienced by the mother, the family and community at large. The initiation hypothesis remains an interesting one, but until we develop some sense of the timing of activities and events at EIA sites, and a far better

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understanding of the use of pottery in modern and historically recent Bantu-speaking communities, it also remains highly problematic.

CHAPTER SUMMARY

In this chapter, I have considered a number of economic, social, political and ideational implications of ceramic use at Ndondondwane. This analysis both contradicts and supports the presence of several important organizing principles postulated by the CCP model. Central storage did not occur at Ndondondwane, although ethnographically it is a common feature amongst Sotho-Tswana societies described by previous researchers. At the same time, there are clear spatial and functional distinctions between domestic and private space at Ndondondwane, and there is some evidence for the spatial distribution of households according to a two-tier status structure. The scale of social differentiation is only vaguely predicted by the CCP. The symbolic implications of the CCP model, however, are more complex, primarily because interpretations of the meaning and use of spaces and objects must be grounded in the historical context in which the practices occur. In considering the broader context of social life during the Ndondondwane phase, I have instead suggested that ceramic sculpture played an important political role in signaling the status of household members in a community occupied during a period of dramatic change in settlement organization in the basin. I also argued that figurines were likely part of the ritual paraphernalia used in initiation ceremonies, but the pit fillings and bottomless pots commonly found at EIA sites may be better explained as a result of rituals surrounding childbirth or the abandonment of settlements, rather than initiation ceremonies.

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Table 9.1. Storage vessels from the Dung area

Function	Class/Type	Decoration	Dung Area		Mound Area		Total	
			N_s	N_e	N_s	N_e	N_s	N_e
Storage	5/2A	Plain[a]	29.0	6.3	1.0	0.1	30.0	6.4
	5/1B	ZIC[a]	1.0	0.2	1.0	0.1	2.0	0.3
	5/2A	ZIC[b]	1.0	0.2			1.0	0.2
Total			31.0	6.7	2.0	0.2	33.0	6.9

[a] Microstyle shared with Dung area during Horizon 2.
[b] Microstyle exclusive to Dung area.

Table 9.2. Series of symbolic dimensions associated with the spatial organization of Swazi homesteads (after Kuper 1982:152-156)

East/Down	West/Up	Sides/Outer	Center/Inner*
Cattle	Headman	Wives	Mother
Dead		Living	Ancestors
Threshed grain		Raw Grain	Beer
Liminal	Normal	Low status	High status

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Table 9.3. Series of binary oppositions between healing and fertilizing agents and dangerous and sterilizing forces in southern Bantu speaking societies (after Kuper 1982:18-24)

Hot (causing sickness and sterility)	Cool (causing health and fertility)
Red*	White
Menstrual blood	Semen
Fire	Water, ash
Lightening	Rain
Witches	Ancestors
Witches' familiars	Snakes, crocodiles*
Metal/ agriculture (women)*	Cattle, cattle products*/ pastoralism (men)*

Table 9.4. Proportion of undecorated and decorated wares in household assemblages

	Mound		Midden 3		Transect 1		Midden 1		Midden 2	
	N_e	% N_e	N_e	% N_e	N_e	% N_e	N_e	% N_e	N_e	% N_e
Plan Ware	94	65.0%	576	69.1%	34	71.4%	30	38.2%	7	30.1%
Common Decorated Wares[a]	50	34.8%	247	29.6%	11	23.6%	44	55.3%	13	55.8%
Fine Decorated Wares[b]	0	0.0%	10	1.2%	2	4.2%	5	6.4%	3	12.4%
Total	145	100.0%	834	100.0%	48	100.0%	79	100.0%	24	100.0%

[a] Includes ZIC, ZIP and Brown Wares.
[b] Includes Black and Red Wares.

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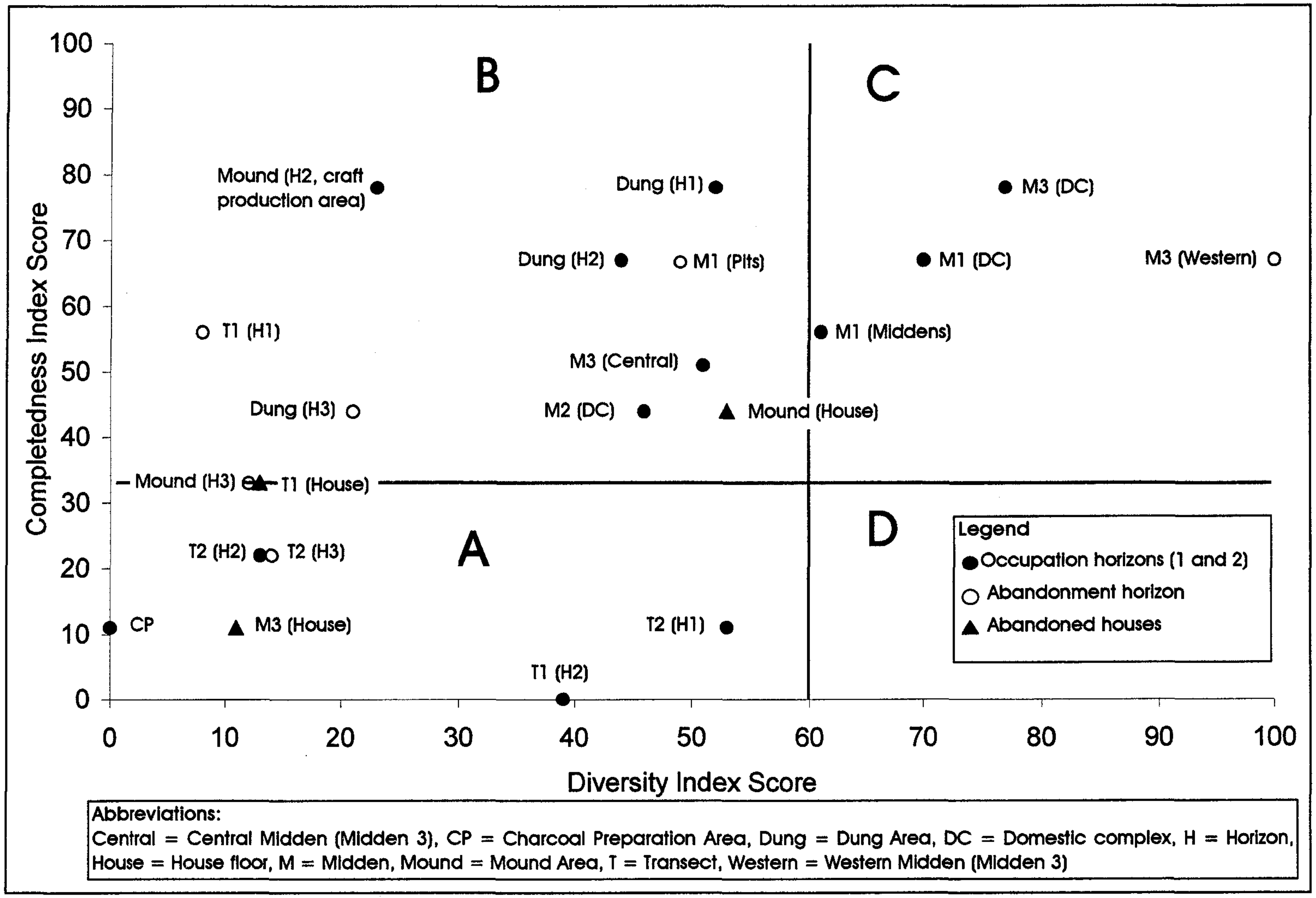

Figure 9.1. Combined completeness and diversity index score categories.

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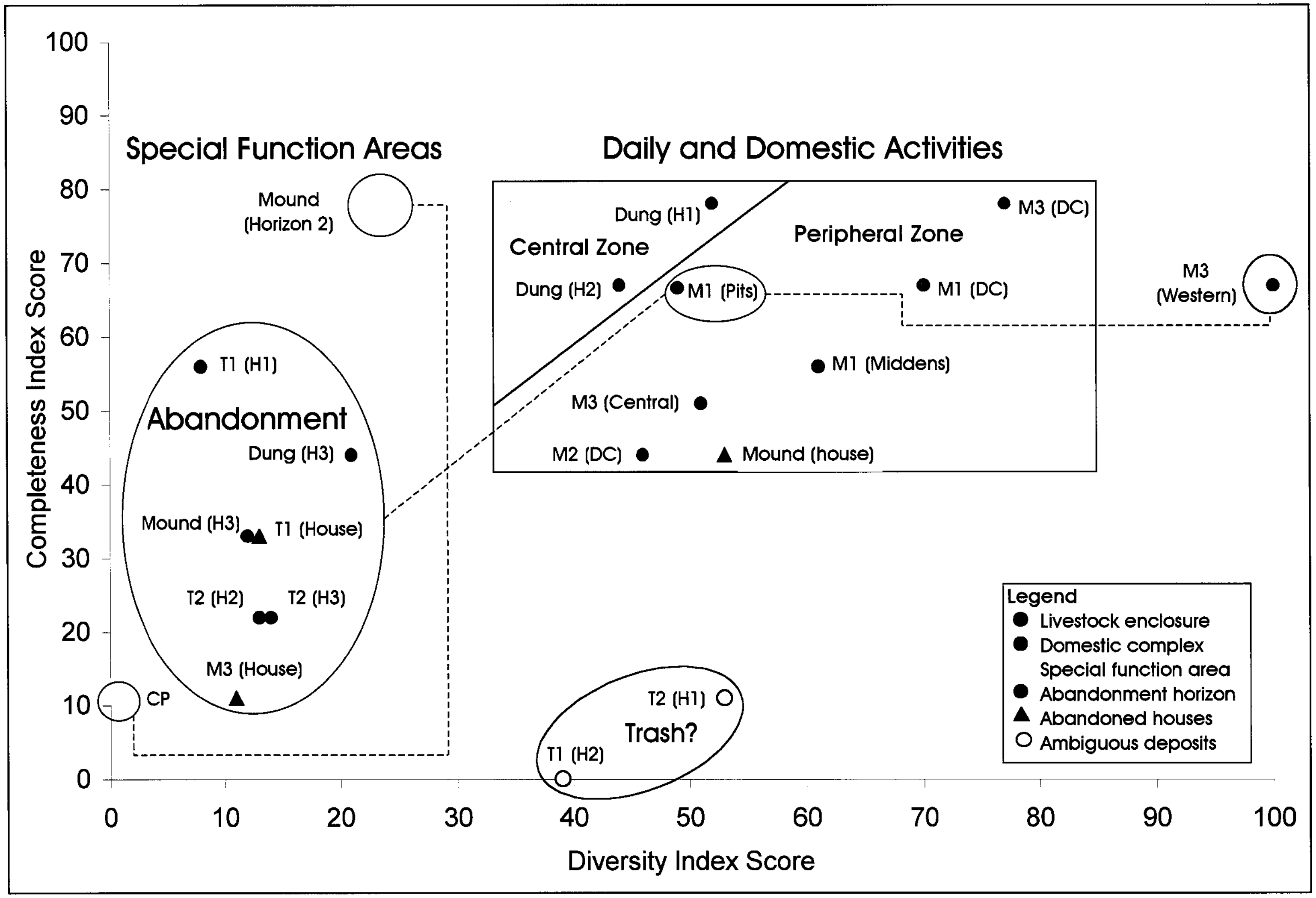

Figure 9.2 Functional groupings of activity areas at Ndondondwane suggested by analyses of ceramic discard and ceramic function. Abbreviations per Figure 9.1.

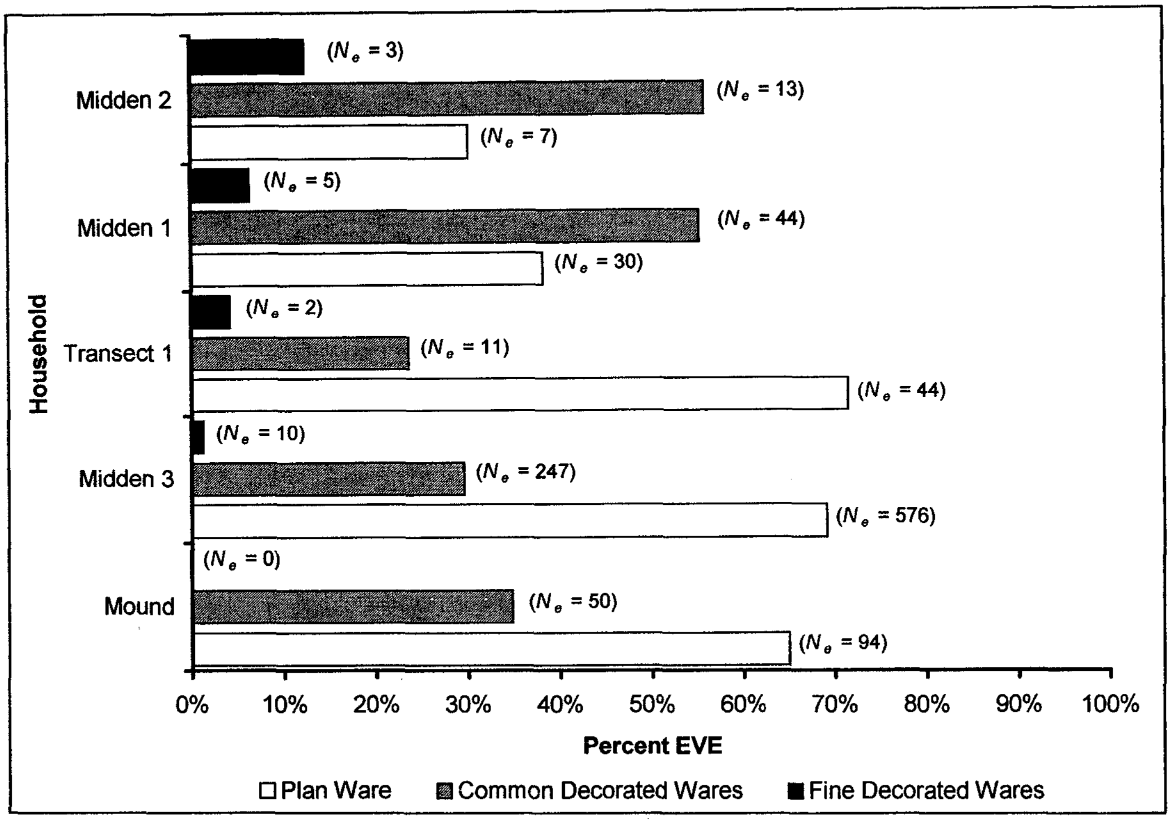

Figure 9.3. Domestic complexes ranked according to the relative proportion of plain, common decorated pottery (ZIC, ZIP, Brown-burnished), and fine decorated pottery (black- and red-burnished) represented in each household assemblage. The total number of vessel equivalents (N_e) in each decorative category for each activity area is given in brackets.

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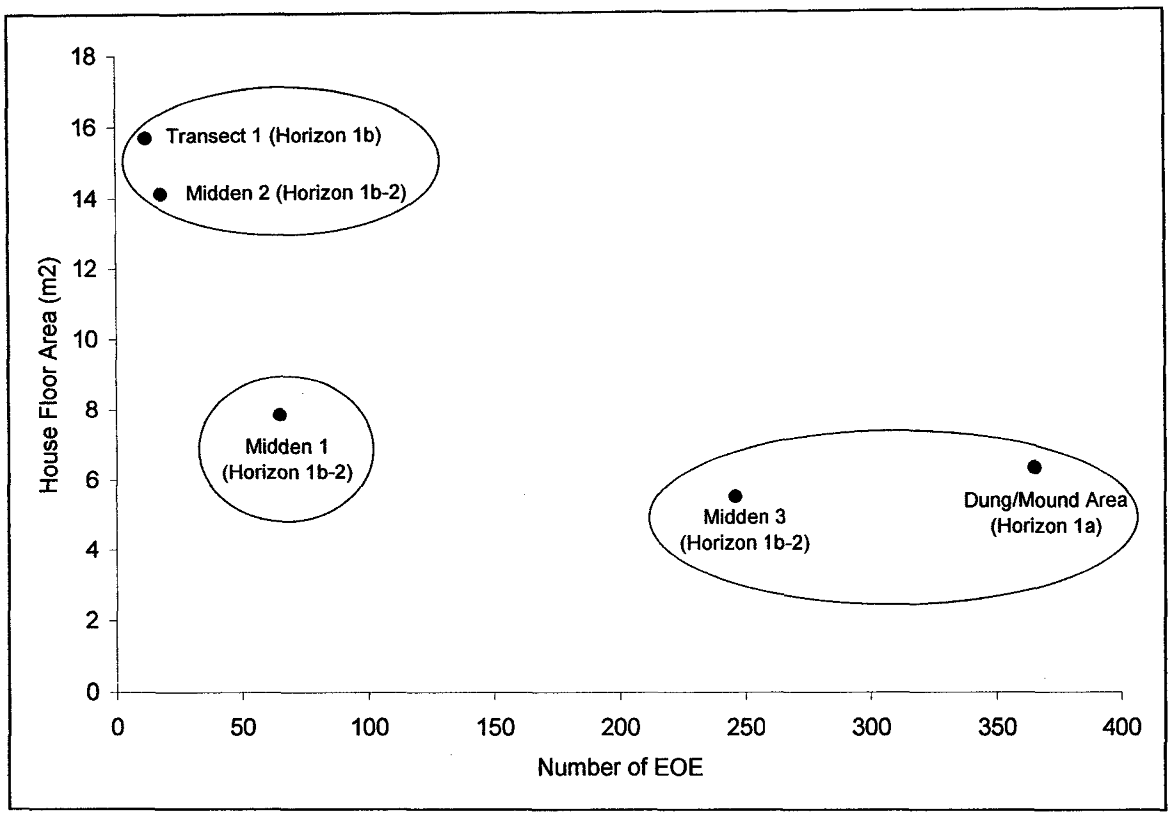

Figure 9.4. Relationship between the frequency of ceramic use categories and house floor area.

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PART IV

CONCLUSIONS

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CHAPTER 10

CERAMIC PRACTICE AND COMMUNITY ORGANIZATION

> With the proper and sensible proviso that conclusions are based on "the facts at hand" and are subject to revisions in the light of fuller and better data, it is a premise of the conjunctive approach[1] that interpretations are both justified and required, when once the empirical grounds have been made explicit. Why has revision been such a bugbear to archaeologists? Other disciplines are constantly reworking their hypotheses and formulating new ones upon which to proceed with further research. When these are found to demand modification and change they are altered. Why should archaeology assume the pretentious burden of infallibility?
>
> *Walter W. Taylor (1948: 157)*

The research presented in the preceding chapters was based on the presumption that a richer account of the way material culture was made, used and discarded in early farming societies in southern Africa would help clarify contradictory aspects of existing models of community organization. The objective was to increase our understanding of EIA lifeways at the community level by attempting to discern how a range of internal factors may have influenced transformations in early African agropastoral societies. The models currently used to interpret EIA farming societies in southeastern Africa present both archaeologically and ethnographically derived claims about the economic, social and ideational dimensions of life. However, many of these claims have not been evaluated in ways that link practices at the household and community levels to broader patterns of cultural norms, values and beliefs that people draw upon to regulate society. I have argued that support for either model must be based on a substantive body of mid-range generalizations that link daily dynamics to broader patterns of culture.

To evaluate these assertions, I chose to examine the production, use and discard of ceramics because of their abundance, durability and variability. In the previous four chapters, I have sketched this variability and proposed ecological, economic, social and

[1] Willey and Sabloff (1980: 138) note that in using the term *conjunctive approach* Taylor "meant the drawing together, or conjunction, of all possible lines of investigations on a specified archaeological problem."

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symbolic interpretations of the ceramic lifecycle at the EIA settlement of Ndondondwane. Figure 10.1 outlines patterns of production, use, and discard behavior in EIA settlements in the form of a model from which specific conclusions and hypotheses for further testing can be derived. In this chapter, I integrate these conclusions into a model of ceramic practice during the EIA and evaluate the archaeological and ethnographic claims of the domestic mode of production and CCP models.

THE CERAMIC PRACTICE MODEL

The ceramic practice model for Ndondondwane is built upon six main lines of evidence: site formation processes, discard practices, the economics of pottery production, the social dimensions of production activities, evidence for intra-site ceramic distribution, and symbolic connections between the use of ceramics and the use of space. In this section, I outline each line of evidence and how it adheres to and departs from previous models of EIA community organization.

Site Formation

In Chapter 7, I considered four natural and cultural taphonomic post-burial processes that have influenced the preservation and distribution of artifacts, features and stratigraphy at Ndondondwane. It was suggested that serious damage to small areas of the site was caused by termite activity, while other burrowing animals, such as rodents and earthworms had less devastating but still significant effects. Indeed, rodent burrowing appears to have greatly influenced excavations in the Mound Area. Importantly, it was suggested that the forces of downslope erosion have either exposed or greatly reduced the overburden in activity areas located upslope of the river, and through a study of ceramics I attempted to show how this can mask the nature of the activities that occurred in domestic areas. Research at EIA sites must continue to study the effects that these and other processes may have on cultural deposits. The study of formation processes must be made a requisite part of archaeological research design in this region, not a concerned afterthought.

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This analysis has shown that site formation processes have affected the fragmentation and preservation of ceramic assemblage at EIA sites, and certainly other classes material culture as well, making it difficult to discern stratigraphic relationships between "central" and "peripheral" activity areas within settlements. These factors complicate our ability to discuss relationships between activity areas within settlements, at sites where many settlements were established, such as Broederstroom and Kwagandaganda, and when speaking of timeframes within ceramic phasing schemes developed for southern Africa.

Where the Garbage Goes

The ability of archaeologists to discern the importance of different depositional phenomena in the formation of the archaeological record is largely governed by our methods—the way we operationalize our theoretical expectations of the types of discard and discard processes. The ceramic perspective on site formation and discard at Ndondondwane presented in Chapter 7 showed how difficult it is to distinguish types of discard and discard processes even when analyses focused on artifact attributes sensitive to different formation processes.

It was extremely difficult to distinguish between primary and secondary refuse in midden contexts because they are identified according to the relative distance between the place of use and place of discard (Schiffer 1976: 30). Many authors have argued that the discard secondary refuse is the main way refuse enters the archaeological record (Cameron 1991, 1993; Cameron and Tomka 1996; Deal 1985; Hayden and Cannon 1983; Lange and Rydberg 1972; Savelle 1984; Schiffer 1976, 1985, 1987; Stevensen 1982, 1985). Such a conclusion must be qualified at Ndondondwane with the recognition that secondary refuse may be typical of discard practices only in Central areas of the settlement (the livestock enclosure and the craft production/assembly area), while the discard of primary refuse may characterize most of the trash deposited in domestic areas.

Abandonment refuse was also difficult to distinguish from the discard of primary refuse around households. Nevertheless, it was proposed that the refuse in the dung-lined pits in domestic areas accumulated during abandonment. This conclusion also has

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a temporal implication. Huffman (1993) has noted that grain may be stored in dung-lined pits for up to three years. After this period they may be filled with debris or dung may be applied again to reseal them. It is doubtful this practice could be repeated many times. As there are few storage pits in evidence at Ndondondwane, they may indicate a much shorter occupation of the settlement than the 100-year ceramic phasing scheme would suggest.

Two cases of *de facto* refuse disposal were inferred at Ndondondwane. Transect 1 is a rare case where *de facto* refuse was preserved after a conflagration destroyed the house. The ceramic debris in the southeastern part of the site around the old pump house may also fit the definition of *de facto* refuse, wherein objects that have not reached the end of their use lives enter the archaeological record without having been discarded (Schiffer 1987: 89).

I did have more success in identifying different types of discard processes identified by Shott (1996: 17-19): (1) breakage during production, (2) abandonment during or after production, (3) loss or breakage while in use, (4) abandonment in use, (5) depletion during cycles of reuse and maintenance, and (6) recycling. There was no evidence for ceramic breakage during production in the form of wasters. There is some evidence that the ceramic "tools" used in iron smelting— the unusual "notched" ceramic object discussed by Loubser (1993) and the slag "skimmer" identified in this analysis (see p. 181)—were abandoned after being used in the Mound Area. Most of the ceramic material at Ndondondwane would fall into Shott's "abandoned in use" category, but the sherds from cooking and serving vessels scattered about the southeastern end of the site may have been accidentally lost/broken while carrying water. As well, there is some evidence for ceramic being depleted or modified during cycles of reuse, such as the ceramic disks and the bottomless pots.

The completeness and diversity indices provided very positive and promising results for using ceramics to distinguish different kinds of deposits and functional areas at EIA sites. These analyses indicated that the location of artifact discard does not always reflect the location of use and secondary discard is common. However, different functional areas can be distinguished by combined completeness-diversity ceramic "signatures."

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Pottery Economics

The analysis of ceramic production in Chapter 8 addressed the organization of activities surrounding the procurement and processing of clay, and the fashioning, decoration, and firing of ceramic objects at Ndondondwane. This study of the production *chaînes opératoires* has reached several major conclusions.

Three groups of ceramic *chaînes opératoires* are discernable at Ndondondwane (Figure 10.1). Each group is defined by the absence of one or more stages in the total possible sequence. There are few classes of ceramics present in the settlement and little variety in the composition and form of classes. Surface treatment is the most highly variable dimension of the ceramic *chaîne opératoire*.

One major implication of this analysis lies in the ability of archaeologists to infer the degree of specialization in pottery making. The Ndondondwane ceramics have none of the hallmarks of specialized potting. Ceramics are not standardized in terms of their fabric, form, size or decoration. This suggests there is no routinization of the production process or standardization of products as observed for the LIA (Evers and Huffman 1988). Thus, production was not specialized. Yet, specialization is not a present or absent condition, and for this reason Costin (1991) suggested that both the Household and Household Industry modes of production involve *individual specialization* based primarily on ability. Differences in the abilities of potters at Ndondondwane are evident in two ways. The infrequent high quality Black and Red wares require a great deal of skill and a mastery of techniques not found with other wares, and it appears that the ceramic heads were manufactured using a set of techniques not used in making other pottery forms. The complex *chaînes opératoires* involved in making these objects sets them apart from the manufacture of more common utilitarian pottery.

It is unlikely, however, that a single potter performed all of the activities encompassed in each stage of the production process, especially if they were passing on their skills and knowledge to "apprentices." Different stages of the *chaînes opératoires* allow for labor and knowledge to be pooled during crucial periods of the production process. Clay procurement requires knowledge of clay deposits and techniques of removal (e.g., to avoid slumping of a riverbed wall). Procuring and processing clays are the most labor-intensive activities (involving hauling, beating, pounding, mixing, etc.).

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And firing is potentially the most dangerous stage of the production process, for it is at this stage where the greatest loss of products can occur.

The limited variation in ceramics forms, and the fact that multiple types were used in the same activities make it clear that ceramics at Ndondondwane were designed as multifunctional containers. A study of use residues confirmed that vessels were used in more than one activity during their use life, such as cooking, storage/transport and serving. Repair holes, although not identified in the Ndondondwane assemblage, have been observed in other EIA assemblages (Whitelaw 1994). At Ndondondwane, and other EIA sites in the eastern lowlands (Maggs 1984a,c; Maggs and Ward 1984), the smoothing of broken rims indicates vessels continued in circulation even though they had been damaged.

The ceramic data point to production being organized at the household level at Ndondondwane. The demand for products was set solely by consumption rates in single households and production was a domestic replacement activity. However, serving vessels were produced in larger quantities and the production rate of this class exceeds its use life. These data suggest that serving vessels were produced in quantities beyond the needs of households.

At this stage in analysis, it is not possible to say with any certainty if pottery was made in every household at Ndondondwane because the works of individual potters cannot be determined. The data on ceramic micro-styles do show that certain kinds of decoration are restricted to or shared between ceramics found in different household middens. I interpreted these patterns in light of the abundant ethnoarchaeological data about how Kalinga household potters transmit and learn pottery making (Longacre 1991; Longacre and Stark 1992). I suggested that senior household potters produced ceramics that are more dissimilar than similar in the details of their decoration even though the same syntactical rules (such as which motifs may be placed on which kinds of pots and where) are followed; in essence, they produced a kind of assertive style. In contrast, I proposed that similarities between household assemblages, which are far less common, resulted from young female age mates in the village making pottery that subtly differed from their teachers in terms of execution, design and decoration in ways that expressed their group identity (or emblematic style).

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These conclusions permit several technological and behavioral hypotheses about EIA domestic ceramic production to be proposed:

- Clay sources exploited during the EIA will be located along tributaries of major watercourses within 6 km of settlement. It is likely that closer sources were utilized (Arnold 1985: 32-57), and those within a two or three km would likely have been preferable.
- Production will be a part-time seasonal activity and will occur during the dry season. The optimal period would be in late spring-early summer or late summer-early fall when seasonal temperatures do not exceed 35°C. At these temperatures, vessels may spall or crack because they dry too quickly, making them unserviceable.
- There are no large, permanent, elaborate production facilities, but there are designated work areas outside residential areas. The density of debris from production activities will be low and spatially dispersed. Debris will occur at firing loci and in central middens.
- The size of production units will be small and their constitution will be based on close kin relations (families resident in a household or co-resident kin). Females will make pottery in villages and skills and knowledge are transmitted generationally from older to younger age cohorts, not necessarily from mother to daughter.
- The limits of variation in products acceptable to consumers are perfectly understood and reproduced by artisans, principally because potters and their families are the main consumers.
- There is no control over craft production, including resources, by an outside authority. Artisans will operate independently of political controls.
- Distribution involves moving products from their location of manufacture to their location of use, but this distance may be confined to the limits of a single settlement.
- The volume of finished goods (scale of production) will be low, and a settlement would no likely exceed production over 100 vessels per year.
- The scale and intensity of consumption will roughly reflect the population of EIA settlements. Maggs (1994) has proposed that the population of settlements could be upwards of 100 to 150 people. The ceramic data indicate a much lower population than these qualitative estimates, likely 30 and probably no more than 40 people.

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- The production of ceramics and iron share common technological, scheduling and symbolic elements in EIA societies.

Giving the Potter a Choice

Conventional approaches to the organization of past production arrangements have typically focused on identifying the attributes of specific forms of organization in relation to three widely cited typologies of production by van der Leeuw (1977), Peacock (1982) and Costin (1991). Although many aspects of these typologies have been challenged as overly "monolithic" inhibiting the ability of archaeologists to identify specialized production (e.g., Feinman 1999), David and Kramer (2001: 305) have also recently noted that "they dwell if at all only momentarily on the nuanced ways in which social relationships between artisans affected craft production." The study of past *chaînes opératoires* provides one way to gain accesses to these relationships. In the analysis presented in Chapter 8, I suggested several socially motivated reasons for the choices made in the production of the Ndondondwane ceramics, which I will summarize here:

- The heterogeneity in fabrics may be explained in part by the tendency for African potters to use readily available materials irrespective of their properties, choosing instead to modify those properties by altering the manufacturing process. This implies that potters at Ndondondwane were not socially influenced in their *selection* of clay sources, but they instead choose to modify the properties by sifting, pounding, kneading and mixing clays from different sources to develop certain "recipes" that were designed for fashioning different qualities of pottery. I proposed that it was the quantity and not the types of inclusions in the Ndondondwane pottery that influenced which clays were used to make certain pots. More effort, it seems, was expended in the preparation of clays, not in using elaborate fashioning techniques. Clay preparation can be done in work groups, while vessel fashioning is often an individual activity in small-scale production systems.
- I proposed that the small range of fashioning techniques used at Ndondondwane can be integrated into the demands of daily household life, and it was these social pressures that influenced the choice of techniques over more sophisticated, time-consuming ones.

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- The narrow range of container forms at Ndondondwane may be explained by their intended use. Vessels were designed to be multifunctional, adaptable and easily utilized in a variety of tasks, from serving to storage to transport. This is why most classes are variations of a basic spherical body form (spherical, ellipsoidal and ovoid), while those with angular (Bi-conical) and conical (pyriform) shapes are rare. The limited number of forms may also explain why there is more variation in the rims of unrestricted bowls, ellipsoidal bowls and jars than any other part of the vessels. This is the easiest part of vessels to elaborate without severely altering the functional versatility of the container.

One important result of this analysis is that some of the social motivations for ceramic production at Ndondondwane fall in line with those presented by recent ethnoarchaeological research conducted in other areas of Africa. One line of future research may endeavor to establish why the *chaînes opératoires* documented in this study depart from those documented in the study of modern and Iron Age potters in the northern part of South Africa reported by Krause (1985).

Distribution

The evidence for storage, feasting and livestock keeping at Ndondondwane provide further insights into the economic dimensions of life in the village. The analysis of ceramic use suggests that pottery containers were not used for the long-term storage of grain, and it was instead proposed that other facilities—pits and granaries—were instead used for private food storage in domestic areas, including households situated in the Central Zone. The lack of evidence for storage pits in the livestock enclosure indicates that a village or supra-regional political authority did not control agricultural surpluses, lending support to the notion that some version of the Domestic Mode of Production was operating during this phase of the EIA.

The evidence for feasting in the livestock enclosure also lends support to the household production model. At present, I can only suggest that feasting took place in the village on an *ad hoc* basis, simply because analysis of the faunal remains is not yet complete. The study of the age of livestock from the Dung Area would provide some insight into the annual butchering behavior at the site and provide one line of evidence

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to determine when these ceremonies occurred during the yearly food production cycle. I must state, however, that the quantity of faunal remains would imply an annual cycle of feasting. Whatever the precise scheduling, feasting occasions would have provided an opportunity to maintain the *relatively* equitable distribution of goods and services within the community over the long-term. At such events, prestation and gift giving would have served to alleviate the obligations of social and material debt accrued by the members of different households within and between communities, provided an arena for formal public declarations of alliance (such as marriage) and dispute, and served as a way of (re)allocating social status.

That such ceremonies took place in the livestock enclosure is not surprising when once considers that this is traditionally a setting associated symbolically with men, cattle, cooling agents and liminality in southern Bantu societies (see Table 9.2). What is interesting, however, is the only one livestock enclosure is in evidence at Ndondondwane. The presence of multiple byres is key evidence for the private ownership of cattle by more than one family at Iron Age settlements (Huffman 1990, 1993). The absence of such evidence at Ndondondwane suggests three possibilities: (1) individual families did not own cattle, (2) cattle owned by all families were penned together, or (3) only one family inhabited Ndondondwane. Given the present evidence, it is most likely that a single, extended co-resident family occupied Ndondondwane, and cattle may have been treated as the private resource of the village head in principle, but a corporate resource in practice. This allows for the possibility that women have "owned" or at least had a vested interest in the redistribution of cattle. "Marrying out" ones daughters is in the best interest of mother for this permits the potential to "marrying in" more wives. This serves to increase the status of senior wives as well as the size and social standing of the household. It also has major economic benefit as well. Another wife and eventually her children may replace the loss of a daughter. A household gains cattle in the exchange and if another wife is taken, the household eventually receives multiple labor units, the new wife's children, for the exchange of one.

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Ceramic Practice, *Habitus* and the Use of Space

The ceramic data from Ndondondwane also provide an opportunity to assess a number of other dimensions of social and symbolic life during the EIA as they pertain to the underlying structural principles defined by the CCP model: political organization, social differentiation, ritual practices, and the relationship between the use and meaning of space. To assess each of these expectations I have stressed that we must consider the recursive relationship between practice and structure. The durable dispositions—the *habitus*—which lie between structure and practice, provide members of a community with strategy generating principles, a practical logic and knowledge of ways to behave in day-to-day activities that cannot be reduced to a simple set of rigid rules and decontextualized norms. The schemes of the *habitus* are learned and reproduced through practice and are reinforced through many kinds of activities that transmit knowledge such as daily work, games, songs, dancing and proverbs. The most appropriate question in this case is to ask whether the systematic dispositions—the structuring principles—predicted by the CCP do indeed explain the kinds, quantities and distribution of mundane ceramic items found at EIA sites.

Political Organization

The most positive correlation between the expectations of the CCP and the ceramic analysis is from the Mound Area. The ceramics utilized in the Mound Area are consistent with the ethnographic expectations of a "assembly area" used for men's craft production activities and political debate. Residues in assembly areas accumulate either by men during political discussion exclusively (which involves drinking beer and eating meat near a council fire), or by all families in the settlement dumping their refuse there (Huffman 1986: 316). Both patterns are apparent at Ndondondwane. As yet, there is no evidence for beer consumption in this area, although further analysis of pot residues should soon qualify this conclusion.

While the siting of this area within the settlement strongly correlates to the organizing principles captured by the CCP, certain features of this area are problematic. As depicted in Figure 10.2(a), the house in the Transect 1 was occupied when the

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assembly/craft production area was established and is situated between the byre and the Mound Area. No settlement plans depicting the CCP I am aware of, including the sample outlined in Figure 10.3, have this feature. Furthermore, the Mound Area was used for many activities during the occupation of the settlement—a house predated the assembly/craft production area in the Mound and iron smelting is clearly attested in the area after the circular structure was dismantled. No analogs of this practice are paralleled in the ethnographic literature.

These may appear to be small deviations from the spatial expectation of a men's assembly area, but the practices that occurred in this area present serious departures from the ethnographic norm. Simply, the CCP best explains the Horizon 2 features and artifacts in the Mound Area, but cannot account for the activities that occurred before or afterwards. On the strength of these data, it must be concluded that a different practical knowledge and logic governed the use of this part of the settlement, although similar generating principles related to male status, activities and political leadership appear to have influenced the positioning of the assembly area.

Ceramic Use and Social Differentiation

There is no evidence that activities in households are distinguished by the presence and positioning of male and female task-related equipment (right and left sides), which is indicative of the social and symbolic division of labor in households. Ceramic use patterns vary according to task function but there is no evidence that ceramic variability at the site is governed by individual or group (family) status. Different goods and products were certainly consumed in different areas of villages and this is reflected in the diversity of objects at different spatial locales. The ceramic data indicate that most households in a village will be similar in the kinds of ceramic containers, and social distinctions may be distinguished by household size and relative spatial location in relation to each other and the livestock enclosure. Several features of the Ndondondwane layout depart from this pattern and the expectations of the CCP.

Midden 3 has an overwhelming number of serving vessels and almost no cooking vessels in the associated middens. I suggested this represents the household of bachelors, and it may very well have been a late addition in the development of the settlement. This

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area may lack cooking pots and have a large quantity of serving because men would neither cook nor undertake any duties where they would contribute to the reuse and recycling of discarded ceramic objects. This was the realm of women and girls. The presence of a bachelor's house obliquely points towards the different possible roles of men and women in EIA society that require much further investigation.

Other deviations include the placement of the principal house and the orientation of the livestock enclosure (Figure 10.2(a)). I suggested that the two largest houses, that in Transect 1 and Midden 2, would have acted as the principle house at different times during the occupation of the village. Both houses are not sited according the normative pattern of the CCP. The Transect 1 house is situated beside the livestock enclosure and Midden 2 is located upslope and off to one side of the livestock enclosure. Furthermore, the livestock enclosure itself opens upslope to the east facing Midden 1, not Midden 2.

The nature, contents and distribution of features at Ndondondwane make it difficult to distinguish the households of village leaders by the ethnographic criteria defined by Huffman (1986b). Other evidence of social status at Ndondondwane also does not support the CCP. There is no evidence for prestige burials in the livestock enclosure or low status burials near domestic areas. The only mortuary remains are from an infant pit burial in Midden 1.

The Spatial Organization of Production

There is a stronger correlation between the locations of male- and female-related activities at Ndondondwane and the CCP. Production loci are spatially segregated according to gender and task function. Most non-craft production activities undertaken by women in evidence at Ndondondwane, such as gardening and food preparation, were located in or near domestic complexes. Evidence for food preparation, food storage, cooking, domestic craft production, tool repair/maintenance is found in domestic complexes. These activities are replicated in each domestic complex except Midden 3.

However, this does not hold for craft production activities. Those activities associated with males are not associated exclusively with the Central Zone of Ndondondwane, nor are pottery-firing loci resigned to the peripheral zone. Evidence for ivory and iron smelting are found in the "assembly area" but iron working can occur in

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two zones: smelting took place in the male assembly area and residues from forging activities occurred in livestock enclosures and near domestic areas (Greenfield *et al.* 1997; Greenfield and van Schalkwyk n.d.). The pottery-firing locus in the Mound Area is difficult to interpret. I suggest it was used in manufacturing the terracotta heads, for the process of making the heads was likely more symbolically loaded than was typical. If we call upon the healing/fertility : pollution/sterility oppositions outlined by Kuper (1982: 18-24), it may be suggested that a place in the settlement associated with cooling agents, such as cattle products and ash, may have been required to counteract the "hot" agents of fire, women and the use of red ochre in decoration. These symbolic reasons also complement the practical ones for why pottery firing may have been situated away from the settlement.

Ceremony and Ritual

Previous interpretations of ritual activity during the EIA have proposed that ceremonies of concern to the broader community will be confined to central areas of settlements, evidenced by the presence and distribution of ceramic sculpture (e.g., Whitelaw 1994/95). However, at Ndondondwane there is limited evidence for rituals in the domestic sphere. Deliberately broken pots (with the base removed) were recovered from the Mound Area during Horizon 3 and from domestic middens where they may have formed part of a rituals dealing with site abandonment. In contrast to Loubser's convincing argument for the Ndondondwane heads being used in initiation ceremonies, I was able to draw upon stratigraphic evidence linking the deposition of the terracotta heads to the abandonment of households during the occupation of the site. I used these connections to propose that the heads could have otherwise been used a finials designating the status of different household members. Whether this is related to the settlement fission and dispersal in the valley during the Ndondondwane phase requires further attention.

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Implications of the Ceramic Practice Model

As to be expected, the archaeology of daily life is much more complex and interesting than theoretical orthodoxies. Yet, archaeological research at this scale is challenged to operationalize theoretical constructs of behavior in very different and more detailed ways than high-level models. The methodology adopted in this thesis has met with different challenges at each stage in the analysis and the assessment in the previous section has qualified my interpretations of the ceramic data. These results, which are summarized in Table 10.1, have several important implications for understanding EIA community organization.

The mode of production model argues for a non-hierarchical socio-political system grounded in an egalitarian sphere of agricultural and craft production. My analyses examined the organization of activities involving the production, use and discard of ceramics at the ninth century village of Ndondondwane in eastern South Africa as an alternative way to evaluate the claims of the model. At Ndondondwane, I have proposed the existence of two production systems. One aimed at meeting household demand, *the domestic mode of production*. Another, which may be tentatively termed a *ritual mode of production* (Spielmann 2002) was designed around the production of highly elaborate containers and sculpture used in feasting ceremonies relating to fertility and social renewal.

The CCP model, in contrast, argues that the principles used to regulate society are expressed in the organization of space. Similarities in the settlement layouts indicate that similar beliefs about hereditary leadership, kinship, marriage and the ancestors also governed the organization and use of space during the EIA. I have suggested both weak and strong correlations between ethnographic expectations and patterns of ceramic use and discard. Effectively, the layout of Ndondondwane is quite similar to the CCP, but the behavior responsible for generating this layout are not easily explained by the organizing principles of the CCP. This implies that some similar (but not the same) social organizing principles and conceptions of space were operating in early farming societies. However, departures from the expectations of the CCP, when they do exist, are very pronounced.

First, there are inversions to the expectations of the CCP. These are of two types. One relates to the regularity with which the hot-cool oppositions documented in the

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ethnographic literature could be applied to the archaeological case study to explain the contradictory presence of male- and female- related activities in the "wrong" area. For instance, iron-forging residues are attested in domestic midden debris and pottery firing in the Mound Area. Each of these activities departs from the "normal" range of activities we would expect to find in these areas. The second inversion has to do with the evidence for iron smelting occurring "within" the settlement. I am not prepared to explain in any detail why this practice would occur during the EIA and not later in the Iron Age, but I would propose two ideas. First, it may have been appropriate to smelt iron "within" settlements as long as this "hot" activity took place in area, such as the Mound Area, associated with many cooling agents. Second, the attitudes about purity and danger may have changed over the last 2000 years, although the central precepts have remained similar, and solutions other than spatial distancing may have been in place to ensure a successful smelt.

Second are the transformational differences in the symbolic dimensions of settlement space proposed by the CCP, which I summarize in Figure 10.2(b). Based on the ceramic data, I can suggest only two kinds. The first replaces the second/junior/left : first/senior/right opposition in the normative model with an opposition along the same axis based on *generational seniority*. The bachelor household is located to the extreme right of the principal house because status based on generational seniority operates left to right and not up and down at Ndondondwane. The second adds "liminality" to the down/front/public/secular oppositions and "normality" to the up/back/private/sacred opposition. These oppositions appear to fit well with the kinds of practices observed at Ndondondwane. Liminality is associated with the men's area of the settlement and what is transitory in EIA society: cattle, the production of goods, the large-scale consumption of food, gift giving, debate, alliance and so forth. Normality, in contrast is associated with what is perpetual and continuous about life during the EIA: home, family, children, food production, etc. Further research on these connections may serve to increase our understanding about change and continuity in the symbolic dimensions of life during the Iron Age.

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CONSIDERATIONS FOR FUTURE RESEARCH

As a whole, the ceramic evidence from Ndondondwane does not help to clarify the contradictory positions offered by the models. Rather, the analysis exacerbated their differences, overlapped on their few points of agreement and opened paths of inquiry begging for attention, which a data set from a single settlement is unable to answer. For example, data on the scale and intensity of ceramic production correspond well to the expectations of the domestic mode of production, but the possibility that serving/eating vessels were made to meet extra-household demand tends to contradict the model. However, because Ndondondwane is the only EIA settlement where the organization of ceramic production has been investigated, it is unknown if these production arrangements are typical during the EIA or if pottery was exchanged between settlements. The interpretations offered about the mode of production are very limited simply because so little can be said about the composition of households, the population of settlements, or the scale of other production activities. Research must take steps to answer these fundamental questions in the immediate future.

While the ceramic evidence does suggest that certain spatial distinctions and activity areas predicted by the CCP model are identifiable archaeologically, such as the central/public:peripheral/private dichotomy or men's assembly areas, the same spaces served different functions during the occupation of the settlement, and several activity areas not predicted by the model were identified, such as the centralized pottery firing location.

Having found that only certain aspects of these models are empirically supported, continued research on community organization during the EIA is met with the demand of (1) reformulating the existing models, (2) formulating a new one, or (3) alternatively, reconsidering the initial presumption that the contradictory economic, political, social, and ideational elements identified by the models actually coexisted during the EIA. Future research can make inroads to exploring these different possibilities in several complementary ways.

Research on craft production requires the laborious analysis of statistically representative samples of the products and residues of production activities, such as ceramic objects, iron slag samples, bone tools and so forth, in conjunction with the

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archaeological interpretation of the associated structures on sites. In most cases that has not been done, and we still have very poor understanding of production scale and intensity, the diversity of products and the spatial organization of craft production activities (cf. Miller 2002). To ensure we are able to address the questions with the appropriate data, specialists must be included in the initial design of research projects.

Basic research into the connections between ceramic function, use life and morphology are clearly required to better understand pattern of ceramic use and discard at EIA settlements. Research of this sort would benefit greatly from technological analysis. As well, programs of ethnoarchaeological research may contribute by establishing the range of factors influencing the ways pottery is used and discarded in modern homesteads organized according to the CCP. A study of the relationships between ceramic use, kinship and spatial organization by Longacre and Stark (1992) is one example the direction such research may take in southeastern Africa. As a final point, I would add that the restudy of existing assemblages, of whatever class of material culture is of interest to the researcher, from new perspectives and using new techniques must be part of the design of future projects into the study of Iron Age spatial organization.

CONCLUSIONS

This case study has demonstrated that identifying the economic, social, political, and ideational facets of EIA societies must be grounded in a detailed understanding of the interrelationships between the structural realm of norms, values, and beliefs and the realm of daily practice and how both may influence and govern each other (Bourdieu 1977; Giddens 1984). A focus on the cognitive (i.e., intellectual) determinants of the organization and meaning of settlement space *alone* fails to consider that the existence of spatial structures are a consequence of both practical *and* intellectual activity (Bordieu 1977; Giddens 1978, 1984). The meaning ascribed to space does not reside in the material world, but is invoked through practice (Bourdieu 1977; Moore 1986, 1994). People, space or objects can only gain identity through their social existence in the material world. Social expressions of culture are *defined* by practice and *governed* by cultural "templates" or "blueprints."

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In adopting a structural perspective, proponents of the Central Cattle Pattern model have made the basic assumption that culture is a reflection of a shared, uniform cognitive structure and not an historical process (Hodder 1991: 37). This approach has masked contradictions between the norms, values and beliefs the model predicts and how these are expressed through daily practice. A focus on male-associated elements of social organization that are believed to be fixed and immutable through time and space has inhibited alternative and more detailed understandings of the organization and meaning of settlement space (Hall 1998; Kent 1998; Lane 1998; Segobye 1998). Any model postulating that the organization of activities is governed by a single set of nonnegotiable rules does not consider that social and gender statuses are constantly being reconstituted spatially as a means to control social interaction and the domains in which people may create discourses of power and authority. Equally, proponents of the Domestic Mode of Production model have failed to take into account the importance of the processes through which apprentices acquire psychomotor skills play in the learning of crafts, the nuanced social relationships and demands placed on artisans, and explain how changes from one mode to another might occur. Only the most preliminary steps to redressing this situation have been made in this thesis.

In following this line of inquiry, doubt has been cast on the ability of the Domestic Mode of Production and the CCP to reasonably account for all of the available evidence pertinent to understanding the organization of production and how the spatial structure of early farming settlements came into being. This study has shown that the maintenance and scheduling of traditional male and female activities in ethnographically documented southern Bantu speaking societies is not paralleled in early farming societies. The identification of a number of disjunctions between theoretical expectations and the empirical evidence for continuity and change in Iron Age craft production and space use suggests that different meanings were ascribed to the organization and use of settlement space during the southern African Iron Age.

The formulation of *a priori* socio-spatial relationships between men, women and the activities associated with them has greatly oversimplified how complex the use of space was in these societies. It would also appear that we cannot possibly attempt to understand the complexity of EIA technological systems without taking into account

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social dynamics, value systems, metaphors, and economic and gender ideologies as they are expressed in the making of objects or the use of space. Knowing the spatial organization of craft production is vital for understanding how the conception and use of space is a means through which society is constituted and understood by its members. Equally, through artifacts—the end-products of craft production—the ideas, values, and knowledge involved in production provides an outward expression of the metaphors and ideology central to, but not shared equally by, all members of a community. To privilege technical practice and space use as it pertains to *either* men or women when formulating our interpretive frameworks, also denies us entry into a past that was lived by the many and not the few.

Although the data utilized in this study are limited, it is nevertheless significant that an intensive examination of activity organization involving ceramics at a single EIA settlement can be linked with transformations and continuities in the primary elements of social and symbolic life proposed for southern African Iron Age societies. The work presented here is just beginning to realize how daily life in villages is integrated into broader settlement systems and domains of culture. Only by comprehending the full array of activities on a landscape can we begin to understand the relationship between the utilization of space and social life.

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Table 10.1. Hypotheses derived from the behavioral claims of the Domestic Mode of Production and Central Cattle Pattern models tested against the ceramic data from Ndondondwane

Claim	Derived Hypotheses	Operationalized Hypotheses	Conclusion
Domestic self-sufficiency	Production is a domestic replacement activity	Scale of production is low	Yes
		Ceramics made primarily for utilitarian use	Yes
		Pottery styles are exclusive to households in a village	No
Household scheduling	Production is seasonal and part-time	Pottery production is part-time and seasonal	Yes
Certain activities are restricted to domestic (private) and central (public) areas of settlements	Domestic and public activities are spatially discrete	Functional areas correspond to those documented ethnographically	No
	Male- and female-related production activities are respectively restricted to central and peripheral areas of settlements	Pottery production is restricted to peripheral areas of settlements	No
		Ceramic firing loci occur outside central areas	No
Settlement head or central authority has control over the production and distribution of goods/foodstuffs	Central grain storage	Grain pits and/or storage containers will occur in livestock enclosure	No
Social differentiation	Principle household is located upslope of livestock enclosure	The location of households will distinguish status differences status in the settlement	Indeterminate
		The contents of households will distinguish status differences status in the settlement	No
Political organization	Male "assembly areas" occur within or near the central livestock enclosure	"Assembly areas" will have an absence of cooking vessels and an abundance of serving/short-term storage vessels.	Yes
Initiation rituals	Public puberty rituals occur within central areas of settlements	Bottomless pots, figurines, and ceramic heads found at EIA sites were used in public initiation ceremonies.	Figurines only ?
	Certain pit fillings related to objects used during a period of seclusion during girls initiation	Pits will be filled at various stages during the occupation of a settlement.	No

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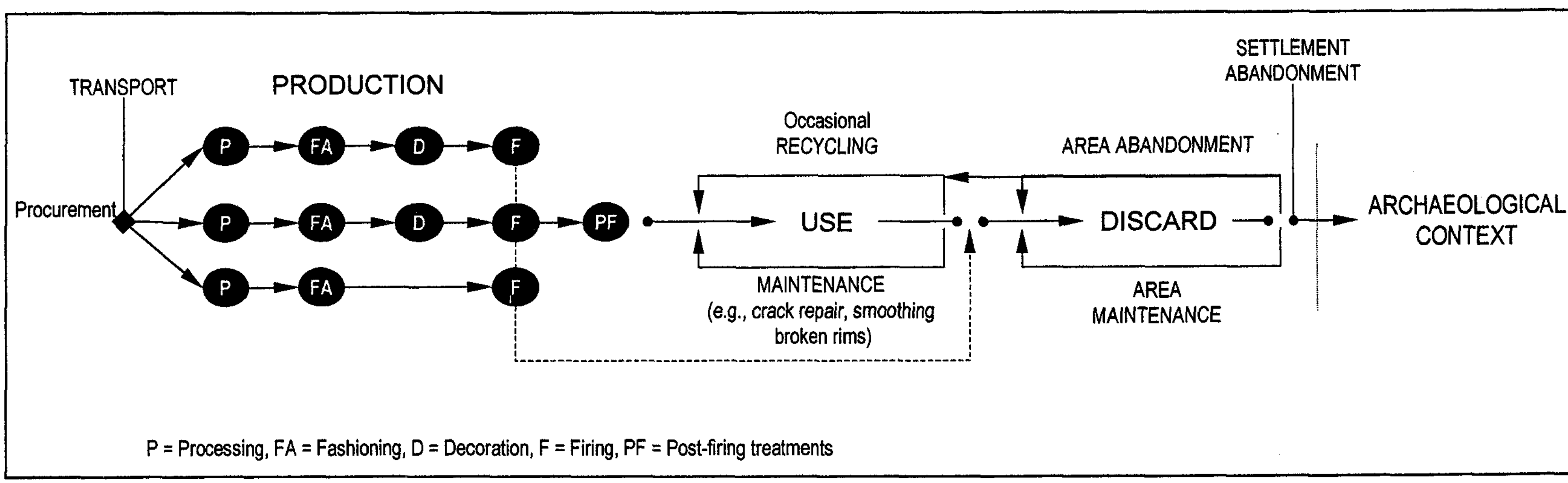

Figure 10.1. Flowchart of the ceramic lifecycle at Ndondondwane.

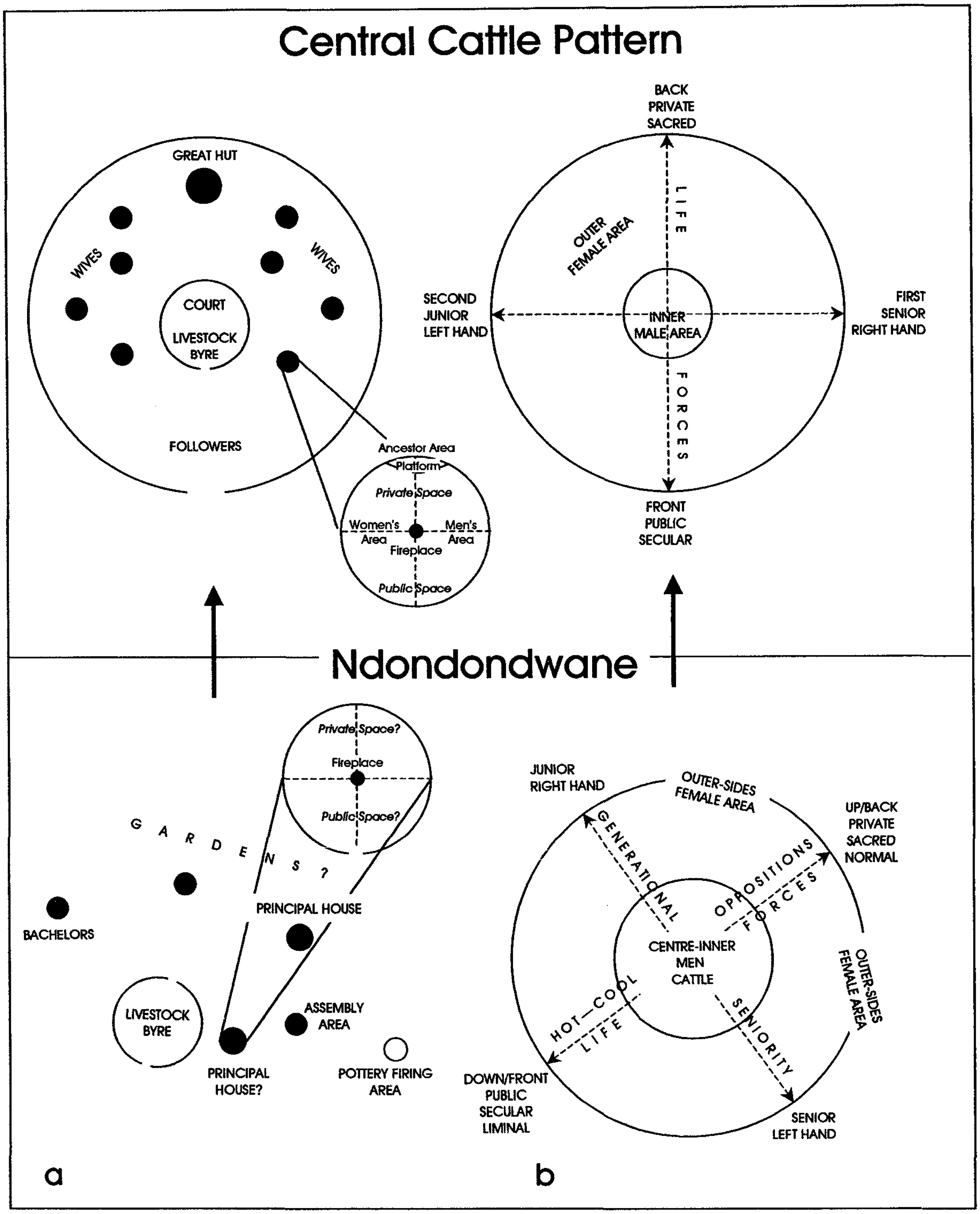

Figure 10.2. Possible transformations of the (a) spatial layout and (b) symbolic dimensions of settlement space during the southern African Early Iron Age suggested by the use of space at Ndondondwane.

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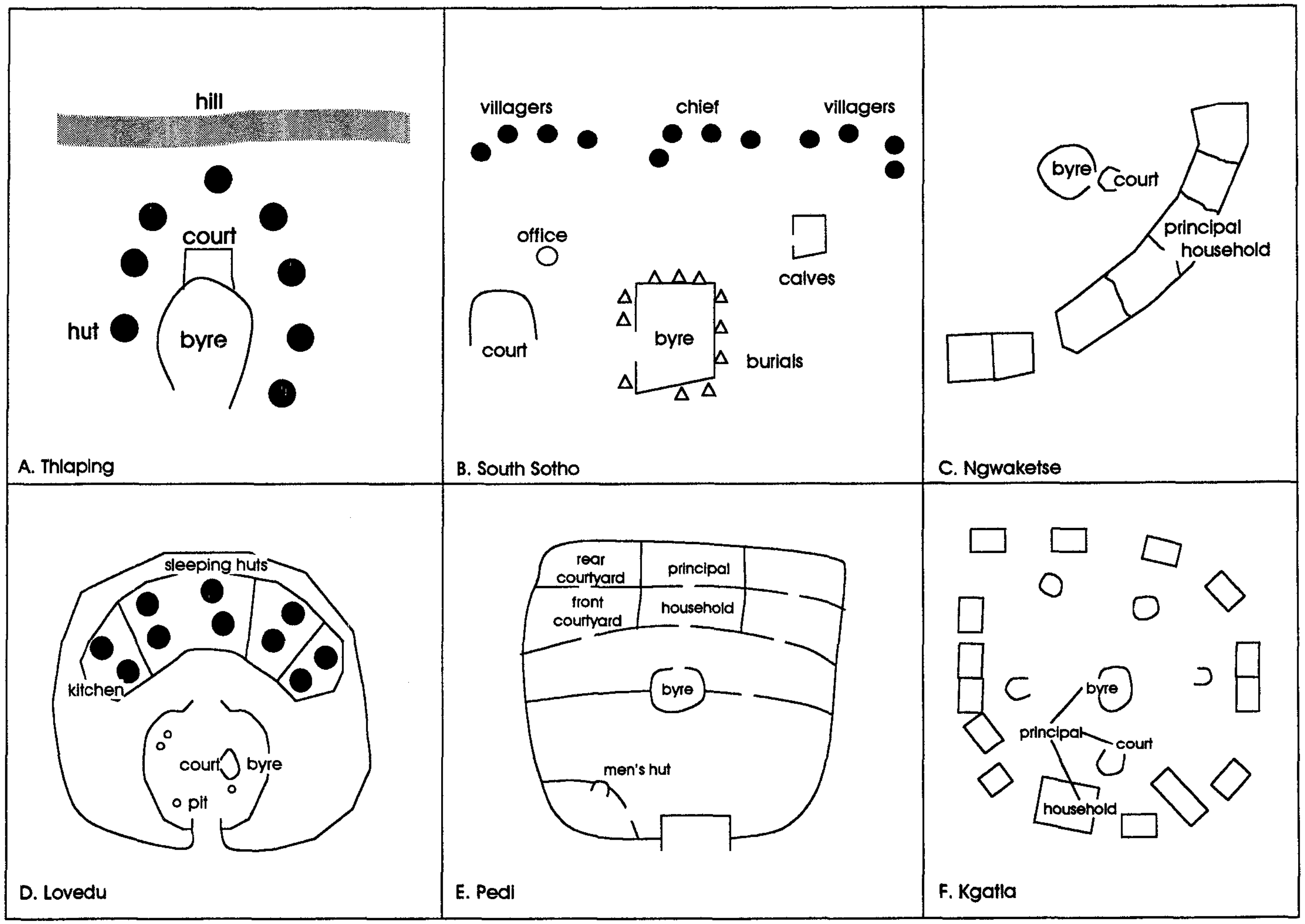

Figure 10.3. Variation in the layout of settlements of southern Bantu speakers who organize space according to the principles of the Central Cattle Pattern (after Evers 1984: fig. 1).

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APPENDIX 1. THE CHARACTERISTICS AND DISTRIBUTION OF VESSELS WITH LUGS

Area and Feature	Horizon	Type	N_S	Orientation	Point(s) of Attachment	Position	Length (cm)	Width (cm)	Lug Hole (measurements in cm)			Decoration (see Figure 6.4)	Vessel Class	Decoration
									Width	Dia.	Depth			
Dung-East														
	1	L1	4	vertical	1	lower ½ neck	2.30	1.00				1-7	Jar	Red
	1	L1	1	vertical	1	throat						1-8	Jar	ZIP
	1	L2b	1		1	lower ½ neck				1.30	0.20		Jar	ZIC
	1	L2b	1		1	shoulder					0.40		Jar	Red
	1	L1	1	vertical	1	neck							Jar	ZIP
	2	L2b	1		1	shoulder			1.50	1.20	0.40		Vessel	ZIC
	2	L2b	1		1	unidentified	3.00	4.10?	0.90	2.50			Vessel	Plain
	2	L2a	1		1	shoulder?							Vessel	Plain
	2	L1	1	vertical	1	lower ½ neck							Jar	Black
	2	L1	1	horizontal	1	throat		0.50					Jar	ZIC
	4	L1	1	vertical	1	unidentified							Vessel	Plain
	4	L3	1	vertical/ oblique?	1	neck	2.00	1.50					Jar	ZIC
Mound														
Ash	2	L1	1	vertical	1	neck	--	0.67				1-8	Jar	ZIP
Furnace rubble	3	L4	4	vertical	1	body	4.00	3.00				"ape-head" lugs	Jar 6-C	ZIC
Furnace rubble	3	L6	1	vertical	1	shoulder						"	Vessel	ZIC
Furnace rubble	3	L6	1	vertical	3	body	7.00	3.00				"	Spherical-body	Undecorated
Furnace rubble	3	L7	1	vertical	1	shoulder	4.50	5.00				"	Spherical-body	Undecorated

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APPENDIX 1. (CONTINUED)

Area and Feature	Horizon	Type	N_S	Orientation	Point(s) of Attachment	Position	Length (cm)	Width (cm)	Lug Hole (measurements in cm) Width	Dia.	Depth	Decoration (see Figure 5.4)	Vessel Class	Decoration
Furnace rubble	3	L5	1	vertical	1	shoulder	4.50	3.50					Vessel	Undecorated
	4	L1	1	vertical	1	neck	2.26	0.78				1-2	Jar	ZIC
Transect 1														
Hut Floor	1	L2a	1		1	shoulder	2.33	1.66					Vessel	Undecorated
Hut Floor	1	L1	1	horizontal	1	shoulder	--	0.64					Spherical-body	ZIP
Midden 1														
	1-4	L3	1	vertical	1	Neck; applied after ZIP decoration	2.30	1.20				1-8	Jar	ZIP
Pit 2	1-4	L2a	1		1	Throat	1.60	0.60					Vessel	Plain
	1-4	L3	1	vertical	1	Neck	2.00?	0.60					Jar	ZIC
	1-4	L3	1	vertical	1	lower ½ neck						1-7	Jar	ZIC
	1-4	L3	1	vertical/oblique?	1	Neck	0.50	1.50				2-3	Vessel	ZIC
	1-4	L1	1	vertical/oblique?	1	throat	0.60	1.60					Vessel	ZIC
	1-4	L3	1	vertical/oblique?		neck	6.50	0.50					Jar 6-C	Red
Midden 3														
	1-4	L3	1	vertical	1	shoulder	3.47	1.40				1-8	Vessel	ZIC
	5	L1	1		1	neck	1.20	0.40					Jar	ZIC

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APPENDIX 2. FREQUENCY OF MINERAL INCLUSIONS

Type of Inclusions	Data	Inclusion Frequency							
		Sparse (< 5%)	Rare (5-9%)	Moderate (10-14%)	Common (15-20%)	Very Common (21-30%)	Abundant (> 30%)	Unclassified	Total
Quartz	No. Sherds		200		3				203
	% Type		98.52%		1.48%				100%
	% Frequency		41.49%		0.21%				5.41%
Gneiss	No. Sherds		7	11	2				20
	% Type		35.00%	55.00%	10.00%				100%
	% Frequency		1.45%	0.72%	0.14%				0.53%
Gneiss and silver mica	No. Sherds			34	1	1			36
	% Type			94.44%	2.78%	2.78%			100%
	% Frequency			2.21%	0.07%	0.36%			0.96%
Quartz and gneiss	No. Sherds		202	1079	1216	238			2735
	% Type		7.39%	39.45%	44.46%	8.70%			100%
	% Frequency		41.91%	70.16%	83.92%	85.61%			72.91%
Quartz, gneiss, silver mica	No. Sherds	1	73	382	227	37			720
	% Type	0.14%	10.14%	53.06%	31.53%	5.14%			100%
	% Frequency	100%	15.15%	24.84%	15.67%	13.31%			19.19%
Quartz, gneiss, silver and gold mica	No. Sherds			32		1			33
	% Type			96.97%		3.03%			100%
	% Frequency			2.08%		0.36%			0.88%

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APPENDIX 2. (CONTINUED)

Type of Inclusions	Data	Inclusion Frequency Sparse (< 5%)	Rare (5-9%)	Moderate (10-14%)	Common (15-20%)	Very Common (21-30%)	Abundant (> 30%)	Unclassified	Total
Quartz, gneiss, clay pellets	No. Sherds					1			1
	% Type					100%			100%
	% Frequency					0.36%			0.03%
Quartz, gneiss, iron oxide nodules, clay pellets	No. Sherds						1		1
	% Type						100%		100%
	% Frequency						100%		0.03%
Unclassified	No. Sherds							2	2
	% Type							100%	100%
	% Frequency							100%	0.05%
Total No. Sherds		1	482	1538	1449	278	1	2	3751
Total % Type		0.03%	12.85%	41.00%	38.63%	7.41%	0.03%	0.05%	100%
Total % Frequency		100%	100%	100%	100%	100%	100%	100%	100%

APPENDIX 3. ROUNDNESS AND SPHERICITY CHARACTERISTICS OF MINERAL INCLUSIONS

		Roundness and Sphericity			
Type of Inclusions	Data	Low	High	Mixed	Total
Quartz	No. Sherds	195	8		203
	% Type	96.06%	3.94%		100.00%
	% Frequency	14.18%	0.34%		5.42%
Gneiss	No. Sherds	7	13		20
	% Type	35.00%	65.00%		100.00%
	% Frequency	0.51%	0.55%		0.53%
Gneiss and silver mica	No. Sherds	2	34		36
	% Type	5.56%	94.44%		100.00%
	% Frequency	0.15%	1.43%		0.96%
Quartz and gneiss	No. Sherds	962	1772		2734
	% Type	35.19%	64.81%		100.00%
	% Frequency	69.96%	74.74%		72.95%
Quartz, gneiss, silver mica	No. Sherds	176	543	1	720
	% Type	24.44%	75.42%	0.14%	100.00%
	% Frequency	12.80%	22.90%	50.00%	19.21%
Quartz, gneiss, silver and gold mica	No. Sherds	33			33
	% Type	100.00%			100.00%
	% Frequency	2.40%			0.88%
Quartz, gneiss, clay pellets	No. Sherds		1		1
	% Type		100.00%		100.00%
	% Frequency		0.04%		0.03%
Quartz, gneiss, iron oxide nodules, clay pellets	No. Sherds			1	1
	% Type			100.00%	100.00%
	% Frequency			50.00%	0.03%
Total No. Sherds		1375	2371	2	3748
Total % Type		36.69%	63.26%	0.05%	100.00%
Total % Frequency		100.00%	100.00%	100.00%	100.00%

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APPENDIX 4. GRAIN SIZE OF MINERAL INCLUSIONS

Type of Inclusions	Data	Very Fine	Fine	Grain Size Coarse	Very Coarse	Total
Quartz	No. Sherds	6	199	38	20	263
	% Type	2.28%	75.67%	14.45%	7.60%	100.00%
	% Frequency	0.68%	14.83%	2.10%	11.30%	6.24%
Quartz and silver mica	No. Sherds		2	502	7	511
	% Type		0.39%	98.24%	1.37%	100.00%
	% Frequency		0.15%	27.72%	3.95%	12.12%
Quartz and gold mica	No. Sherds			1		1
	% Type			100%		100.00%
	% Frequency			0.06%		0.02%
Gneiss	No. Sherds	11	8	1		20
	% Type	55.00%	40.00%	5.00%		100.00%
	% Frequency	1.24%	0.60%	0.06%		0.47%
Gneiss and silver mica	No. Sherds	33	2			35
	% Type	94.29%	5.71%			100.00%
	% Frequency	3.72%	0.15%			0.83%
Quartz and gneiss	No. Sherds	544	852	650	7	2053
	% Type	26.50%	41.50%	31.66%	0.34%	100.00%
	% Frequency	61.33%	63.49%	35.89%	3.95%	48.68%
Quartz, gneiss, silver mica	No. Sherds	293	247	617	143	1300
	% Type	22.54%	19.00%	47.46%	11.00%	100.00%
	% Frequency	33.03%	18.41%	34.07%	80.79%	30.83%
Quartz, gneiss, silver and gold mica	No. Sherds		32	1		33
	% Type		96.97%	3.03%		100.00%
	% Frequency		2.38%	0.06%		0.78%
Quartz, gneiss, clay pellets	No. Sherds			1		1
	% Type			100%		100.00%
	% Frequency			0.06%		0.02%
Total No. Sherds		887	1342	1811	177	4217
Total % Type		21.03%	31.82%	42.95%	4.20%	100.00%
Total % Frequency		100%	100%	100%	100.00%	100.00%

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APPENDIX 5. THE OCCURRENCE OF ORGANIC MATERIAL WITH OTHER INCLUSIONS IN FABRICS

Mineral Inclusions Type		Present	Probably Present	Indeterminate [a]	Not Present	Present and Indeterminate	Present and Not Present	Total
quartz only	No. Sherds	698	8	393	103		9	1211
	% Organics	16.91%	4.26%	16.86%	27.47%		100.00%	17.22%
	% Inclusions Type	57.64%	0.66%	32.45%	8.51%		0.74%	100.00%
quartz, silver mica	No. Sherds	1004	66	613	92			1775
	% Organics	24.33%	35.11%	26.30%	24.53%			25.24%
	% Inclusions Type	56.56%	3.72%	34.54%	5.18%			100.00%
quartz, silver and gold mica	No. Sherds			1				1
	% Organics			0.04%				0.01%
	% Inclusions Type			100.00%				100.00%
gneiss only	No. Sherds	16		4	1			21
	% Organics	0.39%		0.17%	0.27%			0.30%
	% Inclusions Type	76.19%		19.05%	4.76%			100.00%
gneiss, silver mica	No. Sherds	5		33				38
	% Organics	0.12%		1.42%				0.54%
	% Inclusions Type	13.16%		86.84%				100.00%
quartz and gneiss only	No. Sherds	1372	11	850	122			2355
	% Organics	33.24%	5.85%	36.47%	32.53%			33.49%
	% Inclusions Type	58.26%	0.47%	36.09%	5.18%			100.00%
quartz, gneiss, and silver mica	No. Sherds	934	103	437	56	2		1532
	% Organics	22.63%	54.79%	18.75%	14.93%	100.00%		21.79%
	% Inclusions Type	60.97%	6.72%	28.52%	3.66%	0.13%		100.00%

[a] Organics may or may not be present.

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APPENDIX 5 (CONTINUED)

Mineral Inclusions		Present	Probably Present	Indeterminate[a]	Not Present	Present and Indeterminate	Present and Not Present	Total
quartz, gneiss, and silver and gold mica	No. Sherds	97						97
	% Organics	2.35%						1.38%
	% Inclusions Type	100.00%						100.00%
quartz, gneiss, and clay pellets	No. Sherds				1			1
	% Organics				0.27%			0.01%
	% Inclusions Type				100.00%			100.00%
quartz, gneiss, FEO_2 nodules,	No. Sherds							
	% Organics							
	% Inclusions Type							
quartz, gneiss, FEO_2 nodules, and clay pellets	No. Sherds	1						1
	% Organics	0.02%						0.01%
	% Inclusions Type	100.00%						100.00%
Total No. Sherds		4127	188	2331	375	2	9	7032
Total % Organics		58.69%	2.67%	33.15%	5.33%	0.03%	0.13%	100.00%
Total % Inclusions Type		100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%

[a] Organics may or may not be present.