Wells of Experience
A pastoral land-use history of Omaheke, Namibia
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Karl-Johan Lindholm
ABSTRACT

The conventional view on the Kalahari in southern Africa expresses that the area is unsuitable for livestock herding. For this reason, it is argued that livestock herders avoided the Kalahari in the past and were only able to establish themselves in the later half of the twentieth century, when deep-reaching boreholes were introduced in the area. An effect of this concept was that the archaeological record of pastoralists in the Kalahari either was perceived as non-existent or received little attention from scientific enquiry.

Based on an archaeological survey in the Kalahari of the northeastern part of Namibia, the purpose of this study is to construct an alternative approach to the archaeology of livestock herding. The aim is to contribute to a better understanding of the areas unrecorded land-use history.

I depart from the notion that the main ecological constraint for dryland pastoralism is the availability of dry season water and fodder resources. For this reason, the fundamental basis for a pastoral land-use system is places that contain dry season resources. By reviewing recent ecological research, historical and anthropological accounts and previous archaeological research, I establish a link between livestock herders' procurement of dry season key resources and the practice of digging wells. The link can be motivated from the pastoral ambition of accumulating livestock and high water requirements in the restrained dry season. On this basis, I suggest that artificial wells are useful indicators of pastoral land use in the Kalahari.

The most crucial task for the study is to address the archaeological visibility of pastoral well sites. By a research approach integrating the theoretical understanding of pastoralism and a methodology including ecology, archaeology, history and the knowledge of the people who keep livestock in the region today, the archaeological survey revealed 40 well sites, including nearly 200 well structures that have all been used for watering livestock.

However, it would be unfortunate if a study of pastoral wells would solely address the ecological foundation and the archaeological visibility of pastoralism. I suggest that the wells signify the labour of peoples with common or separate histories, with or without own herds, but probably talked about in relation to herds. I will also argue that the wells can be used for tracking and reconstructing a pastoral land-use system that predated the colonial era. Furthermore, the wells can be used to identify changes of the land-use that took place during the twentieth century, which involved that livestock herding was more or less abandoned in large parts of northwestern Kalahari.

The study surmises that the critical historical perspective is valuable for development projects and conservationist interventions active in the region, especially in the light of the recent trends in the dryland ecology, which shows a larger appreciation for the indigenous understanding of the management of dryland ecosystems. With modifications, the developed approach can be applicable for land-use historical research elsewhere in southern Africa.

Keywords	namibia; Kalahari; Omaheke; archaeology; wells; land-use history; pastoralism

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Till min pappa Karl-Erik Lindholm
The cattle are then driven into the pasture in the morning and graze in a horseshoe shape, getting nearer and nearer to the watering place. By around noon, the herds have gathered together by the water, the herdsmen taking it in turns to help each other water the animals. The owners also arrive to oversee the watering and to enjoy watching their herds. Any news is exchanged here and the concerns of the people and their family as well as the pedigree and routines of their precious cattle are discussed at length once again. Travellers also arrive, knowing they are most likely to find people there at lunchtime with who they can discuss overnight accommodation and livelihood. And so an active life in the wilderness develops.

(Büttner 1883, p. 533)
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Chapter 1

INTRODUCTION

*The reality of Kalahari is less romantic but in many ways more interesting* (Russell & Russell 1979, p. 1).

Kalahari is a vast sandy area in the interior of southern Africa. The conventional view is that the northwestern parts of the Kalahari are unsuitable for livestock herding, since the exceptionally thick sands in the area result in a paucity of surface water. Moreover, the sand prevents the digging of wells for watering livestock. For this reason, it has been argued that livestock herders avoided the area in the past, and were only able to establish themselves in the later half of the twentieth century, when deep reaching boreholes were introduced in the area. An effect of this perception was that the archaeological record of pastoralists in the Kalahari was either perceived as non-existent, or received little scientific attention. Instead the ethnographic situation of the mid-twentieth century, seemingly reflecting an area isolated from the general historical trends of southern Africa, was presumed to also be an authentic reflection of the more distant pasts.

Over the two last decades an alternative view has emerged. An increasing amount of archaeological and historiographical evidence suggests that the Kalahari was not avoided by herders in the past. In parallel with this, critical historical arguments have managed to deconstruct many of the assumptions that framed and made sense to the isolationist opinion. Today, the two views on the history of Kalahari have resulted in an intense debate. However, the most apparent result of this debate is that further research remains to be done, especially on the ambiguity of livestock herding in the archaeological record.

This thesis is based on an archaeological survey in the Kalahari of eastern Namibia (Fig. 2.1). This part of the Kalahari has been characterised as exceptionally dry and with little capacity of storing water near the ground surface. However, an archaeological survey in the area revealed 40 well sites including nearly 200 visible well structures, which have all been used for watering livestock. The main question to be addressed in the study is whether these wells can contribute to a better understanding of Kalahari’s pastoral land-use history. To test the hypothesis it is necessary to develop an appropriate research strategy. My approach is based on five case studies, each constituting a separate chapter of the thesis.

**Conceptual background and thesis outline**

I believe archaeology can contribute to the pastoral history of Omaheke and also to a wider diachronic understanding of the role of human practice in the shaping of the African environment. Over the last decade, several researchers have argued for the importance of situating current issues of the African environment, for example nature conservation, land degradation and sustainable development, within a wider social, historical, political, or even in a post-colonial understanding (e.g. Adams & McShane 1996; Kinlund 1996; Beinart 2000; S. Brooks 2005). In this, authors have reassessed some basic concepts in ecology, since they have shown to be overly simplistic (Holling 1987; Ellis & Swift 1988; Behnke & Scoones 1993; Behnke & Kerven 1994). The importance of developing research approaches which link social and ecological systems has been argued for by several researchers in the field (e.g. Berkes & Folke 1998; Scoones 1999). Others have argued the importance of models based on diachronic data sets within local and regional settings for analysing the driving forces of environmental change (Leach & Mearns 1996; Little 1996; McCann 1999; John Kinnahan 2000; Börjesson 2004; Ekblom 2004), as well as empirically grounded studies which include knowledge based on local people’s first hand experience of certain issues (Berkes et al. 1995; Nyerges 1996, 1997; Dahlberg 1996; Powell 1998; Sullivan 1999a). Sullivan (1999b, p. 273) have argued that environmental research in southern Africa needs “hybrid” approaches; i.e. studies that “accepts the challenge to integrate anthropology, ecology and political analysis in order to better represent dynamic interactions between people, environment and policy”.

The benefit of an archaeological approach is that it is inherently interdisciplinary and has a unique opportunity of bringing together the experimental and deductive abilities of natural science
with the criticism and non-reductionism of the social sciences.

An additional advantage is that the basis for the archaeological approach lies in a long-term perspective on “real life” remains that is derived from the first-hand experience, knowledge and practice of specific social groups in interaction with their environment (Sinclair 1997, p.188; McGlade 1995; Crumley 2001, 2003). In addition, the practice that once resulted in the archaeological remains should be considered as linked with a landscape and the “realization of culturally important projects” (Nyerges 1997, p. 2), in which the “ways of acting in the environment [were] ways of perceiving it” (Ingold 2000, p. 9). These aspects point to the possibility of gaining a normative or even phenomenological understanding from the archaeological approach to the socio-environmental interface (Kinahan 1999). The qualities noted above for the archaeological approach have recently been considered as characteristic features of a “future science” (Costanza 2000).

The initial motive for my study in the Kalahari derived from a jointly written Masters thesis in archaeology (Lindholm & Vogel 1996). Our thesis was a critique of the economic and ecological determinism inferred by hunter-gatherer archaeology at the time (for similar critiques, see Bradley 1984, p. 11; Knutsson 1995, p. 7). Hunter-gatherers were commonly described as an essential adaptation and their landscapes usually conceptualised as a bundle of resources. In contrast, the aim of our dissertation was to discuss how active normative behaviour of hunter-gatherers was expressed through their landscapes and settlements. In addition, we suggested how these principles could be identified and investigated archaeologically (Lindholm & Vogel 1996, 1997).

When the opportunity was given to work with my PhD project in Namibia I followed my original interests and since anthropological and archaeological research stressed a long-lasting continuity of hunter-gatherers in the region (e.g. Lee 1979; Smith & Lee 1997), the intention of my study was to enter into the cognitive landscapes of hunter-gatherers in the western Kalahari (Lindholm 1998a, b). However, my initial research objective changed after the first fieldwork season and as a result of issues raised in the so-called Kalahari debate (see Chapter 2), primarily the ambiguity of pastoralism in the archaeological record and the notion of the unsuitability of the region for livestock herding. The new objective came to focus on finding alternative ways for defining pastoralism in the archaeological record in order to contribute to a better understanding of the land-use history of the area (Lindholm 2003, 2006).

The first part of Chapter 2 is a review of the hunter-gatherer research that was undertaken in the northwestern Kalahari from 1951 onwards, and the critique of this research that was raised in the Kalahari debate during the 1980s and 90s. In the second part of the discussion I focus on one specific issue of the debate, namely the ambiguity of pastoralism in the archaeological record. In the final part of the chapter, under the heading Herder practice, I outline an alternative approach to the archaeological visibility of livestock herding. My research approach is to a large extent inspired by previous studies on southern African pastoralism undertaken by the Namibian archaeologists Jill and John Kinahan (e.g. John Kinahan 1991; Jill Kinahan 2000).

John Kinahan has argued that studies on pastoralism need an explicit theoretical framework on what pastoralism represents economically, socially and ecologically in order to define “specific and observable archaeological consequences that help to explain the relationships between the functioning economy and its fragmented remains” (John Kinahan 1991, p. 12). In doing this I will depart from the notion that the main ecological constraint for dryland pastoralism is the availability of dry season water and fodder resources. For this reason, places that contain dry season assets can be considered key resources (Scoones 1989, 1995; Illius & O’Connor 1999), or in other words, the fundamental basis for a pastoral land-use system. By reviewing recent ecological research, historical and anthropological accounts and previous archaeological research I establish a link between livestock herders’ procurement of dry season key resources and the practice of digging wells. The link can be motivated from the pastoral ambition of accumulating livestock and high water requirements in the restrained dry season. Moreover, the pastoral mode of production has the means for mobilising the labour required for an intensified use of places that contain ground water resources (Ingold 1980). On this basis I will suggest that artificial wells, at least from an ecological understanding of dryland pastoralism, are useful indicators for pastoral land-use in the Kalahari.

It would however be unfortunate if a study of pastoral wells would solely address the ecological foundation and the archaeological visibility of pastoralism. Even if the pastoral history is archaeologically ambiguous and ecologically constrained, it is socially and historically reproduced (i.e. John Kinahan 1991). My assumption is that if it is possible to track a series of pastoral wells in the northwestern Kalahari it should also be possible to accumulate indications of geographical networks that manifest a pastoral world’s grazing and communication routes on the local, as well as on the regional scale. Fur-
thermore, it should be possible to contribute to a better understanding of the pastoral land-use history of the region. In my attempt to achieve this understanding I will follow Jill Kinahan’s suggestion and use “both material and documentary records” for “moving the colonial focus of historical archaeology to an indigenous one” (Jill Kinahan 2000, p. 11).

In Chapter 3, I provide an introduction to the research area. The first part of the chapter will concentrate on the environmental setting and introduce some specific places, features, qualities and processes of the Kalahari landscapes that are important for the continuing discussion. In current Namibia there are three broad categories of land tenure; farming with freehold tenure, communal areas and state land including conservation areas (Sweet 1998; Suzman 2001). The three forms of land-use are all represented in the research area and in the second part of the chapter, I outline the general characteristics of the current land-use organisation of the research area.

The purpose of Chapter 4 is to investigate why pastoral wells have not been studied before. This will be done by tracking the origin of the notions that imply that the northwestern part of the Kalahari is a dry impassable barrier and unsuitable for livestock herding. In this I will situate the issues raised in the research background within a wider historical understanding. The chapter is based on a brief history of the Kalahari, beginning a few centuries before the first European explorations of the interior parts of southern Africa in the nineteenth century. The discussion will continue with the German colonisation of current Namibia, up until more recent events associated with South African rule.

The most crucial task for the study is to address the archaeological visibility of pastoral well sites. In the beginning of Chapter 5, the survey method that was used in the study will be introduced and discussed. In the second part of the chapter the results from the archaeological survey will be presented. I will begin by discussing the known conventional archaeological record of the research area and present additional archaeological sites that were identified during my survey. The third and longest part of the chapter is dedicated to the wells, a site category that has only revealed partial interest before in the archaeology of the Kalahari (i.e. Kinahan & Kinahan 1984). In the final sections of the chapter, I discuss some general traits of the archaeological record as it appears after the survey.

However, the identification of a well structure may not be as simple as it might seem. A hole dug in the ground cannot be assumed to be a well or having a single or constant function over time. In order to avoid self-reinforcing arguments in classifying a pastoral well, it seems crucial to use an approach that accommodates not only the archaeological structure, but is able to link it with the practice of livestock herding. To do this, it is necessary to obtain indications from the environmental setting of the wells that correspond with the concept of a pastoral key resource area. Additionally, if present day cattle water points in the Kalahari are considered, it can be assumed that the grazing pressure associated with a well would have induced a structuration process of the surrounding vegetation patterns and the nutrient cycles of the soils that coincide with a piosphere. A piosphere is a concept derived from range-land ecology defining the structuring processes that is related with the livestock’s utilisation of forage biomass around a water point (Andrew 1988). The main task of Chapter 6 is to discuss the hydrogeology and the vegetation of the well sites documented in the archaeological survey and to reconstruct the socio-environmental dynamics of livestock herding in the area.

The discussion of Chapter 7 focuses on the chronological indications that have been accumulated during the study. The purpose of the chapter is to use these indications for dressing the environmental framework provided by the wells by a pastoral land-use history of Omaheke. The first part of the chapter focuses on a brief period of approximately fifteen years at the turn of the nineteenth century. The discussion is based on place names, oral tradition from people living in the area, accounts in contemporary European historical sources and historiographical research. If these accounts are considered in relation to the wells it is possible to accumulate indications that suggest that the wells were part of a pastoral land-use system that predated the twentieth century. The second case is based on an archaeological excavation of one well from the reconstructed system. The results from the excavation imply that it is possible to obtain indications that suggest that some of the wells had a continuity that extends to the centuries prior the nineteenth century. The third case is based on rim diameter measurements of wells with better preservation dug in calcrite rock outcrops. Again I use accounts from the oral tradition, but in this case, in association with the spatial distribution of the wells. I suggest that the distribution of different types of wells can be considered as reflecting a relative chronological sequence, which may have further implications for the current understanding of the areas pastoral land-use history.

In the fourth part of the chapter, I use the evidence accumulated in the study to reinterpret a previous archaeological excavation of a series of pits at #Gi in Botswana (Helgren & Brooks 1983), which the excavators interpreted as fall traps (Brooks...
2002). I propose that a pastoral well site cannot be excluded on any archaeological grounds.

Finally, I conclude the chapter by providing a note on how the pastoral land-use system changed during the twentieth century land-use reforms. Chapter 8 discusses some implications of the study. While many of the arguments in the study are based upon the work of others, the general approach is new to the archaeology of the Kalahari. The developed approach can with modifications be applicable for land-use historical research elsewhere in southern Africa.
Chapter 2

RESEARCH BACKGROUND

Namibia is the youngest independent country in Africa. Its colonial history began in 1884, when the country, under the name of Deutsche Südwestafrika, became a Protectorate of the German Empire (Esterhuyse 1968). In 1915, during the First World War, the South African army occupied and took control over the country. After the war, the Treaty of Versailles stipulated that Germany had to curtail all colonial ambitions (Drechsler 1980, p. 244). In 1921 the League of Nations granted South Africa a formal mandate to administer South West Africa. In 1966, the mandate was terminated by the General Assembly of the United Nations and from this time, Namibia became recognised as the official name for the country. However, South Africa continued its occupation of Namibia illegally. Subsequently, in the same year, the South West African Peoples Organisation (SWAPO) initiated the armed struggle for liberation. South Africa's occupation lasted until 1989. In 1990, the first free elections were held in independent Namibia. The result of the long lasting occupation was that Namibia's history has largely been intertwined with that of South Africa (Mbuende 1986; Katjavivi 1988; Hayes et al. 1998).

Two thirds of Namibia is situated within the Kalahari, which delineates an inland area of sand deposits of 2.5 million square kilometres (Fig. 2.1.). It extends from the southernmost part of Africa to the equator (Thomas & Shaw 1991). The term ‘Kalahari’ is derived from the Setswana word Kgala-gadi, which translates as ‘always dry’ (van Rooyen 2001, p. 9). In this thesis, Omaheke will be used throughout the text for referring to the northwestern Kalahari. The area stretches from the Namibian highlands in the west, is bordered by the intermittent valleys Kaudum in the north and the Epukiro in the south (Fig. 2.1). The perennial Okavango River and its delta delimit the north-eastern and eastern margin of the general Omaheke discussed in this thesis. Omaheke comprises an area of 83000 square kilometres (Encyclopædia Britannica 2005). Today, the largest part of the Namibian Omaheke is situated within the administrative regions of Omaheke, Otjozondjupa and Okavango. The largest part of Omaheke on the Botswana side of the border fence is situated within the administrative districts Ngamiland and Ghanzi.

Omaheke means “deep sand” in Otjiherero, one of the languages spoken in the area. As the name implies, the area is characterised by sandy layers that are considered thick even by Kalahari standards. In the late nineteenth century German sources it was not uncommon to use the word Omaheke for referring to the eastern parts of the colony (e.g. Büttner 1883; von Deimling 1906; Irle 1906; Michaelsen 1910). By the turn of the twentieth century, it became more common to refer to the area as the Sandveld, an Afrikaans translation of the word (e.g. Rohrbach 1907; Lebzelter 1934). Along with increased European activities in the area in the late nineteenth century it was apparent that Omaheke was environmentally and linguistically heterogeneous. At the same time it became common to distinguish different areas of Omaheke and these were usually defined according to characteristics of the savanna environment or the different peoples that inhabited them (e.g. Lebzelter 1934, p. 16).

The northern parts of Omaheke have often been referred to as the Kaukauveld. The name is probably derived from the šA/ǀu//en, one of two !Kung-speaking Khoesan groups that inhabit Omaheke (Köhler 1959a, p. 4). šA/ǀu//en is a Nharon (a neighbouring Khoe-speaking people) word meaning “people from the north” (Suzman 2000, p. 103). In this study I will follow the recommendation by Suzman (2000) and refer to the people by using their own name for themselves: Ju/'hoansi meaning Real or Genuine people. The northernmost parts of Omaheke, towards the Okavango River, have occasionally been recognized as the Kungveld after a second !Kung-speaking people that live in this area. In the Kalahari ethnography, this group have usually been recognized as the !Kung San, but today they are usually referred to as the Ju/'hoansi (e.g. Lee 2003). In the following discussion I will distinguish between the two groups by using a geographical provenience as prefix.

Ethnographically, the northern Ju/'hoansi are most well known for their hunting and gathering economy and egalitarian social structures. During the second half of the twentieth century, this group attracted considerable attention from anthropologists interested in hunter-gatherers (below). The southern Ju/'hoansi have not attracted the same attention from
the ethnographers, probably owing to their close association with other peoples (Kaufman 1910; Guenther 1976; Suzman 2000).

Two Otjiherero-speaking groups, Ovaherero and Ovambanderu (Ova- translates as people in Otjiherero), are associated with Omaheke. They share many similarities in culture and history but have actively maintained two separate identities and histories (Vivelo 1977; Almagor 1980). In early anthropological studies, Herero and Mbanderu were often referred to as Damara, derived from the Khoesan word Dama, and they are well known both as examples of African pastoralism, for their double descent system and for rituals that express strong ties with the ancestors (Irle 1906; Dorman 1925; Vedder 1928; Mossop 1935).

In addition to the Otjiherero and !Kung-speaking peoples, people in the region identify themselves as Khoespeaking Damara, Nama, Nharon, Sotho-Tswana speaking Tswana and Kgalagadi and of European descent (Köhler 1959a; Tlou 1985; Barnard 1992a; Suzman 2000).

People in Omaheke, regardless of the ethnicity with which they identify, seem to be mobile and household members often live for long periods in other places (also noted by Yellen 1976; Vierich & Hitchcock 1979; Wilmsen 1989b). The composition of a household or even a village may change significantly over time (Kent 1995). Mobility, diversification and flexibility are some of the distinguishing characteristics of the social relations and economics of Omaheke (Vierich & Hitchcock 1979; Wilmsen 1989b; Powell 1998). This is most obviously manifested in that people travel much along the tracks...
connecting the southern and northern parts; they also refer to distant places with ease, and often speak more than two languages (Denbow 1990; Suzman 2000; Lee 2003, pp.159).

Today, the economy of the western Kalahari largely focuses on livestock farming. In Namibia, the administrative Omaheke region is often referred to as the “Cattle Country” (Kuteeue 2003). The region is also characterized by its gradual integration into the state economy and the influence of the conceptions and interests of town dwellers, researchers, development workers, commercial industry, mining and agriculture, ranching, nature conservation and tourism; all with specific claims on cultural and environmental goods and services.

Remote hunter-gatherers
Lorna Marshall initiated ethnographic research on the Ju’hoansi (then known as the !Kung San) population in the northern Omaheke in 1950-51 (Marshall 1976, pp. 1). Marshall’s work was based in the Nyae Nyae area, mainly in the settlements at /Gam, Gautscha, Tsumkwe and Cho/ana (Fig. 2.1.). Research on Ju’hoansi in Botswana was initiated in 1962 (Lee & DeVore 1970). Here the ethnographers, mainly from the Harvard University, worked in the settlements surrounding Dobe and /Xai/xai (Fig. 2.1.). The purpose of the Harvard research in the Kalahari was to “compile a complete record as possible of the behaviour of these hunter-gatherers” while the hunting/gathering still functioned (Lee & DeVore 1970, p. 122). The research interest was largely stimulated by finds of fossil remains of early hominids in East Africa as well as by influence from neo-evolutionary theory (Lee & DeVore 1968, 1970). The study area was motivated by the similarity to the floral and faunal environment of the early humans (Lee 1976, p. 10).

The conventional view in the 1970s saw Omaheke as a refuge area, only recently populated by impoverished hunter-gatherer groups pushed out from areas that are more productive to the marginal environment. In contrast to this view, Richard Lee pointed out that there was no evidence that the Ju’hoansi had migrated to the Dobe area from elsewhere (Lee 1979, pp. 39). This coincided with Lorna Marshall’s opinion based on her study on the Ju’hoansi in Namibia, which stressed “that they have lived in the Nyae Nyae area since time began” (Marshall 1960, p. 325).

In order to test the proposition, archaeological research was carried out in parallel with the ethnographic studies (Lee 1976, p. 12). The archaeology revealed a series of Late Stone Age (Yellen 1976; Yellen 1984; Yellen & Brooks 1988) and Middle Stone Age sites (Helgren & Brooks 1983), which indicated a considerable duration of human occupation in the Kalahari. In the Nyae Nyae and Dobe areas, the oldest archaeological dates associated with Stone Age technology are circa 25000 years (Brooks 1984, p. 49) and the most recent 110 ± 50 BP (SI-4098) (Helgren & Brooks 1983, p. 187). The second ambition of the archaeological research was to establish links between the Ju’hoansi and the Stone Age materials. However, the Ju’hoansi did not make stone tools, nor did they have a tradition of stone technology. Therefore, the link was established by their hunting and gathering economy and by using neo-evolutionary explanatory frameworks (Yellen 1976, p. 54). The links was sometimes made in tenuous ways; “not far from a modern Bushman village, [John Yellen] has found the remains of early hunters going back 10-20,000 years” (Lee & DeVore, 1970, p. 123; see also Yellen 1984, p. 56). At other sites, more direct links between the past and the present were stressed. In an archaeological excavation of a series of large pits at #Gi, interpreted as the remains of fall traps, it was noted how Ju’hoansi hunters used the archaeological trenches as kudu (Tragelaphus strepsiceros, a large antelope) traps. This provided “some of the best evidence for continuity between the Ju’hoansi and the Later Stone Age” (Brooks 2002, p. 219). The Ju’hoansi seemed to occupy and re-enact a Stone Age landscape.

The dryness of Omaheke
The continuity of hunter-gatherers had to be explained, since archaeological and historical research had demonstrated a long continuity of agropastoral food production in areas surrounding the Kalahari.

Livestock herding was a widespread and rather fast innovation that swept across the arid parts of the southern African sub-continent about two thousand years ago (Elphick 1977; Kinahan 1995; Mitchell 2002, p. 225-58). Radiocarbon dates associated with pottery and sheep bones indicate that people in northwestern Botswana were the first to take up livestock herding in southern Africa, some time around 200 BCE (Walker 1983). The first herders are usually considered the ancestors of the Khoi-speaking peoples of southern Africa (Mitchell 2002, pp. 227).

Based on the combination of Khoi linguistics and pottery styles, ceramics with characteristic lugs have been used as archaeological key indicators for the spread of early pastoralism in southern Africa (Elphick 1977; John Kinahan 1991; Sadr 1998; Bousman 1998). In the southernmost part of southern Africa, the Cape region, dates from sites with sheep and lugged pottery are a few hundred years later, or almost contemporary with herding sites in the northern fringe of the Kalahari (Bousman 1998,
pp. 137-145). Sites with early dates also appear on the western and eastern fringes of Kalahari and in a few places from within the Kalahari (Bousman 1998, Fig. 4, p. 145). The distribution of herding sites has induced archaeologists to define two main routes along the western and eastern margins of the sub-continent for the introduction of pastoralism to the Cape region of South Africa (Elphick 1977; Bousman 1998). Some researchers consider the spread of pastoralism as an intrusive process of migrating Khoe peoples (Elphick 1977; Walker 1983; Smith 1992). Others stress that the introduction of livestock herding should be understood as the result of the diffusion of new ideas (John Kinahan 1991; Sadr 1998). It is relatively clear that Khoe-speaking pastoralists had spread wherever conditions were suitable for their herds and that they dominated the western and southern area of the sub-continent from at least the fifteenth century (Elphick 1977; John Kinahan 1991, 1995; Mitchell 2002, p. 230).

Approximately 2000-1500 years ago, a second form of pastoralism that included iron metallurgy and crop-planting appears in areas north and east of Omaheke (Mitchell 2002, p. 259). The early farming communities are usually associated with the arrival of the ancestors to the present Bantu-speaking people in southern Africa (Vansina 1990). At least from the sixth century, metal-using agropastoralists had established themselves in the northern and eastern fringes of the Kalahari and from the eleventh century also in the Namibian highland area (Denbow 1986, 1990).

The archaeology indicated that the Ju/'hoansi had not lived in a world of hunter-gatherers for any considerable time. Lee and DeVore acknowledged that plant cropping and herding took place among some of the Ju/'hoansi, who also maintained close relations with Bantu-speaking peoples such as the Mbukushu, Herero, Mbanderu, Tawana, and Ye'i pastoralists who lived in the region. At the time of the ethnographical field campaigns, over 40% of the population in Dobe were Tawana, Herero and Mbanderu (Lee 1979, p. 53). However, the majority of the Ju/'hoansi were defined as living in small “isolated camps” subsisting exclusively on gathering and hunting (Lee & DeVore 1970, p. 122). Marshall distinguished between ‘wild’ and ‘tame’ hunter-gatherers (Marshall 1976, p. 8).

In order to “place the Dobe people into the context of contemporary Africa to see how they have survived for so long as hunter-gatherers in a world of nonhunters”, Lee carried out historical studies on the contact period, defined to the century between 1870 and 1970 (Lee 1979, pp. 39, p. 404). The result of the study was that the close relations between the Ju/'hoansi and their neighbours were very recent and initiated shortly before or within the period of the ethnographic observations. According to Lee, the first Tswana hunters appeared in the 1870s, the first cattle arrived in the 1890s, and the first permanent settlement of Setswana- and Otjihererospeakers took place in the period 1920 to 1950 (Lee 1979, p. 42, p. 92). Lorna Marshall considered her fieldwork as the first prolonged contact between the Ju/'hoansi and outsiders (Marshall 1976, pp. 15).

For the ethnographers, the dryness of the Omaheke environment became helpful in making sense of the idea of recent contact. “Protected by a waterless belt of country on the north, east, and south 50 to 150 km wide, these two valleys [!Kangwadum and /Xai/Xaidum] have remained hunting and gathering strongholds well into the twentieth century” (Lee 1979, p. 39, my insertion). The importance of the Omaheke environment as a variable for the historical explanation can also be noted by its indirect, although regular appearance in the form of hardships involved in travelling in the area (Marshall 1976, p. 14; Lee 1979). Marshall stresses that the “difficulties of the journey” were “important [as] a protective factor for the !Kung in maintaining their own way of life” (Marshall 1976, p. 14). Moreover, it was argued that it was impossible to keep livestock in the area on a permanent basis before European technology was available and deep reaching boreholes could be drilled in the mid-twentieth century (Kuper 1970). The barrier, the unsuitability for pastoralists as well as the subsequent isolation were of major theoretical significance for the model the Harvard research intended to construct.

Through the long continuity of hunter-gatherers, Nyae Nyae-Dobe became a haven for hunter-gatherer research and after the pioneering works, the Ju/'hoansi population has attracted a great deal of attention from the field of hunter-gatherer research. The studies covered a wide range of subjects, such as genetics, psychology, child-rearing practices, biography and medicine (Lee & DeVore 1976). The Ju/'hoansi of the Nyae Nyae-Dobe are today considered as the ethnographically best documented people in the world (see Lee & DeVore 1976; Hitchcock 1986, pp. 375; Lee 2003, pp. 11). In addition, by providing a living record of settlements, the Ju/'hoansi constituted “a narrow and opaque window to the Pleistocene” which had great value to archaeologists interested in fossil remains of hunter-gatherers (Yellen 1977), not only in Africa (e.g. Lindholm & Vogel 1996). This resulted in the persistent theme in hunter-gatherer archaeology, namely the projection of explanatory frameworks to the past from the “ethnography in the desert” (Mitchell 2002, p. 225).

The most important consequence of the eth-
nographical research in the Nyae Nyae-Dobe was that the historical changes that had characterised the rest of southern Africa either were perceived as non-existent in Omaheke, or received little scientific attention.

Isolation questioned

In the early 1980s, an attempt of questioning the presumed isolation of the Nyae Nyae-Dobe area was initiated. Similarly to the way in which the neo-evolutionary research used archaeology to establish the continuum of hunter-gatherers in Omaheke, the critique used archaeological and historical source material to take a step away from the evolutionary perspective and situate the region within a wider historical understanding (Schrire 1980, 1984; Guenther 1980; Gordon 1984; Wilmsen 1982).

The critique became materialised during archaeological excavations carried out by Edwin Wilmsen at the dry season waterhole at /Xai/xai (Wilmsen 1978, 1988; Fig. 2.1). The excavation yielded first millennium pottery, as well as a bone from domestic cow (Bos taurus), a maxilla with some intact dentition radiocarbon-dated to the last century of the first millennium CE (Wilmsen 1978, 1988, p. 33), as well as imported goods and iron objects (Wilmsen 1988). The archaeologist James Denbow provided further data that indicated that pastoralists had been present in the area for almost a millennium (Denbow 1984a, 1984b). In addition, John Yellen’s excavation at Mahopa (Fig. 2.1.), not far from /Xai/xai, resulted in finds of first millennium pottery, usually associated with early herding contexts, in layers dated to the first century BCE (Yellen & Brooks 1988). The first extensive archaeological survey of the Nyae Nyae area on the Namibian side of the border showed that the majority of the sites contained comb-stamped Mbukushu ceramics dated to the sixteenth century (Kinahan & Kinahan 1984; John Kinahan 1986). As the Nyae Nyae-Dobe at the time was perceived as far outside the limits of agropastoral settlement, these finds indicated an earlier influence of non-hunting/gathering societies in the area than was previously thought (Denbow 1984a; Kinahan & Kinahan 1984; Denbow & Wilmsen 1986).

Archaeological surveys and excavations undertaken at the Tsodilo Hills, a group of inselbergs situated on the eastern fringe of Omaheke, revealed that central places with metallurgy, intense mining of the mineral specular hematite as well as crop-planting had been established in the region from the sixth century. In this setting, it was argued, no forager community could exist as an isolate, as had been assumed by the ethnographers in the Nyae Nyae-Dobe (Denbow & Wilmsen 1986). The archaeological evidence did not point to the complete displacement of hunting and gathering. Foraging had been, and continued to be, an important component of the economy for all linguistic groups in the region. Rather, it seemed as though the peoples in Kalahari were opportunistic and open to changes in their subsistence strategies by social and economical systems that were more complex and dynamic than the standard anthropological categories of hunter-gatherer or herder/farmer suggested (Wilmsen 1989a, p. 138). For this reason, “the association of particular types of subsistence strategies with specific ethnic or linguistic groups is not straightforward” (Denbow 1984a, p. 179). Moreover, the relations between the different linguistic groups seem to have been “both of longer duration and greater complexity than was formerly thought to be the case” and this explains the apparently multilingual and multiethnic character of the communities in Omaheke today (ibid.).

It was argued that the Ju’hoansi’s exclusive hunter-gatherer way of life in the 1950s-60s could largely be explained as the result of historically situated sociocultural factors (Wolf 1982; Schrire 1980, 1984; Gordon 1992). The romantic notion of the survival of primordial peoples was according to this view more a result of the interruptive processes of the colonial intrusion, in which certain peoples were differentiated, marginalised and more or less conserved as isolated hunter-gatherers (Wilmsen 1989a, 1999a, 2002; Gordon 1992; 1997). From a theoretical point of view, it was argued that the neo-evolutionary hunter-gatherer concept was a self-generating myth for sustaining the way a Euroamerican middle class thought about certain peoples in Africa (Gordon 1992).

The disagreement in the frames of interpretation formed the basis for a dispute known as the Great Kalahari debate or the Revisionist debate (Barnard 1992b). The debate was especially intense in the 1990s, mainly in the pages of Current Anthropology (Wilmsen & Denbow 1990; Lee 1990; Solomon & Lee 1990; Lee & Guenther 1991, 1995) and the journal of African History (Lee & Guenther 1993; Wilmsen 2003). The evidence used in the debate is usually based on a combination of anthropology, linguistics, archaeology, ecology and historical accounts (e.g. Wilmsen 1989a). Lee and Guenther assert that Wilmsen’s work, especially the book Land filled with flies (1989a) has “density of error and misrepresentation unrivalled in recent anthropology” (Lee and Guenther 1995, p. 298). Wilmsen (2003) has recently responded by presenting further historiographical information and pointed out a series of inconsistencies in their attacks on his study. The discussion has largely focused on the question whether the descriptions of hunter-
gatherers and pastoralists in the historical and ethnographical accounts (e.g. Passarge 1907; Müller 1912) can be considered as authentic reflections of the distant pasts.

Today, the majority of the researchers in the original Harvard hunter-gatherer project have adjusted the initial beliefs and appreciate that the peoples of Omaheke have been in contact with the larger historical processes of the sub-continent for a longer time than previously thought (Lee 1992, 2003). However, the magnitude of the socio-economic processes that characterised the largest parts of the sub-continent into the interior parts of Omaheke is still debated (Smith & Lee 1997; Kent 2002a; Scott 2003). Issues involved are the timing for the first contact, the presence and continuity of livestock and other peoples in the area, as well as the degree to which the Nyae Nyae-Dobe Ju/'hoansi were drawn into the regional socio-economic networks (Lee 2003). Many researchers especially in North America and in Europe perceive the revisionist critique as an example of a post-modern relativistic and deconstructive approach in the field of hunter-gatherer studies. For example, it has been argued that this

“sort of obscurantism will not make the topics of social evolution, primitive society, and primitive mentality go away, however, because they are real scientific problems and not just the figments of evil-minded reactionaries. (…) If they wish to promote justice, liberate the oppressed, and eradicate world poverty; by all means let them try to do so, but let them not confuse these laudable aims with the Science of Man” (Hallpike 2001, p. 572, his own capitalisation).

In view of the fact that the ‘revisionists’ have accumulated a variety of empirical evidence for their point of view, they cannot solely be dismissed or characterised as a critical theoretical school (Denbow 1979, 1990; Denbow & Wilmsen 1986; Wilmsen 1989a, 2003; Gordon 1992). However, it is important to recognise, as Hallpike does to some extent in the second part of the quote above, that the revisionists should be linked to the theoretical framework of a larger scientific discourse that evolved in the 1980s-90s. This research aimed at criticising theories that stressed Africa’s isolation and the lack of political and social structures that was apparent on the other continents and the failure of recognizing the impact of the colonial history (Wolf 1982; Lau 1994; Sinclair 1987; John Kinahan 1991). In addition, they questioned the motives of foreign researchers who came to Africa to research what they presumed to be phases of human evolution (Fabian 1983; Kuper 1988). Moreover, a critique was directed at the exclusive reliance on Euroamerican historical and anthropological sources and the focus on “leaders, military events, politics and racial, ethnic or sexual distinctions” (Lau 1994). The development of the critical historical perspective in the Kalahari anthropology is directly related to the development of Africanism, post-colonialism and the struggles for independence that took place in many places of the African continent at the time.

The ambiguity of livestock herding

The Kalahari debate is often characterised as anthropological and political, although it is quite apparent from the discussion above that “the debate’s fuel is historical and archaeological evidence” (Sadr 1997, p. 105). It can be said that the main issue of the archaeological side of the debate is concerned with the identification of pastoralism and livestock herding in the archaeological record, and how pastoralists can be distinguished from hunter-gatherers. I will discuss the issue more explicitly below.

For a variety of reasons, previous archaeological research in Omaheke has been restricted to the Nyae Nyae-Dobe area. The Harvard archaeological research took place mainly in association with the ethnographic study sites in the Dobe area. The focus of the research lay on a series of Stone Age sites and ethnoarchaeological studies of Ju/'hoansi settlements (Yellen 1977; Yellen & Brooks 1988; Wilmsen 1978; 1988). In association with the Marshall expedition, the archaeologist Robert Dyson collected archaeological materials for the Peabody Museum on the Namibian side of Omaheke. His collections mainly contained flaked stone, but also pottery and some nineteenth century finds of European origin. The finds were obtained during the course of the expedition near the study sites at Gautscha and Tsumkwe, but also along their journey to the study area (Marshall 1976). Later Lorna Marshall entrusted the collections to Larry Lepionka who described them in an unpublished paper (Lepionka 1973).

The most extensive archaeological survey so far on the Namibian side was undertaken by the National Museum, Windhoek, in 1983 (Kinahan & Kinahan 1984). In addition, Smith & Lee (1997; Smith 2001) have carried out an excavation at the waterhole Cho/ana in the northern part of Omaheke. The most recent study is an ethnohistorical and ethnoarchaeological study on Ju/'hoansi *hxaro* exchange in /Gam (Scott 2003). *Hxaro* signifies a Ju/'hoansi gift system of locally produced as well as exotic goods that are exchanged without immediate demands for reciprocity (Wiessner 1986).
The pastoral signature

Crucial for the archaeological debate is the notion that domesticated plants, animals and pottery are part of a Neolithic package (Ammerman & Cavalli-Sforza 1984). In Africa it has been more common to speak of a Pastoral package or an Iron Age package (Smith 1983; Hall 1987), but recently the concept of the Neolithic has been re-introduced (Sadr 2003). The package idea is based on the notion that when domestic bone, pottery or metallurgy appears in the archaeological deposits, it functions as useful indicators of the presence of or the contact with food-producers. The rule has shown to be archaeologically applicable and has also been confirmed by numerous studies in southern Africa, as well as on a global scale (Childe 1925; Clark 1965; Binford 1980; Walker 1983; Phillipson 1985; John Kinahan 1991, 1995; Smith 1992, 2000; Sadr 1997, 2003; Mitchell 2002). It can be noted that the archaeological finds of remains of domestic cow and ceramics in /Xai/xai and of early pottery at Mahopa were the first indicators that the Nyae Nyae-Dobe area had not been isolated in the past (Wilmsen 1982; Denbow 1986, 1990).

Regarding pottery, Omaheke is situated in a region of overlap. Sherds from a number of different ceramic traditions may be found in the region extending over a time period of the two last millennia (Denbow & Wilmsen 1986; Wilmsen 1989a). In general, the ceramics share a number of traits such as having a heavy addition of temper. Cross-hatching occurs on nearly all diagnostic pottery at almost all stages of the sequence, including the oldest Divuyu and N’oma pottery to the more recent Mbukushu ware (Kinahan 1986; Denbow 1990). The affinities Divuyu and N’oma derive from the agropastoral occupations at the Tsodilo Hills. The two sites were rich in pottery, copper and iron tools and beads (Denbow & Wilmsen 1986; Denbow 1990). It is generally agreed that the assemblages manifest a fully developed metal-using agropastoral occupation (Sadr 1997; Mitchell 2002). Divuyu is dated to the sixth to eight centuries CE and the subsequent occupation at N’oma is dated from the seventh to the tenth centuries (Denbow & Wilmsen 1986).

The two sites are key sites for the revisionist perspective, as they define the central places in the model that they intend to construct. A third site at Tsodilo Hills with Divuyu and N’oma pottery and domesticated fauna is the White Paintings Rock shelter (Robbins et al. 2000; Murphy et al. 2001). The most frequent affinity of the pottery in the Nyae Nyae-Dobe is Mbukushu, which denotes pottery produced from the sixteenth to the twentieth centuries along the Okavango River (Kinahan 1986).

In addition to age and affinity of the pottery in the region, the most crucial issue for the Kalahari debate is how the pottery came to the Nyae Nyae-Dobe area located approximately 110 kilometres southwest of Tsodilo Hills, 180 km south of the Okavango River and 130 kilometres west of the Okavango delta, areas with agreed first millennium agro-pastoral sites (Mitchell 2002).

Denbow and Wilmsen perceive the pottery in the Nyae Nyae-Dobe area as significant for the “early Khoisan-Bantu interrelationship” or the “roots” for the pastoral economies of the western Kalahari (Wilmsen 1989a, p. 71). The Tsodilo Hills pottery is related to ceramics found on contemporary sites in the source area for the Okavango River in Angola (Wilmsen 1989a, p. 70) and further up in the Congo Valley (Denbow 1990). By using linguistic, archaeological and ethnographical lines of evidence, Wilmsen and Denbow argue that the sites at Tsodilo are significative for proto-Otjiherero-speaking pastoralists who arrived in the western part of southern Africa 2000 years ago (Wilmsen 1989a; Denbow 1990). In the northern regions of Botswana and Namibia they met Khoesan-speaking herders. Here they intermingled with, rather than excluded, the indigenous peoples in the region.

After this, “[r]elatively small communities of Bantu- and Khoesan-speakers appear to have intermingled throughout this entire region on relatively equal terms. Economic and linguistic—and therefore social—transfers appear to have flowed freely among these communities” (Wilmsen 1989a, p. 71). In addition, the pastoral vocabulary used in the southern Bantu languages is largely derived from Khoesan languages, which can be taken as a further indication of the complex processes of interaction between different linguistic groups in the northern fringes of the Kalahari (Wilmsen 1989a, p. 65; Bousman 1998, p. 146). Accordingly, the result was that pastoral economies became well established in the Kalahari (Denbow & Wilmsen 1986).

Conversely, the researchers in favour of the isolation of the area do not consider pottery as significant for a pastoral economy. Instead, they interpret pottery as exotic items brought in by locally based hunter-gatherers carrying out long-distance trading expeditions to the iron-using pastoral peoples living either in Tsodilo Hills, at the delta, or along the Okavango River (Smith 2001, p. 23; Lee 2003, pp. 223-4). The exotic items were distributed further, eventually as sherds, from places such as Cho/ana and /Xai/xai, acknowledged as centres for the internal hxaro trade, along hxaro networks to the dispersed settlements in the Nyae Nyae-Dobe area (Smith & Lee 1997).

Thus, they interpret pottery as evidence of contact with agro-pastoralists through exchange
networks; but not the actual presence of herders or livestock in the area.

Smith and Lee point out a second feature in the archaeological record that they consider significant for the prolonged isolation. Nineteenth century bottle glass found in Cho/ana carries signs of micro retouching, which in turn indicates that Late Stone Age technological skills survived well into historical times (Smith & Lee 1997, p. 57).

The model of a frontier derives from the archaeologist John Yellen (1984) who stressed the continuity of Late Stone Age technology and the lack of proper Early Iron Age sites (i.e. iron production and cattle bone) as the most important indicators for the isolation of the Nyae Nyae-Dobe area in the past (see also Alexander 1976; 1984; Smith 1996). In addition, he compared relative frequencies of mixed assemblages of ceramics and Late Stone Age artefacts in an attempt to define the boundary between the two separate economies in physical space and to measure the intensity of contact (Yellen 1984; Yellen & Brooks 1988; Mitchell 2002, Fig. 10.1 p. 260). On pure hunter-gatherer sites from the Nyae Nyae-Dobe area, diagnostic sherds were outnumbered by stone artefacts to the approximate ratio of 1:10; the opposite trend of approximately 11:1 can be noted on the pastoralist sites at Tsodilo Hills, which suggests the reverse contact (Yellen 1984, p. 54).

Based on the excavation at Cho/ana, Smith and Lee suggest that the contact and subsequent import of ceramics could have been initiated in the sixth century, at the earliest, if the sherds they found can be considered Divuyu. If the sherds are considered Mbukushu, contacts could have been taken from the sixteenth century onwards, although most likely from the nineteenth century, if the late stone technology and descriptions from the Ju’hoansi oral tradition are taken into account (Smith & Lee 1997, p. 157). It is stressed that this relationship remained unchanged until the end of the nineteenth century when the rinderpest and the German genocidal wars in 1904-07 forced many Herero to flee through the area (Chapter 4; Smith & Lee 1997; Smith 2001; Lee 2003). However, Smith and Lee acknowledge that Tawana herders had been in the area for trade and occasional hunts since the 1890s, but frequent and more prolonged visits of Mbanderu, Herero and Tawana herders did not take place until the 1920s (Lee 1976, pp. 80).

After calls for independent reviews of the archaeological evidence, Karim Sadr re-examined the indications for pastoralism in Nyae Nyae-Dobe (1997). He used a similar approach as Yellen, although on a regional scale in which he compared sites from Omaheke with sites elsewhere in Namibia, Botswana, and in the Cape region. In his model, frequencies of pottery were contrasted with frequencies of formal stone tools in different excavation levels. In the graph, two distinct clusters are formed; one cluster indicates excavation levels characterised by high amounts of formal stone tools, while the second cluster shows excavation levels with high amounts of pottery. Similarly to Yellen, Sadr interprets the pattern as indicating the archaeological signature of two different economies. A third cluster contains sites and excavation levels with mixed assemblages. These sites indicate increased contact with exotic goods (pottery) crossing over into hunting society (Sadr 1997, p. 108). In Sadr’s analysis, /Xai/xai shows the traits of a typical stone tool-using site and can thus be interpreted as a hunter-gatherer site. Furthermore, from the archaeological sites with mixed assemblages Sadr noted that increase in pottery over time had a corresponding decrease in the formal stone tool index. Hence he supposes that mixed assemblages reflect grades of economical change (Sadr 1997, p. 109). Consequently, Karim Sadr stresses that the archaeological record cannot support the model Denbow and Wilmshen intend to construct (Sadr 1997).

Accordingly, Omaheke is still perceived as “somewhat isolated” from the wider political and economic trends of the region until the beginning of the twentieth century (Smith & Lee 1997, p. 52). A persistent explanation for the area’s isolation is that livestock herders “had little interest” in Omaheke and avoided the region owing to the lack of water and the presence of non-palatable grasses not preferred by cattle (Smith 2000, p. 69, 2001, p. 22). It is also assumed that “large herds would create a massive deterioration of the veld and detriment to the stock” (Smith & Lee 1997, p. 57).

Consequently, it is still argued that “large stretches of Kalahari, like the Dobe and Nyae Nyae areas […] were cattle-free zones” until the twentieth century (Lee 2003, p. 145).

From the discussion above it is apparent how the isolationist opinion perceives the ceramics in Omaheke as a priori evidence of exotic goods that have crossed a border zone, signifying exchange between discrete cultural entities and maintaining a more or less stable boundary over the two last millennia. However, in other areas of southern Africa where ceramics are found, they usually function as a priori evidence of innovation and new forms of social and economic interactions that eventually lead to socio-economic diversification and specialisation (Elphick 1977; John Kinahan 1991; Smith & Jacobson 1995; Mitchell 2002). If this is taken in consideration, it seems as though the archaeological interpretation of the pottery is built on the ethnographic
outlook of the 1950-60s and the presumption that the situation was a valid representation of the past. This provokes the question of how the area’s archaeology would have been interpreted without considering the ethnographical background.

Jill and John Kinahan pointed out that the bulk of the archaeological data in the Nyae Nyae-Dobe area is collected from baobab sites (Kinahan & Kinahan 1984; John Kinahan 1986). These sites seem to be specialised and for this reason frequencies for ceramics and stone artefacts would probably not compare with sites where a more realistic relationship might exist. Moreover, as noted above, the data classes’ ‘stone’ and ‘ceramics’ may not even be useful categories for such comparison in the first place. The comparison is factually based on the presumption that stone tools represent hunter-gatherers and that the shift to pastoralism is reflected in relative frequencies of flaked stone and pottery. In contrast to such a view, researchers elsewhere have stressed that pastoralism is not so much a technological as a social phenomenon, pointing out that stone tools and other subsistence-related technology seem relatively insensitive to the shift (Ingold 1980, pp. 162; Cribb 1991, pp. 34; John Kinahan 1991, p. 11). Nevertheless, if the classes of pottery and flaked stone should be compared, Kinahan and Kinahan suggest that a comparison between possible vessels and retouched tools would provide a more realistic value. In this case, only a weak positive correlation will be produced, and subsequently the comparison fails to support the notion of a frontier. It is stressed that the associations between Late Stone Age and Early Iron Age material culture “do not reflect reciprocal change; stone artefacts on pastoral sites in Tsodilo may only evidence interaction with herders, while ceramics on Later Stone Age sites in the Nyae Nyae represents innovation and, ultimately, social change”. Jill and John Kinahan argue that the boundary in Omaheke is mainly a reflection of the available ethnographic data (Kinahan & Kinahan 1984).

The discussion above illustrates how the pottery in Omaheke can be seen from two different perspectives and be used for two completely different historical interpretations. The main reason for the ambiguity is probably that there is no self evident link between pottery and pastoralism. To some extent, this can be illustrated by an example from present day Himba pastoralists at the Kunene River. Their settlements are characterised by a general absence of pottery (Frank 2000, p. 79; John Kinahan 2001, p. 34). This is related to the fact that the preparation of sour milk and other dairy products, the main food of milch pastoralists are generally prepared in gourds or containers of woven organic materials (ibid.). Furthermore, pottery seems more associated with cereal consumption or rituals (John Kinahan 1986, p. 116, 2001, p. 34).

Bone from domestic livestock

Faunal remains from livestock are usually considered as the second part of the pastoral package. Lee has recently stated that he would “disagree with the thesis of Schrire (1984) and Wilmsen (1978, 1981, 1989) that prehistoric contact with herders, some as early as A.D. 1000, fundamentally altered the character of Ju society long before 1900” (Lee 2003, p. 152). If this were the case, he argues, there would be richer archaeological evidence of cattle and goat bones in the Nyae Nyae-Dobe area. “Such evidence, despite concerted efforts to find it between 1978 and 1992, is almost totally lacking” (Lee 2003, p. 152). His critique is understandable, since the agropastoral sites located in the Okavango delta and at Tsodilo Hills contain large amounts of bone in addition to pottery, iron and copper items (Turner 1987a, 1987b; Denbow & Wilmsen 1986; Robbins et al. 2000). On the other hand, the ceramic sites in the Omaheke have no comparable indications. So far, as mentioned above, only one excavation in the area has resulted in finds of identifiable prehistoric cattle bone (Wilmsen 1988, Table 1, p. 38-9). Yellen and Brooks (1988, p. 8) estimate that “the half life of unburned bone in such sandy matrix is measured in decades rather than centuries and only burned bone is well preserved”, suggesting that the tooth at /Xai/xai may be intrusive to the layer from which the date was taken.

However, when discussing archaeological bone in Omaheke it seems there are some further issues that need to be considered. Both sides in the debate agree that cattle, over 1000 animals in some years, have been kept at /Xai/xai at least since 1920 (Lee 1976, p. 92; Wilmsen 1989a). In the period of 1975-6, the years during which the excavation at /Xai/xai was carried out, Wilmsen recorded kills of 361 mammals, 1311 birds, and 283 reptiles and amphibians at /Xai/xai. 650 head of cattle and an equal amount of goats were kept at the site, 11 cattle and 15 goats of which were slaughtered. In addition, 27 cattle and 2 goats that had died from disease and predation were scavenged. Hence, of 2010 animals eaten at /Xai/xai in 1975-6, 2.7 % were of domesticated species (Wilmsen 1988, p. 33), which point to that livestock should not solely be regarded as the source for subsistence in a pastoral community (Jill Kinahan 2004). The excavation at /Xai/xai included circular 773 surface units, 2 metres in diameter. The top-layer, 8 cm deep, yielded only one definite and two possible cow bones, 8 bones of wild mammals, 1 of gerbil, 2 of birds and 1 of frog. Of the identified
bone material, 6.6 % were of domesticated species. 21 identified bones were recovered from below the top-layer (in 21 excavation units) and the maxilla of the juvenile cow (Bos taurus) dated to 1150 ± 60 BP (800 CE) was found at a depth of 63 cm. The single remain of domesticated cattle constituted 4.5 % of the identified bone below the top layer, a figure that is comparable with the bone frequencies of the top layer and the ethnographic data (Wilmsen 1988, p. 33). In addition, the excavation revealed about 1200 unidentifiable bones (Wilmsen pers. comm.).

The low amount of identifiable bone at open air sites is probably a result of trampling, wind and water erosion. Potsherds are also destroyed by post-depositional formation processes (Frank 2000, p. 79).

In a recent study, John Kinahan has provided a further example of why bone should not be expected to appear on all pastoral sites (John Kinahan 2001). In marginal environments, such as Omaheke, animals pastured on soils lacking phosphorus may develop a deficiency that results in a pica, or a craving for phosphorus. In the search for phosphorus cattle eat bones or soil, which may contain the bacteria Clostridium botulinum. Inside the animal, the bacteria create a fatal toxin that results in botulism, a disease that eventually will kill the animal. Himba pastoralists at the Cunene River are aware of botulism and refer to it as Omutjisse aumbinda. As vaccine is not generally available, the Himba prevent the disease by actively cleaning the settlements from bone and animal residues (John Kinahan 2001, p. 34).

Present day livestock owners in the southern parts of Omaheke are also aware of botulism (Afrikaans: Gallamsiekte; Otjiherero: Omutjisse wombinda). Today, vaccine as well as external nutrients have been used since the Independence (Byrnes 1986; Katjiua pers. comm.). In the 1950s, Oswin Köhler noted losses to the disease in the Otjiutuo and Epukiro Native Reserves, although he remarks that “offers of vaccine and bone meal […] are rarely taken advantage of” (Köhler 1959b, p. 49). In the 1970s, the cattle at /Xai/xai ate the “laundry right off the line if left unattended” (Lee 2003, p. 145). In addition, it was noted that almost no remains of the goats, sheep and cattle that were butchered in the Dobe area were left at the kill sites (Brooks & Yellen 1987, p. 77). It seems as though the cattle in the Omaheke have a similar craving resulting from calcium deficiency and that the strategy for preventing cattle to eat animal remains was similar to the one observed among the Himba in Cunene. The practice will unavoidably affect the chances of finding bone on pastoral sites.

The pastoral sites at Divuyu and N'omua at Tsodilo Hills contained large amounts of domestic bone in the archaeological deposits (Denbow & Wilmsen 1986; Turner 1987a). However, these sites are located on the eastern fringe of the Kalahari, strategically situated between moist woodland, dry woodland savanna and Kalahari savanna, only 40 kilometres west of the perennial Okavango River. Presumably, the environment in this area presented a richer grazing in which the cattle did not develop phosphorus deficiency.

On the other hand, a site’s location in a more productive environment near clearly defined pastoral sites does not necessarily mean that it will contain large amounts of bone from livestock. One example is the White Paintings rock shelter, located in the Tsodilo Hills. Caves and rock shelters usually provide better means for protection, although such places are traditionally not considered the “standard pastoral settlement places” (Frank 2000, p. 79). The site contained pottery, Late Stone Age microlithic tools, bone arrow points, iron beads, specular hematite, and a few copper and glass beads. Despite its close vicinity to Divuyu and N’omua, the archaeological deposits of the shelter contained a large amount of indeterminate bones, corresponding to the open air site at /Xai/xai (Robbins et al. 2000, p. 1097). In addition, similar to at /Xai/xai, the identifiable faunal assemblage primarily contained wild species, but included one domesticated specimen, a sheep mandible dated to 1225 ± 60 BP (OxA 6038) (ibid. p. 1098). The date fits well with the dates from the site at Divuyu, where sheep bones were numerous (Murphy et al. 2001, p. 3), and with the late first millennium date from /Xai/xai and other sites in the region (Denbow & Wilmsen 1986; Wilmsen 1988).

However, at this site, owing to the good stratigraphical control and preservation, it is possible to gain some further insights. The deposits dated to “Late Prehistoric/Historic” indicate foraging for wild foods, maize and cattle and that stone tools were used until a relatively recent period (Robbins et al. 2000, p. 1110). The continuous use of stone tools corresponds with the late dates from the open air sites at Cho/ana and #Gi in Omaheke (Helgren & Brooks 1983; Smith & Lee 1997). Earlier levels with pottery and iron beads contemporary with the sites at Divuyu and N’omua contained almost exclusively wild fauna, “despite the fact that nearby village peoples kept substantial herds of livestock” (Robbins et al. 2000, p. 1110). Instead of interpreting the site as indicating a separate economy or culture, the excavators suggest that the site “demonstrates the viability and importance of wild foods to people during the period when agropastoralism was known and widespread trade networks, as well as intensive specular hematite mining, existed in the immediate
area” (Robbins et al. 2000, p. 1110). The example illustrates that an iron-using pastoral land-use regime may include sites that indicate hunting and gathering, and that have a continuous use of stone implements. However, there is no logical explanation for why iron should replace stone directly after the introduction. Instead, it must be presumed that the amounts given were rather limited and not evenly distributed (e.g. Lee 2002). In addition, so far there is no logical explanation for the hypothesis that pastoralists would not produce sites that will appear as foraging sites, especially not in the peripheral areas with smaller settlements, where game might be more abundant. On the contrary, it seems necessary to acknowledge that a pastoral land-use regime will result in sites that do not contain the key indicators from a conventional archaeological point of view (see also Hall 1987; John Kinahan 1991; Vansina 1995; Sullivan 1999a).

With certainty, it is possible to say that pastoralists in the Kalahari, presumably in the past as well as in the present, had to develop local practices that were designed to fit in with local opportunities of providing food for people and the basic needs of fodder and water for the livestock (Bollig & Schulte 1999, p. 493). In addition, it can be presumed that some parts were more productive than other areas that can be considered marginal (Vierich & Hitchcock 1979; Smith 1998, p. 151). Furthermore, different site locations present different potentials for the preservation of archaeological materials. From this perspective, it is perhaps not surprising that the archaeological materials that appear over the southern African continent from the two last millennia indicate differences in composition and in relative frequencies. Although I have not tested my assumption explicitly, it can be noted that the diagram of Sadr (1997) contains pottery and stone tools from caves and open air sites from a range of various environmental settings, for example dry woodland savanna, Kalahari savanna, desert, Fynbos and Karoo (Mitchell 2002, Fig. 2.4, p. 15). When considering archaeological preservation and the environmental variation, it seems equally important to add a social matrix based on the linguistic, cultural and social diversity of the region (Hall 1987, p. 31; Sadr 1998, pp. 127, 2003). After this, the forms for pastoral production can be expected to multiply and it can be assumed that these processes will result in a variety of ways in which livestock herding will appear in the archaeological record. After having considered the socio-environmental variables, it seems more significant for the overall discussion that the preserved artefact types that appear in the archaeological assemblages are possible to compare in a diagram. I believe that comparisons of relative frequencies in archaeological assemblages are useful for discussing social, environmental and spatio-temporal heterogeneity, rather than an archaeological tool for distinguishing pastoralists from hunters. The assemblages show the variety of practices that appear in the landscape and different access to pottery, cereals, metals, game and livestock (Walker 1983; Hall 1987; John Kinahan 1996).

Universal knowledge

According to revisionists, the “close juxtaposition” of the marginal grasslands of the Kalahari, with the more productive riverine and savanna environments surrounding the area was the incentive for the economic diversification and specialisation of a regional agropastoral economy (Denbow 1990, p. 141). The early pastoral settlements in the more productive areas, e.g. Tsodilo Hills, are archaeologically distinct and for this reason generally accepted. Nevertheless, as discussed above, there are problems with finding comparable evidence for livestock herding in the marginal Kalahari savanna. Karim Sadr has correctly pointed out that “archaeology as history works only if […] major social and economic changes are reflected in material culture” (Sadr 1997, p. 108). To some extent, this notion goes hand in hand with the idea that scientific approaches should search for knowledge that can be tested in an operational way. As discussed, an obvious example of archaeological knowledge which to some extent has reached universal significance is the notion that pastoralism is correctly represented by faunal remains of livestock and pottery, and hunter-gatherers by wild fauna and stone technology. However, already in 1936 Childe (p. 81) noted that “The failure to recognize prehistoric settlement sites as belonging to pure pastoralists is not any proof that such did not exist”. He refers to the risks involved with archaeological interpretation based on lack of evidence.

The hazards involved with such an approach have also been demonstrated by archaeological research on other issues in southern Africa. By using a conventional definition of social complexity and urbanism, mainly based on examples from Europe or the Middle East, the development of complex societies and indigenous African urbanism tends to be obscure in the archaeological record. For this reason, as Paul Sinclair has noted, the urban identity of eastern and southern Africa was not widely accepted as an African achievement (1987). By using alternative approaches, based on regional African examples, a different view on tropical urbanism emerges (Sinclair 1987; Pikirayi 2001; Reid & Lane 2004). A second example is the migratory framework commonly used for explaining the introduction of crop farming in southern Africa. If the migratory model is
used exclusively, without considering alternative options (e.g. Huffman 1970; Elphick 1977; Walker 1983; Smith 1992), it fails to acknowledge that the introduction of new plant species occurs in parallel with strong indications of continuity, or even intensification in use, of wild or semi-wild indigenous grass species (Vansina 1995; Jonsson 1998; Ekbloom 2004). This, in turn, indicates that the stone-using indigenous communities of southern Africa did not lack the means for plant cropping even if the focus lay on non-domesticated species (Jonsson 1998). Concerned with pastoral archaeology, John Kinahan has criticised the focus on technological and faunal remains. He stresses that the most “pertinent evidence [of pastoralism] is not necessarily the most obvious or plentiful” and in addition that “the vagaries of preservation will mislead research that is based on outward appearances alone”, such as pottery and bone (John Kinahan 1991, p. 10, my insertion). His opinion seems highly relevant when discussing the pastoral history of Omaheke.

As a general conclusion of my discussion above, it seems crucial to acknowledge that even if the universal rule of the ‘pastoral package’ in many cases has been archaeologically feasible, it is obvious that difficulties arise when the rule is applied in a reversed manner. If it can be demonstrated that domestic bone and pottery cannot be considered central for the archaeological visibility of a contemporary pastoral society living in a marginal environment, it becomes extremely difficult to demand it for a prehistorical counterpart. Moreover, an approach that fails to acknowledge that a pastoral land-use regime also results in sites that do not contain what can be considered the key indicators, might also fail to see other indications of pastoralism that might even better tools for diagnose than the ones traditionally used. Rather than assume that the archaeology of Nyae Nyae-Dobe reflects an avoidance of herders in the past, it seems at least more stimulating to assume that the archaeology reflects the limitations of the conventional approach for identifying the practice of livestock herding, and from this make an attempt to look at the issue in a new way.

**Herder practice: an alternative approach**

From this perspective, I suggest that the most profitable starting point for an enquiry into the pastoral history of Omaheke lies in the interface between the ambiguity of pastoralism in the archaeological record and the notion of an environment unsuitable for livestock herding. The latter view is still used as the main explanation for the presumed avoidance of herders in the past. For example, it has recently been argued that herders cannot have been present in the area because it is “impossible to dig wells by hand that intersect the water table” in Omaheke (Brooks 2002, p. 226). The problem with this view, however, is that it is based on an assumption that so far has never been explicitly tested.

The notion that it is impossible to dig wells in the Kalahari is largely influenced by an old geographical theory inferring that a direct recharge of ground water would be unlikely in Kalahari sand layers “of more than ~ 4 m” (Foster et al. 1982, p. 134; see Mazor 1982, p. 139; de Vries 1984; Thomas & Shaw 1991, pp. 1; Külls 2000, pp. 8 for reviews of geological research in the Kalahari). On the hydro-geological map of Namibia it can be estimated that the sand thickness in Omaheke range from 20 to as much as 100 metres (Christelis & Struckmeier 2001). Such thick sand layers effectively prevent ground water recharge, since the rainfall that is stored in the sand will either evaporate or be consumed by the vegetation. However, recent research has indicated that the hydrogeology of the Kalahari beds is far more complex than previously thought. Post-depositional processes of the Kalahari sediments result in sediments and localities with higher capacity of sustaining localised recharge by constituting flow-paths, water infiltration and storage (Verhagen 1990; Külls 2000; Klock & Udluft 2002). Additionally, livestock herding seems not built up “around the environment as such” (Bollig & Schulte 1999, p. 493). Rather, pastoral knowledge is embedded in a landscape and based on the interaction between the herds and local opportunities for finding fodder and water. This is best illustrated by the fact that present day herders in the region, in contrast to the conventional opinion, dig wells for watering their livestock. Furthermore, as will be described in this thesis, remains of artificial wells appear as a regular feature in the landscape. This contradicts the conventional view and furthermore it provokes the question whether wells, supposedly a tangible feature in the archaeological record, can serve as indicators for livestock herding. However, to be able to address the question, it is necessary to first examine the relationship between livestock herding and wells.

**Pastoralism**

To begin with, it is essential to gain a general understanding of pastoralism and there is an abundance of literature on the subject (e.g. Ingold 1980; Cribb 1991; John Kinahan 1991, 1995; Smith 1983, 1992; Holl 1998; Blench 2001; Mitchell 2002). In a “strict” ecological perspective, pastoralism is plainly characterised by the use of domestic animals to convert forage to meat and milk (John Kinahan 1991, p. 10). Pastoralism is one of the key production systems in the drylands of the world (Blench 2001). Technologically, it has been noted that pastoralism
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requires no significant material addition to the technology of a hunting society (John Kinahan 1991). Pastoralists are “those who are dependent chiefly on their herds of domestic stock for subsistence” (Cribb 1991, p. 17). A wider definition of pastoralists is “those whose entire way of life, social and ritual, as well as economic, is geared to their herds” (Mitchell 2002, p. 239).

In order to gain a more explicit definition, Ingold (1980, pp. 88) has suggested that pastoralism is mediated by an ideology that permits the accumulation of property in livestock. Building on this theory, John Kinahan has stated that “Each day as the herdsman leads his stock from their fold, or drinks their milk, or surrenders a ewe to repay a debt, he reinforces prerogatives of ownership which are specific to pastoral society” (John Kinahan 1991, p. 11). The social relations of property control are actively reproduced among pastoralists and this becomes especially apparent when the livestock is transferred alive between successive owners (ibid.). Ownership is in general characterised by the individual and the result is that the basic unit of productive labour and consumption for pastoralists is the family or the household unit (Ingold 1980; John Kinahan 1991; Cribb 1991).

A second characteristic trait of pastoral production is the accumulation of livestock (Ingold 1980, p. 144). A pastoralist always seeks to keep the numbers of their stock high enough to remain viable as independent herds. However, the risks involved in the accumulation of livestock provoke a series of socio-ecological principles for being mobilised and coordinated. Examples are high labour demands and livestock exchange in which livestock is spread in order to reduce risk for depredations on the herd. For this reason, pastoral land-use tends to cross over several landscape levels from the local grazing range to regional alliances of cattle loans and exchange with other settlements extending over large areas (John Kinahan 2001, p. 35).

In addition to the livestock, it can be noted in the literature how pastoralists maintain a range of complimentary sources, such as horticulture, hunting, gathering and trade (Cribb 1991; Smith 1992; Lau 1994; Jill Kinahan 2000; Blench 2001; Mitchell 2002). Furthermore, it can be noted that the pastoral mode of production requires herders, which equals people that keep livestock without owning them (Hitchcock 1985, p. 108-10; Mitchell 2002, p. 239).

Some authors perceive the pastoral economy as integrative towards non-pastoralists (Schapera 1953; Lau 1994; Denbow 1990), while others have noted how pastoralists marginalise and suppress their neighbours (Marshall 1976; Smith 1998; Scott 2003). Blench has argued that hunters and herders often live in overlapping territories, especially in Africa and Siberia (Blench 2001, p. 45). In addition, he notes that the two interlocking subsistence strategies effectively co-existed prior to the twentieth century, when the competition for land was not of major significance (ibid.).

John Kinahan (1991) argues that the introducers of livestock herding into southern Africa should be looked for in the pre-existing hunter-gatherer communities and “in the context of social changes preceding the adoption of pastoralism”. Continuity in stone technology, ritual specialisation and increase in ostrich eggshell bead production for exchange of pottery has been defined as archaeological key indicators for identifying the process in the western parts of Namibia. The process was driven by ritual specialists in contact with livestock herding peoples by far-reaching exchange networks (John Kinahan 1991). However, Sadr (2003) has recently interpreted sheep remains found on hunter-gatherer sites as owned and herded by hunter-gatherers. In his view, the hunter-gatherers maintained an egalitarian foraging economy combined with ownership of animals – a low-intensive form of livestock herding – that according to Sadr has little to do with pastoralism. Brief localized periods of more intensive animal husbandry, that may appear as pastoral, could arise in this setting as a result of incoming pastoral peoples or by internal tensions in the hunter society (Sadr 2003, pp. 208). The question is how these “hunters-with-sheep” would be differentiated from impoverished pastoralists or pastoralists (ibid.). Hence, ownership of livestock seems still to be the operational definition of pastoralism.

Constraints on pastoralism

Although “the ecological relations of pastoralism stem from the implementation of its social rationality and not vice versa” (Ingold 1980, p. 81, his italics), it can be worthwhile to take a closer look on the greatest environmental constraints for livestock herding in southern Africa.

Archaeologists have always appreciated water as an important incitement for settlement. In addition, archaeologists have preferred to associate archaeological materials with environmental features as reflecting site location preferences. Such explanations for site location have also been criticised for becoming deterministic in following external causes for human decision making (Hodder 1982a; Tilley 1994; Shuyter 2003). However, water can never be reduced to a secondary determinant for site location in southern Africa.

The most important constraint for pastoralists and livestock herders in arid and semi-arid environments is access to water for the livestock. 500 mm
of annual rainfall is considered the lowest limit for rain-fed agriculture (Gewald 1999, p. 11). Pastoralism, on the other hand, is generally defined as the most effective way of using land with low rainfall (Smith 1992).

Estimates of the annual average of precipitation for Omaheke have been calculated from daily recordings of rainfall during the period 1950-2001 at two weather stations, Shakawe and Ghanzi, in Ngamiland, Botswana (Fig. 2.1.). In this period, Shakawe in the north received 530.7 millimetres per year (mm/yr) on average. Ghanzi, in the south, received an average of 419.3 mm/yr during the same period (data provided by Meteorological Services of Botswana). Estimates calculated for the area between Tsumkwe and Gobabis in the central part of Omaheke have given averages of 600 mm/yr in the north and 300 mm/yr in the south (Klock & Udluft 2002). The average amounts of rainfall estimated for the region indicate a semi-arid climate. A semi-arid climate is characterised by hot summers and moderate to cool winters. During the winter (June to August), the night temperature may fall below zero. In the mid summer (November-December), the temperatures can exceed 45°C (Powell 1998, p. 146).

The annual average of rainfall is well above the limits that have been estimated for rain-fed pastoralism (John Kinahan 1991; Scholes & Parson 1997; Sweet 1998; Wilmsen 2003).

However, a focus on rainfall averages may obscure the extreme variability of the rainfall in a semi-arid environment. A semi-arid ecosystem is governed by the annual seasonality of dry and rainy phases. Rain clouds build up in the summer months (September-February) and fall as thunderstorms. The rainfall of a semi-arid environment is infrequent and has a localised distribution. In addition, the frequency of drought years, referring to years with extremely little or no rainfall, is high, reoccurring continuously on an irregular basis. Figure 2.2 illustrates rainfall fluctuations recorded at the weather stations at Shakawe and Ghanzi over the period 1950-2001. Data provided by the Meteorological Services of Botswana.

Severe droughts affecting large portions of the region occurred in the 1930s (Sweet 1998). Between June 1964 and February 1967, nearly 400,000 cattle died, i.e. more than 25% of the total herd of Botswana (Hinchey 1979). The next severe drought occurred in the period 1982-1984 owing to three consecutive years of poor rainfall. The years 1992/93 saw an additional drought that resulted in average cattle losses of 22% in the communal lands of Namibia. The goat losses averaged 40% and sheep losses averaged 43% (Sweet 1998). Using data from the weather station in Maun, east of the Okavango Delta, Lee estimated that in a run of 46 years (July 1922 to June 1968 with an annual average of 462.3 mm/yr), “drought occurred in 17 years (37 percent), and of these, 12 years (26 percent) were classified as severe drought when less than 70 percent of average rainfall occurred. In other words, the probability of drought occur at Maun is about two years in five, and of severe drought, one year in four” (Lee 1976, p. 80). The data are consistent with the notion of Ellis (1994) who stressed that when rainfall is about 400 mm/year, quasi-drought conditions are a common phenomenon and droughts may take place as often as twice per decade.

In savanna ecology and pastoral studies, an increasing interest in the role of rainfall dynamics can be noted (Ellis & Swift 1988; Behnke et al. 1993; Powell 1998). The new interest is based on a new theoretical understanding of arid and semi-arid environments, which have led to a re-assessment of pastoral range ecology (e.g. Behnke & Scoones 1993), and environmental conservation (e.g. Powell 1998). It has been noted that plant production is determined by the variable rainfall and seems unaffected by animal population density (Ellis & Swift 1988). Extended droughts result in intermittent die-offs that will keep herbivore densities below equilibrium (Ellis & Swift 1988; Behnke & Scoones 1993). If livestock populations were dominated by density-independent drought mortality, they would also be only weakly coupled to vegetation resources. Hence,
people are Nama, Samangaigai, /Gam and Gautscha to water their livestock (Marshall 1976, p. 73). The places noted for wells are indicated on Figure 2.1. The Herero and Tswana livestock shall observed how Herero and Tswana livestock /Xai/xai where enlarged and deepened (Lee 1976, p. 45, my insertion). When looking at the nature of the variable climate and the regularity of drought conditions it seems as though it has been necessary for the herd- ers to develop viable mechanisms for coping with such conditions (Scoones 1994; Niamir 1990; John Kinahan 2000). Since livestock herders are dependent on key resource areas for satisfying the needs for water and fodder during the scarcity of the dry sea- son, it can also be suggested that practice associated with places that can be considered key resource ar- eas would be useful for archaeologists in assessing the fundamental basis for pastoral land-use in Omaheke.

Water resources

Today, people in Omaheke use water from deep drilled boreholes for consumption, livestock and for sustaining the dry season. The first borehole in Tsumkwe was drilled in 1960 (Marshall 1976). In the southern part of the research area boreholes were introduced earlier. Two boreholes were drilled in Epukiro in 1924 (Köhler 1959a), and six additional boreholes were drilled in the Epukiro area in 1926 (ibid.). Based on the statements of the people living in Omaheke today, the drilling of boreholes seems to have been most intense in the early 1970s (Chapter 7).

Before the boreholes were drilled, the Ju/'hoansi water resources were divided into a five levelled hierarchy of water places. The lower strate- gies of the water collecting hierarchy were based on the gathering of water-rich roots, tubers and melons, and by collecting water from hollow trees (Lee 1976, pp. 82). In the drier parts of the Kalahari, people procured sand moisture by using so called straw- or sip-wells. This is also one of the most popular motives in the ethnography from Kalahari (Lebzelter 1934; Tanaka 1981; Silberbauer 1981). Such wells have rarely been utilised by the Ju/'hoansi (Lee 1976, p. 84). The most important level of the Ju/'hoansi hierarchy of water sources was permanent and seasonal waterholes. As the waterholes held pockets of ground water near the surface, they could support larger social aggregations during the dry season. On the other hand, the rock hard calcrete deposits (Chapter 3) in these environments also ef- fectively prevented the Ju/'hoansi from excavating wells to tap the underground water supplies owing to their use of wooden digging sticks (Yellen & Lee 1976, p. 34). However, Lee added that most of these waterholes “have been improved and maintained either by the San themselves or, more recently, by the Blacks” (Lee 1979, p. 96).

In contrast to the fine-tuned models that have been developed in the hunter-gatherer anthropology, few studies are available on pastoral strategies for water management in Omaheke. This is probably related to the presumption that the herders are recent arrivals in the area and that when they came, they were not attracted by the natural resources; “rather they were driven into the Kalahari by the political disturbances of the early nineteenth century. It should be remembered that the best pans took many years to find, and they could not be exploited ade- quately until the settlers learnt to sink bucket-wells – another recent development [in the Kalahari] (Kuper 1970, p. 45, my insertion)”. Nevertheless, when “permanent Bantu- speaking settlers began to move into the area, bringing herds of livestock” the waterholes at /Gam and /Xai/xai where enlarged and deepened (Lee 1976, p. 92). During the severe drought in 1951, Lorna Mar- shall observed how Herero and Tswana livestock herders dug wells at the waterholes at Cho/ana, N/ama, Samangaigai, /Gam and Gautscha to water their livestock (Marshall 1976, p. 73). The places noted for wells are indicated on Figure 2.1. The Her- ero homesteads in the southern parts of Ngamiland remained on the same site for years and permanent deep wells were dug nearby (Vivelo 1977).
Wells of Experience

Among the Herero, the wells had an important function for regulating the use of dry season water and land ownership:

“A man, who with his herd and family, migrated to a well-watered area was considered to exercise limited control over the resource. He did not “own” the resource itself (though if he invested in tapping the resource, for instance by digging a well, he then indisputably owned the product of his effort), but he did control to a limited extent access to the resource. Since he was first in the area, he had first claim to the resource. Anyone wishing to water his herds in the area first had to ask his permission. By requesting such permission, a later arrival expressed his recognition of the other’s first rights” (Vivelo 1977, p. 112).

Wells and well rights are acquired and maintained in a manner similar to how other possessions remain in the group (Wilmsen 1989a, p. 190, 1989b). Traditionally, such networks were largely structured by the social relationships of real and fictive kin networks. Initial rights to inheritance were granted through the social unit’s eanda and oruzo, which indicated descent of the female line and the male line respectively. The wells at /Xai/xai had passed in ownership through a set of patrilaterally related Mbanderu men closely related in the intersection of eanda and oruzo (Wilmsen 1989a, pp. 190). One example is James Chapman’s account (Andersson 1856; Een 1872, pp. 36, 59; Lau 1994, pp. 52). One or several settlements could use such wells for both livestock and human consumption over the entire dry season. Büttner describes a watering at the well Otijamongombe located 40 km north of Okahandja. He was amazed by the number of herds that came to the wells. The first herds appeared early in the morning and several herds were in the vicinity. Shortly after first herd had arrived, all the wells were occupied. As soon as a herd left, “the peculiar whistling of the Herero herder” signalled that a new herd with hundreds of sheep and cows would come out of the bush to drink at the wells. This continued until the late afternoon (Büttner 1883, p. 533). Elsewhere in Namibia, up to twenty wells, eight to ten metres deep, dug next to each other have been recorded. It is estimated that these wells would supply sufficient water for hundreds of people and cattle over a period of several months (Lau & Stern 1990).

Büttner continues by describing the wells in “the sand and clay areas of the Omaheke”, which in general were shallower than the wells in the larger river valleys (Büttner 1883, p. 531; see also Irle 1906, p. 15). The wells dug “in Omaheke” usually had the prefix Ombu- (singular) or Ombu- (plural) (Büttner 1883, p. 531). According to Büttner, the herders in Omaheke used a different strategy to cope with the scarcity of the dry season. Instead of depending on one single well, a single cattle owner could split up the herd and use fifty different wells. He describes a man, who with his herds and family, migrated to a well-watered area, “The peculiar whistling of the Herero herder” signalled that a new herd with hundreds of sheep and cows would come out of the bush to drink at the wells. This continued until the late afternoon (Büttner 1883, p. 533). Elsewhere in Namibia, up to twenty wells, eight to ten metres deep, dug next to each other have been recorded. It is estimated that these wells would supply sufficient water for hundreds of people and cattle over a period of several months (Lau & Stern 1990).

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Research background

wooden sticks to dig wells in the calcrete, and he estimates that they could be up to 8 metres deep (Irle 1906, p. 16). In addition, the pans were used in the rainy season as temporal grazing camps in order to allow water and grazing replenish at the dry season wells. Similar to the Ju/'hoansi, the Herero also used water stored in rock cavities, hollow trees and roots during the rainy season (Büttner 1883, p. 532).

Many authors have noted that the construction and the maintenance of livestock wells are “a laborious task requiring the cooperative labour of many men”, demanding considerable time and effort (Vivelo 1977, p. 86; Büttner 1883; Irle 1906; Rohrbach 1907; Wilmsen 1989b). The work includes excavation and in some cases the building of a frame to keep the sides from collapsing (the construction of a well can be followed in a series of photos in the collection of Namibia National Archives (NAN 1964). The watering of cattle demand a considerable amount of effort, especially if several herds share the same well. Before rollers were used, water was passed from the well by steps on the side or by putting a tree log with manufactured steps in the well. A 12 m deep well could have up to 5-10 people forming a chain for passing on water to the drinking trough (Büttner 1883, p. 531; Irle 1906, p. 15; Lee 2003, p. 144). The work associated with a well was considered a risky job, since it could collapse.

The maintenance of a well involves cleaning the well from soils and dung. Seen over time, a well is also used, re-used, and rebuilt several times. In Omaheke today it is frequently declared that if you want to be a successful herder, you ‘should obtain labour before you get cattle’ referring to the labour intensity of herding and watering domestic stock in the dry season. A well represents intensified use that requires high labour demands and coordination; first, when it is constructed and later, when it is maintained and the livestock is watered. Vivelo reports how large investments, not only in labour, but also in technology e.g. pumps, windmills and reservoirs were put into the wells of the Ngamiland Herero in the 1970s (Vivelo 1977). For reasons of coordination and labour intensity, Clark distinguished between tapping existing springs and the “revolutionary innovation” of digging wells for tapping ground water (Clark 1944). In the Middle East and in Europe, archaeological studies on wells are relatively common, mainly because of the occasionally rich content (Thomas 2003). However, few archaeologists in southern Africa have incorporated well sites in their studies. The site #Khisa-//gubus on the Namibian Coast had a formal layout that corresponded to the expected pastoral pattern for the area. Hand-dug wells were situated 420 metres south of the site and interpreted as a direct part of the overall site structure (John Kinahan 1991, p. 100).

An additional example of a pastoral site associated with wells is the dry season encampment sites in the lower part of the Hungorob Ravine at the Dâures Massif. All the sites were centred on a series of wells dug in the streambed (John Kinahan 1991). In the Nyae Nyae, Jill and John Kinahan discuss the implications of the wells found during their survey in 1983. At that time, Nyae Nyae was perceived to be outside the limits of a pastoral settlement and the wells were intriguing, as they are “useful indicators of pastoralist occupation” and supposed a contact situation between hunter-gatherers and herders (Kinahan & Kinahan 1984). In archaeology, wells have been considered part of the pastoral archaeological record based on the aspects of labour intensity, demands of coordination and the relation to pastoral land-use regimes in historical and ethnographical accounts (Kinahan & Kinahan 1984; John Kinahan 1991; Jill Kinahan 2000).

Above I have discussed how the main ecological constraint for dryland pastoralism is the availability of dry season water and fodder resources. For this reason, places that contain dry season resources can be considered as the fundamental basis for a pastoral land-use system. By a review of recent ecological research, historical and anthropological accounts and previous archaeological research a link can be established between livestock herders’ procurement of dry season key resources and the practice of digging wells. The link can be motivated from the pastoral ambition of accumulating livestock and high water requirements in the dry season. Moreover, the pastoral mode of production has the means for mobilising the labour required for an intensified use of places that contain ground water resources.

On this basis, I suggest that artificial wells are useful indicators for pastoral land-use in the Kalahari.
Chapter 3

THE RESEARCH AREA

The archaeological record of the Dobe-Nyae Nyae is relatively well researched (Chapter 2). To the south, no detailed archaeological survey has been undertaken; presumably this is a result of the distribution of the hunting and gathering Ju/'hoansi found at the time of the ethnographical investigations in the second half of the twentieth century. In order to fill this gap, the research area was outlined in a south-west north-easterly direction following the general characteristics of the drainage system and the main boundaries of the region. To the west, the research area is delineated by the western boundary of the Okavango-Epukiro catchment. The valleys of the Alexest and Rooiboklaagte constitute the southern boundary. The border to the Kaudum Game reserve defines the northern boundary, the eastern boundary coincide with the border to Botswana. The research area is fully situated within the Okavango-Epukiro catchment area on the western margin of the Kalahari basin (Fig. 3.1.; Simmonds 2001). The research area covers approximately 48 000 square kilometres or 55 % of the general Omaheke area as outlined in Chapter 2.

Environmental setting
Omaheke has traditionally been described as a rather homogenous environment mainly characterised by dense bush and thick sandy soils. However, field researchers active in the area depict a greater, sometimes subtle diversity mediated by topography, climate, geomorphology, soil thickness and land-use (e.g. Lee 1979; Powell 1998, p. 7).

The Kalahari basin is a large structural depression that resembles a trough. To understand the formation of the Kalahari it is necessary to first study the area on a much larger spatio-temporal scale and as one of the main drivers behind the development of the Kalahari drainage system and sedimentary history (Dardis et al. 1988; Wilkinson 1988; Thomas & Shaw 1991). The research area covers approximately 48 000 square kilometres or 55 % of the general Omaheke area as outlined in Chapter 2.

Geology
The break-up of the southern hemisphere supercontinent Gondwanaland was initiated approximately 200 million years ago (in the Cretaceous-Tertiary period). This event is usually defined as the genesis of the Kalahari and the beginning of its sedimentary history (Thomas & Shaw 1991, p. 24). The break-up resulted in a tilting of the continental margins, a process that initiated an adjacent uplift and the formation of peripheral highlands. In addition, the interior saw major processes of downwarping (Haddon 2005). The geological processes formed a huge inland basin and induced major changes in the fluvial systems of the sub-continent. The downwarp of the interior parts resulted in that the rivers were back-tilted into the heartland of the Kalahari basin, the Okavango-Makgadikgadi System in Botswana (Thomas & Shaw 1991; Haddon 2005). One of the most important implications of an internal drainage system is that it retains all sediment and transports it to the low-lying areas, where they are deposited (Wilkinson 1988, p. 83). Over time, more sediment accumulated in the Kalahari basin. After deposition, the sediments have been modified and reworked through a series of small-scale interactions between tectonics, climate, topography, drainage and chemical processes (Cooke 1980; Moon & Dardis 1988). The processes have been active both during and after initial deposition, in turn resulting in a complex mosaic of regional and local conditions, which we today identify as the Kalahari (Cooke 1980; Thomas & Shaw 1991).

Features of the pre-Kalaharian geology determined the general structure of the basin and its sedimentary history. Moreover, they continue to contribute to the outlook of the current landscape. The geology underlying the Kalahari sediments consists of various rock types dating from the Precambrian basement to the Karoo sequence (Thomas & Shaw 1991, pp. 23, 163; Simmonds 2001, p. 47). In the Kalahari sand mantle, the underlying geology is seldom exposed, but exceptions are a series of river valley exposures and some isolated ridges and inselbergs scattered over the area (Simmonds 2001). The Ghanzi Ridge is the largest pre-Kalaharian outcrop in the Kalahari (Cole & Brown 1976). The ridge extends in a north-easterly direction from the Namibian Highland area towards the Lake Ngami. The ridge is a sub-outcrop largely consisting of sediments ranging from coarse gritstones to mudstones and limestones (Thomas & Shaw 1991, p. 44).
In the area south of the Lake Ngami, the ridge outcrops by a series of inselbergs. Additional inselbergs found in the western Kalahari are the already mentioned Tsodilo Hills, the Koaakhe, the Gcwihaba and the Aha Hills (Fig. 3.1). The Aha Hills is the only ridge that extends into the research area and constitutes its most notable topographical features. The ridge rises to an altitude of 100 metres (1267 m.a.s.l.) above the surrounding plain, which provides a great contrast to the otherwise flat sandy landscape. The ridges include Precambrian dolomite, shale and quartzite. The dolomite is riddled by sink-
holes and caves and serves as an important regional reservoir of groundwater (Lee 1979, p. 89).

Later tectonic activities within the Kalahari Basin resulted in the setting for the Magadigkadi depression and the Okavango Delta, which enhanced further sedimentation of the Kalahari (Reeves 1972; Thomas & Shaw 1990, p. 191). The Okavango Delta is bound by three larger faults, the Gomare in the north and the Kunyere and Thamalakane in the south (Thomas & Shaw 1991, p. 123). The basin area is seismically still active; several modern earthquake epicentres are distributed in the near vicinity of the Okavango Delta (Reeves 1972). The Okavango Delta is fed by the Okavango River, which is the extension of the rivers Cubango and Cuito that drains the Angolan Highlands. The delta environment is characterised by extensive permanent and seasonal swamps. The delta feeds Lake Ngami and the Boteti River, the main inflow to the Magadigkadi Depression in the south-eastern part of the Kalahari basin (Thomas & Shaw 1991, p. 130).

The structural features of the basin provoke the major topographical trends of the landscape (Fig. 3.1). The highest point of the research area, approximately 1600 metres above the sea level is situated in its south-western part. In the continuing discussion, this area will be referred to as the Otjinene area, named after its largest village. From this point, the landscape slopes down towards the northeast and more significantly to the east. The Otjumunguindi area denotes the middle part of the research area. It is named after the cattle post that functioned as the main base during fieldwork. The lowest point of the research area, approximately 1000 m.a.s.l., is situated further east in the Eiseb Graben (Simmonds 2001), a low-lying area between the Ghanzi Ridge and the Aha Hills. The lowest part of the Okavango-Epukiro basin is located inside Botswana, southeast of the Okavango Delta. The Aha Hills constitutes a plateau extending west with a higher ground that divides the catchment area in two parts. The Gam area, south of the Aha Hills will define the northeastern part of the fieldwork area and the Nye Nye area will signify the plateau area directly west of the hills.

Omaheke contains a series of features and landforms presumably from the late Pleistocene when the northern Kalahari was “geomorphologically dynamic” and marked by fluctuating wetter and drier conditions (Thomas et al. 2003, p. 66). A system of parallel longitudinal sand dunes 8 to 80 km in length and 1.5 to 8 km apart, roughly oriented in a WNW-ESE direction are proof of periods of regional aridity in the time period before the Last Glacial Maximum (Thomas et al. 2003). The magnitude of the dunes is largest along an arc in the area directly west and north of the Aha Hills. Dunes also appear on the plains in the south and in the north-west, but here they are hardly noticeable as topographical features. However, some exceptions can be noted, especially in association with the edges of the river valleys. The dunes are presently fossilized, stabilized by vegetation.

Far-reaching changes of the Kalahari fluvial system occurred during wetter periods of the last Pleistocene. Directly west of the Okavango Delta (Fig. 3.1.), a large flat fossil fan filled with alluvial deposits indicates the western limit of a large Palaeo Lake that occupied the largest part of the Okavango-Magadigkadi system (Thomas & Shaw 1991, p. 120, pp. 133). In addition, a row of river valleys was formed by the drainage related to the deposition of the Kalahari sediments and the wetter conditions of the late Pleistocene. They cross the region in SW-NE or W-E directions, sloping towards the Okavango Delta. Today, the river valleys are fossils with intermittent locally distributed flows in relation to intense rainfall.

In Otjiherero, these valleys are called omuramba (sing, plural: omiramba) designating a “vague river bed” with sporadic water flows during the rainy season (Viljoen & Kamupingene 1983). The main omiramba in the region are (Fig. 3.1.) the Epukiro, which incorporates the arms of Alexest and Elandslaagte, the Rooboklaagte, the Eiseb with the Otjino, the Otjozondjou and the Daneib. After the funnel-like Eiseb Graben these omiramba merge to form one single valley. The Omuramba Eiseb became central for this study since the main road through the area follows the valley. The word Eiseb is presumably of Khoe affinity; in Otjiherero the name of the Omuramba is ua Pata (Rohrbach 1907). Southeast and east of the Aha Hills, the omiramba #To/anadum, /Xai/xaidum and /Kangwadum stretch in a straight easterly direction towards the Okavango Delta. These valleys constitute the general Dobe area in which most of the ethnographical research on the Ju’hoansi was carried out (Chapter 2). North of the Aha Hills, the Nhoma Omuramba takes an east-northerly direction and later turns east towards the Okavango Delta. The archaeological site Cho/ana, discussed in Chapter 2, is situated in this valley. In the north, the Kaudum Omuramba is the last larger valley with ephemeral drainage before the perennial Okavango River.

**Kalahari sediments**

It is generally agreed that the Kalahari sand represents the accumulation of material derived from local pre-Kalahari lithologies, supplemented by material transported to the interior by ancient rivers (Thomas & Shaw 1991; Haddin 2005).
However, the Kalahari beds are not uniform, either regionally or within the landscape. The depth of the Kalahari beds is lowest towards the Ghanzi Ridge (approximately 50 m) and increases towards northwest, where 460 m thick Kalahari beds have been identified (Thomas & Shaw 1991, p. 55; Simmonds 2001, p. 47). In the Eiseb Graben up to 250 m thick layers have been noted (Simmonds 2001, p. 48). The base of the Kalahari beds reflects post-Gondwanan drainage and usually includes thin unconsolidated deposits of conglomerate and gravel, but in certain areas of the Kalahari, they may reach a thickness of 100 m (Thomas & Shaw 1990, p. 192). The sandy Kalahari top-layer can be up to 30 m thick and is largely constituted of Tertiary and Quaternary deposits. In general, the Kalahari sand has the attributes of an aeolian deposit (Thomas & Shaw 1990, p. 192). They are well drained, weakly developed, fine sand-sized and light and lacking in soil nutrients and organic matter (FAO 1977; Bergström & Skarpe 1985, p. 3). Nutrients available for plants are concentrated in the top centimetre of the sand. Consequently, the soil is vulnerable to degradation and transportation by wind erosion (Skarpe 1990).

The dune sand tends to be coarse and red signifying high contents of ferric oxide. In cases where the sands are subjected to wetting, for example along drainage lines between the dunes or in the omiramba, the ferric oxide component dissolves to soluble ferrous oxide that leaks out. The result is that soils with active drainage lack iron which is indicated by their white or grey colour. The soil is occasionally also more compact and richer in finer fractions such as silt, seemingly drained from the crests and flanks of the dunes and concentrated at the end of the surface drainage (Yellen & Lee 1976, p. 34). Poorly drained soils with high contents of organic matter, often referred to as black cotton, are restricted to places with sheet drainage (Limbrey 1975, p. 220; FAO 1977). Usually the black cotton form rather localised lenses but extents of square kilometres have been reported (Lee 1979, p. 95).

Post-depositional chemical activities within the sediments have resulted in a range of calcareous and silicified sand, sandstone, grit and duricrusts (Thomas & Shaw 1990; Scholes & Parson 1997; Nash & McLaren 2003). There are three types of duricrusts found in the Kalahari sediments: calcrite, silcrete and ferricrete (Thomas & Shaw 1991, pp. 72). Calcrete is the most widespread variety of the Kalahari duricrusts and it appears as a hard cemented crust of chemically precipitated silica and calcium carbonate, on or near the ground surface (Nash & Shaw 1998).

Calcrete appears in a range of different landscape settings and the genesis is complex and only recently studied and described systematically (Nash & Shaw 1998; Nash & McLaren 2003). Much of the calcrete is pedogenic, i.e. related to processes that transform or remove components of the soil. In this case, pre-existing rock, soil or eroded material in the weathering zone has been replaced by calcium carbonate (Hall 1988, pp. 12). On a regional scale, the occurrence of pedogenic calcrete varies in different areas of the Kalahari and tends to increase along with the rainfall gradient. The distribution also seems to mirror climatic fluctuations in the past (Shaw & De Vries 1988; Nash et al. 2004). However, this is the least exposed calcrete in the Kalahari landscape (Nash & McLaren 2003, p. 7).

Calcrete continues to form by fluvial erosion. A critical factor is evapotranspiration and ground water seepage resulting in alternating moisture cycles that subjects the sediment to wetting and drying (Verhagen 1990, p. 190; Thomas & Shaw 1991, pp. 72; Nash & McLaren 2003). The general term “groundwater calcrete” is often applied to any calcrete of fluvial origin (e.g. Helgren & Brooks 1983, p. 188), but based on subtle hydrological variations, several different forms can be distinguished (Nash & McLaren 2003, p. 4). Although still ongoing, a major phase of calcrete development in the river valleys seems to have occurred across the Kalahari over a period of 2000 to 3000 years immediately before the Holocene (Nash & McLaren 2003, p. 20). Over the period, more than 4 m thick calcrete crusts were deposited at some places in the Kalahari (ibid.). In addition to outcrops of “recent” calcrete, related to relatively recent or ongoing fluvial erosion, “ancient” calcretes, presumably predating the Kalahari sequence, are exposed as cliffs high up in the flanks of the river valleys. The outcrops have been explained by the down cutting of the rivers or by larger scale geological processes, such as the down-warping of the Gomare and Thamalakane faults (Thomas & Shaw 1991). In the margins of the omiramba in the central and eastern parts of the research area such ridges are most widespread. The coarse karstified calcrete of the fault ridges is weak and eroded rocks have accumulated at the base forming extensive talus slopes (Moon 1988). In addition to the calcrete, the talus contains quartz, quartzite and silcrete gravel (Thomas & Shaw 1991).

Valley calcretes develop immediately above, at or below the groundwater table. They occur interchangeably at the margins, on the floors, or as low terraces towards the centre of drainage lines (Nash & McLaren 2003, p. 4). More importantly however, they seem to have a close, or even mutual, relationship with certain geomorphological settings and specific landforms in the Kalahari, such as omiramba and pans (Thomas & Shaw 1991). For the
general public, probably owing to the many films on southern African nature shown on the television, waterholes, or pans, are well known features of the savanna environment. The genesis of the pans is somewhat of an enigma and has been explained by animal erosion, deflation, weathering, lack of fluvial infilling or a combination of all (Shaw 1988, p. 128). Verhagen (1990) have recycled and added to an old ecological theory for the genesis of pans. He suggests that the main mechanism for pans is animal activity and, as I will outline below, the theory may have some further archaeological implications.

The theory is based on the notion that animals on the savanna, wild and domestic, congregate at depressions where rain-fed surface water will concentrate. Owing to the animal concentrations, the vegetation and grass is degraded and the depressions deepened. This results in a series of physico-chemical processes, e.g. wind deflation and deposition of calcrete. The bare clay pan signifies the initial stage of the pan cycle (Verhagen 1990, p. 190). Eventually, the calcrete deposition on the floor and on the margins will result in an aquitard containing pockets of perched groundwater. The congregating animals will increase owing to the possibility of reaching shallow groundwater by digging into the pan. The pan’s water will gradually become more saline due to the high evaporation rates. Shallow ground water will eventually intersect with the pan surface. The seepage and the saline-alkaline conditions of the pan will result in additional deposition of calcrete and the formation of a more permanent landform, the calcrete pan (Verhagen 1990, p. 191).

At the pan floor, the calcrete may deposit up to 50 cm. On the margins, the calcrete may be locally extensive; sometimes, low cliffs are formed. The mechanical impact of congregating animals produces a general barrenness of the pan and its nearest surroundings. Sand and eroded calcrete will be blown from the pan and deposit on its leeward side, building up the characteristic lunette dune (Shaw 1988, p. 127). The increasing saline conditions of the pan eventually result in that the animals focus on other depressions with fresher water. After abandonment, plants colonise the pan, first at the margins and later on the floor.

At the vegetated pan the formation of humus soils will result in more acid conditions and solution channels will leach through the calcrete. In addition, areas with calcrete deposits is usually characterised by development of karst landforms, such as sinkholes and dolines. Karsts occur under widely varying environments and forms by solution processes governed by subsurface flows of water. In addition, it can be noted that the formation of karst landforms is most effective in association with a tall and dense vegetation cover that is able to generate carbon dioxide for absorbing infiltrating water (Marker 1988). Perched water will infiltrate to greater depths and this in turn can be considered as a cleansing process that decreases the salinity of the pan.

The vegetated pan can be identified through a less pronounced and vegetated depression sloping towards a lunette dune. It will retain many of the subsurface features, for example clay and calcrete under the soil as well as (increasingly eroded and permeable) calcrete deposits in the margins (Verhagen 1990, pp. 191). However, since the grassy pan will continue to be an aquitard with perched water, it will continue to provide a contrast to the surrounding environment. In addition, standing water will remain in smaller depressions on the pan, which will eventually result in that the pan is “rediscovered for its fresher water and its cycle of denudation and salination will recommence” (Verhagen 1990, p. 192). Verhagen proposes that the cyclical mechanism of a pan might extend over many centuries or even millennia (ibid., pp. 190).

Archaeological data may to some extent confirm the suggested period. Calcrete deposits have contained archaeological materials or separate archaeological occupations. For example, at the site #Gi in Botswana the Late Stone Age occupation on the surface was separated from a Middle Stone Age layer by a calcrete layer (Helgren & Brooks 1983). It can also be noted that silcrete nodules, a common material for stone tools in the Kalahari, form in situ in the calcrete (Yellen & Lee 1976, p. 34). The pans may however have some additional implications to archaeologists. The excavating processes that initiate a pan can easily be identified at present day cattle shade trees, enclosures and boreholes (Verhagen 1990, p. 190). For this reason, it has been suggested that pastoral land-use in the past might be responsible for some of the pans in the Kalahari (John Kinahan, pers. comm.). If a link between pans and pastoral encampments and well sites can be confirmed this idea would surely have several archaeological implications.

Pans of various stages are found over the whole research area. The largest number of pans in the research area is found in the Nyae Nyae pan veld situated directly west of the Aha Hills. The pan veld is basically constituted on a large depression in the south-western part of the plateau. The area has poorly developed sheet drainage and large areas are submerged after rain (Kinahan & Kinahan 1984). On satellite images over the southern part of the research area, in the upper reaches of the Omuramba Eiseb a belt of small sinkholes, dolines and smaller pans is clearly visible.
Vegetation

Although the deep sandy soils and the paucity of surface water suggested the popular view on Omaheke as a desert, it is more appropriate to consider this part of the Kalahari as a semi-arid savanna including grasses, shrubs, and trees (Scholes & Parson 1997). According to the classification of W. Giess, the southern part of Omaheke falls within the Central Kalahari Camel Thorn Savanna noted for bushes and trees, including the characteristic bush-tree species Acacia erioloba. The northern part falls within the Northern Kalahari Tree and Bush Savanna characterised by more pronounced tree vegetation (Giess 1971).

In general, two larger vegetation mosaics can be distinguished within the two general savanna biotopes: the sandy substrate and the omuramba. However, the two mosaics contain a series of lesser and distinct plant communities, habitats, where the composition of vegetation species and structure is strongly influenced by soil, elevation, drainage and the mediation of landforms, e.g. pans (Vierich & Hitchcock 1979; Lee 1979; Kinahan & Kinahan 1984; Skarpe 1986; van Rooyen 2001). Some plant species are restricted to only one habitat. Other plant species occur over virtually the whole range.

The sandy substrate

The sandy substrate has few persistent water sources, but on flat terrain pans with seasonal bodies of surface water may appear occasionally (Plate 3.1a-c). The mosaic also includes green water resources, which refer to water stored in unsaturated soils, hollow trees and plants (Lee 1979, p. 94; Falkenmark 1995).

The sandy substrate comprises three more or less distinct habitats in terms of soil characteristics and vegetation associations: the crest, the slope valley and the valley floor with compacted soils. The undulating sandy plains with less or no dune formation can be considered as a fourth habitat, but seem more to be a reflection of the three dune habitats. However, the delimitations are obscure and follow small subtle variations of soil and drainage mediated by the topography.

The dune crests are characterised by coarse loose sand. In the southern part of the research area the dunes are vegetated with bushes, shrubs and dispersed trees. The trees are usually stunted and closer to bushes in size, but some trees may reach larger dimensions. Grasses cover only about 20% of the ground surface of the dune crests. The loose sand of the valley slope and at the foot of the dunes is characterised of open grassland with interspersed bushes and small trees. The valley floors are usually sandy but areas with compacted sand, occasionally with smaller silty fractions may appear in association to low-lying areas. In such areas, patches of shrubs and bush can be noticed. Trees may appear either as larger individuals or as younger multi-stemmed stands. The boundary between Giess’s two broader savanna biotopes can be identified south of the village /Gam. Here the vegetation cover of the dune crests gradually transforms to open woodland and the lower flats are characterised by more shrubs.

The mangetti tree (Schinziophyton rautanenii) is restricted to the coarse loose soils of the dune crests. In the southern part of Omaheke, there are no trees, and in the Otjumunguindi area, trees are very rare. If found the mangetti grows as an individual tree and not in groves, as noted farther north. In the Kalahari ethnography, the mangetti, which yields both an edible fruit and a kernel, have been acknowledged as the major food plant for Ju/'hoansi and much research has been devoted to mapping habitats, nutrition and work-efforts involved in the harvest (Yellen 1976, pp. 58; Lee 1979, pp. 184). Nutshells have been found in archaeological contexts. In addition, the tambutti tree (Spirostachys africana) seems restricted to the northern parts of the research area. The tree is poisonous but the hard wood is used for crafts.

The Terminalia sericea with its light green silvery foliage also favours the loose sandy soils. It is a frequently noted species and appears both as a shrub and as a small tree. A forest inventory crossing the two broader savanna biotopes of Omaheke indicated that the Terminalia sericea is the second most common tree in the area and based on crown coverage estimates it is the dominant tree species (Korhonen et al. 1997, pp. 4-6). The wood is hard and can be used for implements and poles. The bark can be used for various cures and the foliage provides a valuable browse for animals (van Rooyen 2001, p. 36).

In the low shrubland surrounding the Terminalia, a series of other bushes and small trees e.g. Rhus tenuinervis, Burkea africana, Bauhinia petersiana, Croton gratissimus, Pterocarpus angolensis, Lonchocarpus nelsii, various Combretum species, C. apiculatum, C. collinum and C. psidioides can be noted. The bark of Croton gratissimus is grinded to a sweet smelling aromatic powder traditionally kept in tortoise shell containers decorated with beadwork. In addition, the bark increases blood coagulation (SU 021022). Ochna pulchra grows as a bush or a low tree and is said to be a characteristic species for the sourveld. The concept “sour” in contrast to “sweet” is used throughout the farming comm-
unities in southern Africa. The classes refer to the palatability of the vegetation to domestic livestock. The classes are applied to individual plants or whole landscapes. In a strict scientific sense, it is difficult to define the contrast between sourveld and sweetveld, but it has been suggested that the palatable sweetveld contains a higher proportion of nitrogen (Ellery et al. 1995).

A number of Acacias such as A. erioloba, A. haematoxylon, A. erubescens, A. mellifera, A. tortilis, A. luwenderetzi, A. hebeclada, A. fleckii, and A. ataxacanthla grow as bushes or low stunted trees on the crests, but also as dispersed bushes or young multi-stemmed trees on the slopes and in the valleys (Coates Palgrave 1983; Berry 2000). In the open areas of the dune slopes and in low-lying areas in the end of local drainage systems, the A. erioloba and the A. tortilis occasionally grow very tall. They supply a cool shade and nesting sites for birds and various other animals (Bothma & le Riche 1995). The browse, especially the pods of the A. erioloba, is favoured by both wild and domestic animals and herders collect them for livestock that are sick and too weak to leave the homestead. In addition to shade, food and shelter, several of the African acacias can be considered as multi purpose trees with many other values (Berry 2000). The importance of large trees for the structuring of the savanna environment has been acknowledged in various studies (e.g. Bothma & le Riche 1995; Dean et al. 1999; Berry 2000).

The bushes or low trees of Combretum hereroense, Commiphora glandulosa and the evergreen Shepherd's tree (Boszia albitrinca) grow both on deep sandy soils and in compacted calcareous soil. Among herders, the B. albitrinca tree is actively conserved for its browse value and its veterinary medicinal properties (Coates Palgrave 1983, p. 186; Homann & Rischkowsky 2001). Old trunks are sometimes hollow and can contain water after rain (Coates Palgrave 1983, p. 186). The bushes Grewia flava and Grewia flavensis have been found over the whole range of the sandy substrate, although they seem to prefer calcareous soils, for example at the pan margins or in the omuramba. They have berries that can be eaten when ripe. The distribution of fleshy-fruited plants such as B. albitrinca and Grewia spp. is largely tied to the large Acacias, which has been explained to be an effect of bird-mediated seed dispersal (Dean et al. 1999, p. 76). The bush is also favoured among browsers and livestock. The Herero in Omaheke do not use Combretum imberbe, Boscia albitrinca and Grewia flava as fire-wood (Lindholm, pers. obs.). The Terminalia prunioides favour areas with compacted grey sand and Lee noted that the species is a useful indicator
for distinguishing the low-lying habitats in the undulating plain environment (Lee 1979, p. 96; Coates Palgrave 1983, p. 683). The tree has a hard wood that is suitable for construction and firewood. Also found in the lower range is the multi-purpose bush *Peltophorum africanum* and the *Rhigozum trichotomum* and the *Rhigozum brevispinosum* low shrubs that appear over the whole range, but most frequent in compacted soils.

In the lower vegetation of the dunes the creeper *Citrullus lanatus*, commonly known as the *tsamma* melon, is a reoccurring plant. It provides a bland but important water source for insects, birds, animals, livestock and people (van Rooyen 2001, p. 147). The creeper *Indigofera flavicans* and the herb *Hernmannia tomentosa* are also common in the margins of the shrubland of the dunes. *Sansevieria aethiopica* have fibres that can be used for making strings. It grows in characteristic colonies and is not very common in the southern parts of the research area, but in the Nyae Nyae pan veld they can form rather extensive patches.

*Harpagophytum procumbens* is commonly found in the open areas of the dune valleys. It is a weedy perennial tuberous plant with creeping stems. The fruits have characteristic hooks that have given it is popular name, *Devil’s Claw*. Twenty-nine different traditional uses of the plant have been recorded (Stewart & Cole 2005). To mention a few examples, the plant has traditionally been used as an abortifacient, as an antibiotic, for diabetes, tuberculosis and rheumatism. Today the plant is commercially harvested for the production of pharmaceutics in the treatment of degenerative rheumatoid arthritis, osteoarthritis, tendonitis, kidney inflammation and heart disease. Most of the world’s supply comes from Namibia. Harvest of the plant has improved income levels for many rural communities, but it has also raised questions of sustainability (Stewart & Cole 2005).

The perennial grasses *Schmidtia pappophoroides*, *Aristida meridionalis*, *Stipagrostis uniplumis*, *Eragrostis trichopora*, *Schmidtia pappophoroides*, *Cenchrus ciliaris* and the annuals *Eragrostis biflora* and *Schmidtia kalahariensis* have been identified continuously during the survey. However, classification of grass is difficult for the non-specialist and a number of additional grass species, which have not been identified in this study, can be expected (i.e. Cole & Brown 1976; Müller 1983; Giess & Snyman 1986; van Oudshoorn & van Wyk 1999; van Rooyen 2001). The grasses identified reflect the low nutrients of the soil in Omaheke and generally provide a marginal grazing for domestic livestock (Cole & Brown 1976; Smith 2001).

### Omuramba

Even though the *omuramba* seldom contain surface water, their importance for the Kalahari ecosystem should not be underestimated (Plate 3.2a-c). In relation to intense precipitation in the rainy season, surface flows may occur over short distances. In addition, the *omuramba* form the only consistent water sources, since they constitute a variety of sediments and landforms that may store pockets of water on or nearer to the surface (Thomas & Shaw 1991, p. 136). The omiramba are also recognised as routes for deep aquifer recharge (e.g. de Vries 1984).

The *omuramba* substrate comprises five more or less distinct vegetation habitats in terms of soil characteristics and vegetation: the upper reach, the slope valley, the sediment floor, the calcrete floor and finally the cliffs of ancient calcrite outcrops. The calcrete outcrops and the Ahā Hills constitute habitats that resemble each other, but will be left out in this description. The majority of the plant species that was noted for the sandy substrate mosaic appear in the *omuramba* setting. In terms of soil and vegetation associations, the upper reaches of the omiramba resembles the dune valley and the upper part of the *omuramba* valley slope resemble the dune slope.

Frequently noted plants on the *omuramba* slope valley are species already noted for the sandy substrate. Additional species identified include the bush or the low tree of *Albezia anthelmantea*. The bark of the tree is considered as an anthelminic for example against tape-worms (Coates Palgrave 1983, p. 218). On disturbed sandy soils in the omuramba valley slopes, the *Gifblaar* (*Dichapetalum cymosum*) is a frequently recorded plant in the research area. It has an underground stem and branches that spread over large areas. The plant is identified through dispersed patches of green leaves. The plant, especially the leaves, is very poisonous and is acknowledged to be a serious problem in Omaheke, as well as in other areas of southern Africa where cattle are kept (Watt & Breyer-Brandwijk 1962; Giess & Snyman 1986). The green juicy leaves of the *Gifblaar* sprouts among the first at the end of the dry season and attract the livestock when the grazing is scarce. According to Giess and Snyman (1986, p. 280), the plant’s flesh and fruits create an intoxicating effect in humans.

The largest parts of the larger *omuramba* are characterised by flats of compacted calcareous silty soils with surface drainage. Intrusions of black cotton and sheets of valley calcrete can occasionally be noticed in association with minor localised depressions with sheet drainage. The vegetation cover is sometimes characterised by grassland interspersed with bushes and trees.
In some places, mainly along the Eiseb and Otjinoko Omuramba, areas with dense almost impassable thickets of bush can be noted. The thickets contain species such as Catophractes alexandrii, Dichrostachys cinerea, Rhiqozum brevispinosum, Grewia spp. and the thorny A. mellifera, A. hebeclada and A. fleckii. These thickets occur mainly on or in the periphery, of areas with sheet calcrete or on compacted calcareous soils under a heavy grazing pressure. Shortly before the first rains, the bushes flower, forming colourful patchy mosaics of green, yellow and white against the darker green of the dunes and the slope valleys.

Combretum iberbe, leadwood, appears as a shrub or a small tree; in the Omatako Omuramba some trees reach considerable sizes. In Otjiherero, the tree is called Omunborombonga and is regarded as the ancestral tree from which the first human beings as well as cattle, sheep and wild animals appeared (Berry 2000, p. 59). Williams (1991, p. 59) considers the legend associated with the tree as depicting the migrations of the ancestors of the Otjivambo- and Otjiherero-speaking peoples and their arrival to the region and first meeting with !Kung-speaking peoples. Finnish missionaries working among the Ovambo at the turn of the nineteenth century recorded the legend:

“Kanzi [the ancestor of Herero] and Nangombe [Ovambo’s ancestor] came out of the leadwood tree, which is situated far in the east, across the grass savanna, in the place known as Maakuku (...) When they came out they found a short, light brown person [the ancestor of Aakwankala or !Kung] with big buttocks in a squatting position at the foot of the tree. Kalunga [i.e. God alt. name Mukuru, SU 2002] put in front of them cattle, sheep, hoes, axes, milking pails and small digging poles, and asked them: -Why are you so idle? Can’t you see those things which I put here for you? Take, each of you what you want! Kanzi stood up and took many cattle, all the sheep, a milking pail and a small digging pole. Nangombe followed him and took a hoe, an axe, a milking pail and the rest of the cattle left by Kanzi. The small, light brown man with big buttocks stood up and took a small digging pole, left by the others. Kalunga ordered them again, saying -Go, then, where you want to go! (...) Kanzi went with his wife southward, the light brown
man went into the forest eastward, and Nangombe with his wife went to On-
donga.” (Williams 1991, p. 58-9, my in-
sertions).

The omiramba constitutes a series of local drainage systems. The low-lying areas in the end of these drainage systems are similar to pans and are charac-
terised of poorly developed sheet drainage. After rain relatively large areas can be inundated. The floor is constituted on thick calcrete deposits and at the margins the calcrete can form low cliffs. Sink-
holes and larger dolines (see p. 27) up to 200 m in diameter appear in this setting. Some of the smaller dolines may have thick fillings of organic soils and dense thistle growth. The vegetation structure may in some places bear a resemblance to riparian wood-
land (Plate 3.2c). Heavily grazed areas commonly covered by the plant Sida cordifolia. The Acacia erioloba reaches considerable sizes in the umiramba setting, especially in association with the larger dolines (Chapter 6). In the same setting, bushes and trees of the species Ziziphus mucronata, Grewia flava and Boscia albitrunca are commonly found. Ziziphus mucronata is a typical multi-purpose plant providing a cure for various remedies and browse for animals during droughts. Several dwarf shrubs, e.g. Geigeria ornativa and various succulents can be noted in the undergrowth.

The baobab (Adansonia digitata) is restricted to the Aha Hills and the Nyae Nyae area. The baobab is for many people a familiar African tree spe-
cies, especially famous for its shape and size. Sev-
eral authors have noted the spiritual importance of the baobab tree for many local communities in Af-
rica (Coates Palgrave 1983; Giess & Snyman 1986; Sinclair 1987; Williams 1991; Powell 1998; Ekblom 2004). The baobab is also an important resource for food, water, shade and crafts. Fibre from the bark is used for various purposes. Stripping the bark from the lower trunk of most trees usually leads to their death, but baobabs not only survive, they are also able to regenerate new bark (Giess & Snyman 1986, p. 241). Its fruits represent a convenient source of food very high in vitamin C, that is naturally con-
served by the hard outer shell (Ekblom 2004). The white pulp of the fruit is pounded and the powder is stirred with water for porridge. Fresh baobab leaves provide an edible vegetable similar to spinach that can also be used medicinally (Coates Palgrave 1983). The hollowed-out trunk of a living tree pro-
vides nesting sites for bees and many older trees are also able to store water, estimates up to 700 litres are available (Blench, forthcoming). The palm Hy-
phaene petersiana appears in the Omatako Omu-
ramba.

Pans appear in both mosaics and will trigger own habitats. The vegetation structure of the pans is rela-
tively distinct with a concentric zonation partly de-
pending on the context for the pan and partly on its constitution, i.e. whether it is clay, calcrete or a vegetated pan (above; Allen 1978, pp. 171-7). Fre-
quently noted species in association with the pans are Ziziphus mucronata, Grewia flava, Catophractes alexandrii and several of the Acacias. In association with larger calcrete pans, the species structure con-
tains larger tree vegetation and resembles the cal-
crete areas of the omiramba.

The animal life
In addition to the diversity of the plant species, the Omahahe environment contributes to a rich animal life, including several of the well-known southern African invertebrates, reptiles and amphibians, birds and mammals (Liebenberg 1992). Lee noted that 58 mammal species, 90 bird species, 25 species of rep-
tiles and 85-90 species of invertebrates, all together about 260 animal species, were known to the Ju’hoansi (Lee 1979, p. 98). Table 3.1 lists species observed during the fieldworks in 2001-2004, and it may be considered as an example of animals that can be expected while travelling in Omahahe.

From the mid-nineteenth century, the hunting pressure had a great impact on the animal life in the western parts of the Kalahari. The elephant (Loxo-
donta africana) were hunted to such a degree that it was near extinction at the end of the nineteenth cen-
tury (Thomas & Shaw 1991, pp. 212). The cheetah (Acinonyx jubatus) and zebra (Equus burchelli), previously present in the area (Lee 1979, p. 98) are rarely seen today. The buffalo (Syncerus caffer) has returned to the Nyae Nyae area through nature con-

ervation efforts. Lion (Panthera leo) and giraffe (Giraffa camelopardalis) may occasionally be seen, but seem to be more frequent in the northern parts of the research area (Lee & Smith 1997; Powell 1998). Today the elephants are very abundant in the Nyae Nyae area and their impact on specific tree food resources and on the waterholes have resulted in problems for the local Ju’hoana residents (Powell 1998). Sometimes the elephants break the southern fence of the Nyae Nyae Conservancy (Fig. 3.2.) and migrate south to the /Gam area (Vot 2004).
Table 3.1 Animal species observed in Omaheke during fieldwork in 2001-2004

<table>
<thead>
<tr>
<th>Species</th>
<th>Observation area</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ungulates:</td>
<td></td>
</tr>
<tr>
<td>Blue Wildebeest Connochaetes taurinus</td>
<td>Nyae Nyae</td>
</tr>
<tr>
<td>Red Hartebeest Alcelaphus buselaphus</td>
<td>Nyae Nyae</td>
</tr>
<tr>
<td>Gemsbok Oryx gazella</td>
<td></td>
</tr>
<tr>
<td>Kudu Tragelaphus strepsiceros</td>
<td>Nyae Nyae, Otjumunguindi, Otjine ne</td>
</tr>
<tr>
<td>Eland Taurotragus oryx</td>
<td>Otjumunguindi</td>
</tr>
<tr>
<td>Steenbok Raphicerus campestris</td>
<td>Nyae Nyae, Otjumunguindi</td>
</tr>
<tr>
<td>Common duiker Sylvicapra grimmia</td>
<td>Nyae Nyae, Otjumunguindi</td>
</tr>
<tr>
<td>Springbok Antidorcas marsupialis</td>
<td>Otjine ne</td>
</tr>
<tr>
<td>Roan antelope Hippotragus equinus</td>
<td>Nyae Nyae</td>
</tr>
<tr>
<td>Carnivores:</td>
<td></td>
</tr>
<tr>
<td>Leopard Panthera pardus</td>
<td>Otjumunguindi</td>
</tr>
<tr>
<td>African Wild dog Lycaon pictus</td>
<td>Nyae Nyae</td>
</tr>
<tr>
<td>Spotted Hyena Crocuta crocuta</td>
<td>Nyae Nyae</td>
</tr>
<tr>
<td>Black-backed Jackal</td>
<td>Otjine ne, Otjumunguindi</td>
</tr>
<tr>
<td>Bat-eared fox Otocyon megalotis</td>
<td>Otjumunguindi</td>
</tr>
<tr>
<td>Other:</td>
<td></td>
</tr>
<tr>
<td>Elephant Loxodonta africana</td>
<td>Nyae Nyae</td>
</tr>
<tr>
<td>Spring hare Pedetes capensis</td>
<td>Otjine ne</td>
</tr>
<tr>
<td>Scrub hare Lepus saxatilis</td>
<td>Nyae Nyae</td>
</tr>
<tr>
<td>Baboon Papio ursinus</td>
<td>Otjumunguindi</td>
</tr>
<tr>
<td>Porcupine Hystrix africanus</td>
<td>Otjumunguindi</td>
</tr>
<tr>
<td>Ground squirrel Xerus inauris</td>
<td>Nyae Nyae, Otjine ne, Otjumunguindi</td>
</tr>
<tr>
<td>Warthog Phacochoerus aethiopicus</td>
<td>Nyae Nyae, Otjine ne</td>
</tr>
<tr>
<td>Ostrich Struthio camelus</td>
<td>Otjine ne, Nyae Nyae</td>
</tr>
</tbody>
</table>

Current settlement and land-use
The limit for freehold or the “commercial” farming district is mainly located in the regions of the larger towns Ghanzi, Gobabis and Grootfontein in the southern and western fringes of Omaheke (Fig. 3.2.). The three towns function as administrative centres for their respective regions. The population in the commercial farming area mainly consists of descendents of the European settlers and, as described previously, the establishment of new farms was most intense in the period 1895-1930. Like most Namibian farms, the farms in Omaheke average around 5700 hectares (Sweet 1998, p. 4) and are enclosed by fences. The land-use in the farming district is technologically well developed, capital-intensive and export oriented (ibid.). The farming can be said to represent European notions of agriculture based on private ownership and market principles. The labour pool on the farms consists mainly of indigenous people. Many workers live with their families in small labour compartments or in small villages close to the farms (Werner 1998; Suzman 2000).

The communal farming areas are located on the thicker Kalahari soils north and east of the freehold farming district. The communal area is largely modelled on the Epukiro Native Reserve and the later homeland for Herero and Mbanderu that were established under the South African rule (Chapter 4). After Namibian independence, the homelands became transformed to the current communal areas and the tribal names were replaced with neutral names. The two Otjiherero-speaking groups Herero and Mbanderu constitute the single largest language group of the communal lands in the Omaheke Region with approximately 22 000 people (of 55 000 regional inhabitants) claiming Otjiherero as their first language (Suzman 2000, p. 13). In addition to the Otjiherero-speakers, a large population (6600 out of the approximately 55000) of !Kung-speaking Ju/'hoansi (≠Au/en) lives in the Omaheke Region (Suzman 2000, p. 13; see also Guenther 1976; Barnard 1992a).

Current land-uses in the Communal Area presents an example of range land pastoralism, an economical form that combines subsistence herding with market economy. In contrast to freehold tenure, the land is not subdivided into private ownership. Instead, it is occupied based on communal ownership and user rights under traditional authority and policies (Sweet 1998). The livestock herding is generally based on small cattle posts distributed according to social and environmental circumstance; it is low-technological and labour intensive. However, small farmlands, usually for planting maize, are allocated to individual households in association to the homesteads. The grazing areas tend to be shared by the community member, although certain forms of individual rights over particular pieces of the grazing land are maintained (Sweet 1998; Stahl 2000; Lindholm pers. obs.). Over the last decades, the livestock economy of Omaheke has gradually become more involved in the commercial agricultural economy, which is most noticeable through regular cattle auctions in the Otjine ne, where cattle are sold principally to buyers from the commercial farming district (see also Vivelo 1977).

In 1959-60, a settlement programme for the Ju/'hoansi was initiated in Tsumkwe (Fig. 3.2.). The purpose was to turn the Ju/'hoansi into settled food producers and wage earners and make way for a
Wells of Experience

Figure 3.2. The current land-use system of Omaheke.

larger nature conservation project in the area (Hitchcock 1996, p. 17; Powell 1998, pp. 109-10). However, the settlement scheme resulted in major social disruptions, alcohol dependency and violence (Biese et al. 1992). In the 1980s, John Marshall assisted the Nyae Nyae Ju/'hoansi to leave the despair in Tsumkwe and resettle on their lands. Small settlements were established near the game water points in the Bushmanland conservation area and the Nyae Nyae Farmers Cooperative was founded.

In 1993, a Community Based Natural Resource Management project (CBNRM) was implemented (Powell 1997, 1998). The purpose was to secure the involvement of the Ju/'hoansi in the nature conservation project. A CBNRM project is associated with a progressive and post-colonial approach to environmental conservation in Namibia (Sullivan 1999a, pp. 1). Basically it is based on the notion that the colonial annexation of Namibia resulted in the inhabitants of the current communal areas in Namibia were legislatively divorced from their lands. The purpose is to re-establish the links between people and land mainly by stimulating participation of the local residents in land-use related decisions (Powell 1998; Sullivan 1999a). An additional task of a CBNRM project is to find viable approaches to sustainable resource management. In practise, this has resulted in that traditional economic activities are complemented or replaced by different forms of tourism-based enterprises and environmental conservation. Based on the Nature Conservation Amendment Act from 1996 the Nyae Nyae Conservancy was established in 1998 (GRN 1996).

The current population of the Nyae Nyae Conservancy consists of approximately 1600 Ju/'hoansi living in a number of small villages distributed on an area of 9030 square kilometres (Suzman 2001, p. 39). The current land-use regime of the Conservancy is constituted on a generalised economy, which includes hunting, gathering and the tending of small herds of livestock. Tourism and craft making have gradually become more important for generating income (Hitchcock 1996; Powell 1998; Suzman 2001).

During the 1990s, a large part of the former Eastern Bushmanland transformed to a communal area for Otjiherero-speakers which decreased the
The research area

territory for the exclusive use of the Nyae Nyae Ju/'hoansi. The reason for this is that after Namibian independence, many Herero in Botswana had expressed their desire to return to Namibia. The governments of Botswana and Namibia made an agreement of repatriation, although stipulating that any Herero going back to Namibia had to leave behind their herds and possessions, due to the foot-and-mouth epidemic that affected Botswana at that time (Byrnes 1996). In 1993, the main waterhole in /Gambecame the administrative centre for 5000 Herero and Mbanderu repatriated from Botswana, although a substantial population Ju/'hoansi continued to stay in the area (Powell 1998; Scott 2003). The current land-use in many ways resembles the cattle post system in the south. Herds from the area are regularly taken through the quarantine camp at the cordon fence to cattle auctions in Otjinene (Lindholm, pers. obs.).

Today, the research area contains four distinct land-use systems more or less subordinated to ethnic systems (Fig. 3.2.). By drawing a transect from the south to the north, the strategies for land-use range from commercial farming based on private ownership, a labour intensive livestock economy, followed by a conservancy with a general hunting and gathering economy and finally a game park, where human agency is restricted.

In general, it can be said that the people in the different areas perceive their environments differently, and have developed different conceptions and strategies for managing their landscapes. In next chapter, I will position Omaheke in a historical background.
Wells of Experience
The purpose of this chapter is to provide a historical background to Omaheke. A central concern will be to ask how the assumption of an unsuitable environment came into being. The focus of the discussion will be on European activities from the period of the early exploration onwards. The location of areas and places mentioned in the discussion below are given in Figures 2.1 and 4.1.

Until the decade for independence, Namibian history was notoriously under-researched and to a large extent based on European travelogues and on settler histories (Lau 1995a). After independence, a large number of works directly or indirectly involved with Namibian history can be recognized. The source material has largely consisted of recently available archival records from Namibia, Germany and South Africa. The research focus has been on the social and political effects associated with the colonial rule of the twentieth century (e.g. Krüger & Henrichsen 1998; Hayes et al. 1998; Gewald 1999). Other researchers have focused on the precolonial past through studies of genealogy and the oral tradition of the local communities (Tlou 1971; Almaes 1979a, b; Williams 1991). The aim has been to move the focus from stereotyped ethnic and racial explanations to more nuanced social, economic and political understandings of the Namibian past(s) (John Kinahan 1991; Williams 1991; Gordon 1992; 1997; Lau 1994; Gewald 1999; Jill Kinahan 2000). The precolonial history and the effects of colonial rule in the peripheral areas of the country are largely unrecorded and depend on a combination of historical and archaeological data (John Kinahan 1991; Jill Kinahan 2000).

Early exploration

Works on the period between the fifteenth and the eighteenth centuries from Namibia, as well as in Angola, Zambia, Botswana, South Africa, Zimbabwe and the countries along the East African Coast indicate that the period for the first European contacts was energetic. It was characterised by dynamic societies that connected large areas of the southern African continent (Williams 1991; Lau 1994; Pikirayi 2001; Mitchell 2002; Reid & Lane 2004). During this period, large socio-political organisations, urbanism and international contacts extending over the inland region to the Oceans in west and east can be identified (Denbow & Wilmsen 1986; Sinclair 1987; Vansina 1990; Radmilahy 1998; Jill Kinahan 2000; Juma 2004; Somadeva 2006). As discussed in Chapter 2, the understanding of this period and the extent of these processes in Omaheke is debated.

Using Tawana genealogies and oral tradition, Thomas Tlou (1985, pp. 11) has dated the Yei and Mbukushu migrations into the northern Botswana and the Okavango Delta to the earlier half of the eighteenth century (see also Larson 1970). Recent historical research from Angola supports this view by showing how the dry periods between 1620 and 1640 and again in the 1720s seem to have resulted in political unrest all over southern Angola (Bollig & Gewald 2000, pp. 15). In addition, the effects of the drought were enhanced by reactions to slave raiding and the penetration of merchant capital from the Angolan coast. These processes stimulated the development of centralised political systems in the Huila highlands (ibid.). Williams (1991) relates the early southward migrations of Otjiherero-speaking peoples as a byproduct of the slave trade in central Angola around 1600. These accounts can partially explain why Otjiherero-speakers moved to the arid lowlands of northern Namibia and it is not unlikely that the ancestors to the present day !Kung-speaking peoples in Omaheke participated in these southward movements (Wilmsen 2003).

In the late eighteenth century, the Tawana, an offshoot of the BaNgwato settled in Kgwebe in the Lake Ngami region south of the Okavango Delta inside present day Botswana (Tlou 1985). Here they established a state and met other Setswana- and Sekgalagadi-speakers, as well as Khoe-speakers (Tlou 1985, pp. 38, see also Peters 1972; Hitchcock 1985; Wilmsen 1989a). Some Khoean and groups of already present Setswana-speaking Kgalagadi with livestock seem to have moved further north into the region west of the Okavango Delta and Tsodilo Hills at this time (Tlou 1985). By at least 1820, Setswana-, Sekgalagadi-, Khoe- and !Kung-speakers
Figure 4.1. Map of the northwestern Kalahari showing places mentioned in the text.
seem to have been established over the whole of the western Kalahari and contested with Otjiherero-speaking groups for grazing land (Wilmsen 2003, p. 7). In this setting, the Tawana hegemony and the medium for an intense trade between the coasts and the inland evolved during the nineteenth century (Wilmsen 1989a; Jill Kinahan 2000).

The first European accounts of Namibia are from a series of natural harbours along the coast. Since the fifteenth century, these harbours, especially Walvis Bay as the largest and the safest harbour, had attracted Portuguese, Dutch and British seafarers (Jill Kinahan 2000, pp. 14). In 1632, the Dutch Cape Colony was founded in the southwestern part of present-day South Africa. During the following centuries, the inland areas were gradually more influenced by people from the Colony. Few of them wrote about their experiences, although it is possible to find exceptions (Mossop 1935). From 1775, Hendrik Jacob Wikar journeyed for almost five years along the Orange River, today delineating the national boundary between Namibia and South Africa. From the Cape perspective, the Orange River (Fig. 4.1) was in many ways the frontier between the known and unknown. Wikar describes the social and linguistic setting of the Orange River as heterogeneous including Otjiherero-, Khoekhoen- and Khoesan-speakers acting within an economic framework based on herding, hunting, gathering and trade (Mossop 1935).

Along the Namibian coast, the European activities were more intense. In the 1770s, the whaling grounds outside Walvis Bay was discovered (Fig. 4.1). American whaling and fishing expeditions traded tobacco, muskets and gunpowder with the people living on the coast (Jill Kinahan 2000). European merchants introduced mass-produced goods, for example glass beads, earthenware and porcelain, as well as tea and spices shipped from India and Southeast Asia. In return, the trade gave livestock, hides, ivory, ostrich feathers and copper from the southern African interior (Jill Kinahan 2000). The first contacts resulted in expanded external trade, which in turn seem to have stimulated the diversification of the pastoral economies and an increase in their production (Johm Kinahan 1991). The East Indian trade route and the increasing commercial value of the southern African coastline resulted in several early charts and descriptions of the people along the coast by British naval explorations (Jill Kinahan 1990). The British occupied the Cape Colony in 1795 (Jill Kinahan 2000, p. 15). Around the turn of the eighteenth century, we gain the first historical insights to the societies in the middle and southern parts of Namibia (Lau 1994, pp. 3). Around 1810, the Oorlam with livestock and guns migrated from the Cape into Namaland and Damaraland, the terms by which the southern and central parts of Namibia were referred to at the time. Oorlam was the term for dispossessed Khoesan-speakers who had been closely involved in the Cape Colony. Initially, until they had established their superiority over the Khoekhoen and Herero pastoralists further north, their arrival in the region resulted in intense social disruption and violence (Lau 1994, pp. 19).

Owing to the conflict, no European traveller entered Namaland or Damaraland between 1825 and 1834 (Jill Kinahan 2000, p. 17). The Oorlam leader Jonker Afrikaner established his main settlement in the centre of current Namibia, in a place near the current Capital Windhoek (Lau 1994, p. 28; Fig. 4.1).

Initially, most trade between the interior and the coast used indigenous middlemen (Wilmsen 1989a; Jill Kinahan 2000). In 1836, the Cape explorer James Alexander crossed the Orange River. The purpose of his journey was to carry out an overland exploration and to establish contact with Jonker Afrikaner, who had established himself as sovereign “over much of southern and central Namibia” (Lau 1994, p. 28). Alexander hoped to be able to promote trade and to become “acquainted with the Damaras”, which was the common name for the Herero during the nineteenth century (Alexander 1838, p. vif). Following Alexander’s journey, a larger influx of traders, hunters, missionaries and explorers in Namaland and Damaraland can be noted. In general, the early overland expeditions avoided the Kalahari and focused on the highland area and the coast (e.g. Alexander 1838). The general view on the Kalahari was that it was a dry, barren and uninhabited wilderness. In the 1840s, trade and mission stations were established on the Namibian coast and in the central parts of the country in places such as Gross Barmen, Oka-handja, Otjimbingue and Otjikango (Lau 1994; Gewald 1999).

The historical ‘opening’ of the Kalahari dates to 1849, when David Livingstone’s expedition, at invitation of the Tswana Kgosi (i.e. Chief or King) Letsholathebe, crossed the Kalahari from the south. Livingstone’s party was the first known Europeans to visit the Lake Ngami (Livingstone 1912). The motive for his journey was “to extend the knowledge already attained of the geography and mineral and agricultural resources of Eastern and Central Africa, to improve our acquaintance with the inhabitants, and engage them to apply their energies to industrial pursuits, and to the cultivation of their lands with a view to the production of the raw material to be exported to England in return for British manufactures” (Ryan 1997, p. 31). Letsholathebe, on the other hand, seemed to have been equally interested in unmediated contact in order to increase his trade

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in ivory and cattle (Wilmsen 1989a, p. 80). The time period for the expansion of the European markets to the inland region can be recognised as a prelude to the actual colonisation process (Wolf 1982, Wilmsen 1989a, p. 129; Jill Kinahan 2000, p. 21).

Two years later, a second route was opened to Lake Ngami. This route originated in Walvis Bay, the main harbour on the Namibian coast (Jill Kinahan 2000, p. 14). It followed the !Khuiseb River up to the Swakop River and the mission stations on the highland plateau (Een 1872, pp. 2). From the highland area it continued along the main valleys of the Okavango-Makgadikgadi drainage system: the Nosso, Epukiro, Otjimbinde to the Ghanzi limestone ridge. Here over fifty pans and waterholes with almost twenty-five springs constituted the last stretch of the way to Lake Ngami (Guenther 2002, p. 127). The first Europeans to make the journey were Francis Galton and Charles John Andersson (Galton 1853; Andersson 1856). Andersson stressed that “it is more than probable that this route (the shortest and best) will be adopted as the one by which commerce and civilization may eventually find their way to the Lake regions” in the central part of Kalahari (Andersson 1856, p. iii). The pioneers of the route were later followed by James Chapman and the artist Thomas Baines who drew and painted people, animals, birds and landscape (Baines 1864; Tabler 1971).

Plate 4.1. Wells on the river bed near the current road between Okahandja and Okakarara. Photo: courtesy of John Kinahan.

The Omatako Valley connected the Namibian highlands with the Ovambo peoples who lived along the Cunene and the Okavango Rivers in the north (Andersson 1861; Wilmsen 1989a; Lee and Guenther 1991, p. 594). Een (1872) considered the Omatako Omuramba as well watered, but mainly populated by impoverished Herero (“Ovatjimba”) and generally avoided by the people with large livestock herds, except for in periods of drought. Nevertheless, other contemporary authors mentioned that large cattle herds were kept in the Omatako Omuramba during the nineteenth century (Büttner 1883; Seiner 1905; Irle 1906). For example, Kambazembi from Otjozondjupa had posts in the area around Otjituuo, one of which was called “Okaamatutjindo” (“it protects the treks”) (Köhler 1959b, p. 32).

Before the mid nineteenth century explorations, the popular view on the Kalahari was that of a depopulated wilderness. However, the pioneers Galton (1852, Maps, pp. 141) and Livingstone (1912) could outline in detail the larger valleys of a complex network of perennial and intermittent rivers that crossed the central parts of Kalahari. In addition, they demarcated the locations of central places, such as the Tsodilo Hills (Sorilo Hill; Sorila) and well-known trade centres such as Libebe (Libabe) at the Okavango River (Williams 1991). In the east, the maps indicated the rivers Chobe, Borotse and Zambezi, which in turn linked with the Zimbabwean highlands and the towns at the East African Coast, which had been involved in the Indian Ocean trade for centuries, linking to networks that extended to the Mediterranean, Middle East, India and South East Asia (see above).

In view of the fact that physically, the explorers had only reached a few places within the Kalahari, it is likely that they based their maps on a palimpsest of information; own observations, the knowledge of their guides, presumably middlemen in the Kalahari trade, and on that of people with whom they communicated during their journeys. Denbow and Wilmsen (1986, pp. 1513) argue that the routes followed by the explorers were based on the trade networks that had developed from the sixth century onwards, if not earlier. The exploration and the map making were more of bringing the indigenous geographical knowledge to the attention of the Europeans (Wilmsen 1989a; see also Johansson 2001, p. 80). The same point of view has been expressed by Gordon, who stresses that “These hunter-traders did not rush blindly over the landscape. Instead they followed preexisting trade routes and utilized traditional hunting grounds” (Gordon 1992, p. 36). After the initial contacts in the Kalahari, the European activities increased rapidly. In the late 1860s, it is estimated that more than 200 Europeans were operating in the western parts of the Kalahari (Lau 1984).

The travelogues

The early explorers shared the ambition of describing their findings in the new world. The first descriptions of Omaheke are from the larger routes in the southern and south-western fringes. The accounts describe vast areas of flat sandy terrain with abundant, sometimes impassable bush vegetation,
wild animals and exotic peoples. The dryness and the problems of finding water are constant themes in the travelogues (e.g. Galton 1853; Andersson 1856; Livingstone 1912; Farini 1886; Hodson 1912). Francis Galton wrote

“a fascination which has often enough proved its power by urging the same traveller to risk his comfort, his health, and his life, over and over again, and to cling with pertinacity to a country which after all seems to afford little else but hazard and hardships, ivory and fever. The motive which principally induced me to undertake this journey was the love of adventure” (Galton 1853, p. 2).

The hardships helped to establish a scenic and adventurous background to the narrative that was intended for a larger Euroamerican readership.

Even though a selective emphasis can be noted in the descriptions of people, birds, and mammals, they were often very detailed and carried out within a scientific endeavour (e.g. Andersson 1856). The accounts also indicate that as members of the modern and enlightened world, the explorers shared a Victorian view of the world, including biases concerning nation, race, history and development (Fabian 1983; Adams & McShane 1996). The interaction between science and adventure encouraged the general conception of the Kalahari as a desert or ‘thirst land’ populated by “men who are 1800 years behind” (Mackenzie 1871, p. 523). The indigenous peoples occupied lower steps of the evolutionary ladder within this perspective, in contrast to the newly arrived Europeans, who represented men on the frontier bringing civilisation and progress (e.g. Galton 1853; Een 1872). Such notions of Africa have long attracted the general reader in Europe and North America (Schrire 1986; Gordon 1992, 1997).

However, in the accounts it can be indirectly appreciated that the indigenous communities constituted a wide-ranging and productive economy largely based on hunting, cattle, trade and the mining of copper (Tlou 1985; John Kinahan 1991; Wilmsen 1989a; Williams 1991; Gordon 1992; Lau 1994; Jill Kinahan 2000). The nineteenth century is also characterised by the emergence of very large polities, “societies hitherto unseen in central Namibia” (Gewald 1999, p. 11). Examples are the socio-political aggregations of Jonker Afrikaaner, Hendrik Witbooi, Kambazembi, Tjissseta, Kamaherero, and the Mahereros, in the west and the Tawana hegemony of Sekgoma Letsholathebe in the east and the Ovambo kingdoms in the north-west (Tlou 1985; Williams 1991; Lau 1994; Jill Kinahan 2000). The larger socio-economical aggregations controlled the trade for cattle, ivory, ostrich feathers and copper. Work on improving the roads between the larger centres in the central parts of the country was initiated (Dierks 1999, p. 9). The increasing role of livestock in the merchant economy moved the basis from ivory to livestock, which stimulated raiding for cattle, for example along the Otjimbinde and north of the Okavango River (Wilmsen 1989a, p. 138; Johansson 2001). The livestock trade developed a strong decentralised aspect involving the establishment of cattle posts in the peripheral areas to the larger aggregations. Hitchcock, for example, notes how the “Western sandveld” transformed from a Tswana hunting area to a grazing area with cattle posts (Hitchcock 1985). During the second half of the nineteenth century, trade networks operated widely across the Kalahari (Gordon 1984; Wilmsen 1989a; Jill Kinahan 2000).

In the last quarter of the nineteenth century, the sphere of exploitation of the European hunters and traders had increasingly moved north and east from the larger trade routes out to peripheral areas of the country (e.g. Johansson 2001). They followed minor trading and hunting routes initially depending on the knowledge of their guides, who had been herdsmen, hunters or trade middlemen (Tlou 1985, Map 4, p. 49; Wilmsen 1989a; Gordon 1992; Wilmsen 2003).

The Afrikaners originated from the Dutch settlers who landed on the South African coast in the seventeenth century. Over the eighteen and nineteenth centuries, the expanding colonial activities of the British in South Africa resulted in a series of Afrikaner migrations to the interior parts of southern Africa. One migration known as the Dorsland Trek reached Omaheke around 1877. The socio-ideological foci of these Afrikaners seemed to have been on livestock with a strong basis in hunting, gathering, crafts and trade (Russell & Russell 1979). By this they shared many similarities with the indigenous livestock economies and in many ways the trekkers seem to have conformed to the existing socio-economic patterns (ibid.). Some Afrikaners stayed in Omaheke (Tabler 1973; Gordon 1992), while others crossed the area by going over the Nyae Nyae to settle in the southern parts of Angola. Here they engaged in the regional economy as traders, craftsmen and transport riders (Russell & Russell 1979).

The trade for ivory, ostrich feathers and hides expanded rapidly in this period. Denbow and Wilmsen (1986) suggest that 45 400 kg of ivory were exported from the Kalahari in the mid-nineteenth century. Thomas & Shaw (1991, p. 112) suggest that the figures were greater than this. Van Zyl, an Afri-
kaner hunter and trader, managed to kill 400 elephants in the Ghanzi area in 1877. The following year, his party of six managed to kill 103 elephants “in a single afternoon” (Thomas & Shaw 1991, p. 213; Gordon 1992). The intensive trade in ivory resulted in near extinction of the elephant in the Kalahari.

In contrast to the explorers of the mid nineteenth century, the traders and hunters did not document much of their activities. Few wrote travelogues and they seldom kept diaries or wrote letters. There are some exceptions however and historiographical research has revealed details of the traders and their activities (Tabler 1973; Wilmsen 1989a, 2003; Johansson 2001). The successor of Charles John Andersson, Axel Eriksson, who in the 1870s had built up a “large hunting and trading empire on the Walvis Bay-Ngamiland route” (Thomas & Shaw 1991, p. 213), realized in the 1880s that it was possible to make a good profit if he could bring cattle from the west to the east. At this time, the exploitation of gold and diamonds had been initiated in the Transvaal. The aggregation of people in this area resulted in higher demands on food which subsequently increased the meat prices. Due to the livestock raiding of the N/ama along the Otjimbinde route, the main route between east and west, he decided to cross the Omaheke further north from a place near Otjituuo in the Omatako (Johansson 2001). In his letters to Sweden Eriksson describes how he used indigenous guides for finding the paths and the watering places. The route presumably went over the Nyae Nyae to Lewisfontein situated in the Dobe area of Botswana (Wilmsen 1989a; Gordon 1992; Wilmsen 2003). Eriksson took the journey at least once in person in 1883-84. On the first trek, Eriksson managed to move 1300 animals to Transvaal (Johansson 2001, p. 81). After this it “became the customary route between the interior and the west coast” (Watts 1926, p. 93 cited from Gordon 1992; see also Johansson 2001, pp. 81). During the second half of the nineteenth century, European explorers, traders and settlers had “crossed the country in various directions, so that it is fairly well known now in its main features” (Dorman 1925, p. 19, my insertion). Farini, one of the last to publish the Rhenish mission that had been active in the country since the 1840s, the activities by the German merchant houses and the establishment of the German colonial party in the 1870s resulted in Germany’s political involvement in Namibia (Esterhuyse 1968). The British Cape Colony, who had annexed Walvis Bay in 1878, suspected that the Germans would go across the Kalahari and join with the independent Afrikaner republic of the Transvaal. In response, the Cape Colony used their missionary and trade connections with the Tswana in present Botswana for expansion to the north (Tlou 1985, pp. 114). In 1885, the British proclaimed the protectorate Bechuanaland over their Tswana allies. However, it seems that the German threat was exaggerated. A decade had passed after the foundation of the colony before the Germans managed to set up a working administration, creating a colonial economy and infrastructure allowing settlers to arrive on a larger scale (Heywood et al. 1995). The mission stations changed to become smaller towns and new missions and settlements were established in peripheral areas of the colony (Esterhuyse 1968, pp. 6; Dierks 1999, pp. 15, 33).

Along with the German colonisation process, missionaries wrote accounts and researchers initiated formal works on describing the environment and the culture of the colony (Büttnner 1883; Irle 1906; Schinz 1891; Passarge 1904; Lau 1984, 1995a). This research provides a number of valuable insights into the Namibian societies at the time. However, little has been translated from German to English. This impression was confirmed by Dornan, noting that “Of these travellers Passarge and Schultz have made the most detailed investigations into the geography and ethnology of the Kalahari” (Dornan 1925, p. 19). He continues by stating that the “books of these two travellers, more especially the former, are not nearly so well known as they deserve to be, and are well worth translating into English” (ibid.). Today, Siegfried Passarge is considered the pioneer of the Kalahari physical geography and the maker of modern geography (Thomas & Shaw 1991, p. 2; Wilmsen 1997). In addition, he contributed several works on the cultural geography of the Kalahari and the Okavango in the late nineteenth century (e.g. Passarge 1905a, 1905b, 1907).

Siegfried Passarge has gained considerable interest in the Kalahari debate. Wilmsen pointed out Passarge’s pioneering contribution to the method of participatory observation and stressed the importance of his Khoesan ethnography and culture geographical research. In order to make Passarge’s ethnographical texts available for a larger audience Wilmsen edited a publication in which the texts appear in English translation (Wilmsen 1997). Pas-

German colonisation

In 1884, the German protectorate Deutsche Südwestafrika was formally established. Petitions from
sarge’s research was studied by the most prominent scholars on Khoesan ethnography in the early twentieth century and widely used in their works (e.g. Bleek 1928; Schapera 1930). However, the Kalahari ethnographers of the 1960-70s have neglected his work until recently (e.g. Guenther 2002; Lee 2002). Wilmsen stresses that if Passarge’s information had been recognised, their research focus would have been differently orientated (Wilmsen 1997). Passarge argued that the Kalahari Bushmen had a centralised political structure in the past which had degraded during the nineteenth century, until his encounter with them. Guenther (2002, pp. 140-3) has discussed several source critical problems with Passarge’s texts, especially those concerned with the ways of the Bushmen in earlier times. However, Passarge’s account of larger scale social aggregations and collective hunts—not documented in the twentieth century ethnographies—he assesses to “be on safer evidential ground” (Guenther 2002, p. 140-3).

During his fieldwork in 1896-98, Passarge observed how the Ju/hoansi herded Tawana livestock at cattle posts in the Nyae Nyae area (see also Lee 1979; Tlou 1985; Hitchcock 1985; Wilmsen 1989a, pp. 80). Some of these cattle posts were solely under the supervision of Ju/hoansi herders “Some of their cattle may have survived from earlier decades, some were certainly the product of Sekgoma’s policy, and some were probably retained from raids” (Wilmsen 1989a, p. 139). In addition, he noted that the “Mbanderu division of Herero inhabit the sandveld at the upper end of the Epukiro and Eiseh, and, together with important sections of the Herero, the area of the large Omuramba Omatako” (Passarge 1905a, p. 80, transl. by Wilmsen 1997). However, “During the past decade they have, (…) advanced into the area of the upper Schadum [Kaudum; a dry river valley north of the Nyae Nyae], and in the year 1898 I myself found several colonies in the Kaukauveld. It is possible that they advanced into this area in large numbers owing to the chaos of warfare” (ibid.; transl. by Wilmsen 1997). Historical research has established that the followers of Chief Kahinemua and Nikodemus went to Botswana after their headmen were executed. These Herero were settled by Sekgoma Letsholathebe around his cattle posts at Mahopa, Kangwa in the Dobe area and in the Nyae Nyae (Pool 1991, p. 152; Gewald 1999, p. 110, 2002, p. 219). Passarge considered Omaheke as being populated by “Buschmänner” and “Bantu-Proletarier”, a peripheral area of the larger cattle economies in the west and the east (Passarge 1905a, p. 87, Appendix, Tafel 2.).

Excluding the areas infested by tsetse fly, there is strong evidence for cattle being grazed over large areas of the Kalahari in the end of the nineteenth century (Thomas & Shaw 1991, p. 214). Denbow & Wilmsen estimates that 12 000 head of cattle were exported annually to the markets of Cape from northwestern Kalahari between 1860 and 1890 (Denbow & Wilmsen 1986).

It is necessary to point out that Passarge may have experienced a society and an economy that was under considerable stress. For example, large sections of land changed ownership in the central parts of Namibia during the time of his fieldwork. However, this was not only a result of the expansion of the German settlers. Many indigenous leaders sold their land in order to re-establish losses from the intrusive trade in livestock (Drechsler 1980; Lau 1994; Pool 1991). The intense trade had resulted in raiding, unequal production and disruption of pastoral alliances, which seem to have caused a general collapse of the pastoral economies in the marginal areas (John Kinahan 1991; Jill Kinahan 2000). During Passarge’s fieldwork in 1896-98, the situation was further deteriorated by the *rinderpest*, a livestock disease that basically came to destroy the whole basis for the indigenous economy (Plate 4.2.). The reduction of game is difficult to estimate, but it has been estimated that up to 90-95 % of the livestock in southern Africa were lost to the epidemic (Pearce 2000). As the basis for the indigenous economies generally lay in cattle, the years of the rinderpest have been described as a “dividing line” in southern African history (Kjekshus 1977, p. 126; Schneider 1994). Moreover, the cattle that died were often buried in the softer soils of the river valleys in too shallow graves, resulting in the poisoning of water resources. People and cattle suffered new epidemics
and historical evidence from the central parts of current Namibia indicates that thousands of people died at the large settlements that had been built in association with the mission stations (Gewald 1999).

The uprising in 1904-07
The Kalahari debate has been characterised by a concern with the question of whether minor trade routes crossed the Omaheke in the nineteenth century. The existence of these routes of contact and mercantilism, although considered based on pre-existing indigenous trade networks, were first suggested by Denbow and Wilmsen (1986; Wilmsen 1989a, p. 81) and later reinforced by Gordon (1992). The south-eastern route to the Nyae Nyae corresponds with Passarge’s journey described in his fieldworks in 1896-98 (Passarge 1907), which in turn was based on a Tawana hunting route (Tlou 1985). The second route was considered as following the Eiseb Omuuramba. The first step of the third route was Erikssen’s Putz, located about forty kilometres below Otjituuo in the Omatako Omuuramba, and it went over Karakuwisa and Tsintsabis in the Kaudum Omuuramba to Lewisfontein situated inside Bechuanaland (Wilmsen 1989a, p. 81; Gordon 1992; Johansson 2001). However, “Given the absence of documentation for any of these routes” they have also been heavily criticised by Lee and Guenther (Lee & Guenther 1991, p. 596; see also 1993; 1995).

Eleven years after Passarge’s fieldwork, the Colonial Commissioner Paul Rohrbach recognised that before the war of 1904-07, Kehoro was a central place of the Herero, similar to Okahandja and Omurum in the west. The area surrounding Kehoro between the black Nossob and the Epukiro was defined as rich in pastures and water places, in most cases as chalky pans (Michaelsen 1910). Here, according to Rohrbach, excellent grazing land was situated extending north over the Epukiro and the Eiseb and to the east along the Omurumbha Otjombinde (1907, p. 94-95). He continues by saying:

“…the actual Omaheke of the Hereros was, in spite of sand and thorn before the uprising yet rich in cattle. To be sure, the principal and leading chiefs did not settle here, but rather in the preferred more western tracts of the country, but they had large cattle posts in the Omaheke and moreover there were numerous Feldhereros working as cattle guards for their wealthier tribal comrades. Also the Osthereros or Ovambandjerus, whose territory extended westward to the Owikokororo, had many cattle in the Sandveld” (Rohrbach, 1907, p. 85).

A passage from the missionary Tindall, also associated with the area north of Epukiro, infers a similar setting, although sixty years earlier: “Cattle Damaras [Herero] are very numerous; said to be very rich in cattle. Their number and extent of their country is unknown” (Tindall 1959 cited from Wilmsen 1989a, p. 93). Epukiro and Otjiarua in southern Omaheke seem to have functioned as places for barter between the Herero, Nama and Tawana (Köhler 1959a, p. 35). After the uprising in 1904, the view on Omaheke changed in many ways. The area was seen as the fate of the “Herero Nation” (e.g. Deutsches Kolonial-Lexikon 1920, pp. 248). The area was viewed as a dry, barren and a more or less depopulated desert inhabited by isolated remnants of hunter-gatherers. As this notion is crucial for later archaeological and anthropological research in the area and for their perspectives on the past, it seems necessary to gain a more detailed insight into the events that resulted in this view.

In the last years of the nineteenth century, the settler policy of the German Colony was especially active and the number of settlers increased dramatically (Rohrbach 1907; Esterhuyse 1968; Drechsler 1980, pp. 243). The period saw some minor uprisings; however, they were suppressed by the German troops who executed some of the leaders (see above). To some extent, the events can be considered as a struggle for paramount leadership among the Mbanderu and Herero chiefs, stimulated and mediated by the German colonisers (Drechsler 1980). In January 1904, the tensions between the German settlers and the local communities led to a widespread revolt. Common explanations for the causes of the uprising are that the aggressive European trade interrelated with a competition for dominance of land, pastures and water (Bley 1971; Drechsler 1980; Lau 1994), and that it was the first war against European colonialism (Mbuende 1986; Katjavivi 1988; Werner 1998). The second war would subsequently be the SWAPO war of liberation (1966-1989) against the South African occupation. The latter perspective is to a large extent influenced by progressive and history-materialistic theory (Drechsler 1980; Mbuende 1986; Katjavivi 1988). More recent research has attributed the uprising to psychological reasons of settler paranoia (Gewald 1999, p. 191).

The German policy of divide and conquer affected not only the Otjihererospeaking groups of Namibia, but came to involve a substantial part of the indigenous Namibian population (Bley 1971; Drechsler 1980). The uprising turned into a war that
lasted until 1907 and which broke all resistance to German colonisation. The wars of 1904-07 have traditionally been considered as two wars; i.e. the German-Herero war of 1904-5 and the German-N/ama war of 1905-07 (Drechsler 1980). The use of ethnic labels for differentiating between two contemporary conflicts has been questioned. Henrichsen (2005) stresses that the use of ethnic labels is based on a general assumption of Africa inferring that “the reasons and genocidal consequences of these conflicts could be attributed to these ethnic designations only”. Drechsler (1980, p. 159) have noted that “it was irrelevant whether those attacked had been involved in the war or not and whether they were Herero, Bergdamara or San (“Bushmen”)—the German soldiers were anyway incapable of distinguishing between them”. In addition it can be assumed that the uprising populations were ethnically and linguistically mixed (Chapter 7).

Herero, at the time led by the paramount Chief Samuel Maherero (Pool 1991), initiated the uprising in January 1904. A number of German farms and military posts in the central parts of the country were attacked (Drechsler 1980, pp. 142; Pool 1991, p. 209). The revolt spread and shortly after, farms elsewhere in the country were attacked (Pool 1991, p. 207). Although lacking a general strategy and organisation, the Herero seem to have been unexpectedly successful in the first weeks of the rebellion (Bley 1971, p. 149-150), but over time German military reinforcements of the Schutztruppen and the arrival of more experienced leadership resulted in that the colonial troops could take over the initiative (Drechsler 1980, p.156; Pool 1991, pp. 219).

In August, following a series of larger battles, a large group of Herero and Mbanderu had aggregated near the Waterberg plateau on the western edge to the Kalahari (Drechsler 1980, p. 154; Mossolow 1993; Gewald 1999). A series of important well sites were located in the area surrounding Hamakari. The chief battle of the war was fought around these wells on 11 August 1904. The German ambition in the battle was to take control of the water points and to achieve the final destruction of the resistance (Bley 1971; Drechsler 1980). The German troops failed to achieve this ambition, however, as the enclosed Herero and Mbanderu managed to break out and flee with their livestock (Drechsler 1980, p. 155). The weeks after the battle was again characterised by smaller skirmishes between the pursuing German troops and smaller groups of refugees who moved to the northeast and east towards the Omaheke (Bley 1971, p. 150; Gewald 1999, pp. 170).

The Poverty of Omaheke

Some authors have argued that the Herero break through at Hamakari was intended, and consider it as the first phase of a vicious German war strategy with ambition of channelling the Herero out to the waterless “Omaheke desert” (e.g. Drechsler 1980). The second phase of the strategy was to seal off the area by a defence line along a series of waterholes situated on the western and southern fringes. On 2 October 1904, the German military Commander General Lieutenant von Trotha formulated an extermination order, which has become known as the Vernichtungsbefehl. In the order it was declared that all Herero, whether armed or unarmed, whether women, men or children, with or without cattle would be shot at if caught on German territory (Drechsler 1980, p. 156-157; Gewald 1999, p. 172-73). von Trotha clarified his order by stating that “shots at women and children means firing over their heads to drive them away. I am in no doubt that as a result of this order no more male prisoners will be taken” (cited from Drechsler 1980, p. 157). The following morning at dawn, the Herero prisoners were hung in the presence of about thirty children and women who were later sent away with copies of the order translated into Otjiherero. As the next step, in order to keep the Herero away from the water sources, the Germans initiated search patrols (Rohrbach 1907). The objective of the campaign was that the Herero would meet a slow agonizing death in Omaheke (Drechsler 1980, p. 156).

According to this view, the dryness of Omaheke became an active part of the German war strategy;

“No pains, no sacrifices were spared in eliminating the last remnants of enemy resistance. Like a wounded beast the enemy was tracked down from one waterhole to the next, until finally he became the victim of his own environment. The arid Omaheke was to complete what the German army had begun: the extermination of the Herero nation” (Kämpfe in SWA, vol. i, p. 207 cited from Bley 1971, p. 162).

Post-war accounts establish the success of the strategy by pointing out that the “Armut der Omaheke” (i.e. the Poverty of Omaheke) resulted in heavier losses for the Herero than the battles of the first half of the year (Deutsches Kolonial-Lexikon 1920 Band III, p. 248). The oral tradition illuminates the great suffering among the people who escaped through Omaheke (e.g. Pool 1991, pp. 276; Webster 2001).

Much historical research on the war has been devoted to estimating causality figures (e.g.
Drechsler 1980, p. 165-66; Pool 1991, p. 278). The research focus is not surprising, since the war also represents one of the first examples from the modern era of a “deliberate policy of genocide” (Gewald 1996, p. 2; Melber 2005). However, it is difficult to estimate how many the Herero and the Mbanderu were before the war. Using numbers provided by the mission stations, it has been calculated that the Herero population in the 1870s were approximately 60 000-80 000 and that the Mbanderu counted 10 000-20 000 (Irle 1906; Pool 1991, p. 279). Although debated, up to 40 000 Herero and Mbanderu with 60 000 heads of livestock are said to have aggregated at Hamakari before the battle and the escape through Omaheke (Pool 1991, p. 279). According to the official numbers of the German government in 1912, the Herero population of the colony was 19 721 (Pool 1991, p. 280).

Authors have questioned whether the war really represents a case of genocide (Poewe 1985; Lau 1995b). They stress that the genocide theory is theoretically stereotyped, based on ambiguous data sets and fail to acknowledge the propaganda involved with the British/South African takeover of the country in 1915 (Poewe 1985, pp. 57; Lau 1995b, pp. 39). Tilman Dederer (1993, p. 80) have reviewed the debate and in his conclusion questions whether this is a sign of Namibian historiography coming to a full circle, as the progressive historians in Namibia defend ideas which customarily have been associated with right-wing authors. Based on the explicit order by von Trotha, on confirmed cases of hangings of prisoners of war, the reluctance to take care of suffering and unarmed civilians and attacks on settlements (for examples see Bley 1971, pp. 260; Drechsler 1980, p. 157-62; Wilmsen 1989a, p. 145; Pool 1991, p. 271), there is firm evidence for considering the campaign of 1904-5 as an attempted genocide. If the genocidal activities were part of an official strategy, whether they reflect the panic and frustration of individual units of young and inexperienced soldiers operating and suffering in a foreign country, or a combination of both (e.g. Frenssen 1908) is a question that goes far beyond the scope of this thesis (see Melber 2005 for a discussion).

The issue I wish to point out, however, is that much research on the war, in similar ways to the Kalahari ethnography, has used the dryness and the unsuitability of Omaheke as a primary variable for historical explanation (Bley 1971; Drechsler 1980; Mbuende 1986; Katjavivi 1988; Pool 1991). Through this, they have followed what can almost be considered a general rule in African research, namely to use the environment as “an explicit or subtle subtheme” for historical explanation (McCann 1999, p. 9). The determinism implied effectively succeeds in robbing the Herero and other peoples of Omaheke of independent action and thought (Gewald 1996, p. 4).

A closer look on the war historiography shows that in contrast the Kalahari ethnographers who carried out detailed and qualitative ecological studies, the environmental variable is largely based on written sources or plainly on pure assumptions associated with the “Omaheke desert” (Drechsler 1980, p. 155). In addition, still concerned with the written accounts from the aftermath of the war, it is not unlikely that the Omaheke war strategy was created ad hoc, used as propaganda, to rebuild the reputation of the German army. The purpose may be to draw the focus away from the failures of the early part of the conflict. The lameness of the administration had attracted critique in Germany, in turn resulting in that the whole colonial project in Namibia was questioned and the future support to the colony was put at risk (Bley 1971, pp. 174, 255; Gewald 1999, pp. 196). Nevertheless, while Omaheke was used to re-establish the reputation of the army, it does not seem improbable that the narrative of a hostile environment may have helped to obscure possible genocidal activities of the Schutstruppen. An additional problem associated with sole reliance on written evidence is that the proposition of the impassable Omaheke desert never can be tested.

It is known that the whole region experienced increasingly drier conditions during the last decade of the nineteenth century (Passarge 1905a; Nicholson 1996). October, the month for the beginning of the German campaign inside Omaheke is the driest month of the year. In addition, the refugees seem to have dispersed and to have been aware that they risked being attacked by German patrols if they stayed too long at the well-known water places. The German patrols used indigenous guides who seem to have had knowledge of the location and the place names of the water places in the area (Rohrbach 1907; Wilmsen 1989a, p. 145). Consequently, it must have been difficult to find sufficient time for the digging of wells and to gain water for people and livestock. This does not mean that it was impossible to find water. In January 1905, German patrols found several well sites on the southern fringe of Omaheke where “some seem to be enduring (…) or yet if they are filled, they can still be opened again” (Rohrbach 1907, p. 91).

Bley (1971) estimated that only a thousand Herero managed to cross the Omaheke in 1904. Pool estimates that 1175 arrived to Bechuanaland (Pool 1991, p. 280). In her criticism of the genocide theory, Lau (1995b) referred to Pennington and Harpending’s (1993) demographic research in Ngamiland. In their calculation, they used recon-
struction and projection based on the census in Botswana 1946, together with the numbers of a census in the 1970s. The study indicated that 6-9000 Herero, a much larger group than previously thought, managed to reach Botswana (Pennington & Harpending 1993, pp. 223). One objection to the calculation is that it seems to be based on the presumption that all Herero in Botswana were related to the refugees. Thus what may be forgotten is that a substantial number of Otjiherero-speakers were living in the general area before the war. Previously in this chapter I have reviewed sources that indicate that Otjiherero-speaking peoples with cattle were present in both the southern and the northern parts of Omaheke in the end of the nineteenth century. If these accounts can be considered significant, they imply that these people must have lived in places and travelled along paths that correspond with the routes that were later used by the refugees. In the same paper, Lau argued that the escape routes over Omaheke were “well known by Herero and had, in fact, been travelled for centuries” (Lau 1995b, p. 50), and if Wilmsen (1989a, 2003) and (Gewald 1999) are consulted, a number of indications that support her notion can be gained. Nevertheless, Lau also noted that no routes used in the escape have been traced or surveyed (Lau 1995b, p. 50).

The Epukiro Native Reserve

Directly after the war, the peoples that had participated in the uprising were used for forced labour. They were not allowed to own land or raise livestock and from the age of seven, they had to wear numbered metal pass tags around the necks (Drechsler 1980, p. 231; John Kinahan 1991, p. 122). The intensity of the German patrols in Omaheke decreased when the Oorlam-N/ama initiated their uprisings in the south, but still in 1912, German patrols were sent out for looking for small groups of Veldhereros in order to draw them into colonial control (Rohrbach 1907; Müller 1912; Werner 1998).

After 1915, when the South African army occupied and took control over the country, many Herero returned from Omaheke and Bechuana-land in an attempt to return to the settlements where they had stayed before the conflict. However, the central parts of the country and the well-watered area north of Gobabis had been developed into a farm district for European settlers. Consequently, many of the old Herero locations were situated on the lands of the newly established European farms. The land question involved some acute problems for the new administration of South West Africa, as Namibia was referred to at the time (Krüger & Henrichsen 1998, pp. 150). The result was a rigid control system in which certain areas of the country were set aside for specific ethnic groups (Hayes et al. 1998). The question of allocating land for indigenous peoples arose already in the 1890s, both in Namibia and in Botswana (Schapera 1943, pp. 9; Drechsler 1980, pp. 114). In Botswana, Proclamation no 9/1899 established the Ghanzi farm block for European descendants farmers on a well watered limestone ridge in the south; meanwhile, the Tawana reserve incorporated the area north of the farm block, from the national border to Namibia and over the Okavango delta, i.e. the current Ngamiland district (Schapera 1943). In Namibia, reserves were primarily demanded by the German missionary societies. The missionaries were worried that the whole territory would be under settlers and therefore they argued the importance of the indigenous groups retaining at least as much land as would ensure the continued existence of the Mission stations (Drechsler 1980, p. 114). The German imperial proclamations of 1898 and 1903 made provision for the establishment of areas for exclusive occupation of indigenous population groups, although the war in 1904-07, which to a large extent was a reaction to this legislation, delayed the realisation of the plans (Werner 1998).

A common opinion among the colonisers was that the indigenous nomadic land-use suffered from a general lack of order: “It was not easy to say at any one time how far these vacant lands could be said to have been occupied by Natives, or what particular natives” (Lord Hailey 1948, cited from SWA 1964, p. 67). The notion of conflict was actively used by the German and later by the South African colonial administration for making their own occupations legitimate; “The Hereros and the Nama were hereditary enemies and had fought each other almost continuously until Germany took the country over and placed its capital, Windhoek, between the two tribes” (Marquard & Standing 1939, p. 244; see also Lebzelter 1934, p. 18; SWA 1964, p. 33). The presumed competition and conflict between different groups did not only appear in the official records, but also in the ethnography, where it was noted that land issues and conflicts “played a conspicuous part in the inter-tribal relations” (Schapera 1943, p. 9; Hahn et al. 1928, Bruwer 1966). It was suggested that the best medium for creating control and welfare were to impose “a check upon further territorial expansion”, and set aside areas “for the Natives on certain terms” (Schapera 1943, p. 9).

In 1921, the League of Nations granted South Africa a formal mandate to administer South West Africa. Involved in the responsibility was the welfare of the indigenous peoples of the country - a duty which included the provision of lands “for exclusive occupation and use by the native population” (SWA 1922). The Native Reserves could not be subdivided
into farms, as they should be occupied on the basis of traditional communal ownership (Werner 1998). Certain traditional forms of individual rights over particular pieces of land could exist, however (SWA 1964, p. 27). Consequently, the following year, the Epukiro Native Reserve was declared to be set aside for the Otjiherero-speaking Herero and Mbanderu. The intention was to accommodate people from the Windhoek and Gobabis districts and to settle so called Herero Crown Land squatters (Köhler 1959a). The land reform of 1922 had resulted in that certain areas were reserved as government owned Crown Lands, for nature conservation. In the Crown Lands, domestic animals (except dogs) were prohibited and hunting with firearms restricted (SWA 1922). The colonial project required not only control of people but also of the nature (Adams & McShane 1992).

New farms for European descendants were established in the farmland area of Omaheke up until the early 1930s “by which time the commercial farming block had taken on more or less the shape it has today” (Suzman 2001, p. 13). Many farmers were descendants of the Afrikaners who had trekked to Angola in the nineteenth century. However, in 1928-29 they had been forced to leave Angola for northern Namibia. From here, the South West African authorities relocated them to the farm district north of Gobabis (Hartmann et al. 1998, pp. 61-3), although some of the Afrikaners settled in the farm block in the Ghanzi District of Botswana (Russell & Russell 1979). Since the farms in the area had a constant need for labourers, the general idea was that the Native Reserves should contribute with this (Werner 1998).

The reserve made it possible to control the population and their production. Restrictions were imposed on the types of activity that the reserve residents could undertake and detailed inventories of livestock numbers, grazing fees, taxes, schemes for dairying and livestock auctions were maintained (Werner 1998). Wolfgang Werner (1998) argues that the purpose of the control system was to keep the residents of the reserves poor. Silvester, in turn, stresses that the “legislative obliteration of the black pastoral economy (...) aimed at removing the threat for competition for white settlers and creating a malleable labour force” for white farms and in industries of urban centres (Silvester 1998, p. 98).

In contrast to the intention of the reserves, the residents did not seem keen to leave them to work on the farms. The Chief of the Reserve superintendents pointed out that the reserves are for elders and children and “not intended for young able-bodied natives (...) [who] should go out and obtain work” (NNA A 158/131). The establishment of a formal contract worker system and firm legislation against idleness and vagrancy aimed to draw in labour from the native reserves and throughout the twentieth century, the reserves secured an “adequate and cheap labour supply” for the farms (Suzman 2001, p. 12; Gordon 1998, pp. 54; Werner 1998). The colonial authorities also encouraged farmers to employ Bushmen on their farms. It was widely believed that once “tamed”, Bushmen would become good and loyal farm labourers (Gordon 1992, pp. 137-40; Suzman 2001, p. 12). However, the encouragement took horrible forms. Bushmen were beaten or caught in order to make them farm workers. Suzman have addressed how the Ju’hoansi in Omaheke still relate armed missions undertaken by farmers to capture “escaped” workers, acquire new labourers or for finding playmates to their children (Suzman 2000, 2001, p. 12).

In an area that today designates the Eiseb Block, a double cordon fence demarcates the red line or the northern boundary of the old Epukiro Native Reserve and at the same time, the outer extents of the Police zone. Police zones had been established by the German authorities already in 1906. Theoretically, the Police zone implied that people within the zone were under Police protection (Silvester et al. 1998, p. 3). The Native Reserves were generally situated within the Police zone, although “Bantu laws and custom are (...) in force and the Government exercises a minimum of control—just sufficient to prevent inter-tribal war and crimes of violence” (Marquard & Standing 1939, p. 247). The purpose of the fence was also to prevent domestic stock and game that were infected by diseases to migrate towards the southern parts of the Omaheke. At the same time, the fence prevented Herero herd-ers from encroaching on the Crown Land in the north. For this reason, the fence can also be considered as separating the past authority of the Departments of Bantu Administration and that of the Nature Conservation (Gordon 1992, p. 165; Fig. 4.2.).

During the twentieth century, an increasing number of ethnographical studies and surveys was carried out that directly or indirectly tied in to the Bantu-, Khoekhoen- and Khoesan-speaking peoples in Omaheke (e.g. Kaufmann 1910; Dornan 1925; Bleek 1928; Hahn et al. 1928; Schapera 1930, 1937; Lebzelter 1934). Judged from the reading of these sources, the objective of the studies in most cases seems to have been to reconstruct the traditional ways of the indigenous communities and how they had appeared in the period before the colonial era and the devastating wars. After 1926, the Administrator of Southwest Africa became the Supreme Chief of all Bantu tribes. He was advised by a council where one of the members was required to have anthropological skills and special knowledge of
“non-European affairs” (Marquard & Standing 1939). An inventory of ‘wild Bushmen’ was ordered by the High Commissioner’s office, in collaboration with the Anthropology departments of South African Universities and the Native Affairs Department (NAN 1939a). From the police station in Witvlei the commander reported “I beg to report that the type of Bushmen referred to in the questionnaire by Prof. Schapera does not reside in this area” (NAN 1939b), the commander in Steinhausen expressed on the other hand that “There may be wild Bushmen to the north of the Epukiro Native Reserve, outside the Police zone” (NAN 1939c), i.e. in the Crown Land overlooking the legislation of the Native Affairs. The depression and the Second World War resulted however in the delay of the ethnographical inventories (Schapera 1943, p. vii).

From having been recognised as “cattle raiders”, “parasitic”, “wild animals”, or a “bastard race” the Khoesan peoples of Omaheke became a larger concern for the colonial administration during the early part of the twentieth century (Gordon 1992). The motives for this, however, were slightly different from the reasons for establishing the Epukiro Native reserve: “With the death-knell of these people ringing, one wishes that there was a reserve for them (...). A reserve where they can live in peace and where they can maintain their lifestyle so important for scholarly research” (Deutsche Kolonial Zeitung 1909, p. 452 cited from Gordon 1992, p. 60). However, it would take over fifty years before the plan of a Bushman reserve was realised. Provisionally and as long as they did not use firearms for hunting nor kept livestock, the Ju/'hoansi could stay in the Crown Land nature conservation area.

After the war, the grand “era of the ‘Ethnographic Survey of Africa’” was initiated (Harney-Sievers 1999, p. 495). This period was characterised by extensive ethnographical research, not only in the Kalahari, but also in other parts of the African continent. As already described, the first foreign ethnographers to arrive in Omaheke were the Marshall family who reached the Nyae Nyae in 1951 (Marshall 1976; Wilmsen 1999a). At Cho/ana, the government had established a border post to the Crown Land overlooking the truck road to the mines in South Africa, presumably, the same road Axel Eriksson used for bringing cattle from Angola back in the 1880s. When they arrived, however, they noticed that Herero and Tawana herdsmen with livestock were present at several places in the Nyae Nyae area. In view of the fact that the area was legislated Crown Land, their presence was illegal. In 1957, after complaints from the Ju/'hoansi residents at Gautscha, the ethnographers intervened. The Police in Windhoek was contacted about the encroachment and they sent a patrol to Gautscha. The Police shot the livestock and forced the livestock herdsmen to cross the border to Botswana (Marshall 1976; Kandjii 1996; Wilmsen 1999a).

In 1959-60, a settlement programme was initiated in Tsumkwe. The purpose was to turn the Ju/'hoansi into settled food producers and wage earners (Hitchcock 1996, p. 17). However, the settlement scheme in Tsumkwe resulted in major social disruptions, alcohol dependency and violence. The relocation also had some additional consequences for the Ju/'hoansi. The Nyae Nyae area again became attractive for nature conservation efforts. In the same period, the Kaudum Game Reserve was established (see Fig. 3.2.). Since it was a Game Reserve, human activities became restricted within the area. This means that no settlements were allowed, except for the tourist camps and the camp for the Park staff. Further, the local communities were not allowed to hunt, gather or keep livestock in the area. At the same time, several game water points were drilled in the Nyae Nyae and plans for a grand Bushmanland Game park were formulated (Powell 1998, pp. 108).

In 1962, the South African Prime Minister Verwoerd appointed the Odendaal Commission of Enquiry, named after its chairman F. H. Odendaal, to investigate social, economic and political conditions in Namibia (SWA 1964). The objective of the Odendaal Commission was to integrate the territory of Namibia more closely with South Africa. The Epukiro Native Reserve was enlarged in its western, northern and eastern parts, comprising an area of 45 000 square kilometres and changed name to Eastern Hereroland. At the same time, the Crown Land in the north become formally established as the reserve Eastern Bushmanland for the Ju/'hoansi. Regarding the Ju/'hoansi and other Khoesan speakers who had lived outside the Native Reserves, it was expressed that “So much of the nomadic urge and way of life still survives, however, that this must be treated with the greatest possible measure of sympathetic understanding in the approach to their development” (SWA 1964, p. 31), and “change can be brought about only through a process of evolution” (SWA 1964, p. 295). The Odendaal commission also recommended improvements of the existing reserves concerning water, grazing, taxation, livestock production and schooling (SWA 1964, p. 297).

The Odendaal commission is usually considered responsible for the introduction of apartheid in Namibia, which resulted in the further disintegration of the peoples in Omaheke. In 1976, Eastern Bushmanland was again proclaimed a Nature Conserva-
Fig. 4.2. Epukiro Native Reserve 1955.

The result was that Omaheke was divided into distinct land-use systems. In the Dobe area of Botswana and Hereroland, the land-use was more or less based on labour intensive livestock farming. In Bushmanland, the policy focused on environmental conservation (Powell 1998, p. 110). In the Ghanzi and Gobabis farm blocks, the land-use focused on commercial livestock farming.

Profound changes

It is apparent that the main body of ethnographic evidence was collected in the period after “the most far reaching and profound changes in the social life” (Lau 1994, p. 1) of the peoples of southern Africa; the period of European expansion, the rinderpest of 1896-97 and the forced introduction of colonial rule in 1904-07. This resulted in the native reserves and that some people were caught in nature conservation areas. Moreover, as Wilmsen (2003, p. 96) has pointed out; during the 1930s-1950s it was a deep trade recession in the area associated with world depression and war, and

“It was at the end of these depressed decades with their atypical economic conditions that modern ethnographies of disengaged Khoisan foragers were written. When Botswanacraft, a parastatal crafts purchasing organization, began buying local products again for a revived world market in the early 1970s, local economies recovered to some extent and several Khoisan families prospered modestly by investing craft sales profits in livestock”.

A general trait of the colonial era in Namibia is that it completely lacked a historical explanation or discussion concerned with the history of the indigenous peoples (Werner 1998, p. 23). In addition, the period was characterised by a general inability to acknowledge the repercussions involved with the colonial project. Instead, the past was characterised as static and a period of tribal unrest and conflict that was only ended by the European interference. Mixed populations were assumed to result in conflict, as the one recorded in Gautscha in 1957 and the colonial authorities endeavoured to prevent conflicts in order to maintain control and stability. The ethnic structure and the lack of historical frameworks helped to produce a static image of the peoples in Omaheke and a view in which the peoples in the periphery represented a more or less original land-use organisation.

Hence, Omaheke was probably not only what the arriving explorers, traders, colonisers and an-
thopologists saw in the region, but also what they have learned to see. This learning process should be understood as intimately linked with the history of European exploration, colonialism and the scientific projects of developing a language for perceiving and representing some specific qualities of Omaheke that has been important for the Euroamerican experience of Africa (Fabian 1983; Kuper 1988; Adams & McShane 1996; Gordon 1992, 1997; S. Brooks 2005). It is however important to note, as Lentz (1998) does, that the colonial framework accommodated several ethnic discourses which interacted and fed into each other and that the indigenous peoples should not be considered as passive receivers in this process (see also Hayes et al. 1998; Werner 1998; McGregor 2005).

Nonetheless, from this background I argue that the common notion of Omaheke, as inferred in the Kalahari ethnography and in the historiography of the war 1904-07, which implies a dry impassable barrier unsuitable for livestock herding, may be open to question. This idea seems to be a direct result of the larger events that characterised the turn of the twentieth century and onwards, and related to presumptions sprung from the colonial history and legislation of the area.

In order to test this hypothesis I will now turn to the unrecorded history of Omaheke.
Wells of Experience
Chapter 5

THE ARCHAEOLOGICAL SURVEY

The archaeological survey was preceded by field visits to known archaeological sites located in the Nyae Nyae area and in the commercial farming district in the south. Along with the field visits, two minor reconnaissance surveys were undertaken along the Otjozondjou and the Eiseb Omiramba (Fig. 5.1.). The purpose was to prepare for the survey by gaining a general introduction to the Kalahari environment, to the known archaeological record and to see how different archaeological sites appear in the landscape. I am grateful to John Kinahan who tutored my initial experience of Omaheke.

Since the Nyae Nyae area had been surveyed relatively recently (Kinahan & Kinahan 1984), the survey was more comprehensive in the southern parts of the research area. Owing to external circumstances, for example the time schedule and the accessibility of certain places, most time was spent in the communal lands. Both random and more structured survey strategies were used. Parts of the research area were systematically foot walked by covering the ground at transects intervals, spaced depending on the thickness of the vegetation cover. The area foot surveyed in detail cover approximately 80 sq. km (Fig. 5.1.).

As the activity of digging wells is a living memory in present day Omaheke it seemed valuable, if not necessary, to incorporate knowledge from people who keep livestock in the area today, in order to acknowledge their first hand experience of certain issues. Discussions with people met in the field were undertaken as a part of the survey in all visited places. Most of the time in the field was spent at small cattle posts in the communal lands together with people identifying themselves with a variety of ethnic groups tending goats, sheep and cattle. Given that the survey method came to be associated with the knowledge of people living in the study area, it is necessary to outline the social context and to introduce some issues involved in working with oral evidence.

In archaeology, studies of contemporary cultures have been undertaken since the later half of the nineteenth century (e.g. Nilsson 1866). The main purpose for this has been to address functional issues of the archaeological material and to formulate analogies to the past. However, the approach did not become formalised until the 1960s (Binford 1968, 1983, p. 23; Kramer 1979). In general, the ethnoarchaeological approach focuses on the development of hypotheses and theories concerned with how the archaeological artefactual material is produced, structured and transformed by the investigation of a contemporary community (e.g. Yellen 1977; Binford 1983). Ethnoarchaeological studies have also been carried out by archaeologists interested in symbolism and normative behaviour (e.g. Hodder 1982a, 1982b; Wadley 1987; Kent & Vierich 1989; Kent 1992; Whitelaw 1991). More recently, archaeologists influenced by post-modern and relativistic thinking have used ethnographical examples for criticising some certain aspects of modernist science and archaeology (e.g. Tilley 1994).

Lately, several authors have argued the importance of accommodating alternative knowledge systems within the scientific frameworks. In ecology, concepts such as Traditional Ecological Knowledge, Indigenous Knowledge Systems and Local knowledge or Ecological practice appears frequently (Brokensha et al. 1980; Berkes et al. 1995; Chambers et al. 1989; Warren et al. 1989; Nyerges 1997; Bollig & Schulte 1999). Local knowledge is a social product, which in contrast to the universal claims of scientific knowledge, is closely linked with, or even restricted to the practice of a specific cultural and environmental context (Berkes & Folke 1998; Bollig & Schulte 1999; Sullivan 1999a; Homann & Rischkowski 2001). The intention is to acknowledge the first hand experience of local land-users and to construct a platform for facilitating discussions between scientists, development practitioners and the local community (Barrow 1996; Dahlberg 1996; Leach & Mearns 1996; Fairhead & Leach 1996; Berkes et al. 1997; Powell 1998; Bollig & Schulte 1999).

In archaeology, local knowledge approaches have been used for defining alternative, non-artefactual ways for archaeological visibility, or for problematising and extending the definition of what can be considered an archaeological record or cultural heritage (Jonsson 1998; John Kinahan 2000, 2001; Ndoro 2001; Lindholm 2003; Ekblom 2004; Sinclair
Figure 5.1. The research area, archaeological survey areas and the two excavation sites are indicated on the map.

2004; Jill Kinahan 2004; Macamo 2005; Karlström 2005; Molin 2005). To a large extent these works goes in hand with the ambition to move the focus of archaeology to an indigenous point of departure and address issues of identity and history.

Oral testimony associated with the wells, mainly from present day Herero livestock owners have been used to gain insights to the knowledge and the practice that is coupled to livestock wells. An additional task was to construct hypotheses concerning the archaeological record and to provide dates for the use of the wells. On most occasions, the interviews were carried out through a translator and for this reason, a semi-structured questionnaire was prepared and used as a framework for the discussion (Floquet & Mongbo 1993, p. 15; Tobias 2000). Through this, the discussions was organised by a check list method in which the respondent would be able to answer in short terms, for example; -what is the name of the well? -who dug the well? -how was it dug? –is there a story associated with the well? All answers were followed up with why and how questions. When possible, the interviews were carried out close to the well in question. This strategy seemed to be most effective when carrying out interviews through a translator. English was a second or even third language for all involved; hence questions were reformulated and repeated several times during the discussion in order to reduce the discrepancies related with the translation. In the text, reference will
be given to the people who shared their knowledge about the wells and the past in Omaheke (Appendix 1). References in the text will be given either by name and date, with initial and date or with a series of initials if the reference is concerned with an account given by more than one informant. References to Anonymous will be used in cases where the information provided can be considered as sensitive.

Through the focus on practice associated with wells, my key informants were inter alia elder Herero men who were young in the 1940-50s and participated in well digging activities. Through a series of interviews and talks, as well as by visiting their homesteads, I have engaged in discussions about the wells. Unavoidably, I have also discussed the past and the present of the life in Omaheke in more general terms. From a gender perspective, the landscape that will be projected is largely a male Herero landscape. Most likely, because of the focus on the wells, interviews with older women have mainly dealt with the practices of their husbands, fathers and grandfathers. However, this does not mean that a gender perspective is not applicable in a study of wells. Quite the opposite, since the wells may be a profitable platform for future studies on gender and on class relations in Omaheke.

Some of the group of elderly men who acted as key informants can be considered as prominent in the Herero society. They have extensive herds and often they have privileged positions within the traditional structures; they are Chiefs or Councillors in one of the Ovaherero Royal Houses, or they are keepers of the Okuruwo, the holy fire, at which the ward establishes contact with the ancestors for advice and help (Plate 5.1.; Irle 1906; Vivelo 1977; Kinahan 2001). A second group of informants do not directly tie in with the traditional structures of the Herero society. This group seems to focus more on agriculture, ranching and commercial aspects of the cattle economy. They breed stock for shows and auctions and they seem to have stronger relations with the city and are active in farmer organisations.

The cattle-post system in Omaheke is labour intensive. On the posts, relatives of the owners often take care of the actual work with the cattle. Often the relatives are young unmarried men, periodically working in the towns or on the farms in the commercial farming district. In general, most Kalahari residents seem to appreciate family ties in regard to working with cattle (Russell & Russell 1979; Wilmansen 1989b). In practical terms, as my assistants in the field can be associated with this group, my research process was closely linked to them. In this way I obtained insight into their work; we transported fodder and spare parts for trucks or pumps to the boreholes; we visited cattle posts, examined sick cattle and transported Omaere (Otjiherero; soured milk) from the posts to Otjinene, the main village in the southern part of the research area. Occasionally, I could assist in the work with watering, branding and moving cattle. Together with the workers at one cattle post I participated in the opening of a well. A participatory research approach was an effective way to address and gain insights into practical aspects of cattle herding in Omaheke (Chambers 1992).

Additional workers are also needed within the current cattle-post systems (Bollig 2000). The contemporary cattle posts in Omaheke are for this reason populated by workers of non-kin and their families (Plate 5.2.). In the few cases where the workers have their own stock, it is only a few goats or sheep. The ethnic identities of the workers vary; they are Herero, Ju/'hoansi, Damara, Nama, Ovahimba or Ovambo. Even workers from more distant areas in Zimbabwe and South Africa can be found on the cattle posts in Omaheke, indicating how far people in southern Africa may travel for the chance to generate income (Lindholm pers. obs.). Master Kau (2001), one older Herero informant, stressed that until 1931, when a few Ovambo came to work in Omaheke, the workers of the cattle posts were exclusively from Omaheke, mainly Herero and Ju/'hoansi.

The workers are paid in money and with food, but often they add to their subsistence by a generalised economy. To mention a few examples, they sell craft, hunt, gather, wash clothes, collect and sell devil’s claw, or clear bush in order to make and sell fence poles in the commercial farming district. Many workers, especially Ju/'hoansi may have stayed at a single Herero family’s cattle post for a considerable time (Lindholm pers. obs.; Köhler 1959a, p. 49). Ethnographically, since the group is well represented among the farm workers in the commercial farming district as well as on the Herero cattle posts in the communal lands (Guenther 1976), Ju/'hoansi working on the cattle posts have usually been considered as examples of “tame”, “acculturated”, “non-traditional” or “assimilated” hunter-gatherers. Recent research questions this view, however, and acknowledges a larger complexity in the construction of identity (Suzman 2000). During talks and two longer interviews with one older informant, I have also tried to approach them and discuss their view on the wells and the past and present of Omaheke.

As my interest in wells was noted, people came to me in order to share their knowledge of wells, or to bring me to wells that they knew about. Approximately 50 % of the wells were found with the assistance of the local community. However, this

The archaeological survey
is not surprising, since many of the wells have been used until recently, or are still in use today for temporal grazing or for when the borehole pumps break down. For this reason, rather than being considered
as strictly archaeological features, the majority of the wells mapped in the survey might be better understood as recently or temporarily abandoned, still conserved in the herder’s landscape.

At the middle stage of the survey (in November 2002), one minor excursion was undertaken to places situated outside the main research area within the neighbouring catchment, the upper Omatako basin. The motive for surveying in this part of Omaheke was to acquire insights that could be compared with the well sites from within the Okavango–Epukiro basin. Primarily the excursions helped me to define qualities that characterise a well site, but they also helped me to understand variations, scales and similarities between well sites from different parts of Omaheke.

Studies of vegetation composition and structure and soil chemistry were carried out during the survey. The vegetation study was prepared by a visit to the National Herbarium in Windhoek. All classification of vegetation was carried out in the field without any impact on plants. The geochemical method was based on the reflectoquant spot-test method, where the analysis can be done in the field by using portable and cost effective test-kits (Persson 1996, 1997). The instrument used for the analysis of the soils was Merck’s Reflectometer Rgflex and Reflectoquant phosphate, nitrate, nitrite and pH sticks.

To combine archaeology and ecological studies with the knowledge of people working in the current cattle post system turned out to be an effective strategy for the archaeological survey. Already in the early steps of the survey I was able to note a series of characteristic qualities of the wells in terms of topography, geohydrology and vegetation structure. In the continuing survey, remote sensed data i.e. satellite images was used for identifying areas exhibiting characteristics that was similar to the well areas. Low-lying areas were defined by digitising the outer limits of surface water bodies from the rainy season of year 2000. The amounts of rainfall that year were about 40 % - 90 % above the annual average; hence, large areas of the drainage system were submerged. Outcropping calcrite, joints in the river valleys and thick vegetation-cover presumably drainage lines were noted on the maps. By this strategy I was able to predict a series of possible well areas, which could be surveyed. A site was classified as a well site only after visible well structures had been found. In addition to the wells, a series of other types of archaeological sites were identified in the survey and I will present these later in this chapter.

**Historical sources**

Historical sources were used for tracing wells and place names that were retrieved in the archaeological survey. In addition, historical sources were used to identify wells in areas not surveyed during the study. The sources consisted of archival material from 1907-1955, mainly concerned with the administration of the Epukiro Native Reserve stored at the National Archives in Namibia. The official reports by O. Köhler (1959a, 1959b) from the Ojituto and Epukiro Native Reserves provided maps and descriptions that could be compared with earlier accounts from the area and the results from the archaeological survey. The works of K. G. Büttner from 1883 and J. Irle from 1906 were used to understand the cattle economy and the well digging techniques of the nineteenth century Herero. Siegfried Passarge (Passarge 1905a; Wilmsen 1997), Paul Rohrbach (1907), Hans Kaufmann (1910) have been used for tracing wells and places names mapped and collected in the archaeological survey.

Historical maps such as Langhans’s Deutscher Kolonial Atlas in Vier Blatter (1894), von Deimling (1906), and foremost the 1904 Kriegskarte von Deutsch-Südwestafrika (hereafter Kriegskarte 1904) have been used in the study. The Kriegskarte originated during the rebellion of the indigenous population in January 1904. The General Staff in Berlin commissioned the urgent compilation of a map that would provide detailed geographical information for the German troops during their campaign. The Kriegskarte’s mapmaker, Dietrich Reimer, had the opportunity to use a wide range of data: the accounts and published maps by travellers, unpublished cartographic material from the colonial office and the trading companies as well as maps by well-known cartographers. As discussed before, these accounts were most likely written in interaction with the local communities. The Kriegskarte is a complete map of Namibia at the scale of 1:800000, indicating roads, surface water, dunes and villages. Moreover, the map lists more than 4000 original place names mainly in Otjihero, Nama and Damara1 (von Schumann & Rusch, 1987, p. i). For this reason, the map can be considered as a good summary of the geographical knowledge of Namibia acquired by the Europeans in the period 1820-1904.

**Site documentation**

The central points of all archaeological site indications were recorded by a handheld Global Position-
ing System (GPS) instrument (Garmin 12), as well as plotted on 1:50000 topographic sheets. Surface documentation by drawing plan and section was undertaken at selected sites. Two minor test pit excavations were undertaken at two well sites (National Monuments of Namibia, Permit 11/2004). The purpose of the excavations was to test whether it was possible to gain direct chronological information from well sites. The first excavation at the well site Ozombu Zo Vindimba resulted in no chronological information, although it provided insights in the hydrogeological processes that constituted the site. The second excavation was carried out in Otjonzonedema and here it was possible to obtain datable archaeological material (Fig. 5.1.; Chapter 7). The analysis of the archaeological material was undertaken at the institute for African and Comparative Archaeology (ACA), Dept. of Archaeology and Ancient History, Uppsala University, Sweden. After final analysis, the material, drawings, photos as well as the digital documentation will be stored at the Archaeology Department at the National Museum of Namibia.

All datasets, e.g. satellite images, environmental and archaeological survey data, findings from previous research and historical maps were geo-referenced, compiled and analysed by using GIS software. Geographical Information Systems (GIS) is a computer aided system of methods for research on spatial data. Today, GIS seem to be the most effective method available for research that aim for making and visualising connections of local practice and the physical landscape (Turner & Taylor 2003, p. 177). The availability of remote sensed data, especially satellite imagery, has increased over the last few years, which in turn has led to better opportunities for studies that strive for integrated landscape research. Furthermore, in archaeology it has been argued that the full potential of archaeological spatial analysis and modelling is probably not realisable without the use of GIS (Allen et al. 1990; Gaffney & Ztancic 1996; Gillings et al. 1999).

Survey results
Aside from fences, current settlement and two finds of abandoned drilling equipment, it can clearly be said that the remains of human practice in Omahke are sparse. Moreover, the remains can be considered as reflecting six broader categories: artefact scatters, tree harvesting sites, stone cairns, burials and settlement remains, traps and ambush hunting sites as well as the artificial wells (Appendix 2).

Artefact scatters
In general, sites defined through artefact scatters can be said to mirror three general types. The first type of scatter contains flaked stone, usually of Late Stone Age affinity (LSA), sometimes with fragments of bone and ostrich eggshell. In general, they are characterised by their close association with pans, baobab trees or stone hunting blinds (blinds are constructions for ambush hunting, see below) at the permanent waterholes in the Nyae Nyae and Dobe area (Lepionka 1973; Kinahan & Kinahan 1984; Yellen & Brooks 1988). Figure 5.2. indicates the distribution of LSA sites known before this survey. 16 additional scatters of flaked stone have been identified in the survey (Fig. 5.2.). The scatters vary in size from a few flakes to widely dispersed scatters. Apart from for mapping the locations and documenting length and width measurements of some randomly picked flakes, no detailed investigations have been done on the scatters in this study. Consequently, the discussion below is preliminary.

At one small pan north of Epata, a scatter covered an area of approximately 50 x 50 m. The scatter was associated with an area with valley calcrete. The estimated density of the scatter was 11 flakes per square metre. The stone were mainly of high quality crypto crystalline silcrete (CCS). In the vicinity, several smaller scatters have been documented (Fig. 5.2).

Two thin scatters of flaked CCS were found in association with a baobab tree and near a mangetti harvest site in Makuri, Nyae Nyae (below).

Five of the scatters were associated with outcrops of ancient calcrete and have apart from this no direct relation with any specific features. The pieces appear to be larger, and they do not seem to include formal tools to any larger degree, although exceptions have been noted. For example, a scatter associated with the calcrete outcrop at Otjumunguindi comprised a retouched flake (Fig. 5.2.).

The largest scatter found in the survey was associated with outcropping coarse ‘ancient’ calcrete of a small fault escarpment on the southern side of the Eiseb Omuramba, approximately 20 km east of the village Otjumunguindi. At the foot of the ridge, a small clay pan was located. The archaeological site was associated with the outcrop and the talus slope. The scatter consisted of several minor scatters of flaked quarts, quartzite and silcrete distributed over a relatively large area of approximately 300 m x 300 m. Two additional sites are located not far from this site and are also associated with outcropping calcrete. On one of these, several of the rocks resemble Kalahari marble, the rock surfaces are covered by impact marks, and the ground surrounding the rock was covered by debris (Plate 5.3.).

The calcrete ridges are riddled by sinkholes which form small rock-shelters (Fig. 5.2). None of the shelters examined in this survey contained cul-
Figure 5.2. Distribution of archaeological sites indicated by scatters of flaked stone. Based on this survey, Lepionka 1973; Kinahan & Kinahan 1984; Yellen & Brooks 1988; Smith & Lee 1997.

The small sizes of these shelters can, however, be used as an argument for not being used as human dwellings, although many animals tend to have used them as lairs. In two cases, it was possible to find single pieces of flaked silcrete, quartz or quartzite in one case in direct association with the shelter and in the second case near the talus slope. It can be suggested that these places basically reflect the same activity as the larger scatters described above. Similar sites were identified in the Otjozondjou and Nhoma omiramba. In the Nhoma Omuramba the site was associated with pebbles and gravel of a river cutting.

As described above, ancient calcrite outcrops may contain lenses of quartz, quartzite and silcrete gravel derived from the basal Kalahari geology. Moreover, silcrete form in situ in calcrite deposits. In general, there are no diagnostic tools in the scatter, and the flakes could reflect debris. One explanation for the scatters is that they are a result of random flaking associated with erosion of the calcrite cliffs and the formation of the talus slope (Lepionka 1973). However, this process would not explain all scatters associated with the ridges and certainly not scatters associated with more recent valley calcrites at the pan margins. Occasionally, ridged flakes with platform residues, apparently struck from prepared cores and even retouched flakes, can be found. Some quartz flakes can be associated with fracture patterns which have been noted as significant for an inten-
tional reduction of quartz (Callahan et al. 1992; Knutsson 1998). For this reason, I think that the scatters, in addition to random flaking, represent the first step of a reduction sequence (see also Bisson 1990). It is easy to imagine how the stone toolmakers browsed the calcrete deposits and the talus for stone raw material. Chunks may have been examined through a few strikes and eventually some nodules were prepared to cores. Eventually, the prepared cores were taken to places elsewhere for the final tool manufacturing. Judged from the size of some of the scatters, it seems likely that some of these places may have been visited and revisited over considerable periods of time. This in turn suggests that these sites became specialised places in the landscape for acquiring raw material for stone tool production, or in other words, quarry sites.

To place the stone tool production activity into a chronological frame is difficult without more detailed investigations. Nevertheless, one clue can be derived from the fact that the area is situated directly north of the Gam lineament, a major fault, which can be clearly identified on the relief map of the research area (Fig. 3.1). The fault is aligned south-east, and the southern side has a downward displacement of 200 m (Simmonds 2001, p. 48). The fault traverses a number of sand dunes that were most likely formed in the dry period of the last glacial maximum. If the fault ridges can be associated with an event after this, the earliest quarrying at these ridges would have taken place c. 18 000 to 13 000 years ago, which would place the activity in a Late Stone Age context. The majority of the earliest dates for the Late Stone Age in the area fall in 15000- 10 000 BP (Wilmsen 1988; Yellen & Brooks 1988). People in Omaheke continued to use stone tools well into the nineteenth century, as indicated by micro retouched European bottle glass (Smith & Lee 1997) and nineteenth century radiocarbon dates in association with Late Stone Age industry (Helgren & Brooks 1983). Some people in Omaheke still use quartz for making fire (Lindholm, pers. obs.).

Scatters with pottery
In addition to stone artefacts and bone, the third kind of scatter includes fragments of ostrich eggshell, pottery and exotic trade goods (Fig. 5.3.).

Judged from this survey and previous work in the region, ceramics are most regularly found in association with the baobab trees in the Nyae Nyae area. Of the twenty baobab sites that yielded stone artefacts and/or ceramics in a previous survey, “seven had no ceramics, four had only ceramics and nine had both, in slightly varying relative frequencies” (Kinahan & Kinahan 1984). The excavated site at Cho/ana contained pottery (Smith & Lee 1997; Smith 2001). Similar ceramics were also found by the Marshalls at several sites in the vicinity of Gautscha pan and from the pan itself, all sharing the traits of dirty grey colour and a fairly fine sand temper. The sherds found at Gautscha “varied considerably in thickness, but could well have been derived from the same vessel” (Lepionka 1973, p. 3). The majority of the sites in the Dobe area contained pottery (Yellen & Brooks 1988; Wilmsen 1988).

This survey has revealed two new ceramic sites. The first site was associated with a baobab tree within the n'ore of the Makuri village in the Nyae Nyae area. A n'ore (sing. n'oresi, plural) is a geographical unit that forms the basis for Ju/'hoansi land-use. A custodian of a n'ore is referred to as n'ore Kxau, which is usually the older residents of a

Plate 5.3. An area with exposed calcrete in the Omuramba Eiseb. The rock surfaces are covered by impact marks, suggesting that the site has been used as a quarry for stone raw material.
The archaeological survey

Figure 5.3. Distribution of archaeological sites indicated by scatters of pottery and exotic trade goods. Based on this survey, Lepionka 1973; Kinahan & Kinahan 1984; Yellen & Brooks 1988; Smith & Lee 1997.

The scatter comprised only one decorated sherd, the lower part of a rim. The ware was well-fired, thin and hard with a muddy grey tint and a smooth surface with sand and mica temper. The identified decoration looked like fingernail imprints or crosshatched incisions (Fig. 5.3.). The mica temper and the fingernail imprint would suggest a late second millennium Khoe affinity (Jill Kinahan 2000, p. 72), although the decoration corresponds to some degree with a single sherd of pottery found in a previous survey in association with the well and hunting blind site at N/ama pan (Jill Kinahan & John Kinahan 1984, Fig. 10, B 2728; Chapter 7).

The second scatter with pottery was found in association with a well site at Otjozondema in the /Gam area. All sherds at this site were undecorated. A small-scale excavation was undertaken at Otjozondema and will be discussed in detail in Chapter 7.

Only one find of pottery is reported from the southern part of the research area. This may be explained by the focus of previous research, the general lack of baobabs in the south or the survey strategy used in this study. The Marshall expedition found six sherds of pottery in the southern parts of the research area from one place in the Eiseb Omuramba, about “57 miles east of Epata on the northern side of the Omuramba” (Lepionka 1973, p. 2; reconstructed location Fig. 5.7). The ware was presuma-
ably of two types. Four of the sherds were tempered with coarse bits of calcrete and were quite friable as a result of poor firing. Both the inner and the outer surfaces were pockmarked by the washing or rubbing out of temper fragments. The other two sherds had a “muddy gray color” but were harder with smooth, well rubbed surfaces (ibid.). The clay body of these sherds is described as similar in constitution, but in addition to the coarse calcrete chunks, a finer sand temper had been added (ibid. p. 2). These sherds seem similar to the single sherd found in the Makuri n'ore and discussed above. Lepionka interprets the sherds from Eiseb as well from Gautscha as being derived from single vessels and not as isolated sherds. The ceramics in Eiseb connects the southern part of the research area with the ceramic finds in the /Gam-Nyae Nyae-Dobe area.

Figure 5.4. Decorated sherd from Makuri n'ore.

Trade goods
Figure 5.3. also shows sites with indications of exotic trade goods. From different places around the Gautscha pan, the Marshall expedition collected 4 pierced and one fragment of mollusc shell beads, 1 non-pierced cowrie shell, 1 aqua blue roller glass bead and 6 purplish blue cane beads of indigenous manufacture and 1 opaque white glass bead, the latter of European origin (Lepionka 1973; Jill Kinahan 2000). At Cho/ana, glass beads and copper artefacts have been found down to levels dated to 315 ± 20 BP and iron fragments in layers dated to c. 1380 BP (Smith 2001, p. 20-1). Retouched green bottle glass has been found in the top layers, indicating a continuity of stone technology into the second half of nineteenth century (Smith & Lee 1997), corresponding with late radiocarbon dates of Late Stone Age technology from the region (e.g. Helgren & Brooks 1983). Also at Otjozondema, a small flake of brown bottle glass was found during the excavation (Chapter 7).

During bush clearing, villagers from Epata found 31 iron beads at the well site Ozombu Zo Vindimba (Plate 5.4.). The sizes of the beads range from 0.8 cm to 1.9 cm in diameter with a width of 0.6 cm. The beads had hatched decoration along the edges. In 1821, Shaw noted that the Nama “have ornaments of ivory, copper and iron rings on their legs and arms” (Shaw 1821, p. 120 cited from Lau 1994, p. 11-2). This practice was most likely not restricted to one group, but seems like a general rule for people in the whole region during the nineteenth century (e.g. Galton 1853; Andersson 1856, 1861; Baines 1864). Similar beads have also been found in archaeological contexts at Divuyu, N’loma and White Paintings Rock Shelter (Mitchell 2002, p. 277-8; Murphy et al. 2001, p. 2). An excavation and a detailed survey in the area surrounding the site did not reveal additional archaeological finds.

Plate 5.4. Three of the iron beads that were found at Ozombu zo Vindimba during bush clearing in 2004. The beads are presently stored at Kaumbangere Cultural Centre in Otjinene.

Plate 5.5. Nineteenth century annularware or industrial slipware from Djoxho pan.

A sherd with slipped bands of coloured glaze with two black lines on a white bottom was found in association with one of the baobabs at Djoxho pan, Nyae Nyae (Plate 5.5.). On the lowest part of the sherd, a blue field appears. From the raised glaze the affinity of the sherd can be determined to annular-
stoneware or industrial slipware. These were made from 1790 to approximately the late middle nineteenth century (Jill Kinahan, 2000, p. 75). European ware of this type has been reported from the Nyae Nyae area in two of the previous surveys (Lepionka 1973; Kinahan & Kinahan 1984). Similar European 17th to 19th century ware has been reported from the African West Coast (Jill Kinahan 2000), as well as from the African East Coast (Macamo 2005).

At N!oma, cane glass beads and marine mollusc shells, such as the cowrie, dated to the 9th century have been taken as evidence for that the site was connected with intra-continental trade networks linking with the East African coast from an early stage (Wilmsen 1988, p. 31). On the Namibian coast, finds of annularware and iron beads on pastoral sites have been interpreted as indicating that these sites were in contact with the regional trade routes that were active during the seventeenth to the nineteenth centuries (Jill Kinahan 2000). Even though finds of trade beads, metals and European goods in Omaheke are sparse, the presence of such artefacts suggests that the trade networks also reached the interior parts of the Kalahari, which have also been argued by previous archaeological and historiographical research in the region (e.g. Denbow & Wilmsen 1986; Wilmsen 1989a; Gordon 1992).

Stone cairns, burials and settlement
In addition to sites identified by artefact scatters, a number of sites indicated by larger structures and features were documented in the survey (Fig. 5.5.).

Hardly any indications of settlements and graves were identified during the survey. In western Kalahari, such remains are extremely obscure (Yellen 1977; Kinahan & Kinahan 1984). However, at some places, mainly in association with the Omuramba Eiseb, cairns of calcrete rocks can be found. They appear alone or in clusters. The forms of the cairns were in contact with the regional trade routes that were active during the seventeenth to the nineteenth centuries (Jill Kinahan 2000). Even though finds of trade beads, metals and European goods in Omaheke are sparse, the presence of such artefacts suggests that the trade networks also reached the interior parts of the Kalahari, which have also been argued by previous archaeological and historiographical research in the region (e.g. Denbow & Wilmsen 1986; Wilmsen 1989a; Gordon 1992).

Visible surface indications of more possible graves were found as Omapumba (Fig. 5.9) and at Ozumbu Zo Vindimba. At Ozombu Zo Vindimba, two graves were situated on the slope valley 1.3 km from the Eiseb Omuramba, approximately 700 m west of a well site (Fig. 5.6.). They were constructed by large calcrete rocks most likely taken from the river floor. Both graves were arranged in a west-east direction with larger rocks marking the western short ends. One of the graves had a larger stone placed in the eastern short end. The current Herero community relates the graves at these two sites to the war in 1904-07 (CK, MK 2004). However, the written war history indicates that the Herero were in such a great hurry that they were generally not able to bury their dead (e.g. Drechsler 1980; Pool 1991). Consequently, it is difficult to discuss the dates of these graves without carrying out more detailed investigations.

Recent grave areas are not uncommon in the perimeter of the current settlements. Nevertheless, these grave areas may include what can be considered as “archaeological” graves; i.e. the date of the grave and the person buried are unknown today. This can be exemplified by the situation at Ombujunjama, a small village associated with one large and five smaller pans, situated thirty-five km northeast of Otjinene. The villagers say that the pans held water almost on a permanent basis in the past. A borehole was drilled in the largest pan in 1973 and at the same time, Ozonganda (plural, sing.; Onganda), Herero homesteads, were established at Ombujunjama. Today there are eighteen Ozonganda arranged in a circular pattern around the communal borehole. A small Ju/'hoansi settlement is located on the fringe of the village approximately 1.5 km directly northeast of the borehole. The villagers showed me three recent graves (from 2001) located at a distance from their settlement. However, the informants characterise a relatively large area around these burials as a grave area, and two additional known graves that were not visible at the surface were pointed out to me (Vo 2002, GM 2002).

In addition, the remains of a small Ju/'hoansi village associated with one of the smaller pans could be observed. The locations and the layout of the village were relatively easy to follow by the remains on the ground surface. The residues consisted mainly of plaster fragments, browner soils and the sticks that were used as frames for the house constructions. Through a combination of the memory of the informants and the house remains, five settlement areas could be reconstructed. These areas could be understood as reflecting a sequence of settlements, representing at least six different eventually overlapping Ju/'hoai dry season settlement
A grinding stone for red ochre was found in association with the well site at Dobe pan, in the Nyae Nyae area. Ochre mixed with fat is a commonly used cosmetic and well documented in historical sources and the find may be taken as a settlement indication (Lau 1994, p. 12; Kinahan, pers. comm.).

One general rule that seems applicable to grave sites in the Kalahari is that they appear more frequently in areas that have been used for dry season habitation. Dry season settlement areas tend to be more stable and prolonged compared to temporal rainy season habitation (e.g. Brooks & Yellen 1987).

Figure 5.5. Distribution of archaeological sites indicated by structures.

All grave and settlement indications mapped in this survey have been in the vicinity of well sites (below). The association can be considered as a verification of the previous interpretation.

Ambush and fall trap hunting
The Kalahari ethnographies list detailed information on a number of hunting strategies including the tracking of game, digging out or using long poles for capturing burrowing animals, and also the use of snares and traps for catching small mammals and birds (Marshall 1976, Lee 1979, Tanaka 1980, Silberbauer 1981).

Wilmsen (1989a, p. 230-1, Table 6.4) has provided a detailed breakdown of kill methods. From his table, it can be estimated that the larg-
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Figure 5.6. Graves at Ozombu zo Vindimba.

The largest proportion of kills for Ju/'hoansi, Mbanderu and Tawana in the Dobe area is from snaring. In addition, it can be seen that few of the most common hunting strategies tend to be archaeologically visible.

In this survey, a series of sites that can be considered as traps has been mapped (Fig. 5.5.). Two log traps were identified in association with the calcrete fault ridges in the middle part of the research area. Even though the structures had not been in use for some time and were covered with sand, it was possible to reconstruct the overall structure of the site. A relatively large area of a steep side of the ridge had been enclosed by a bush fence. The fence enclosed several small cavities in the ridge, possibly functioning as lairs of some burrowing animal such as the porcupine (*Hystrix africanus*). In one place, an opening had been made in the bush fence. Here a log trap was constructed using two rows of poles, creating a 20 cm wide entrance. A larger log was arranged in such a way that it would fall and trap the animal using the entrance. The trap must be considered as very recent. In addition to the quarrying of stone, the traps present an additional activity that may be associated with the calcrete ridges in Omaheke. An additional category of traps used in Omaheke is exemplified by a number of pits dug on the floor of the Omuramba Eiseb at Epata. The structures are archaeologically very similar to the artificial wells (below and Chapter 7), although three Herero informants in the Otjinene area explained that these features were called ondwija (pl. ozondwija; derived from o-ndwi pit), and have been used as fall traps (Kaz 2001; MK 2001; KN 2002).

Even though the traps appear similar to wells, the main difference is the location in the landscape (Fig. 5.7.). The ondwija was constructed near pans and game trails and used in the dry season when water is scarce and the animals congregate around the last shrinking surface waters. A well, on the other hand, is for natural reasons associated with an aquitard at the end of the drainage line, where the water will store. The ozondwija at Epata was located approximately 490 m away from a low-lying area with dolines, where the majority of the wells were dug (Fig. 5.15.). The location corresponds to a historical account describing how pitfalls in the Kalahari “were dug along the pathways that the animals
in the village Okarunjara, an additional ond-wija system containing 36 small pits were found. Murangi Kamanunu relates that more ondwija systems are located in the Otjinoko Omuramba, but they were not identified in this survey. According to the Herero informants, the ondwija were constructed by Ovatjimba (Chapter 7) who hunted and gathered along the omiramba in Omaheke during the nineteenth century. Pitfall hunting is described in many of the nineteenth century accounts (Guenther 2002, p. 143), but has never been documented in the modern Kalahari ethnographies. One exception is an account from Allison Brooks, who describes how the Ju’/hoansi used their archaeological trenches at ≠Gi as fall traps (Brooks 2002, p. 219). In addition, the excavators revealed a series of pits at the site that they considered fall traps (ibid. for a detailed discussion of this issue see Chapter 7).

**Hunting blinds**

Hunting blinds are stone or mud structures used for ambush hunting from concealed places near pans, game trails and salt licks. None of the extensive ethnographies have in detail described ambush hunting strategies from hunting blinds. However, two articles by Allison Brooks (1978, 1984), and by Crowell and Hitchcock (1978) describe hunting blinds in Botswana. Jill and John Kinahan (1984) have also reported and described hunting blind sites in the Nyae Nyae area (Fig. 5.5.).

Hunting blinds are often constructed with a circle of calcrite boulders around shallow depressions, where the soil has been removed. The removed soil may be added to the edge of the hole or on top of the stone circle. In the ethnography, it has also been noticed that they can either be with or without bush or grass screens or log roofs (Crowell & Hitchcock 1978). The common shape is circular and semi-circular of varying size. Crowell and Hitchcock report the average of 1.5 m inner diameter.
with ranges between 0.1-0.65 m in height. The largest hunting blind at Gautscha had an external diameter of 4.3 m and an internal diameter of 2.7 m with a maximum depth of 0.4 m (Kinahan & Kinahan 1984). Based on nine of the hunting blinds at Gautscha, the mean external diameter was 3.4 m with a standard deviation of 0.6 m (ibid.).

The largest group of blinds in the research area is situated at Gautscha in the Nyae Nyae area. This site consists of ten circular and semi-circular structures spread at the foot of a hardpan bank along the eastern margin of the pan. The blinds at Gautscha vary in size, but were all constructed with calcrete boulders. Similar to Gautscha, in terms of orientation and organisation, N’ama Pan consists of a smaller hunting blind site including one double semi-circular blind (Kinahan & Kinahan 1984, Figs. 5 & 6).

During the survey in 1999, an additional blind was identified at N’ama. The blind was located at a distance from the pan, at a possible ambush location near a game trail. The same pattern has been observed at Dube Pan, where a single blind was located away from the waterhole and appeared to occupy a possible ambush position. Similarly, it is reported that three blinds at Xae-sca seem to cover most approaches to a small doline (Kinahan & Kinahan 1984).

In addition to the blinds in the Nyae Nyae, one single hunting blind made by calcrete boulders is located on the margin of a fossil pan on the estates of a commercial farm in the Otjinene area (Fig. 5.5. & Fig. 5.10.). A calcrete cap seals the blind indicating that the structure has been submerged without being reused for some time. An inspection of the nearest area surrounding the pan did not reveal further blinds, but construction works by machines on the pan margins might have damaged other possible hunting blinds.

A common characteristic of the hunting blinds is their association with the permanent waterholes, constructed at places that would have the very last supplies of water during the dry season. For example, most of the hunting blinds at Gautscha and the single blind at Audax would be submerged when the pans are full. The blinds appear at pans where wells have been dug and they can, as the case was at N’ama pan, be connected to each other (Kinahan & Kinahan 1984). Their locations indicate that they were used during the dry season when water is scarce and the game congregate around the last water sources (Brooks 1984, p. 45). The Ju’hoan Chief Kandaro (2002) in Otjinene relates that hunting blinds were used by the southern Ju’hoansi and could be built in stone or wood. In addition, he relates how they also dug shallow depressions, without using stone boulders. Hunting blinds were built on the pans or the omiramba near animal paths. He estimated that the Ju’hoansi had 8-10 n!oresi between Gobabis and Otjinene and 6-7 n!ore upwards along the Eiseb Omuramba including /Gam (Cka 2002). His account is partly supported by Kaufmann’s ethnography (1910, Karte des Auin Gebiets, p. 137). In addition, he mentioned that hunting blinds were constructed in the “Omuramba ua Pata” (Eiseb) and in association to some pans near “Otjinene, Otumumbonde, Otjumunguindii, Omapumba, Okondjatu, Okahandja, and Epako” (Gobabis) (see Fig. 4.1, 5.9. & 5.22.). Regarding fall traps, Kandaro said that the Ju’hoansi, in addition to the hunting blinds, constructed fall traps. The fall traps were “not similar to the ond-wija” dug in the river valleys. The Ju’hoansi dug their pitfalls in the sand near game trails and grazing areas away from the omiramba and the water points where the hunting blinds were located. According to Kandaro, each family had their own sets of hunting blinds and pitfalls and these could be dug in several places. Two or more families could hunt together depending on how many they were and where they were hunting. They made also screens out of bushes so the animals had to go near the blinds.

**Figure 5.8.** Reproduction of a sketch of a hunting blind system made by Chief Kandaro.

Animals that are shot with poisoned arrows do not die instantly. Since predation levels are generally higher near the water sources (Binford 1983, p. 68), it seems likely that the shot animals would escape and ‘lick their wounds’ in areas away from the water sources, where they were not vulnerable to predation. If traps are dug in these areas it would considerably increase the chance of a catch. Judged from the drawing Kandaro made in the sand during our
talk, these areas seem to coincide with the places where they dug pitfalls (Fig. 5.8). The day after the hunt, the hunters would track the animals to the grazing areas and possibly animals could be found in the fall traps. For this reason, the fall traps can be considered as a second level of the hunting blind system.

Otjumunguindi, one of the places that Chief Kandaro indicated as having been used for ambush hunting, was surveyed in detail. At one place a single circular heap like structure (1.5 m in diameter) coincided with the expected location of a blind. If the structure is a collapsed blind, it has probably not been in use for a considerable period of time. The stones were situated on top of a 2-3 m high outcrop of karstified calcrete located in the middle of the Omuramba floor. 250 m east of the assumed blind, a well site was found, which indicates that the presumed blind is associated with an area with a relatively persistent water source (Fig. 5.17.). At some places of the ridge, pockets in the calcrete presented natural ambush places that could be used as blinds if only partially modified. An almost similar setting was found 6.5 km west of Otjumunguindi. Here a gully went through the steep calcrete ridge, presenting a natural entrance to the Omuramba floor from the higher plateau area. At each side of the small valley, two linear structures made of calcrete blocks could be noticed. The structures faced the gully and were 1.7 m respectively 1.5 m long. The placement of the stones represented good ambush positions. However, the stone anomalies and the strategic locations are the only aspects that would support the interpretation that the features at Otjumunguindi represent hunting blind sites. The largest problem is that the sites contain few and obscure blinds, compared to the Nyae Nyae. In view of the fact that hunting blinds reflect communal hunting strategies, the sites commonly contain a series of structures (e.g. Brooks 1978, 1983; Crowell & Hitchcock 1978; Kinahan & Kinahan 1984). In addition, the two sites did not have any other archaeological indications. In previous reports of hunting blind sites, these are generally associated with scatters of flaked stone and bone (ibid.). For this reason, it is difficult to confirm the hunting blind site at Otjumunguindi.

The hunting blinds are still maintained and used in the Nyae Nyae today, although more individually and sporadically (K /K 2004). Today it is illegal to hunt in the southern parts of Omaheke.

Tree harvesting sites
As discussed in Chapter 3, the Omaheke environment contains a number of different plant species that provides valuable resources. A tree harvesting site can be defined as a direct reflection of this (Fig. 5.5.). A tree harvesting site consists of different sets of cracking stones that seem to have been transported to the vicinity of a tree or a tree groove. The rocks have been used for cracking shells, kernels or for grinding pods during the harvest of trees. Tree harvesting sites are usually found in association with grooves of mangetti (Schinziophyton rautanenii), baobab (Adansonia digitata), or at pan margins. Large calcrete chunks were associated with the shade zone of the majority of the baobabs in the Nyae Nyae (Kinahan & Kinahan 1984).

Five harvesting sites have been mapped in this survey. One of the sites was associated with a pan margin within the n'ore of the Makuri village (Plate 5.6.). The site consisted of an outcropping rock boulder with four smaller rocks placed on top. These rocks had impact marks and have, judged from the nutshells found nearby, been used for striking mangetti kernels. A few pieces of flaked stone were associated with the rock, seemingly derived from broken strikers, but they could easily be mistaken for flakes from stone tool production. The second site was found at the foot of one hill in the Aha Hills. The site was connected with the shade zone of a large baobab tree. This site was identified by one larger rock, a smaller rock and a thin scatter of fragments from baobab fruits and mangetti nutshells. Associated with the tree line at the pan margins of Erindi Rombahe, Erindi Roukambe and Ombugunjama similar sets of calcrete rocks, apparently brought from the pan, have been noted. However, no indications of shell fragments were found in connection with these sites.

Plate 5.6. Mangetti harvest site. The distance between the two main rocks is approximately 40 cm.

The size of baobabs in the Nyae Nyae area suggests that individual trees may be very old and might "qualify as fixed points in the archaeological landscape of the last two millennia" (Kinahan & Kinahan 1984; see also Giess & Snyman 1986, p. 241). However, similar to many large tropical trees, the baobab has no reliable tree rings, and size does not necessarily indicate age, since variation in water content of the trunk can also cause large fluctuations in size. Nevertheless, a radiocarbon-dated baobab
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tree elsewhere, 4.5 m in diameter, obtained a date of 1010 ± 100 BP and this was clearly not the limit (Swart 1963 cited in Blench, forthcoming). In addition, archaeological material such as potsherds and flaked stone may be found within the trees, which could provide further support to the notion that they have acted as landmarks in the landscape for a considerable time (Zedeño 2000, p. 106).

Plate 5.7. Peg ladder associated with one of the *baobabs* in the Makuri n’ore.

An additional feature that may be taken as indicating tree harvesting are peg ladders. A peg ladder is constructed by wooden pegs that are put into manufactured holes in *baobab* trees (Plate 5.7.). Many of the large, mature *baobabs* in the Nyae Nyae carry scars of wooden peg ladders on their trunks. Occasionally, several routes indicate alternative approaches along the trunk to heights of more than 10 m (Kinahan & Kinahan 1984). The reason for making the ladders is that the trees bear large amounts of fruit in winter and that the trunks are often colonized by bees, the nests of which are harvested for honey. An additional reason for the ladders may be that the cavities of the trees contain large amounts of water (Lee 1979; Giess & Snyman 1986). The *baobab* regenerates new bark over the holes after the peg-ladders. Before they disappear, the holes have the appearance of shallow pock-marks. It has been suggested that a hole after a peg-ladder would take about 200 years to heal, suggesting that the harvesting of the trees have a long continuity (Giess & Snyman 1986, p. 241).

The largest *baobab* trees in the Nyae Nyae have names and dates engraved on the trunks. The majority of the names are of European origin (Marshall 1976, pp. 55-7; Kinahan & Kinahan 1984). At the Vortrekker Tree, in the northern part of the Nyae Nyae, initials from 1876, 1883, 1884, 1891, 1900 and names such as Clatz, Ehme and Süberg are noticeable. On the *baobabs* in Gautscha, N. L. and REES are associated with the dates 1878 and 1887 respectively. Several dates are from 1905 and are engraved by German soldiers who bivouacked under two of the *baobabs* at Gautscha (Marshall 1976, p. 58). On the trees near Gura pan, engravings from 1911, 1930, and 1950-80 can be identified. In 1917, W. Mattenklodt, a German fugitive during the British occupation, carved his name on a *baobab* at Gautscha. Many of the twentieth century dates seem to reflect the attempts of the German and later the South African administrations to control the colony by sending out police patrols to the remote areas. From the decades represented on the trees, it is probably possible to discuss changes in landscape centres as well as date temporal intensity in the activities of European settlers and later, colonial military or police forces in the area (Kinahan pers. comm.). The most recent dates seem to be engraved on the *baobabs* at Homasi and Djoxho, which can be explained by late tourist initiatives at those specific places during the last decade. The largest *baobab* tree at Homasi collapsed in 2004 (Lindholm, pers. obs.).

Five additional *baobab* sites were found during this survey (Fig. 5.5.). Not far from the village Baraka, one single *baobab* tree with the engraving F. G. Olivier with no associated date was found. Within the n’ore of the Makuri village, twenty *baobabs* were examined during the present survey. Two of the *baobabs* had clear signs of peg ladders and one of the trees had NI 89 engraved on the trunk, which may be connected to Gautscha. In addition, two of the trees had thin scatters of flaked silcrete
within the shade zone and one tree had a scatter that included pottery.

**Well sites**

150 visible indications of wells were documented at 34 different localities within the research area (Fig. 5.9.). For reasons of comparison, six additional localities with 48 visible well structures were surveyed outside the study area (Fig. 5.22.). Below I will describe the well sites that were mapped in the survey. First, I will discuss the wells found along the Eiseb Omuramba. After this I will consider the wells in the Otjinoko and Alexest Omiramba, followed by a discussion concerning the wells in the Nyae Nyae and /Gam area in the northern part of the research area. Finally I will examine the wells that were investigated in the Omatako catchment and provide a note to the distribution of the wells.

**Omuramba Eiseb**

In the southern part of the research area, the archaeological survey revealed 15 well sites with 97 visible well structures. The two southernmost well sites are situated within the commercial farming district on the estates of two current farms, Okaropiko and Audax. The well at Okaropiko is situated approximately 20 km south of the village Otjinene in a belt with scattered pans and dolines, a karst landform significant for active groundwater (Chapter 3).

![Figure 5.9. Well sites documented in the archaeological survey.](image-url)
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Figure 5.10. The well sites at Okaropiko and Audax.

The well at Audax is located in the Eiseb Omuramba. On satellite images from the rainy season in 2000, active surface drainage could be identified between the two site areas, indicating how the dolines channel water down to the low-lying areas of the Eiseb Omuramba. The well sites at Otjinene and Epata are located further down in the Eiseb Omuramba. At the pan Ozunduno (measuring approximately 2 x 2 km), located on the undulating sand plain approximately fifteen km north of Otjinene, further wells were identified. Parallel with the Eiseb Omuramba, a small plateau can be noticed.
Here it is possible to identify several small dolines and small pans. The plateau and the Eiseb Omuramba meet near the location for the well site Ozombu Zo Vindimba. Further north in the Eiseb Omuramba, the indications of wells become sparser and sometimes also more obscure as archaeological structures. Well sites were identified near the current settlements at Okarunjara, Otjikorondo and Okambonde. The majority of the wells mapped further north in the Otjumunguindi area are associated with unconsolidated sediments and without previous knowledge of such wells, they are extremely difficult to locate. Wells could however be identified near the settlements at Otumumbonde, Otjumunguindi and Okamuputo. Well structures have also been identified at the pans of Ombujunjama and Otjipahewa (Fig. 5.9.).

The current farm at Okaropiko was established by German-speaking settlers in 1942 (JSD 2002). The site contained two visible well structures. The first well was directly associated with the southern edge of a large doline with several larger Acacia trees growing in the perimeter. The well had a circular form and measured 1.3 m in diameter. This well had not been used by the current farm and was subsequently filled with soil and calcrete rocks in order to avoid fall accidents and injuries to animals and people. A second well was located 30 m south of the doline. The structure was much larger than the first and dug in an “L” form through a thick layer of calcrete. The farmer says that it had a more irregular shape in the past, but along with the development of the farm, the well shaft has been modified to its current shape. Among other things, a concrete frame has been constructed (Fig. 5.10.). The well is approximately 6 m deep and the farmer uses the well for irrigation of the farmland (JSD 2002).

The farm Audax is considered one of the older farms in the area (MH 2001). Herero informants in Otjinene still relates how the grandfather of the current farm owner bought cattle from the Herero who arrived in the 1920s in order to help them to “buy the rights to stay at Otjinene” from the Police in Steinhausen (MH, DK, AT, HK, HT 2001). The well at Audax is associated with a small fossil pan associated with the floor of the Eiseb Omuramba (Fig. 5.10.).

The well shared many characteristics with the filled well at Okaropiko as it was circular, measured 1.2 m in diameter and dug through a thin layer of sheet calcrete. At the time of the visit, the pan and the well were filled with water. The depth of the well was estimated to be approximately 1.7-2 m. On the other side of the pan, a hunting blind site was lo-
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Figure 5.12. A well from Otjinene that includes three different forms of wells.

cated (above). The vegetation structure can be considered as riparian including several larger trees. The two main villages in the southern part of the communal lands are Otjinene and Epata. Twenty-two wells divided into eight smaller groups were mapped in the area surrounding the village Otjinene. The well site associated with the village Epata consisted of twenty-six wells divided into nine smaller groups (Fig. 5.11.). In Otjinene, the wells centre on one larger and several smaller dolines. The centrally situated well cluster in Epata is associated with a doline that is approximately 200 m in diameter.

The appearances of the well structures identified on the four first sites Okaropiko, Audax, Otjinene and Epata vary. Four of the wells at Otjinene and Epata resemble the small shallow wells identified at Audax and Okaropiko with rim diameters of 0.6m to 1.3 m and depths between 1 m to 3 m. Thirteen of the wells were deeper and had larger rim diameters with oval or irregular shapes, measuring 2.5 m x 1.2 m up to 7 m x 2 m, with depths of 3 m to 7 m. Thirty of the wells at Otjinene and Epata were circular with rim diameters of about 1.6-2.5 m and depths between 10 m to 30 m. One well in Otjinene included all the three forms (Fig. 5. 12). The sides of the wells had eroded and the underlying calcrete was exposed. Wear on the calcrete crust suggested the past location of a small circular well, c. 90 cm in diameter. Estimated from the ground surface, the depth of the well would have been about 1.7 m. The oval well measured 2.3 m and 1.5 m and the depth was 4 m. Presumably the well had been deeper, since the bottom was filled with eroded soils and garbage. The third well was deep and circular measuring 1.4 m in diameter.

The depth of the well could not be estimated, since it was filled to the rim with garbage. The three general forms of the calcrete wells as identified at Okaropiko, Audax, Epata and Otjinene reoccurred at other sites during the survey (below and Appendix 3). When I describe the additional wells documented in the survey, I will use the terms small circular, oval irregular and deep circular as general references. In the third part of Chapter 7 I will return to the issue and discuss whether the three general forms may have some wider significance.

Ozunduno
The current village at Ozunduno is associated with the southern side of a large calcrete pan (Fig. 5.13.). On the northern side of the pan two deep circular wells were found. The western well was dug in association to three smaller dolines. The calcrete edges of the two dolines located closest to the well had wear on the sides facing the well. The soil filling of the dolines mainly contained organic matter. The dolines were characterised by woody vegetation, most notably a series of large Acacia erioloba trees, bushes of Acacia mellifera, Grewia flava and Ziziphus mucronata. The well measured 2.7 m in
diameter and was dug through the pan calcrete deposits to a depth of 15.5 m. The second well at Ozunduno was located 420 metres east of the first well. This well was also circular and measured 1.7 m in diameter with a depth of 16.4 m. In addition, it shared all the principal characteristics of the first well. A detailed archaeological survey within the area surrounding the wells at Ozunduno did not reveal any further site indications.

Ozombu zo Vindimba is located 17 km north-east of Otjinene. Here, two visible graves and iron beads have been found during bush clearing (above).
The site is located on a plateau 400-500 m upslope from the Omuramba Eiseb and is associated with the coarse sandy soils of the slope valley. This is a contrast to the well sites discussed so far, which all have been associated with omuramba and pan settings as well as outcropping calcrete. Owing to the surface finds of iron beads on the site, a detailed survey of the area and the surroundings was undertaken together with two small test pit excavations: one in the area where the iron beads had been found and one within a randomly chosen concentration of *A. erioloba* trees (Fig. 5.14.). The two areas were connected by a row of randomly distributed test pits. The survey and the excavations did not result in any additional archaeological finds, although it was possible to note some characteristics of the hydrogeology and the vegetation structure associated with the site.

Eight large *Acacias* were situated within the primary well cluster. The trees carried older or newer marks of branches having been cut, an observation that will be discussed in Chapter 6. In the *Acacia grove*, the sediments of the excavated pits contained homogenous sandy soils without any visible stratigraphy. However, it could be noted that the sediments of the five western squares were completely dry (Fig. 5.14.). In contrast, the soils of the three eastern squares were saturated to such extent that it was possible to form the sand into balls. In addition, a number of termite mounds could be observed within the cluster. The mounds of the termite *Macrotermes michaelseni* are usually found in areas with a high ground-water table, particularly seasonal pans and drainage lines. When constructing their mounds, the termites favour areas with clay, as the clay minerals are critical for mound construction (Dangerfield et al. 1998). Occasionally the sediment heaps associated with the wells contained gravel and also larger chunks of calcrete. The large patches of the bush *Catophractes alexandrii*, a bush species that grows in the well area, can be taken as an additional indication for the presence of sub-surface calcrete sediments and that the soil cover is relatively thin, since this tends to grow in connection with calcrete sediments. In addition, it has been noted that the bush species is stimulated by an intense and prolonged grazing pressure (Cole & Brown 1976). Figure 5.14. illustrates slope directions, the distribution of the wells, *Acacia erioloba* trees, patches of *Catophractes alexandrii* and the
termite mounds. When looking at the distribution of these features in combination, the drainage lines that cross the landscape become apparent.

One open and thirty closed wells were mapped at the site. The closed wells were visible as shallow depressions, some with signs of seepage at the lowest point. The majority of the depressions had visible sediment heaps. In most cases, the heaps were relatively flat, with obscure micro-topographical features, but in a few cases, they were clearly discernable (Fig. 5.15.).

![Figure 5.15. A well at Ozombu zo Vindimba](image)

The stratigraphy of one opened well provided further indications of an active water regime. The excavation of the well showed gradually finer sediments at greater depth. At the depth of 1.2-1.5 m, the sediments were predominantly grey and of a finer silty-loamy fraction. As already mentioned, the coarse soils of the slope valley tend to be red, signifying high contents of ferric oxide. In cases where the soils are subjected to wetting, the ferric oxide component of the soils dissolves to soluble ferrous oxide, which leaches out. The result is that soils with active drainage lack iron, which is indicated by their grey colour. They are also more compact and richer in finer fractions such as silt. In addition, the sediments contained limonite, which is hydrated ferric oxide, a common feature of the oxidation zone in tropical soils and most visible when moist. Ferric oxide is also the basic ingredient of one of the common duricrusts of the Kalahari soils, ferricrete. Similarly to calcrete, the ferricrete hardens when subjected to phases of wetting and drying.

![Figure 5.16. A combined well at Otjikorondo.](image)

On the floor of the Eiseb Omuramba, approximately three km north of the large site at Ozombu Zo Vindimba, a single well was found. This site shared all the previously noted characteristics of a low-lying area with calcrete deposits and larger tree vegetation. A further well site containing three visible well structures was located only one and a half km further north, near the village Otjikorondo. Here one of the wells (Fig. 5.16.) was small and circular and positioned at the rim of an oval irregular well, which may be understood as indicating a sequence similar to the ones that was discussed in Otjinene and Epata. The small well measured 1.26 m across and was 1.36 m deep. The larger well measured 2.6 m x 2.3 m across the rim and had a depth of 5.14 m.

A deep circular well was mapped not far from the village Omungonda. The single well structure was associated with outcropping calcrete and completely embedded in a dense patch of thorny *Acacia mellifera* bushes. The well was said to have been dug by Nikolas Tjivirura in 1957 (KN 2002). The next well site in Eiseb appeared as four large depres-
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sions approximately 5 to 7 m in diameter located at the western side of the valley floor. The sediment heaps were to some extent flattened, although they were still clearly seen. The heaps contained sand, gravel and calcrete rocks. I was later told by Kazeriwa Ndjizera that the old name for this place was Ozombuzamakura. A similar site, with one, or possibly two obscure well indications, is located further north in the Eiseb Omuramba, not far from the settlement at Okambonde.

The first well in the Otjumunguindi area was located near the village Otumumbonde. The well was dug in calcrete and it shared the general characteristics of the deep and circular wells examined before. The diameter of the well was 2 m and the depth 11 m. The cattle post at Otjumunguindi is located fifteen km east of Otumumbonde. Near Otjumunguindi, three well sites were mapped. The first well site was associated with calcrete deposits on the Omuramba floor. The site had only one clear well structure and it can be characterised as a small and circular well, measuring 0.6 m in diameter with a depth of 1.5 m (Fig. 5.17.). The two wells at Otumumbonde and Otjumunguindi were the only two calcrete wells mapped in this area. However, the omuramba floor in this area is characterised less by valley calcrete and more by finer unconsolidated sediments and black cotton. Outcropping calcrete is confined to the fault ridges in the river valley margins. Nevertheless, even if the additional wells that were identified in this area tend to be obscure as archaeological features, their importance as water points for a pastoral land-use regime should not be underestimated.

The two sediment wells that are closest to Otjumunguindi were found by the current settlement in 1982 (BT 2001). They noted depressions in a low-lying area that was submerged during the rainy season. When digging in these depressions, they found strong water points that can be used for a considerable time into the dry season. In good years, they have even used these wells over the entire dry season. Today, this place functions as a communal watering area for cattle from many cattle-posts in the area (FT 2001).

In the Otjozondjou Omuramba, the people and cattle of a permanent settlement depended solely on a similar well called Okatjimbe, a variant of the name Ombru Katjimbe, until 1974 when a borehole was drilled. In the early 1970s, the informant was told by the old people where to find the well and he went to the place and opened it (CK 2002). Today, the settlement and the borehole are abandoned at Okatjimbe, but the well is occasionally opened up by collectors of Devil’s claw (Harpagophytum procumbens) during the harvest season. Not far from this place, near the present cattle-post at Okamangondo, the well Okamuputo had a similar story (CK 2002). The well is only visible as a depression in an area with clay sediments (Plate 6.1.).

Figure 5.17. The calcrete well in Otjumunguindi.

Otjino-Alexest Omiramba
In the neighbouring omiramba the Otjino and the Alexest, another series of well sites were identified. In two ways, the well sites here differed from the wells mapped in the Eiseb. First, no other type of well than deep circular wells could be identified in the well sites. An additional difference was that the persons who had dug the wells still lived by them and consequently, they could be approached.

In the village Okomungondo, Kaputuaza (KK 2001) dug a well in 1940-41 at a large calcrete pan. The well is 30 m deep and had a diameter of 1.5 m. Over the years, he had modernised the well with a donkey pump and a concrete water tank. He relates how the children enjoyed using the donkey as a carousel when they pumped water for the livestock. The well was located in the centre of the settlement, with the cattle enclosure located 20-30 m west of the well, one living area 50-60 m east of the well and a second living area located south of the well.

Nathanael Kandjou was born in 1919 in Epukiro. In 1936, he came together with his father to Kazapamba. Ludvig Kandjou came at the same time, and they dug the first well in the village. The well was over 30 m deep and had a diameter of 1.5 m and it still contains water. They never used temporary grazing camps (Ozohambo), only the well for providing water to the livestock. The Government drilled the village borehole in 1952 and today they have stopped using the well, instead sharing the borehole with the other homesteads in the village (NK 2001).
ised by extensive calcrete deposits. A calcrete quarry for making bricks for house construction is situated in the middle of the village. The vegetation is characterised by *A. hebeclada*, *A. mellifera* bushes and several large *A. erioloba* trees. Eight well locations were mapped in Otjiyetjombungu. The village elders stated that there was no Herero settlement here before the war in 1904-07 (Votj 2001). The current Herero settlement was established in 1927, when *Oziamba Isa* arrived to the area. He was originally from *Etawamba* (K 2001), located north of Windhoek.

Before 1955, when the first borehole was drilled by the Government, the wells were the only water source for the village. The westernmost well was 1.5 m in diameter, 5-6 m deep and situated close to five large *Acacia erioloba*. The grove was considered as demarcating an old cattle enclosure, although no signs of a fence could be seen. The well and the trees were situated next to a large doline. The second well was 16 m deep, almost 2 m in diameter and dug in grey unconsolidated sediments with sub-surface calcrete. The first settlers shared this well and according to the elders, this well was found as it appears today when they arrived in 1927; “they just had to build a trough next to the well” (K 2001). Since there was no settlement established at the place at the time, they do not know who constructed the well in the first place.

The next three wells were all dug in calcrete and measured 1.8/15 m, 1.9/16 m and 2.1/20 m. They were modernised and enclosed with rectangular wire fences sharing the characteristics with the wells documented in Ngamiland by Frank Vivelo (1977). The last two wells were dug in unconsolidated sediments and currently filled with sand and gravel.

Three additional well sites were mapped in the Otjinoko Omuramba. One of these wells was located in the centre of the current village Ojitwaneho. The well was related as having been dug by *Kamheke* in 1957 (BK 2001). Today, the well is embedded in a dense *Acacia mellifera* bush and sealed by several logs. It measured 1.5 m in diameter, a depth of 11.5 m and could hence be related to the deep circular wells that had been recorded elsewhere. Near Otjinoko and at Okawoha, two deep circular wells measuring 1.5/20 m and 2/24 m were mapped. According to the informants, the wells were dug by Anton Kaute. For the first well, they could not give a precise date (BK 2001; Kaz 2001). However, the second well (Fig. 5.18) was acknowledged as having been dug in 1942. The well was dug in the omuramba calcrete floor in association to a doline. Bushes of *A. mellifera*, *G. flava* and *Z. mucronata* grew on the edge of the doline. A large *A. erioloba* stood in the middle of the depression which was filled with organic soils. On the side facing the well, worn access could be observed on the calcrete edge. The well had several calcrete rocks placed around the rim and as a fundament for the drinking trough.

According to the informants, Kaute constructed a new well not far from the other two already in 1947, but they could not recall where.

Chief Kazapua mentioned that Anton Kaute kept the *Okuruwo* at his settlement near the wells. This can be taken as an indication of that the wells were related to a more or less permanent settlement. If there were good rains, they made temporal grazing camps on places elsewhere in the area (below).

![Figure 5.18. Anton Kaute’s well near Otjinoko.](image)

**Nya Nyaé- /Gam area**

In 1983, the survey by Jill and John Kinahan documented four well sites at the pans Dobe, N’ama and Gautscha and Gura (Kinahan & Kinahan 1984). The site at Dobe pan had the largest number of well structures consisting of twelve clearly visible wells. The wells were dug through a thin layer of sand into calcrete deposits and can be characterised as oval irregular. Some of the wells showed stages of decay with collapsed sides. Some of the wells had steps in the sides, most likely used for passing the water up to the drinking trough. This is also supported by wear on the calcrete (Fig. 5.19.). At the centre of the site, two shallow depressions that share the characteristics noted for well sites associated with unconsolidated sediments may indicate the location of earlier wells. A thin scatter of flaked silcrete was associated with the well. The single well at N’ama lay in direct connection with a series of hunting blinds. The well can be characterised as an oval ir-
regular and it measured 7 m across. Gura pan had two oval irregular wells and Gautscha pan had two wells dug at the pan margin. At the southern margin of Djoxho pan, two small circular wells were documented in the survey.

The first borehole in /Gam was drilled as late as in 1985 (Tarr 1998). Following the Namibian independence, the government reserved a substantial region near /Gam in former Bushmanland as a communal area for the Herero from Botswana. Before the Namibian government drilled communal boreholes, the herders used a spring in /Gam and a series of wells dug in the valleys nearby to provide water for their stock (JU 2002). In the 2002 survey, a series of well sites in the /Gam area were mapped and interviews with the villagers were undertaken. The objective for making the interviews was to understand how the newly arrived people located the wells and how they were dug. Since they had almost exclusively relied on the wells, I wanted to enquire how much livestock a well in the area could sustain over the dry season.

The area surrounding /Gam is characterised by extensive calcrete deposits. Karst landforms, dolines and small pans appear frequently in the landscape. /Gam originates from a Khoe word that indicates water and the village is situated close to a large pan (Passarge 1907). A well measuring 8 x 5 m over the rim is located in the centre of the pan. Lorna Marshall (1976, p. 73) reports how the well at /Gam was about 4.5 m in diameter (15 feet) and 6 m deep (20 feet) in the 1950s. Essentially the well is more of a natural spring that has been deepened and modified, presumably as a result of greater outtake (Edwards et al. 1983). On the calcrete edges, it is possible to observe areas with extensive use wear on the rocks, indicating the side from where the water has been taken. During my fieldwork, I visited /Gam late in the dry seasons of 2002 and 2004, and on both occasions, the modified ‘well area’ was filled with water. From the geohydrological map of Namibia it is possible to note that the spring in /Gam is one of several natural springs that are distributed in this part of Omaheke.

In the larger process of repatriating Herero from Botswana in 1993-94, one of the first returnee settlements relied solely on the spring in /Gam and two sand wells at the Otjozombanui, situated 28 km northwest of /Gam, very close to the old track to Tsumkwe. The villagers still open the well when the borehole is not functioning and they stress that the water is very near the surface. At the time of the

![Figure 5.19. The wells at Dobe (modified from Kinahan & Kinahan 1984, Fig. 7.).](image)
survey, the two wells were visible as two depressions in the sandy sediments, sharing many characteristics with the sediment wells discussed before. The oral tradition relates that the well was used in the devastating migration of 1904; in addition, it was defined as a very old watering place “also used by the Bushmen”, which seems to be a common saying for establishing antiquity in Omaheke. An additional well site located ten km south of Otjozombanui was also used by the returnees in the 1990s. This well is called Otjimihama and it appeared in a similar way: as a depression in the sand with scattered calcareous rocks on the surface and in close association with the old track to the north.

The pan #To//ana is located in the upper reaches of the valley #To//anadum 15 km east of /Gam, close to the Botswana border. The pan is characterised by extensive calcareous deposits. Lee (1976, p. 83) has defined this pan as a semi-permanent pan. On the western side of the pan in connection with a series of small dolines, a well was found. The well is oval in shape, clearly comparable with oval and irregular wells examined in the southern part of the research area. It measures 3.5 m x 1.8 m and is approximately 7 m deep. According to the Herero informants in the area, the well was in use before 1957 when the Herero were forced to migrate to Botswana by the authorities (WK 2004; VM 2004; Marshall 1976, p. 60). After the repatriation in 1996, the pan has only been used as a rainy season grazing area (Ohambo) without permanent settlement (JU 2002).

In the Otjozondjou Omuramba, 15 km south of /Gam, the well site Otjiwapehuri is located. In terms of geology and appearance, the site shares many similarities with the well site at Dobe pan in the Nyae Nyae area described before. Here seven well structures, one larger depression and six smaller could be identified in the grey sandy silty soils. On the surface, larger and smaller chunks of calcareous, ferricrete and what seemed like sand stone could be observed. The people in the nearest settlement say that they used the wells in 1997 and that they knew were to find it after they had heard about the place while still being in Botswana.

The well site Otjizeandu is located on a grassy pan 10 km west of /Gam and 7 km north of the Daneib Omuramba. The area is characterised by an active surface drainage towards the upper reaches of an arm of the Daneib. The wells are situated 300 m north of the old track to Tsumkwe. The site contains two wells located approximately 280 m apart. The pan is constituted by subsurface calcareous overlaid by a thin vegetated sand layer. The villagers do not know who dug the wells first; they found the wells in 1997 when they came here. Occasionally, they still use them today when the borehole breaks down. The well had an oval irregular shape and measured 4.70 m x 1.90 m and was approximately 6 m deep, dug through a 1 m thick calcrete crust (Fig. 5.20.). In connection with the well, a wooden drinking trough made from an Acacia erioloba log was found. The western well was only visible through a depression but shared the general appearance concerning placement in the landscape.

Figure 5.20. The eastern well at Otjizeandu.

Four well structures were found in and near the village Otjozondema, located northeast of /Gam (see Chapter 7). The first well appeared as a shallow depression in a grassy pan, although, judged from calcareous rocks that are associated with the edges of the well, it seems that this well is also associated with subsurface duricrusts. In connection with the well structure, a thin scatter of pottery, flaked stone and ostrich eggshell was found. For this reason, the site was chosen for more detailed investigation. An archaeological excavation was undertaken at the site and in Chapter 7, I will provide an excavation report. The second well site at Otjozondema was located 1.3 km north of the first well, near a small track towards the Botswana border. One well was dug in calcareous in the margin of a small doline. It can be characterised as a small and circular well measuring 1.6 m in rim diameter; the depth could not be measured since it was filled with black cotton. Two other wells were only visible as depressions, sediment heaps and fractured calcareous.

In the northern part of the research area, it is also possible to locate places with wells that have been used for watering livestock. The majority of the wells in the northern research area were associated
Ozohambo
On the sandy plains in the periphery of the Eiseb Omuramba, several of the calcrete pans (Otjiherero; Erindi sing. Omarindi pl.) have a tradition of Ohambo (sing. Ozohambo pl.) grazing (Fig. 5.21.; Plate 5.8.).

Ozohambo denotes a specific herding strategy employed during the rains to allow the fodder and water of the dry season areas to replenish. The strategy was, and still is, based on the movement of the livestock to the pans in the outlying areas using surface water. The Ohambo grazing was characterised by a higher mobility, as the cattle were brought from pan to pan according to the rhythm of the shrinking water resources. At the end of the rainy season, the herders dug small wells, mainly for extending their stay before they returned to the dry season homesteads. Women, older people and the youngest children usually stayed at the permanent homesteads in the omiramba with some cattle and the small stock. Many elderly men talks about the past ways of ohambo grazing with nostalgia, as this also was the time for hunting. This practice seems to have been more formalised before the boreholes, but today the practice of establishing smaller temporal grazing “camps” is still part of the Omaheke land-use (Stahl 2000). Research in western Omaheke indicates that the rainy season surface accumulations of water are perceived as of better quality than the water sources used in the dry season (Homann & Rischkowsky 2001, p. 7). Today, many of the pans have permanent settlements based on permanent village boreholes.

Rainy season camps, regardless of whether they are associated with herding, hunting or gathering, are archaeologically very obscure (see Yellen...
1977 and Brooks & Yellen 1987). At the Ohambo, the herders only use tents or build shelters in light materials such as grass.

Three of the waterholes with oral traditions of Ohambo grazing coincide with sites that have been noted as tree harvesting sites (see above).

The villagers at Ombujunjama say that the pans held water almost permanently in the past (GM 2001, SK 2001). The name of the current village refers to at least three _ombu_ shallow wells located in between two of the pans. As archaeological structures, they are more obscure than the wells in the omiramba. They are identified through irregular sediment heaps, depressions with steep sides with a lair like burrow in the bottom.

The calcrete pan Otjipahewa is also known for its permanent water in the past (Fig. 5.21.). The water in the pan could last for a long time into, or in good years, even over the dry season. Before the borehole was drilled in the beginning of the 1970s, the pan was frequently used as a hunting and Ozo-hambo area. One possible small circular well was identified here, but since the structure was associated with eroded calcrete, it was extremely obscure.

Erindi Rombahe, (a pan located on the sandy plain 3.2 km from the Otjinoko) has an “old history” (Kau 2001). Herero have stayed here even before the “old Maherero” at the time when there “were still no
Boers in Okahandja”. In the dry season, they stayed at the omiramba; in the rainy season, they were at the pans for summer grazing. Up to ten different Ozonganda could share the water from the pans. The pans at Erindi Roukambe and Otjiarua are also considered as Ozohambo areas (HB 2001, Köhler 1959a). The pans are today located in the village centres and the current settlement has impacted on possible site indications on the surface.

The pans are known to have provided water the whole year round in the past. Since the 1960-70s, the pans hold water only from January to February and others are constantly dry (CK 2001; Kau 2001).

A fault ridge near the settlement at Otjohi contained outcrops of a layered sedimentary rock riddled with holes and cavities. The holes had rim diameters of about 1 m and they were up to 3 m deep. None of the holes showed signs of having been widened or modified to cisterns. According to the villagers in the area, they can contain significant quantities of water after the rains and they are regularly used by the herders in the area. The use of such water sources has also been noted in the nineteenth century sources. Büttner describes how rainwater could remain for some days or weeks, depending on the location, in rock holes called *oma-o* or *otu-uua* in Otjiherero. The “shepherds and the hunters” know exactly where to find these places and they were immediately searched for after rain (Büttner 1883, p. 532).

**Wells in the Omatako catchment**

For comparative reasons, one minor survey was undertaken in the Omatako Omuramba. The reason for this was that this valley constituted the main route to the north during the nineteenth century when the Europeans became active in the area. Axel Eriksson’s route for bringing cattle to the mines in South Africa started at Erikssen’s Putz, located about forty km below Otjituuo (Chapter 4).

Omatako linked to the Okavango River which in turn linked to the larger trade centres at Andara and Libebe. From here, a further route followed the river inland to the delta and the Lake Ngami area.

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**Figure 5.23.** The well site at Kaiziuse.
Wells of Experience

This area connected the inland with the west and the east and was an important node for the trade networks (Galton 1852; Peters 1972; Wilmsen 1989a; Lee & Guenther 1992). In addition to the wells connected with the Omatako Omuramba, a series of well sites between the Omatako and Eiseb was examined. By this, the interior parts of Omaheke was gradually approached (Fig. 5.22.).

The scale of a large well site in the Omatako can be exemplified by the well site Kauziuse, located ten km south of the village Ojituuo, in turn located approximately half way between Windhoek and the Okavango River. Kauziuse was connected with a large pan with several larger dolines and smaller sinkholes scattered over the area (Fig. 5.23.). The largest well cluster was located at the margin of the pan, within a large almost park-like grove of *Hyphernia petriiana*, a palm tree (Fig. 5.23.).

The wells were dug through a layer of sand down to subsurface calcrete. The majority of the wells were deep circular and oval irregular, but on the pan margin, two small circular wells were identified. At the edge of the well site, a thin scatter of flaked CCS was found. An additional silcrete scatter was found in association with a river cutting a few km east from the well site.

160 km southwest of Kauziuse, on the estates of the farm Klein Hamakari, the well Ombuengero is situated. The well is connected with a depression of the Omuramba Omuramba, which is an arm of the Omatako Omuramba. As mentioned in Chapter 2, *Ombu* is an Otjiherero word related to a shallow well dug in unconsolidated sediments. *Ongero* refers to the last born; hence, the name of this well translates to the “well of the last born”. *Erumbi* means the first-born (Anonymous). The well was filled with sediments at the time of the visit, although the informant says that it could be dug to a depth to 10-12 m. 90-100 cattle per day could drink from the well during the dry season. As indicated by a monument for the units of Colonel Heyde and Major Osterhaus not far from this well, Ombuengero was most likely one of the wells that were fought over in the battle at Hamakari in August 1904 (Chapter 4; Mossolow 1993, p. 38).

The well at Okahitua was located 33 km east in the Omatako Omuramba. At Okahitua, three visible well structures, appearing as depressions in unconsolidated sediments associated with larger Acacia trees, were noted. The wells were, according to the people in the village, found in 1913 when they first settled here. They knew about the wells before their arrival, since it was an old watering place used before the war (Oka 2002).

The village Ondjouzondjou has three wells associated with dolines and woody vegetation, mainly *Acacia tortilis*, *Acacia hebeclada* and *Acacia erioloba*. The wells have caved in and can only be identified by depressions with scattered rocks. The village Omapumba is located twenty-five km northeast of Ondjouzondjou. The well *Ondjouboja Katuzze* is situated not far from the present village Omapumba. The well is connected with a sinkhole with a woody vegetation structure mainly of the species *Combretum hereroense*, *Acacia hebeclada* and *Ziziphus mucronata*. The well was not open and could not be identified through structures other than a depression. The well is considered as an old well; Katuzze was the first person to settle here, and this is the reason for the name of the well (LK 2002). The informant Mr Leonard Kavetuna relates that before the uprising in 1904, a number of people stayed in the area. He mentions Nguzerua, Kaakamburuua, Tjizepe and Kovatjauna Kaeljaue. Four additional wells were mapped in the village Omapumba. They could all be classified as deep circular wells connected with calcrete deposits, and according to Leonard Kavetuna, they were dug in the 1920-30s. The first borehole in the village was drilled in 1957 by the South African Government; the first permanent village was established in 1959. In 1970, the Government drilled the second borehole. As noted above, a grave was situated not far from the wells.

A note on the distribution of the wells

A well should be looked for in low-lying areas that receive water from upslope areas. This can be pans or in places at the foot of the dry river valleys. After rainfall, these depressions are often submerged, but in the dry season, when there is no surface water, well areas can be identified by observing topography, lines of drainage, seepage, termite mounds and calcrete deposits. Dolines and sinkholes are additional important characteristics of an area where wells can be expected (Chapter 7).

From the distribution of the wells, it is possible to see that the wells only cover a small part of the total research area (Fig. 5.9.). Considering the extent of the research area, the well sites do not represent the total number of wells that has been dug in this part of Omaheke. From a land-use related perspective, ground water is the water in the saturated zone that is available for human land-use through seeps or springs on the surface, or that can be collected by digging wells or by drilling boreholes (Edwards et al. 1983). Hence, the distribution gives a preliminary indication to the hydrologic background and that the variation of water availability within the valleys, as well as between the different valleys of the catchment. For example, only two wells have been identified in Otjozondjou Omuramba, but a series of wells has been indicated in the...
The archaeological survey

Omuramba Eiseb. Between the northernmost well in the Eiseb Omuramba, Okamuputo, and the southernmost well site in the /Gam area the distance is 60 km. The last part of Eiseb before the border fence to Botswana was not surveyed during this study. However, judging from the current trend, it is likely that further places with well indications, as archaeological structures or in the oral tradition, would appear in this last stretch of Omuramba Eiseb. It is also necessary to note that the area between the two parallel valleys of Eiseb and the Otjozondjou Omiramba is characterised by extensive dune formations with very thick sand. Nevertheless, shortly beyond the boundary to Botswana, the omiramba Otjozondjou, Daneib and Eiseb converge in an area characterised by thinner alluvial sand layers.

In the descriptions of the well structures it is apparent how they exhibit a great variation ranging from rather shallow depressions in sand or clay to rather extensive structures dug through calcrete. Visibility associated with a fixed point and a better preservation is probably the best explanation for why the majority of the wells, approximately 94%, are connected with duricrusts associated with landforms. In some places, the duricrust was thinner or covered with a thin sand or clay layer. In other places, the calcrete might be very extensive, sometimes forming low cliffs. 50% of the wells were sunk in exposed calcrete and can in most cases be identified in a relatively straightforward way. Only 6% of the well sites can be considered sediment wells; i.e. the well structure is defined through a depression in uncon-
solidated clay, silt or sandy sediments at the end of a local drainage system. The wells sunk in unconsolidated sediments tend to be obscure; mainly they cave in and fill up during the rains. The number of wells in the different well sites varies between a single to several. Within the research area, the largest groupings of wells are situated in the Oti/Enene-Epata area. The largest cluster in the northern part of the research area is situated at Dobe pan with twelve wells on the pan margin. The largest well site mapped in this survey, with 36 visible well indications, is situated in the Omatoko Omuramba, the valley that delineates the western fringe of the Omaheke. The survey in the Omatoko catchment indicates that the wells in this area share all the basic characteristics that have been noted for the wells inside the research area. One notable difference, however, is that the wells outside the research area tend to be filled and to a larger extent identified through depressions of unconsolidated sediments rather than outcropping calcrete. Büttner (1883, p. 531) argued that the smaller “ozo-mbu” wells had the advantage that they seldom refilled with sediments and could for this reason be used “year after year” after only few improvements. The stronger “ozo-ndyombo” wells were constantly refilled by the more active drainage during the rainy season and for this reason, they had to be re-dug every dry season (ibid.). Whether or not this is the reason for the noted differences in the archaeological preservation of the well structures has not been addressed in this study, but it can be assumed that a study of this issue would demand long-term observations and the digging of experimental wells.

Wells in the ethnography
In addition to the wells found in the archaeological survey, some additional well locations can be reconstructed by using historical and ethnographical sources. A report written by the superintendent of the Epukiro Native Reserve, Oswin Köhler (1959a), included a map indicated settlement locations in the Epukiro Native Reserve. By including the wells from his report, that were in use in the reserve in the 1950s, it is possible to see that some of the well sites found in the survey were known and also in use at the time. In addition, on his map over the Epukiro Reserve it is also possible, by noting place names that infer wells, i.e. ombu and ozombu, to locate additional places that had livestock wells at the time. Many of these sites were never rediscovered as archaeological structures during this survey. This may serve as an indication that these wells were connected with unconsolidated sediments and the limited preservation of wells dug in sand and clay. For the northern part of the research area, it is difficult to do a similar reconstruction. As discussed in Chapter 4, from 1922 the Nyae Nyae area was legislated as Crown Land, where livestock herding was prohibited.

The /Gam area was acknowledged as the home range for the /Du /da band, the most isolated band according to the Harvard ethnography (Lee 1979, p. 73). From the ethnographical accounts and the oral tradition, it is nevertheless apparent that Tawana and Herero herders ignored the legislation, at least until 1957, when they were relocated to Botswana. Lorna Marshall (Marshall 1976, p. 73) mentions livestock wells at Samangaigai, N/ama, Gautscha, Cho/ana (Tsho/ana) and /Gam. Wilmsen reports wells in /Xai/xai on the other side of the border fence that have been in use by Herero since at least the 1930s (Wilmsen 1978; 1989b). The well in /Xai/xai was however probably only one of the 176 “hand dug wells” that the Botswana Tribal Grazing Land Programme indicated on their provisional maps of water resources in the old Tawana Reserve (Wilson 1979, p. 63).

Figure 5.24. summarises all indications of livestock wells in or near the research area. The map confirms the impression from the archaeological survey, that the larger well sites are all associated with Epukiro, Alexest and the Eiseb Omiramba. In the Otjinkoko Omuramba, there were no further indications of wells, which to some extent already had been established by the archaeological survey.

The result of combining these lines of evidence is that on a distance of approximately 160 km, which is the length of Omuramba Eiseb within the former Epukiro Reserve, there are fourteen places in which herders have dug wells for livestock. An estimated average gives that a well, indicated either through a place name or as an archaeological structure, appears on at least every 11 km in the southern half of the research area. A similar calculation for the northern part of the research area, based on the distance between the wells at Otjiwapehuri and Cho/ana is approximately 180 km if the old track is followed. In connection with the track, twelve different well sites have been identified during the survey and from ethnographical accounts. This gives an estimate of one well site for every 15 km.

The archaeological record of Omaheke
I will conclude the survey report by providing four notes concerned with the archaeological record of Omaheke.

First, from the preceding works and this survey it is clear that the traces of human activities are few and obscure in Omaheke. The reasons for the sparse archaeological record can be concluded from the findings of the previous research.
Despite the near regularity in mobility of ethnographically described hunters and herdsmen, site location is not precisely repetitive in location. In addition, mobile life of nomadic societies entails small assemblages of material culture, not likely to survive for long, except in the case of thin surface scatters of ostrich eggshell, bone, flaked stone and ceramics. It can be further noted that most resources procured by ethnographically described and present day economies in the Kalahari and likely procured by prehistoric hunter-gatherers and pastoralists are widely scattered. They also tend to be highly seasonal or sporadic in occurrence reflecting the low, erratic and unevenly distributed rainfall (Yellen 1977; Lee 1979; Kinahan & Kinahan 1984; Powell 1998). Moreover, wild and domestic animals have a significant impact on the archaeological materials. Bone debris, for example, is reduced and scattered over vast areas by scavengers, elephant traffic and cattle trampling near water sources and other fixed points in the landscapes (Kinahan & Kinahan 1984). That archaeological sites in the Omaheke would provide sequential and stratified remains seems for these reasons unlikely (Kinahan & Kinahan 1984; Yellen & Brooks 1988).

Secondly, observations on the Dobe Ju’hoansi settlements in the 1970s indicated that group size, season and the variety of activities carried out on a site increases with the number of people and the length of their stay. From this it was proposed that these relations would have a close correlation to the archaeological visibility of the site (Yellen 1977). However, an explicit test of this proposition in the neighbouring Nyae Nyae area could not confirm the suggestion. In contrast, they were “unable to find a direct correlation between ethnographic and archaeological site visibility” (Kinahan & Kinahan 1984). The majority of the sites identified represented “special activity loci to which the foragers dispersed during aggregation” (ibid.). Instead, the association to a fixed point in the landscape and the type of activity carried out seemed to be the most important criteria for archaeological visibility.

This study supports the latter suggestion. The majority of the sites were associated with distinct features in the landscape, e.g. trees, pans or ridges of ancient calcrete. All sites, except the remains of a relatively recent settlement, can be considered as manifesting specialised activities that would have taken place in the periphery to a settlement. In addition, the majority of the site indications, for example the ondwija, hunting blinds, wells and to some extent the sites that are related to harvesting of mangetti and baobab, tend to reflect dry season land-use. Hence, it can be said that the archaeological record of Omaheke reflects specialised practice carried out during the dry season. It has however been suggested that areas with higher density of sites reflects a more intense use within a nomadic land-use system, which may be a better tool for defining settlement and aggregation areas (Kinahan 2001).

Thirdly, it can be valuable to provide a short note on the association between pottery and pastoralism. The survey revealed one single well site, Otjozondema, which had pottery sherds in its direct association. Eventually the sites at Cho/ana and Xai/xai represents similar situations, since they contained pottery and have also been documented as well sites, the latter probably since at least the 1930s (Passarge 1905a; Marshall 1976; Wilmsen 1978; Smith & Lee 1997). At the well site Ozumbu Zo Vindimba, thirty-one iron beads have been found. One of the wells in the Nyae Nyae area, N/ama, had a single pottery sherd in its direct association, although the other wells are in the near vicinity of sites that contain surface indications of datable pottery and nineteenth century goods of European origin (Lepionka 1973; Kinahan & Kinahan 1984; Smith & Lee 1997). The wells at Dobe had a Late Stone Age scatter associated with them (Kinahan & Kinahan 1984). As discussed, the Marshall expedition found pottery in the Eiseb Omuramba. The reconstructed find place is situated approximately 8 km from the nearest well in Köhler’s report, but 33 km from the nearest visible well structure identified in my survey (Lepionka 1973; Köhler 1959a). However, these examples are the only archaeological surface indications of pottery and iron beads that have been found in association with nearly 150 well structures in 34 sites, with a presumed continuity of livestock herding since at least the last decade of the nineteenth century (i.e. Passarge 1905a). This example illustrate how wells, without doubt the most crucial places in the landscape for a livestock herder, do not necessarily accumulate pottery, the archaeological material that conventionally has been associated with livestock herding.

This takes me to the fourth and final note. From terms of visibility, it has recently been argued that the hunting blinds; “used redundantly, are most prominent in the archaeological record” of the region (Brooks 2002, p. 223). The fact that Late Stone Age materials are generally associated with the features and that they have been used by the Ju’hoansi enhance their importance for understanding the long-term continuity of hunter-gatherers in Omaheke (Brooks, 2002, p. 219). Similar to the hunting blind sites, the wells mapped in the survey were also associated with fixed points in the landscape, and in most cases, they were clearly visible structures. Like the hunting blinds, they have been used until re-
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recently, or are even still in use, at least when the boreholes break down. In addition, they are associated with settings where scatters of flaked stone as well as the hunting blinds can be expected. Concerning context, there is no crucial difference between the two site categories hunting blinds and artificial wells. However, this study establishes one fundamental contrast. Judged from the number of site indications it seems as though the wells may be an even more prominent feature of the archaeological record of Omaheke.

At least this is the case on the Namibian side of the border fence, where the 34 well sites outnumber the 6 hunting blind sites that have so far been reported from this area.

Evidently, my argument is based on the assumption that prominence can be assessed from simple mathematics, which with no doubt is not always the case, and in addition that the wells, similar to the hunting blinds, can be considered as archaeological features. In the following two chapters I will discuss the evidence that allows me to do so.
Chapter 6

THE PASTORAL LANDSCAPE OF OMAHEKE

Rainfall herders

A spatial separation between areas accessible only during the wet season and areas that contain dry season key resources can be considered a heterogeneous grazing system (Scoones 1989, 1995). The interaction between animal behaviour, herding strategies and the vegetation resources that go across habitat types, from the landscape level to the regional savanna ecosystem, are critical for understanding the fundamental principles of livestock herding (Niamir 1990; Bollig & Schulte 1999). For example, so called ‘spill-over exploitation’ of poor habitats that would not support grazing on its own has been identified as a crucial aspect of grazing regimes in variable environments (Illius & O’Connor 2000, p. 292). The degree of such exploitation is positively related to the proportion of the area consisting of high-quality habitat (ibid.). Without an insight into the spatial and temporal use of resources in a heterogeneous grazing system, questions of an area’s capacity of sustaining livestock herding cannot be appreciated (Scoones 1995, p. 234).

Below I will use the wells for a larger scale socio-environmental assessment of Omaheke in order to test whether the wells can be considered as reflecting a spatially heterogeneous grazing system centred on a row of more predictable key resources. In this chapter, the wells will form the platform for an integrated approach to the interplay between human practice, animal behaviour and the other domains of the environment.

The analysis is based on surface interpolation. Surface interpolation is a GIS-method that aims to make predictions for whole areas from a set of local measurements of observed cases, i.e. the wells mapped in Omaheke. An interpolation estimates the value for an area whether or not a measurement has been taken at the location. The result of an interpolation is referred to as a model. A deterministic interpolation method Spline was used for the surface interpolation. Spline is considered the best method to use for interpolations of moderately detailed data-sets and for representing varying surfaces of phenomena such as temperature (Childs 2004, p. 34). Metaphorically speaking, the aim of the model is to ‘measure the temperature’ of the presumed grazing system in Omaheke. It is an attempt to separate and define ‘colder areas’ based on outlying grazing constituted on surface water and ‘warmer areas’ with indications of a dry season grazing regime, hence representing a pastoral key resource area.

As we have seen, the difficulty of gaining physical evidence, in the form of archaeological/material indications, for rainy season pastoral land-use is apparent (Chapter 5). Nevertheless, six historical Herero Ozohambo areas at #To/ana, Otjiarua, Ombujunjama, Erindi Roukambe, Erindi Rombae and Otjipahewa have been identified through interviews with the informants and the report by Köhler (1959a). Pans that are traditionally Ohambo grazing areas were consequently defined as the primary indication for reconstructing rainy season grazing. In addition, places with Visible surface water as indicated on satellite images of the research area from the rainy season of 2000, or accumulations of surface water seen during the 1999-2004 fieldworks were used as indications that temporal grazing may have occurred at the site, even though this cannot be considered as evidence of the activity in itself.

In contrast to the difficulty of finding physical evidence for temporal grazing associated with surface water, the wells present tangible evidence for pastoral land-use. The indications of the dry season land-use system were based on an assessment of every individual well of the 150 wells documented within the research area (Appendix 2). Every well was scored using a four-graded scale for Hydrogeology, Size and Oral tradition. The three categories were motivated from the reason that each category has the capacity to indicate dry season grazing on its own.

The category Hydrogeology indicates whether a well is associated with karstified calcrete landforms, with subsurface duricrusts or with unconsolidated sediments. As discussed before, the Size of a well is generally a function of the outtake. For this reason, it can be assumed that a larger well indicates a more intense and aggregated settlement for the dry season. It has to be noted, however, that size measurements of the wells in many cases are estimated and not based on absolute measurements,
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since the wells show a high individual variation owing to differences in geological context. The current appearance is probably also indicative for the last period of use. Nevertheless, the deep circular wells with a depth extending 5 m gained the highest value followed by the oval irregular wells and the small circular wells with diameters up to 1.7 m and a depth up to 2 m. The fourth class, undefined, are cases where the size of the well cannot be estimated, but where place names, oral tradition or the local hydrogeological circumstances indicate a well site.

Oral tradition is an assessment based on statements of local herdsmen. Dry season signifies accounts that affirm that the well area has been used in the dry season. Intermediary refers to accounts that indicate that the well area has been used in the dry season in good rainfall years or in the intermediary period in the end of the rainy season, or as a temporal outlying grazing area. Outlying signifies accounts that allege temporal grazing mainly in the rainy season. If the account referred to one well in a larger cluster, the other wells were given the same value. No tradition groups cases where no oral tradition is available, but an archaeological well site is clearly defined by an archaeological structure. Places where a well could be suspected, although indicated neither by a structure nor in the oral tradition, were not incorporated in the analysis. In the next step, the values for each well were added and the sum became the basis for an overall value (from 5 to 60) that was used in the surface interpolation.

Analysis of the interpolation

The result of the interpolation is illustrated in Figure 6.1. In the interpolation, supporting field observations, in combination with remotely sensed data, it is possible to distinguish different areas of Omaheke. It is important to note that the Nyae Nyae-Gam area, compared to the Ojitjune area, has a slightly better rainfall regime and a moderate hydrogeology in the form of a wide-ranging pan environment, where some pans contain surface water on an annual basis (Marshall 1976; Lee 1979). For historical reasons, the deep circular wells are all confined to the southern part of the research area. The high values for these wells in all three categories inflict on the outlook of the surface interpolation, implying that the weight of the model to some degree may be a reflection of the land allocations that took place in the twentieth century (Chapter 4 & 7).

The result of the surface interpolation is interpreted as follows: the spectrum orange to red represents areas with highest values. Areas with red would be able to sustain pastoral herding during the Dry season even in periods with prolonged drought as documented by the Marshalls in 1951 (Marshall 1976, pp. 3). Areas classified as Dry season-intermediary are interpreted as containing well sites that have the capacity of supporting dry season settlement in years with rainfall, but not necessarily in years with drought conditions. The classification Intermediary refers to areas which can support pastoral herding in the dry season in association with good rain years and during the rainy season. Outlying indicates areas for summer grazing, but in years with extremely good rainfall they may also have the capacity of sustaining a prolonged grazing into the dry season, or even over the dry season. Temporary signifies areas with surface water accumulations that can sustain temporary grazing during the rainy season. Again it has to be noted that rainfall events in Omaheke are extremely unpredictable in timing, distribution and in the amounts that fall. Hence, the green area illustrates areas with the capacity of sustaining localised distributions of surface water, not the actual extent of surface water. Owing to the high evaporation rates, the surface water bodies in Omaheke are extremely transient (Külls 2000). Small localised drainage systems associated with the omirambah and dune valleys together with scattered pans are the most important features of the landscape for constituting surface water. The surface water commonly appears in the form of pans or as small shallow ponds. In the flats of the Nyae Nyae, large areas are under water during the rainy season. Consequently, the green in the model indicates the outer range for pastoral land-use.

The largest area in the model is classified as Dry, meaning that this area has little capacity of sustaining surface water owing to the high evaporation rates. In Omaheke, the estimated potential evaporation for pan environments increases from 2700 mm/y in the northern Omaheke to 3200 mm/y in the southern part (Klock & Udluft 2002). These figures exceed by several times the amounts of rainfall that fall in the region. The result is a general paucity of procurable surface water, especially during the dry season. As noted before, this aspect of the Omaheke environment has made authors consider the area unsuitable for livestock herding (Smith & Lee 1997; Brooks 2002; Smith 2002).

The result of the surface interpolation is consistent with the findings of recent geological research which has reassessed the recharge rates of rainfall to the groundwater store in the Kalahari. The studies have shown that recharge varies significantly from place to place in the Kalahari depending on the distribution, intensity and frequency of rainfall
events and the underlying geology in terms of sand depth, soil type and geological formation (Mazor et al. 1977; Mazor 1982; de Vries 1984; Thomas & Shaw 1991; Külls 2000; Christelis & Struckmeier 2001; Klock & Udluft 2002). The duricrust has been noted for its good capacity of recharging rainfall to the Kalahari ground water store (Goudie 1973; de Vries 1984; Nash & McLaren 2003). This is exemplified by a study in the Omatako catchment on the north-western side of Omaheke, where some places have exceptionally high recharge values largely associated with duricrusts riddled by dolines and sinkholes (Külls 2000). The same pattern has also been observed at the Auob crater, located south of Omaheke, where calcrete with extensive sinkhole belts focus rainfall through the Kalahari calcrete. This allows a rapid recharge of rainfall to the ground water system and decrease the amount of water that evaporates (Christelis et al. 2001). Klock & Udluft’s study (2002) also indicates that recharge has a strong relationship with the surface materials. In addition, Klock & Udluft have provided estimates of the recharge rates. Areas covered by sandy soils receive less than 1 mm/y, while recharge rates in karstified rock are locally as high as 100 mm/y. Estimated from the rainfall averages in Omaheke as ranging between 300-600 mm/y (Chapter 2), this implies that the recharge rates, estimated from local circumstances, range from almost non-existent up to 16% of the rainfall in places with karstified calcrete, the most common context for the wells in Omaheke. It can be assumed that wells dug in such contexts contribute by draining the surface and channel water to the underlying geology. In addition, Külls study in the Omatako catchment indicates that response to rainfall at any single site that contains these qualities tends to be consistent from year to year. This implies that the well sites offer a higher degree of predictability in the variable ecosystem.

Spatial heterogeneity
In order to focus the model and the hydrogeological discussion on to a practical level, it may be worthwhile to provide estimates of the production for some of the wells within the model. The estimates are based on accounts from livestock owners, historical accounts and the ethnographies. The wells referred to in the discussion are indicated on the surface interpolation (Fig. 6.1.).

To begin with, it has been calculated that cattle in an African pastoral production system need between 8.4 litres to 28.7 litres of water per day. The
In the Nyae Nyae area, the wells did not have to be headman, goats and sheep stayed at the well site when the cattle were taken to the pans. Women, the dug in the summertime (December to February), eating 6 kg dry matter in an air temperature of 35º C. In the same estimate, goats and sheep need 3.4-11.9 and 2-20.1 litres of water per day respectively (Castel 2006, p. 16 see also King 1983; Nicholson 1985).

Josef Dauth, (2002) the farmer who uses the well Okaropiko, estimates that during three months in the dry season, approximately 20 cubic metres of water per hour for approximately ten hours per day is required for watering the fields. By simple mathematics, this is equivalent of water for almost 700 lactating cows or 1650 goats. During the daily out-take, the water level in the well sinks 2-3 m (estimated from watermarks on the calcrete). According to Dauth, the well regenerates over night to the same level it had before the out-take. The regenerating capacity and the amounts of water suggest that this well is constructed within a spring. Here it has to be noted that Dauth uses a pump and not manual labour, which would certainly reduce the amounts of water that can be taken from the well. Still, the example illustrates how certain points in Omaheke have the capacity of producing large quantities of water.

The informants in Otjozondema relate that before 1957, they herded their cattle within the entire area between the Nyae Nyae and the Okavango delta (WK, VM 2004). The wells were dug in the summertime (December to February), when the cattle were taken to the pans. Women, the headman, goats and sheep stayed at the well site throughout the year. In the winter, the well was full. In the Nyae Nyae area, the wells did not have to be dug so deep, since water was close. Here, they divided the herd between four or five different wells.

According to Kariko, who herded cattle in the Nyae Nyae area, the well site at Gautscha consisted of two wells, both called *Ovikonda Vrongo*, in the early 1950s (WK 2004). The wells sustained approximately 300 cattle over the whole dry season. The well in Otjozondema could sustain up to 200 cattle over the whole dry season.

It is somewhat more difficult to estimate the production of the smaller clay wells. Accounts from the herders today may however give some estimates. The well at Okamuputo in the Otjumunugindi area is one of the smallest wells mapped in the survey (Fig. 6.1.; Chapter 5). In October 2002, before the first rains, a well was dug by four men in two hours (Plate 6.1.). At 2.5 m deep it was close to water, indicated by wet clay sediments and a muffled noise when hitting the bottom. At the same depth the water started to percolate through the sediments generating a thin water surface. Kambirongo estimated that the following day, the water in the well would be sufficient for watering fifty head of cattle and that it would be possible to use the well, with modifications, for some time, possibly a week (CK 2002). Based on his account and the estimates given above, the well could have the capacity of a daily production of 1400 litres of water for a short time in the dry season. Here it could be useful to remember Büttner’s account of the “ozo-mbu” wells that was referred to in Chapter 2. They were associated with flats that contained soil moisture. When the herders dug a well, the water accumulated slowly, but no longer than 24 hours. The water in the well would be sufficient for a few cows, and for this reason, the herders dug many wells. The larger settlements in Omaheke had 50 or more of such wells (Büttner 1883, p. 531). Estimates can also be gained from the periphery of the research area. Wilmsen estimated that 650 cattle and an equal number of goats stayed by the well at /Xai/xai during 1975-6 (Wilmsen 1988, p. 33). Vivelo, while observing a watering in Ngamiland, estimated that “the total number of cattle grouped about the well to be 1000-1200” (Vivel 1977, p. 87-8).

The model and the production estimates reflect how the unpredictable rainfall recharges to the Kalahari groundwater store. Two well sites, Okaropiko and /Gam, seem to be modifications of existing springs and can for this reason be considered as dug in confined aquifers. In confined aquifers, the groundwater is separated from the surface by impermeable material, in the Kalahari, usually calcrete. At Okaropiko and /Gam, these aquifers give rise to springs or artesian wells, where the pressure within the aquifer is sufficient to produce flowing wells at the surface (Edwards et al.)
The pastoral landscape of Omaheke

1983). However, the majority of the wells in Omaheke are associated with perched groundwater resources, which connotes relatively small water bodies lying above the general water table. Perched ground water conditions arise from water infiltration, flow-paths and storage of aquitards held by isolated layers of impermeable material, such as the valley calcrete of the pan and omiramba (Chapter 3). In addition, it can be presumed that the active drainage results in layered subsurface sediments of different fractions that will contribute to the water pockets (Thomas & Shaw 1991, p. 85; Scholes & Parsons, 1997, p. 10). In Omaheke, perched water resources are much closer to the surface than the groundwater and consequently they can be procured by digging wells.

The well locations can be seen as documenting local knowledge of a complex network of perched and rainfall-driven subsurface water resources. The small wells dug in unconsolidated clay sediments, can probably be said to exhibit a small-scale waterpoint in the middle of the recharge spectrum estimated for the Kalahari hydrogeology (Klock & Udluft 2002), while the wells dug in the calcrete with karst landforms manifest larger wells in the upper end of the recharge spectrum (Külls 2000; Klock & Udluft 2002). For this reason, it can be suggested that pastoral wells can be used as a proxy for places and sediments in the complex hydrogeology of the Kalahari, which has only recently been appreciated by hydrogeological research. It can be suggested that the model indicates the limits and the basis for a pastoral land-use regime in the Omaheke. It is noticeable that the largest parts of the research area are not suitable for dry season habitation. Three areas, the Nyae Nyae, /Gam and Otjinene area, contain places which would be able to support settlement and grazing in the dry season.

Vegetation and soil chemistry

Next, I will discuss the case of vegetation and soil chemistry of the well sites. Theoretically, the case is based on the concept of a piosphere. The concept derives from rangeland ecology and it defines the structuring processes that are related to the livestock’s utilisation of forage around a waterpoint (Andrew 1988). A piosphere reflects change on two highly interdependent scales. The first scale is the pressure of usage as a result from grazing and mechanical impact. The second scale is that of nutrient redistribution, germination and regeneration conditions (Andrew 1988; Moleele & Perkins 1998; Derry 2004). For piospheres of modern boreholes in southern Africa, several overlapping zones have been noted in which soil nutrients, seeds and trampling of the livestock are redistributed, in turn creating distinct responses in the vegetation and of the soils. The area closest to the borehole is commonly referred to as the sacrifice zone. Here the ground is heavily affected as a consequence of trampling and defecation of the aggregating livestock. The next zone can be considered as a transport zone, where the vegetation is sparse, heavily affected by mechanical impact, grazing and browsing by livestock going back and forth to the waterpoint. Drops in soil nutrient levels have been noted in this zone owing to the constant movement of the livestock. Particularly in vegetated arid and semi-arid areas, such as the Omaheke, the outermost zone is characterised by proliferation of perennial shrubs. In the literature, this process is commonly referred to as bush encroachment and the effect can extend for tenths of kilometres. Within the large piosphere associated to a waterpoint, additional points, for example salt licks and shade trees, attract and aggregate the livestock which may result in additional smaller piospheres (Derry 2004, p. 11).

It can be assumed that the grazing pressure associated with a well would induce a structuration process of the surrounding vegetation patterns and the nutrient cycles of the soils that coincide with a piosphere. However, the vegetation responses that are associated with piospheres do not seem to be irreversible (John Kinahan 1999). On the contrary, places resting from grazing seem to “recover quite dramatically” over a few years (Dahlberg 2000, p. 37). This would influence the archaeological visibility of the well after it is abandoned. It has however been noted that a grazing cow returns 79 % of the nitrogen, 66 % of the phosphorous she eats (Bartlett 1996). For this reason, it can be suspected that a large amount of the nitrogen and the phosphorous would be distributed around a well in a pattern that would harmonise with patterns that can be recognized from current waterpoints. Soil nutrient analysis is a conventional archaeological strategy for confirmation of observations based on artefact clusters, structures, sites and on site (Sinclair 1987; Persson 1997; John Kinahan 1999).

However, piospheres are not only restricted to domestic livestock. Similar processes occur in wildlife systems associated with natural waterholes (Derry 2004, p. 11). Unfortunately, it can be presumed that it would be difficult to exclude wild life in the production of piospheres, since it would seem that wild and domestic animals could not be separated based on nutrient levels. It can however be assumed that a culturally mediated piosphere could be separated on behavioural grounds. Wildlife piospheres, especially around artificial waterpoints, tend to lack woody vegetation (Barnes 2001; Brits et
The reason for this is that elephants and other wild browsers/grazers tend to override seedlings and bush near the waterpoints (Barnes 2001). The same would also apply for the livestock that suppress the growth of seedlings, delaying growth to reproductive maturity or making the plants vulnerable to fire (Chirara 2001, pp. 29). What may be more significant is that elephants, rhinoceros and giraffe damage large trees. This can be illustrated by a recent study in a wooded grassland habitat in Kenya where almost a thousand larger *Acacia* trees were monitored from 1998 to 2001 (Birkett & Stevens-Wood 2005). The time period for the study included 12 months of rainfall at 60% below average. The low rainfall resulted in elephants switching diet from grass to trees. Heavy browsing by giraffes reduced the growth rates of the trees and consequently increased their vulnerability to the drought conditions, resulting in additional tree losses. The authors conclude that the combination of low rainfall and heavy browsing by elephants, black rhinos and giraffes led to rapid and extensive tree loss in areas near waterpoints (Birkett & Stevens-Wood 2005, p. 129). A recent study in Etosha identified the same process and in addition indicated that tree mortality exceeded recruitment of woody plants during 1984 to 2001, the time period for their study. The chances of survival of a tree varied greatly, but usually increased with distance from the waterpoint (Brits et al. 2002; de Beer et al. 2006).

Below I will assess the vegetation and the soils that are associated with current waterpoints and in the vicinity to the wells in Omaheke. The objective is to test if the vegetation and the soils of the well sites reflect piospheres and furthermore that they can be distinguished from wildlife piospheres.}

**Terminalia sericea**

In the first case, I will illustrate the structure of *Terminalia sericea* vegetation associated with a present day livestock waterpoint. The study is based on measurements of tree trunk diameter in relation with distance from a present day waterpoint (Figure 6.2). The waterpoint is located on thick sandy soils in an undulating dune environment. The waterpoint takes water from a borehole drilled in a small cluster of pans situated shortly south-east. The borehole was drilled in the 1970s during the process of modernising Hereroland. By establishing new boreholes and settlements on the plains, the omiramba could be destocked (Chapter 7). The general rule seems to have been to drill one borehole for each village. The homesteads were distributed around the centrally located borehole on distances of 300 m up to 2 km. Judging from the ethnographical research, this seem to be a common distance for settlements in the Kalahari at the time (Vivelo 1977; Binford 1983; Brooks & Yellen 1987). Either all livestock of the village shared the communal borehole, or pipelines were constructed that brought water to the individual homesteads, as the case was in the example discussed here. The settlement had an own pipeline drawn from the main borehole.

When the Herero locate their homesteads *Ozonganda* (pl.; *Onganda* sing.) they find a suitable shady tree and place the main hearth of the homestead immediately to the east. In the ethnography we can find examples of that the tree was consecrated with the blood of a game animal, poured into a cut in the bark (Barnard 1992a, p. 206). The settlement tree defined the set-out of the *Omuvanda*, which is a straight symbolic line between the house of the homestead owner and the entrance to the cattle enclosure. The place for the holy fire *Okuruwo* is set out after the *Omuvanda*.

*Omuvanda* is of great symbolic importance since it "articulates the fruitful union of husband
and, wife of the deceased and living members of society, or of the inhabitants of the homestead and their herds” (van Wolputte 2000, p. 388). In the past, the general pattern of an idealised homestead organisation was circular. The house of the homestead owner faced west, the female relatives built their houses on the north side and the male relatives on the southern side of the head’s house and the Omuvanda. After the 1950s it has been more common to organise the settlements in a west facing arc. Today Herero homesteads are usually built in a linear way, facing a quadratic cattle enclosure. However, the circular pattern can still be recognised in some villages although on a greater scale. In such cases, the main Onganda is positioned on the eastern side of the village. Relatives from the female side (e.g. sister’s sons) build their homesteads on the northern side and the male relatives (e.g. sons, brothers) on the southern side (Lindholm pers. obs.).

The settlement tree becomes the locus for most of the activities that are carried out at the homestead, especially during the hottest hours of the day. In addition, the tree becomes a landmark that contributes to the shaping of the piosphere and the surrounding socio-environmental universe.

In this case, the settlement tree is an extraordinarily large *T. sericea*. It is located very close to the *Omuvanda* and in direct association with the cattle enclosure with the waterpoint (0 m). The zone 0-400 m from the waterpoint and the settlement tree can be considered as indicating the transport zone. Here the aggregation, trampling and grazing pressure is most intense and the ground is bare except for some patches of *Sida cordifolia* and *Acacia mellifera*, which are useful indicators for a prolonged and intense grazing pressure (Katjiua, forthcoming).

Still within the transport zone, about 200 m from the settlement tree, a small grove of three individual *Terminalia sericea* is located. Such trees are intentionally saved by the herders, and relatively often it can be observed that saplings and minor trees within the transport zone are protected by the construction of pole fences. One motive for keeping trees here is to create shade areas in the open and hot area, especially for weak, lactating and dehydrated cows during the dry season. Daytime temperatures beneath some specific tree species (*Boscia albitrunca*) have been found to be as much as 21ºC cooler than that of open unprotected sand (Bothma 1982). Goat enclosures are usually situated in the back of the Onganda on a distance of 50 to 200 m. Moreover, since they are considered smelly, they are moved on a regular basis. Inside the goat enclosures, similar shade trees are kept. When a goat enclosure is abandoned, the shade trees may be cut down for browse of firewood. In order to not kill the tree they are cut at heights of ca 1.60 meters above the ground surface. The height corresponds with the normal height of the ‘browse line’ maintained by donkeys and also cattle in the vicinity of settlements (Kinahan, pers. comm.). It can occasionally be noticed that new branches with green leaves have spruced on the stumps of the old shade trees. Approximately 400 m from the large settlement tree, the *T. sericea* vegetation becomes denser. Even here a tree layer, although very much smaller, is clearly distinguishable in the vegetation structure. This area outlines the physical boundary of the transport zone. In this area, the cattle rest and feed the calves during the hottest hours of the day. In this zone, the majority of the goats and sheep will be found. Compared with the next zone, the bush layer in the browsing and rest area is thinner, due to the intensive browse in this area.

The outer zone after 5-600 m from the waterpoint is referred to as the mokuti. Mokuti translates to “woods” and traditionally it has connotations similar to the Euroamerican notion of ‘wilderness’ (van Wolputte 2000, p. 372; Jill Kinahan 2004).

However, the lands in the fringe of the settlements are also considered omihimahi, resource areas in which the main part of the cattle’s grazing and the gathering of plant resources take place (Wilmsen 1989b). Today the cattle are generally on free range and they may walk as far as 12 km for feeding before returning to the homestead (Katjiua, forthcoming). If animals are missing in the evening when the livestock return to the pen, the range is actively searched by riding or walking to places known as popular rest zones, for example some specific grazing areas, larger trees or pans. Today, many homesteads fence the outer ranges in a conelike manner to enable the discovery of livestock and to prevent theft (Stahl 2000). In the past, the cattle were herded to a larger extent (Een 1872; Büttner 1883; Irle 1906).

In the case above, I have aimed to illustrate how the piosphere of a present day waterpoint is clearly reflected in the structure of the bush species *Terminalia sericea*. In addition, the case illustrates how the vegetation structure is formed around a series of larger trees and how the piosphere reflects important guidelines for livestock herding as well as the normative socio-spatial principles of a Herero cultural landscape (Soja 1985). It can be assumed that in the past, the herders’ movement of animals took place between places for drinking and places for feeding and the homestead. It can also be assumed that these movements took place within the spatial organisation of a cultural landscape.
Wells and large trees

*Acacia erioloba* is one of the most common species near the wells. This is not surprising, since the tree is a phreatophyte with preference for areas of high soil moisture (Coates Palgrave 1983, p. 235). Herders in Omaheke usually say that they looked for large *Acacia erioloba* trees when deciding the location for a well (e.g. NK 2001; KK 2001).

Large herbivores and birds are considered as the primary means of seed dispersal for the species (Dean *et al.* 1999). As a reflection of this, it has been noted that watering points in Botswana generally have high concentrations of *A. erioloba* seeds (Ernst & Tolsma 1990 cited from Seymour & Milton 2003, p. 7). The trees that grow in the well areas are generally well developed. At some of the larger well sites, for example Kaizuse, Otjinene and Epata, the vegetation structures resemble parks. The dolines associated with the wells have an exceptionally thick vegetation cover in addition to *Acacia erioloba*, usually of the species *Grewia flava*, *Boscia albitrunca*, *Ziziphus mucronata* and *Acacia mellifera*. Common traits for the smaller sites, for example Otjumunguindi and Okamuputo, are that they are only associated with only one or two larger *Acacia erioloba* trees that contrast against the otherwise homogenous bush and grass dominated landscape (Plate 6.1).

The age of the *A. erioloba* is unknown and difficult to estimate, although dated live specimens have been about 250 to 300 years old (Barnes *et al.* 1997; Steenkamp 2000; Barnes 2001). In order to assess the temporality of the tree vegetation at the well sites, a general appraisal of the vegetation structure associated with two well sites was undertaken. The appraisal was done through a series of 20 x 50 m sample areas in association with one well situated in an omuramba and the second on a pan on the plain. Two comparative sample areas were located in between wells. The first was associated with an omuramba and the second with the sandy substrate (Fig. 6.3a.). At all places, all individual bushes, large trees (>40 cm diameter), fallen large trees (>40 cm diameter), and calcrete rock upheavals were counted. The rock upheavals are formed by calcrete crust broken by the expansion, movement of roots and from tree fall-gaps. They are basically seen through discrete distributions of calcrete rocks. After the tree died, it fell and was presumably taken as firewood or just decomposed. However, the past location of the tree can still be seen through a small heap or circle of rocks about 1.5-2 m across (Fig. 6.3b-c.). Archaeologically, they can easily be mistaken for either a hunting blind or a small tent circle. In the diagram it can be noticed that well sites are characterised by many large living trees (c. 100-300 years). Fallen dead trees, in different stages of decay, and root upheavals without associated trees can be seen as indicating two additional time scales (300< years). Viewing the classes together, they can be considered as indicating a temporal sequence of large standing vegetation over a relatively long time interval.

When considering that the wells are dug at places that are better watered, and for this reason have longer growing seasons, it is maybe not surprising that they are characterised by large trees (Figure 6.3d). Nevertheless, this presents the clearest contrast to the vegetation structures that were noted for waterpoints exclusively used by wildlife, as discussed above. Moreover, some indirect support for the suggested pattern can be gained from places in southern Africa which are shared by humans and elephants. In such areas, competition and sometimes conflicts between elephants and the local communities arise. The conflict is in the majority of cases the result of elephant crop raiding and impact
on tree vegetation resources, which works against the interests of human land-users (Powell 1998, p. 47; Sitati et al. 2005). Studies on the issue have shown that guarding efforts decrease the likelihood of successful crop raiding (Sitati et al. 2005). Frequently, it can be noted that the large *Acacia erioloba* trees near the wells carry indications that branches have been cut (Plate 6.2.). The fact that the tree branches have been cut cannot be taken as indicating guarding efforts, but rather as a sign of active management of the trees near the wells.

Reasons for cutting branches are to harvest browse, firewood or timber from trees without killing them, aiming for the full re-growth of the tree. If the roots are left undamaged, trees re-grow quicker than in the time required for a seedling to develop into a mature tree. This may indicate that the trees are actively maintained in the well areas, in
Plate 6.2. An *A. erioloba* at the well site Ozombu Zo Vindimba. The tree has one new and several older marks indicating that branches have been cut, a trait that can be observed at most of the well sites in Omaheke. Exposure towards the southern excavation area (see Fig. 5.14.).

Turn reflecting similar principles of an active management of the vegetation discussed above, concerned with the *T. sericea* vegetation at a present day settlement in Omaheke.

For this reason, I suggest that the characteristic large woody vegetation of the wells is not only the result of a moderate hydrogeology and longer growing season. This also seems to be a significant trait for a culturally induced piosphere as well as a reflection of the great value that is placed by herders on the vegetation that grow near their settlements and at their watering points. From modern examples it can be understood that the multipurpose woody vegetation that appear in the well areas constitutes a highly important component of the dry season plant resources (Scoones 1995; Dean *et al.* 1999). The cultural significance of the trees over time is in many places indicated by archaeological materials mixed with recent litter in the shade zone cast by the tree canopies (Chapter 5 & 7). In contrast to the woody vegetation of the wells, the areas that are located in between the wells are dominated by bush vegetation with few additional indications of large standing vegetation (Fig. 6.3a.). I have already touched on the fact that livestock do not sustain the shortage of the dry season only by water. In terms of fodder for livestock, the sourveld grasses of Omaheke are generally perceived as one crucial limitation for livestock herding in the area. This notion goes in hand with ‘palatability’, a concept usually used for describing diet quality for livestock.

During the dry season of 2001, I followed a small herd of cattle in order to observe their feeding behaviour. The observation was initiated at noon when 5 adults and 4 calves gathered under a small shade tree in the edge of the piosphere in the periphery of the settlement. The herd stayed in the shade over the hottest period of the day until the afternoon, when the cows began to feed their calves. After twenty minutes, the group left the shade area and they were observed until dusk. Over a three-
hour period, they covered a distance of approximately 1.5 km. Over that relatively short distance, the structure of the vegetation changed from open grassland to shrubland with *Terminalia sericea* as the dominant species. The feeding behaviour of two adult animals and one calf was observed during this period. The consumption indicated 68% woody plant consumption versus 32% grass during the observation (Oct 2001). Preferred bush species was *Terminalia sericea*, *Grewia flava*, *Boscia albitrunca*, *Combretum apiculatum* and *Bohemia petersiana*.

The importance of bush for cattle has been noted in several studies over the last years, starting with Ian Scoones’s study in Zimbabwe that indicated that livestock were dependent on the use of ‘key resource’ patches for fodder (Scoones 1989). The range ecologist Mutjinde Katjiua investigated the extent of bush encroachment and the response of *Terminalia sericea* to browsing on a relatively homogenous landscape of the sandy substrate in the Ojitene area. By sampling the vegetation cover at five distances from the boreholes he was able to assess woody plant cover, height, basal area, composition, abundance as well as herbaceous plant composition and abundance. Within the system, Katjiua recorded 71% browse (woody plant) consumption versus 29% grazing during an observation of 18 hours spread over two dry seasons (Oct 2000 and 2001) (Katjiua, pers. comm.).

*Terminalia sericea*, *Bauhinia petersiana* and *Philenoptera nelsii* contributed 74.5% to the browse consumption and *Philenoptera nelsii* was the most preferred browse. Generally, cattle preferred browse with high crude protein and phosphorus content but avoided browse with high fibre content (Katjiua & Ward 2006). As a result of this and from interviews with villagers in the area, Katjiua & Ward argues that woody species contribute significantly to cattle diet during the hot-dry season in the northern Kalahari. For this reason herders prefer to settle in areas inhabited by some specific woody species. Compared with the limited grasses, which in addition are vulnerable to trampling, drought and fire, the herders perceive the bush as an important and predictable resource for the dry season (Katjiua, pers. comm.).

This point of view is to some extent also perpetuated by current villagers in the /Gam area. They stress that the vegetation in the /Gam area has changed since they arrived in the 1990s; among other things, they note a thickening of the bushes. *Terminalia sericea* increases in the sandy areas and the bush species *Catophractes alexandri* increases along the drainage lines. During the same time period, they have noted lesser grass. In contrast to the negative perception of bush encroachment put forward by many researchers, the villagers in /Gam perceive the thickening of bush as relatively positive as the cattle will have more to eat, especially during the dry season (Vot 2004). This can be further illustrated by an informal ranking exercise carried out with some herders in the Omaheke, using the question “which species would you like to have near your Onganda (i.e. homestead)?” They ranked thornless bush species as *Terminalia sericea*, *Catophractes alexandri* and *Dichrostachys cinerea* before grass and motivated their choice by stating that these species are highly important as browse in the dry season for goat, sheep and cattle (Vo 2002).

A recent study in the communal lands directly west of the research area has also provided a similar result. The villagers in one village noted the bush species *Omusejasetu* (*Terminalia sericea*) as important because it helped the cattle to survive during dry periods. For the same reason, the second village preferred the species *Omunguindi* (*Boscia albitrunca*). The different preferences most likely reflect differences in the vegetation index associated with the two localities. In the rainy season, cattle in both villages depended mainly on grass, which was seen as a valuable but unreliable resource for the overall resilience of the land-use system (Hommann & Rischkowsky 2001, p. 7).

Decrease of perennial grasses is considered as a prime indicator for bush thickening, i.e. that certain bush species increase and suppress the grass layer (Derry 2004). In Omaheke *G. flava*, *T. sericea*, *A. mellifera* and *Catophractes alexandri* are examples of invasive bush species (Brown & Cole 1976; Moleele & Perkins 1998; Derry 2004; Katjiua & Ward 2006). The reasons for the stimuli depend on the species in concern. Some species gain a competitive edge owing to longer roots and the lowering of the water in the saturated zone following the decrease in the grass cover (Moleele & Perkins 1998). Other bushes may distribute by animal induced seed transport (Tews & Jeltsch 2004). Shade trees and waterpoints will in this case gain considerable higher concentrations of seed (e.g. Ernst & Tolsma 1990 cited from Seymour & Milton 2003, p. 7).

Such processes may result in a substantial increase in bush cover, so called bush encroachment, particularly around boreholes. In addition, many bush species have a high resilience after fire and low mortality to drought (Skaarpe 1986; Chirara 2001; Tews & Jeltsch 2004). On a Landsat MSS satellite image from 1972 which combines the near infra-red bands in order to enhance vegetation structure it is possible to identify a slightly different texture, seen through brown-red colours, in the areas surrounding...
Figure 6.4. Subset of Landsat MMS satellite image taken over the southern part of the research area in 1972 (USGS). The image is based on a combination of the near Infra Red bands (4, 3, 2) which reflect green leafed vegetation. On the image areas with thicker vegetation is shown as red and brown; meanwhile the grey-green coloured areas reflect red soils with thinner vegetation layer. Archaeological indications of wells are projected on the image as blue dots.

the wells (Fig. 6.4.). In this part of the research area, the expansive era of borehole drilling was not initiated until 1972. Until then, most of the water was taken from wells and boreholes in the omiramba. After 1972, a gradual expansion out from the omiramba could be achieved by the drilling of boreholes on the plains. The texture of the image most likely represent a thickening in the *Terminalia sericea* vegetation associated with sandy soils and the intensive dry season grazing connected with the wells.

From the examples discussed above, it can be suggested that bush species have a positive correlation to pastoral land-use on two levels. Grasses are in general more vulnerable to dry conditions, fires, and are more easily affected by trampling. In contrast, most of the woody species noted in Omaheke are resistant to arid conditions, defoliation and droughts (Chirara 2001). For this reason herders, locate their settlements in association to areas that contain bush species important for the dry season. In turn, different bush species are stimulated by the settlement by the associated grazing pressure that reduces perennial grasses and the concentration of seeds. The process will result in a general lack of high-quality grass, which in turn results in that the livestock develops a preference for bush. Today, the bush vegetation of the Omaheke area supports a highly productive cattle economy and only recently have external nutrients been brought in to the communal lands by a few farmers. Before independence, the communal farmers in Omaheke were not allowed to use fertilizers (Katjiua, pers. comm.).
This in turn illustrate that the notion of palatability is complex. The conventional assumption that cattle rely on grass, while goats and sheep forage on a mixture of grass, shrubs and low trees seem too simplified (e.g. Owen-Smith 1999; Smith 2001; Brooks 2002, p. 225). Rather, it seems that the qualities that is desirable for foraging is highly subjective and related to the local opportunities of finding viable fodder (Scoones 1995; Bollig & Schulte 1999; Derry 2004, p. 13; Katjiua & Ward 2006). The importance of some specific bush species can be explained by the fact that browsing on bushes, in contrast to grasses, presents a far more predictable resource for the dry season. The most important criterion in ranking the value of natural resources, such as grazing and browsing, harmonise with the concept of a key resource, i.e. the availability of the resource in periods of scarcity, mainly the dry season. Hence, it can be argued that the focus on grasses largely mirror a Eurocentric perspective initiated as early as in the nineteenth century (Wilmsen 1997, p. 288-9; Rohrbach 1907), and to a lesser degree the ability of African pastoralists to maintain opportunistic and adaptive resource use in a heterogeneous environment.

Even though my own observations are restricted and not supported by large data sets, it is at least possible to define a relation between wells and patches of vegetation that also correspond with the concept of a pastoral key resource area. This justifies one conclusion that has an implication for the general debate concerned with pastoralism in Omaheke. Limited access to grass should not be considered as a limitation for livestock herding in Omaheke without first demonstrating the proposition.

**Geochemical structuring**

As already noted, the effects in vegetation structure tend to be relatively short-lived if the grazing pressure is taken away (Dahlberg 2000). This will unavoidably least among the preservation of the vegetation responses associated with abandoned wells. However, since animals “concentrate phosphate just as they do nitrogen” and the surplus “is excreted” (Limbrey 1975, p. 69), effects in the soil nutrient redistribution seem to be more persistent (Kinahan 2000). Dean et al. (1999) have demonstrated that the subcanopy soils of the shade zone of large Acacia erioloba trees are nutrient enriched and form nutrient rich patches long after the tree have died. Belsky and Canham (1994) have in turn pointed out that a nutrient patch develops slowly and is linked to the life-span of the tree. Therefore, the soil chemistry should vary with tree age (Belsky & Canham 1994). The hypothesis to be tested in the case below is if the waterpoints have acted as nodes in the geochemical structuring of the landscape and if it is possible to define structures in the soil chemistry that harmonise with the principles of a culturally induced piosphere. In the second stage, I will test whether similar patterns can be identified at the wells.

The general strategy was to sample every hundred meter along a 1 km long transect in a straight direction, following or crossing, the general character of the landscape topography. The samples were taken from underneath the looser trampled top layer on approximately a 5 to 10 cm depth. The phosphate values are presented as ppm; $\text{PO}_4^{3-}$ dissolved in $\text{H}_2\text{SO}_4 \times 5$ (Persson 1996, 1997).

**Soil chemistry at boreholes**

From a chemical point of view, the Kalahari sand can be considered as a fairly homogenous deposit with low and evenly distributed soil nutrients (i.e. Bergström and Skarpe 1985, p. 4). The first graph presents samples that were taken in association with a borehole located in a minor valley that confluence with the larger Otjozondjou omuramba (Fig. 6.5.). The borehole was drilled in 1974, but has never been used by a settlement (CK 2002). The sampling followed the valley along a line in a straight southern direction. The soil phosphate content of the soil samples lay between 45 and 60 ppm. The phosphate values were relatively high, most likely reflecting that samples were taken within an omuramba. The sandy soils on the valley sides are well drained and tend to leach phosphates to the low-lying areas in the end of the slope (Limbrey 1975; Illius & O’Connor 2000). If the sampling had been done on top of the sandy plain, the soil phosphate content would presumably have been lower, probably around 5-10 ppm (see below and Bergström and Skarpe 1985). A small peak of 70 ppm can be noted on +100 m. The slightly higher value here can be explained by a track, used by cattle, crossing the valley at this point.

From the equivalent values in the graph, it can be argued that it represents a landscape relatively unaffected by an intensified pastoral land-use regime in the form of a settlement or a waterpoint. For this reason, it lacks many of the presumed features, e.g. settlement and shade trees, which would produce distinguishable ‘piosphere effects’. This transect will appear in the forthcoming graphs as a general comparison to the sampling that was undertaken in environments that were or had been under intense grazing regimes.

Figure 6.6a illustrates the result of the sampling for soil nutrients that was carried out in association with the settlement where the sampling...
of *Terminalia sericea* was undertaken (above). If the zonation of phosphates is compared with the structure of the *Terminalia* vegetation, it is clear how the pattern of the soil nutrients correlates with the patterns noted in the vegetation structure. The high phosphate values at the starting point represent the waterpoint/settlement area, the peak at +200 m indicate the shade tree area, and the less significant peak at +400 to +500 m from the borehole represent the boundary of the settlement zone and the goat herding/cattle rest area. The distribution of phosphates indicates a clearly discernable structure, in turn reflecting the spatial organisation of the land-use system associated with a Herero Onganda or with other words; a culturally mediated piosphere. In association with the same waterpoint, two additional series of soil samples were taken in two other directions. In the three graphs illustrated below it can be noted that thicker sandy soils generally have lower phosphate levels tending to fall far below the reference value from the omuramba. Nevertheless, features that constitute ‘piosphere’ effects are located at distances that create clearly comparable patterns in the soil phosphate redistribution.

Figure 6.6b shows the phosphate levels of soil sampled in association with a second borehole in an omuramba. At this place, the environmental setting replicated the setting for the reference graph. The two sites are situated only 6 km from each other. This borehole was also drilled in 1974, but in contrast to the first example, it was used until 1994, when the Onganda moved to another place (CK 2002). The fundament for the water tank, some house remains and debris of the settlement were still visible at the time of the study. The phosphate distribution indicated a fluctuating pattern that ranged between 50 and 250 ppm. When the pattern is compared with the previous graphs, it can be suggested that the high phosphate values at the starting point to +100 m represent the waterpoint/settlement area, an observation that could be supported by the settlement remains. The peak at +400 m could indicate a shade tree area, but in this case, no tree or remains of a tree could be observed at the time of the sampling. The less significant peak between +600 and +800 m from the borehole could represent the outer limit of the settlement zone or the goat herding/cattle rest area. Some vegetation responses can be linked to the impact of the settlement, for example, small ‘island like’ patches of *Acacia mellifera* and *Sida cordifolia* could be identified in the area closest to the waterpoint. Compared with present settlements, they seemed to be in a state of diminishing, breaking up to smaller patches by intrusive grass. The general impression of the vegetation structure was that it mirrored the grassy vegetation of the un-grazed reference area. Judging from these observations, it seems as though the effects linked with the impacts of trampling and grazing have decreased over the last ten years, since the place was abandoned. Without the remains of the settlement and the sampling of soil chemistry, it would have been difficult to identify that the area had been under a grazing regime only eight years before the time of the study. In addition, the pattern of culturally mediated piosphere is apparent in this graph.

The graphs discussed above were all based on sampling in homogenous environmental settings, either on plain environments or along omiramba valleys. In order to test the significance of the observed pattern, the next graph illustrates the sampling of soil nutrients in association with a settlement and a drinking spot, also established in the beginning of the 1970s (Figure 6.6c). Again, the borehole was drilled in the Omuramba, but in this case, the phosphate sampling was carried out across the valley. Through this, the sampling included three different facets of the Omuramba environment: the floor, the slope and a dune crest. Also in this case a
similar pattern to the previous graphs is identified, in which the drinking spot, the shade trees and the transport zone are clearly distinguishable by high respectively low values. A difference can be noted in the area between +300 and +700, characterised by very high phosphate values. It should be noted that

Figure 6.6a-c. Distribution of soil nutrient values in relation to waterpoints drilled in the 1970s. a) Distribution of soil nutrient values in association with a borehole drilled in a pan environment. b) Distribution of soil nutrient values in association with a borehole drilled in an omuramba. c) Distribution of soil nutrient values in association with a borehole drilled in an omuramba; sampling carried out across the valley.
these samples were taken in a well-drained dune slope crest area with thick sandy soils, i.e. where low phosphate values would be expected. The vegetation in this area is characterised by dense bush vegetation, and in addition, a number of trees grow in this zone (mainly of the species *Boscia albitrunca* and *Terminalia sericea*). The high values can most likely be understood as representing the shade and browse value of these trees and subsequently be characterised as a cattle rest area.

The five graphs discussed so far indicate phosphate values ranging from 250 to 500 ppm for the zone nearest to the waterpoints (Fig. 6.7.). The second zone, closest to the waterpoint, is characterised by high levels of mechanical impact by clearing, browsing and trampling. This zone is also characterised by soil nutrient levels that drop to levels that equal or are even lower than the reference value.

![Figure 6.7. Comparison and interpretation of soil phosphate values in association with boreholes.](image)

Values ranging from 250 to 500 ppm are usually found 200 to 400 m away from the drinking spot. A slightly higher peak ranging from 50 to 75 ppm of soil phosphate can be noticed in the area approximately 400 to 700 m away from the waterpoints. Even if variations can be noted, a comparable pattern can be distinguished. The pattern is understandable if the spatial layout of a Herero settlement is considered. The higher peaks of the drinking spot and the larger shade trees, from within, and from the boundary of the settlement zone reflect places where the stock stands still for longer periods and where the defecation tends to be more concentrated. It can be assumed that high values indicate that trees attract the animals as they give shade and for this reason, they induce secondary piosphere effects. The result is that some distinct ‘islands’ with higher soil phosphate contents are formed within the trampled area. The goat herding area is similar to the shade trees, characterised by less movement, but more of the goat’s circular movement in the periphery of the settlement zone. Areas where the soil nutrient values are relatively low can be understood as transport zones, characterised by a more intense movement of the stock. This peak tends to appear 300 to 500 m from the drinking spot and outlines the most apparent physical boundary of the outer settlement zone of a present day Herero village. In the subsequent zone, which can range from 300 to 700 m, fluctuations of soil phosphate levels can be noted, but after 700 m, the general tendency is that the impact of the settlement decline in the phosphate redistribution. This area commonly defines the boundary to mokuti, or the wilderness.

**Soil chemistry at well sites**

The graphs discussed above illustrate the structure of the soil chemistry related to modern waterpoints that were all established in the early 1970s. Below, the results from a similar study undertaken at some of the wells will be presented.

To begin with, very few wells have discernable remains of drinking trough areas. The location of the soil heap in combination with geochemical sampling seems to be useful for defining the spatial organisation of a well site. In addition to defecation, sub-surface carbonates, excavated and dumped nearby during the digging of the well would most likely also affect the phosphorus concentrations of the area closest to the well.

At Epata, the sampling began at the southernmost well of the cluster, located furthest away from the present day village borehole (Fig. 6.8a.). The sampling followed the general strategy that was used for the boreholes discussed above. The first transect followed the omuramba in a southwest direction. Compared to the sampling undertaken at the boreholes, the phosphate levels seemed to be higher at Epata, ranging between 155 ppm to above 600 ppm. This can be an effect of the local carbonate-rich geology. An additional explanation is that the area has been under a more prolonged grazing compared to the settlements on the plains. Nevertheless, for the first 500 m, a fluctuating pattern, recognised from the sampling at the boreholes, could be noted. After +500, the phosphate levels increased considerably. To some extent, the higher values can be explained by a thickening of the woody vegetation in this area. A second transect was sampled in association with the well cluster at Epata (Fig. 6.8a). The sampling was initiated near a well a few hundred metres north from the first. In this case, however, the sampling was carried out in a north-westerly direction from the valley floor uphill the slope. In the graph it is possible to see that the
The pastoral landscape of Omaheke

Figure 6.8a-c. Soil phosphate sampling at wells. a) sampling in Otjinene and Epata, b) sampling in Otjozondema, c) comparison of soil nutrient sampling at the wells.

well area is again characterised by high phosphate values. A second peak appears at +300 m and a third less significant peak appears at +500 m from the well. After +600, the soil phosphate contents decrease to very low rates, dropping below the reference value, which to some extent can be explained by the drained soils of the slope. Sampling was also carried out in association with the
northeastern direction towards the well site at Epata (Fig 6.8a.). Here the phosphate levels were also very high near the well, coinciding with the values measured for Epata. For the first 500 m, the pattern coincided with the pattern noted for the boreholes but after 500 m, the soil phosphate values increased considerably.

Sampling of soil nutrients were undertaken in association with the archaeological excavation at the well site Ovjozondema, in the northern part of the research area (Fig. 6.8b). The sampling was carried out along two transects: one to the south and one to the east (see Chapter 7 for the details of the excavation). The sampling to the east resulted in a pattern that coincides with the previously noted pattern. Similar to the wells at Epata and Otjinene, the levels were very high and the fluctuation of the soil nutrients seemed to continue after +500 m. The sampling to the south indicated high values for the zone +700 to +1000 m, before, within and after a minor omuramba.

Viewed together, the phosphate content of the soils associated with well sites tends to be higher than the values measured for the boreholes (Fig. 6.7 & 6.8c). Presumably, the higher levels of soil phosphate in association with the wells reflect that the samples were taken in different environmental settings richer in carbonates. However, it seems that it is possible to trace patterns similar to the one observed at the present day waterpoints. In all the cases, a dramatic drop in soil nutrients can be noted directly after the well. I interpret this as indicating the trampled area of the transport zone. Peaks in the soil nutrients most likely associated with features that produce secondary piospheres can be identified. However, in addition to the general similarities with the boreholes, a considerable variation can be noted, especially in the area after +500 m. At the boreholes, the soil phosphate drops and falls below the reference value in all cases. At the wells sites the soil phosphate levels continues to fluctuate and reach very high values, matching the levels measured for the actual well area. I suspect that this pattern illustrates a problem with phosphate sampling within the well areas.

Judging by the few wells that have been documented at the pans and by accounts from the herders living there today, the boreholes that were sampled for phosphates were all drilled in pans and omiramba that were not used for dry season grazing in the past. If cattle grazed in these areas, they would have done so during the rainy season, when the pans kept surface water. This period of the pastoral year is characterised by a high mobility, in which the cattle and the herders tend to follow the pace of the shrinking surface water. The wells on the other hand are located in areas that have presumably been under dry season grazing for longer than the pans. It might also be worthwhile to take into consideration that the wells were dug in areas where the hydrogeological circumstances are better than elsewhere.

Two distinct features of the soil nutrient patterns associated with the wells could be identified (Fig. 6.8c). First, it was possible to establish high nutrient contents in direct association with the well, which presumably are a result of defecation and carbonate accumulation related with the excavation of the well. Lower values were noted in areas that can be considered transport zones related to the aggregation and the movement of livestock. The fluctuating patterns of distance to the wells presumably indicate nutrient rich patches caused by shade trees and minor waterholes. These points created additional ‘piosphere effects’ that are projected, resulting in complicated patterns.

This chapter has presented evidence that indicates that the wells form nodes in the landscape and induce changes in the distribution of soil nutrients that correspond with expected patterns for a piosphere.

An ecology of practice?

In order to illustrate the acute environmental constraints that affect pastoralism in variable environments, John Kinahan recently compared rainfall and cattle numbers in the Kunene region for the period 1971-1996 (Kinahan 2001, Fig. 3 p. 28). Here he points out that there is a noticeable lag in the response to rainfall, and cattle numbers appear to plummet only under conditions of extreme drought, as the one occurring in the catastrophic drought of 1981. However, the cattle numbers in Kunene increased fifteen-fold over the fifteen years following the drought. Kinahan understands this as the result of successful risk management strategies. The basis for the system is the resilience of the drought prone environment and a spatially heterogeneous grazing system, characterised by “a sparse but relatively predictable distribution of small encampments, only some of which might be occupied for prolonged periods” (Kinahan 2001, p. 27). Moreover, the herders extend the movements of cattle by exchange and cattle loans in which the livestock is moved up along the rainfall gradient to places with more water and better pastures (Bollig 1997, 2000). After a severe drought, cattle loans can be recalled and the main result is that depleted herds can be rebuilt more rapidly than by natural increase.

A second example of the dynamics involved in a rainfall driven herding system in a semi-arid environment can be gained by comparing rainfall figures with the *Ovitiwondo*, which is a list of year
names commonly referred to as a “Herero Calendar” (Irle 1906, pp. 221; Vedder 1966; Gibson 1977, p. 67; Almagor 1980, p. 67; Pennington & Harpending 1993, p. 53). Traditionally, the Oviuondo was based on oral tradition and the name for each year was determined by what people has considered as the most significant event of the year (Almagor 1980, p. 68). In a comparison with the rainfall curve for the period 1950-1980 at Shakawe and Ghanzi and the Ngamiland Mbanderu Oviuondo for the same period it can be noted that the years 1950, 1965 and 1970 are recorded as drought years and in the reconstructed rainfall curve, significant drops can be identified on the same occasions (Fig. 6.9.). In addition, the Oviuondo records how the people abandoned their homesteads in eastern Omaheke and moved with their cattle to settlements at the Okavango delta. However, when the two years with exceedingly good rainfall, above 700 millimetre in the reconstructed rainfall curve, are studied, it becomes apparent how the Oviuondo record year names that indicate the digging of new wells and the establishment of new settlements. In Omaheke, this would mean that herders would abandon large areas in drought years to aggregate around the strongest waterpoints that seldom fail. Subsequent re-colonisation would appear in years with rain, and expansion in years with exceedingly good rain.

Here it can be noted that a present day trek with 60 head of cattle on foot from /Gam to the auctions in Otjinene, a distance of 250 km (Fig. 2.1.), use approximately eight days for travelling the distance (FH 2004), and even the smallest well mapped in the survey, Okamuputo, would be able to support a herd of that size during the journey (above). That Omaheke contains a mix of marginal and areas that are more productive makes sense from current understandings of pastoral grazing in a semi-arid environment (Scoones 1995; Illius & O’Connor 2000).

The wells in Omaheke nurture several more aspects than just simple ‘adaptations’ to an external environment, as the practice observed in the well areas not only reflects the ambition to use these places. It has been noted that some features of the vegetation structure of the wells, especially the larger trees, derive from a modification of the pre-existing vegetation by management strategies accommodated within a pastoral landscape. Powell (1998) has presented a similar view concerned with the vegetation mosaic in the Nyae Nyae area. The vegetation in this area is structured by patch burning, which means that the Ju/'hoansi deliberately introduce bush fires in order to reduce bush, create open areas, stimulate green pick and protect areas from wild fires.

Figure 6.9. Daily recordings of rainfall and Oviuondo recordings; year, year-name, meaning and explanation from Almagor (1980, p. 73-4).

After the well was dug it became the locus for a hierarchical sequence of social and natural interactions. The practice and the management transformed the original attractor, i.e. the key resource, into what can be characterised as a landmark. By its properties as a place, its performance and life history, a landmark is a junction in the web of human and nature interactions (Zedeño 2000, p. 107). The well functioned as an adhesive for a nested system of processes constituted in entirely different time-space-scales: The history and geography of human activities, which are guided by perceptions, choices and circumstances on a predominantly small scale, in relation to physical and biological processes that occur at very different temporal and spatial scales (McGlade 1999). The result is that the well area reflects a “more than the sum of its parts” effect, in which the ecological practice integrates several domains of the Kalahari environment that would usually have been studied separately.

The ecology of practice in the well areas can be interpreted as structuration, or a longer term
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strategy, for managing a pastoral key resource area, a process where distinctions between the natural and the anthropogenic landscape are not straightforward (Nyerges 1997; Sullivan 1999b). Historicity, here defined as the reproduction of a landscape structure; based on practice over the long term, seems for this reason to be a vital part of the dry season key resources and the patchy vegetation mosaics within an ecosystem at disequilibrium. I initiated the study with the ambition to test the proposition that well sites can be used as indicators for pastoral land-use in Omaheke. In this chapter, I have presented a series of arguments that support my notion that the wells designate a rainfall driven herding system based on wells dug in perched ground water resources.

The main conclusion of this chapter is that the wells and my model of a spatially heterogeneous grazing system are consistent with recent findings in range land ecology and hydrogeological research in the Kalahari. Hence, my proposition that the wells in Omaheke indicate pastoral key resources seems to withstand an explicit field test. Consequently, the assumption that the Omaheke environment cannot sustain livestock herding can be questioned on almost every point.
Chapter 7

OUTLINING A CHRONOLOGY FOR THE WELLS IN OMAHEKE

When my survey in Omaheke began, it appeared that with few exceptions, the wells were a sad memorial over the devastating escape from the Germans through Omaheke in 1904-5. This event is often brought up when talking about the wells with the people who live in the area today. The administrator of the Native Reserves in the Gobabis district, Oswin Köhler, came to a similar conclusion in the 1950s: “Most of them [the wells] are still known today, and old people (...) remember the events after which the water-holes (ozumbo) were called” (Köhler 1959a, p. 35).

However, during the survey it was possible to retrieve indications from the oral tradition that pointed at a use of the wells earlier than 1904-5. Bernard Kapari Kandanga says that Tjamuha from Okahandja stayed at the well Okozonduzu in the 1890s. In addition, “ua Peta the father of Hijandjumbikaja” was mentioned as having dug a well at Okozonduzu before the war. Here it can be repeated that the ua Pata Omuramba is an alternative Otjiherero name for the Eiseb Omuramba. In addition, the village name Epata seems to be a variant of the name ua Pata; for example, the older generation still uses the word in referring to both the village and the omuramba (e.g. Kau 2001; Cka 2002). Since wells are commonly associated with the person who had the well constructed, it seems possible that the two places associated with ua Pata could be an indication to one herder’s movements, or to his network of cattle posts in the nineteenth century. Wilmsen presents an illustrative example on the “magnitude of some movements that were taking place during the first half of the nineteenth century. Alexander (1838) records his encounter with Jonker Amraal on the Orange River in 1812; 39 years later, in 1851, Galton obtained guides from this same man (then living near Windhoek) for his journey to Tournobis (Rietfontaine) and Lake Ngami (Galton 1853)” (Wilmsen 1982, p. 17).

Nevertheless, according to the present day villagers, Epata is a relatively recent name for the place. The old name for the well site was according to the villagers Ondama ya Muundjua (Ep 2001). Kazapua stresses that Mbanderu herders had been in the area for a considerable time even “before the Boers came to Okahandja” (Kaz 2001). On German maps from 1904, Epata is indicated with its current name, which could support this notion (Kriegskarte 1904, Blatt Otawi). Regarding individual wells in Epata, one well is acknowledged as dug by Kazao around 1900. Just before the war, Kazao left Epata and moved to Epukiro. A second well in the cluster is said to have been dug by Tjetjisida in 1895 (Ep 2001). Such accounts suggest that the escape through Omaheke may have gone through a pre-existing and at least partially known pastoral landscape that may have evolved in the century, or even in the centuries, before the war.

The purpose of this chapter is to test this proposition and see whether the wells can contribute to a better understanding of Omaheke’s pastoral land-use history.

The first case focuses on a brief period before and during the war in 1904-5. The discussion is based on place-names, oral tradition from people living in the area today and accounts in contemporary European historical sources. The second case is based on an archaeological excavation of a well in Omaheke. The third case is based on rim diameter measurements of wells dug in calcrete outcrops seen in relation to accounts in the oral tradition, but also in relation to the spatial distribution of different forms of wells. In the fourth case, I will use the evidence accumulated in the study for reinterpreting an archaeological excavation at #G1 in Botswana (Brooks 1978, 1984; Helgren & Brooks 1983).

The wells in the war 1904-7

The oral tradition concerning the war seems to reflect two general categories: first, there is a shared general tradition of the war to which most of the Herero and Mbanderu can refer. This tradition appears in discussions regarding the war, in textbooks, in the radio programs of Mr Kaputu broadcasted in Otjiherero by the Namibian Broadcast Company (NBC), and was actively expressed in the war commemoration ceremonies during 2004. The stories relate the extreme suffering of the people when they crossed Omaheke (Plate 7.1.). The accounts tell of
the extreme dryness and how the refugees went from one waterhole to the next, finding that the wells were usually dry or had too little water. Old people and children that did not manage to keep up the pace were left behind and it was possible to see mothers who carried their dying or dead infants on the back. One story relates how the men suckled at their women to quench their thirst, or how the stomachs of dead people were opened in order to find some amounts of water. Victims of the thirst were often left without burial and wild animals followed the refugee trail (Pool 1991, p. 276, 319; Webster 2001). Some details in the current oral tradition seem to be based on published memoirs and eye witness accounts from the official enquiries that followed the war (Drechsler 1980, pp. 156; Pool 1991, pp. 264, 271; Mossolow 1993, p 39; Gewald 1999, pp.174).

Plate 7.1. Photo of Herero refugees in Omaheke 1905 (NAN 1905). Photo: courtesy of National Archives of Namibia.

The second group in oral tradition comprises place bound stories, more specifically addressing specific events at specific places. In the majority of the cases, the events related took place at well sites. All places mentioned in the text are indicated in Figure 7.1.

The most common theme in the oral tradition associated with the wells is that the water was not sufficient for the amount of people and livestock that arrived at them during the escape 1904-5. The well sites Okozonduzu, Ozombu Zo Vindimba and Otjumunguindi have stories that indicate that the number of refugees reached far above the wells’ carrying capacity and that they emptied almost instantly. The wells at Otjinene and Epata, however, seem to have contained larger quantities of water (i.e. Pool 1991, p. 319), but on the other hand they were also relatively well known by the German troops (Rohrbach 1907).

Leonard Kavetuna (2002) recalls an event that is related to the well at Ondjomboja Katuze. At the time of the battle at Hamakari, the herder Kaakam-bureaun stayed at the well. After the battle, many people came to the well with their livestock. However, so many came at the same time that the edges of the well collapsed and both people and cattle fell down and died. Watering acutely thirsty cattle is a risky job that demands considerable control and coordination (Baines 1864; Büttner 1883). Later arrivals to the well had to push aside the corpses in order to reach the water.

It can be assumed that the accounts reflect the drier climate that prevailed in the region during the decade before the war. In 1895, northern Namibia had only received 65 % of the average rainfall (Pool 1991, p. 279). Passarge reported that many wells between Ngami and Omaheke were dry when he travelled in the area in 1896-97 (Passarge 1899, p. 197-99). The drought conditions are also supported by Sharon Nicholson’s (1996) reconstruction of shorter-term trends of the climatic conditions of southern Africa for the period 1790 to 1920. For the period of 1790-1810, the Kalahari seems to have been characterised by continually abundant rain and the Okavango delta and the associated lakes had high water levels. In the period of 1810-40, the rainfall decreased in the central Kalahari as well as in the central part of Namibia. The period of 1870-95 was again characterised by increased rainfall in the Omaheke area, but in 1895-1920, the time for the rinderpest and the war, it seems that a generally drier climate with lesser rainfall prevailed (Nicholson 1996, pp. 80).

A second place-bound theme is concerned with German executions of captured Herero. Several large trees associated with the well sites in Otjinene, Epata and Ozombu Zo Vindimba is acknowledged for having been used for hangings (CK, MK 2004). One further example is a large Acacia erioloba tree that grows next to a small pan shortly north of Epata. The tree carries a name, Okamuvya kotjiku, which refers to an arrow and a snare, in turn referring to a hanging during the war (BK 2001). The narrative corresponds with written accounts of German soldiers from the campaign and photos taken of corpses hanging from trees (e.g. Gewald 1999, pp. 165). A sad aspect of this is that the trees that were used for executions were probably the same trees that were actively managed within the pastoral ecology, as discussed in Chapter 6.

The well site Ozombu zo Vindimba has a tradition of being poisoned. During the pursuit in October 1904, the Germans established a base at the site and when they later abandoned the place, they are said to have poisoned the wells. Two graves located near the well site are, as discussed in Chapter 5, acknowledged to be the graves of people who
died after drinking water from the wells. The story associated with the pan Erindi Rombahe relates a German ambush and the oral tradition states that many Herero are buried in the area next to the pan. I was advised “to drink water from the pan, but do not swallow, if you drink the water you will be lost. If there is no water in the pan, take soil in the mouth, it is a sacred place” (Kao 2001).

A third theme in the oral tradition is concerned with hiding places and places where it is possible to see parts from wagon wheels and other things that were left by the refugees in the flight. The name of the well Okahitua derives from going inside. Among current Herero, living in the area the name is understood as being related to the war and that the refugees dug holes to hide in after the battle at Hamakari (Oka 2002). Nevertheless, both the place and the name appear on the Kriegskarte from 1904 (Blatt Otawi). A body of research has discussed how expressions about the past are encoded, selective, and have a relation with the subjective or collective perception of the present (Vansina 1965; Tlou 1971; Almagor 1980; Werner 1998). It seems that the name is of pre-war origin and that the meaning of the name has been redefined in order to fit with a war narrative.

According to Kambirongo, the well Okatjimbe was given its name by a small Herero settlement during the war in 1904. Kapiringi, one of the Herero said to have stayed at the well, died there. It was possible to see parts from wagon wheels and other things on the ground in the 1970s, when he lived near the well (CK 2002). However, we were not able to retrieve such finds when we visited the site during the survey. Elderly informants in Ozunduno stated that they arrived to the pan in 1958. They came from the Ovitoto area near Okahandja. When they arrived, the two large wells dug in the pan were already present and they do not know who dug them (Voz 2001). The former principal for the school in Otjimene, Mr. Murangi Kamanunu, confirms that the Ozunduno district was reserved for Herero from Okahandja and that they arrived with their cattle in the period 1957-59 (2001). When asked about the wells in Ozunduno, he explains the wells by referring to stories that he heard in childhood. During the war in 1904-07, many Herero stayed in Omahcke and hid from the German troops at the omarindi, (i.e. the calcrete pans sing; Erindi). The pans Erindi Roukambe and Erindi Rombahe also have similar stories of hiding places associated with them. As German patrols were sent out in order to find these hiding places, the oral accounts can indirectly be supported by historical accounts (see also Rohrbach 1907; Krüger & Henrichsen 1998, p.150; Werner 1998, p. 51).

When asked which routes were used for crossing Omahcke, Leonard Kavetuna (2002) stated that the people went from Ondjomboja Katuze to the wells at Okozonduzu, Okondjatu, Ozonguti and Ombu Jaka-reju (present name Ombu Mbande). After this, they headed for the “old way to Toteng” (a settlement near Lake Ngami) and according to Kavetuna, this was the “ua Pata Omuramba” (Eiseb). He believed that some refugees went to “Gamma and Onyaiya”, the current Otjherero names for /Gam and Nyae Nyae respectively. Kavetuna maintained that at least some of the people had good knowledge of the area, even if they could not be certain that there was enough water in the wells. In 1980, Wilmesen collected similar stories from residents in /Xai/xai, Botswana; Tautona, a N/ama man who was 86 years old at the time, remembered the escape through Omahcke and said that they took the route because they were accustomed to using it. Kahape Tuvare, a 73-year-old Mbanderu, mentioned that his grandfather and father lived at Kangwadum and that they had watered the cattle at /Xai/xai. This was the main reason for why his relatives came to /Xai/xai (Wilmesen 1989a, p. 145).

According to Kavetuna, Samuel Maherero followed the route Otjomopanda, Okozonduzu, Okondjatu, ua Pata (Epata) to the wells at Ozombu Zo Vindimba after the battle at Hamakari. At Ozombu Zo Vindimba Maherero’s party was almost overtaken by the pursuing Germans. Maherero continued further up along the Eiseb to the wells at Ozombu Ouivre. In an interview with Mr. Kaputu, Pool gained names for additional well sites that were traversed by Maherero during his escape (Pool 1991, p. 319). Two of them, Okambonde and Okatjimbe, have been identified in this survey.

Kazeriwa Ndjizera recognises the wells at Ozombu Zamakura, Okambonde and Ozombu Ouivre as larger aggregation sites during the escape (2002). Moreover, Ozombu Ouivre is noted for being the place where the Paramount chief Samuel Maherero took the decision to go to Botswana. According to the story, the reason for the decision was that Maherero overheard a discussion of some women who had not recognised him. When he heard that they blamed him for the war and their unfortunate situation, Maherero became disillusioned, laughed and decided to continue north along Eiseb to Onyaiya. The name of the current village Ondjora translates as laughter, which is a reference to the story. In this survey, no well structures have been found in the actual village Ondjora, although well sites have been mapped in the vicinity. In addition, on Köhler’s map over the Epukiro Native Reserve, the location of Ozombu Ouivre corresponds to the location of the current village Ondjora. After the
events related above, Samuel Maherero went further to /Gam and the Nyae Nyae. This is partly confirmed by Rohrbach (1907, p. 86-7), who, based on statement of a prisoner of war in December 1904, mentions that a neighbouring group of people played an important role for Samuel Maherero during his escape from the Germans. Maherero’s party had arrived at a water place, which according to Rohrbach “seems identical to the water place Neinei or Debra” (1907, p. 87), i.e. present day Nyae Nyae.

Gerhard Pool (1991, p. 319) has stated that the Nyae Nyae would have meant a detour, if Maherero intended to go to Botswana. He suggests that Onyaiya may actually be a reference to /Xai/xai, since this would have been the most logical route as the Eiseb crosses the border south of the Aha Hills and links with the /Xai/xaidum. What Pool may not have considered is the existing Mbanderu settlements in the area and earlier migrations to Botswana. One example is the one that took place in 1896, following the German persecution of the Mbanderu chiefs Nikodemus and Kahinemua (Chapter 4). This event is still acknowledged in the contemporary oral tradition in Omaheke. Kazeriwa Ndijzeria states that Mbanderu with cattle went over the Eiseb-Epukiro area to Botswana in the late nineteenth century after their chief Kahinemua had been executed by the Germans. In addition, he recalls the name Ndjare Kamburece as one of the people with cattle who were in Botswana before the war.

One group of 40-50 Mbanderu with livestock is also documented to have moved from Grootfontein to Ngamiland (Wilmsen 1989a, p. 141). In addition, Gewald have discussed how these earlier refugees were settled by the Sekgoma Letsholathebe around his cattle posts in the current Nyae Nyae-Dobe area (Gewald 1999, p. 110, 2002, p. 219). However, Wilmsen (1989a, p. 141, pp. 197), building partly on the work on Alnaes (1979a, 1979b), provides detailed genealogical information that expresses that these migrations went to places where they had legitimate claims to land. For example, the ancestors of Wilmsen’s informant Kahae Tuvare resided together with the Ju”hoansi at a place near Qubi in Kangwadum, shortly north of the Aha Hills. In addition, Tuvare noted that “Onyaiya is the old place of Nikodemus” which denotes that it was considered the ancestral place for his affine. An indication of this is that several place-names in the Nyae Nyae area, for example Guru, Ojikarema and possibly Djarutsa and Makuri are derived from Otjiherero (Wilmsen 1989a, p. 145) and, moreover, all, except Makuri, are indicated on the Kriegskarte (Blatt Andara, below). Furthermore, Kazeriwa Ndijzeria expresses that Samuel Maherero travelled to the “Onyaiya” already before the war in order to see the intended road.

A further indication of that the refugees went to the Nyae Nyae is the accounts that refers to “message trees”, on which the refugees carved their names before they crossed the border to Botswana. By this, they communicated to later arrivals that they had managed to reach the safety within British territory. Two general areas for such trees have appeared in the discussions concerned with the war; first, in the area where the road turns north from the Eiseb to /Gam, second, “in Onyaiya”. Such trees has not been identified in the survey, but may, however, correspond to the fact that many baobab trees in the Nyae Nyae have names and dates engraved on the trunks, many from the late nineteenth century (Chapter 5).

After the sojourn in the Nyae Nyae, it seems that Samuel Maherero went further northeast into the present day Botswana to Mahopa in the Kangwadum, north of the Aha Hills, and from here, he sent letters to Letsholathebe calling for assistance (Gewald 1999; Gewald 2002). Additional Herero and Mbanderu refugees arrived in Botswana and many continued to the settlements at Nkalachwe, Tsau, Thololamoro and Toteng (Gewald 2002).

Pastoral well sites on the Kriegskarte

In the last decade of nineteenth century, the German administration decided to establish a series of military posts in the eastern parts of the colony. In 1895, a military post was established in Otjituuo in the Omatako Omuramba (directly north of the well site Kaiziuse, described in Chapter 5). An additional post was strategically located in the confluence of the Gunib and Omatako omiramba (Fig 7.1.). The upper reach of the Gunib valley is situated in the same area as the upper reaches of Otjozondjou and Eiseb omiramba in an area not far from Otjine. The military post at Epukiro was established two years later, in 1897 (Köhler 1959a, p. 21). Owing to the long continuity of explorers, traders, missionaries and settlers along the larger omiramba, they were relatively well known to the German administration. A clear indication of this is the number of ‘quellen u. wasserstellen’ (i.e. springs and watering places) indicated on the Kriegskarte (1904, Blatt Windhuk & Otawi) along the larger omiramba. The smaller paths that led to the decentralised areas in the interior of the Kalahari gained little attention from the early colonial administration. This is confirmed by Rohrbach (1907, p. 85), who noted that Epata was the most well known pre-war Herero settlement in Omaheke. To the west, further north and to the east the country was rather unknown to the settlers.

My belief is that the quellen u. wasserstellen”
on the map is a partial documentation of pastoral key resource areas and well sites used by the pastoral economies in Namibia during the nineteenth century. The assumption is based on what seems a general rule in the contemporary European accounts. They were selective and often seem to express more about the observers, than about the observed (Lau 1995a; Johansson 2001). The nineteenth century Europeans were not only selective in what they described. In addition, they primarily interacted with the people who were politically and economically most influential in their activities. Judging by the language of documented place-names on the Kriegskarte and the historical accounts from the time period, this was mainly prominent Herero and N/ama cattle owners, whom the Europeans perceived as “Chiefs” (von Schumann & Rusch 1987; Lau 1994). In addition, the historical accounts record how impoverished herders attached themselves in large numbers to the mission stations (Lau 1984). Consequently, the Europeans adopted this version of the cultural geography and landscape place-names. Since the indigenous economies as well as 19th century European trade focused on cattle, the maps can be seen as reflecting places where it was possible to water the livestock during the treks. It can also be noted that several of the ‘quellen u. wasserstellen’ have place-names with the Otjiherero prefixes: Ozondjombo, Ondjombo, Ozombu and Ombu which denotes wells (von Schumann & Rusch 1987). An additional argument is that the places with ‘quellen u. wasserstellen’ usually coincide with places where well sites have been documented during this survey (Chapter 5).

Four of the six well sites that were examined outside the research area are possible to identify on the map, namely Okahitua, Ondjomboja Katuze (Otjimboja-Kutuse) and Okozonduzu (Blatt Otawi). The Kriegskarte indicates forty-three ‘quellen u. wasserstellen’ inside the research area (Blatt Otawi & Andara). Even though many place-names have changed since 1904, it is still possible to identify some of the wells that were documented in the archaeological survey (Appendix 3). In the Otjine area, the wells at Epata, Otjine and Okarupiko (Okarupoko on the Kriegskarte) are indicated on the Kriegskarte and six additional sites that have not been identified in this study. The Eiseb Omuramba is extremely generalised on the map, which most likely is a reflection of that the area was not visited by Europeans with cartographic skills (Tabler 1973). In the confluence of two larger valleys, most likely the Otjinoko and the Eiseb Omiramba, one place, Gamsvley, is indicated as a “quellen u. wasserstellen”. The name Gamsvley derive from a Khoek word for water and the Afrikaans word for a pan or a spring (Kriegskarte 1904, Blatt Otawi). Using the nomenclature of the present study, the area seems to coincide with the Otjumunguindi area. Five well sites have been documented in the area surrounding the convergence.

Moreover, thirty-three “quellen u. wasserstellen” are indicated in the Nyae Nyae and /Gam area. The well sites at Gura, Dobe, Gautscha, /Gam and N/ama can be identified as “quellen u. wasserstellen” on the map. A series of places, for example Tuturuga, Naissoba and Kaugána, indicated north and northeast of /Gam has not been rediscovered in this survey, although their general locations match well sites mapped in this survey. Here it can be noted that if the Kriegskarte had been used for the interpolation carried out in Chapter 6, the weight of the interpolation would have been completely different. Most likely, the detailed mapping of this area is an indication of the activities of von François, Powrie and Passarge in 1891 and 1898 (Gordon 1992, p. 36; Kriegskarte 1904, Blatt Andara).

Ozombu Zo Vindimba

On September 29, 1904, the German troops almost overran Samuel Maherero at the well Ozombu Zo Vindimba (Pool 1991, p. 270). The German Commander von Trotha estimated that over 100 wells were dug at the site, each between two and three metres deep (ibid.). Here von Trotha decided not to pursue the Hereros any further and Ozombu Zo Vindimba became a base for German patrols who searched the Omaheke. The Germans established a heliograph stations here and at Epata. A few days after the infamous extermination order, von Trotha returned to Windhoek to take care of Witbooi’s revolt in the south. The patrols in Omaheke continued under the leadership of von Estorff (Pool 1991, p. 274). According to notes in von Trotha’s diary, the general plan seemed to be to occupy the water holes from Gobabis to Grootfontein and to send out patrols under “constant movement” in order to “find small groups of the nation who have moved back westwards” (cited from Pool 1991, p. 273).

For the German troops scouting the Sandveld in 1905, the Kriegskarte turned out to be of limited use (Rohrbach 1907; Plate 7.2.). The complex network of omiramba on the western slope of the Epukiro-Okavango catchment was far too generalised on the map. The name Epukiro for the largest village in the southern fringe of Omaheke appears to be derived from the Otjiherero verb puka “lose one’s way” (Köhler 1959a, p. 35). Köhler interprets the meaning to be “country where one gets lost” which may be a reference to the flat terrain and the thick bush vegetation. The terrain and the inadequate maps resulted in the Germans having to rely on in-
...digenous guides in their campaign. By following the guides, the patrols found routes and water-places previously unknown for the Germans, as well as the existence of large areas of what Rohrbach would later assess as good pastureland (Rohrbach 1907, p. 85).

In January 1905, Lieutenant Degenkolb and Captain Rembe with the Lieutenants Meinardus and Rausch carried out reconnaissance over the Otjozondjou Omuramba and the Omuramba Eiseb. Degenkolb went out from the wells at Otjozondjou and followed the valley up north for about 50 km. He reported that the river bed alternated between extended and flat with occasional passages of narrow terrain. Remains of dead persons and animals showed that the valley was one of the trails that had been used by the escaping Herero’s (Rohrbach 1907, p. 85). About 40 km north of Otjozondjou, a footpath crossed the Omuramba and according to the indigenous guides, the path led westward, “to the Omuramba u Omakatako”. To the east, this path led to the well Ozombu Zo Vindimba in the Eiseb Omuramba. About 50 km beneath of Otjozondjou, the valley bifurcated. Shortly before the bifurcation some (at that time dry) water holes and a dried up well was found. The Hereros (presumably using information from the guides) call this place Ondurwu (Fig. 7.1.). The arms of the confluence went to the southeast and northwest. The south-eastern arm was said to lead to the Eiseb and also to be identical with the valley that went to the well site OmbujaKambonde. The name OmbujaKambonde again appears on a map over the Epukiro Reserve fifty-five years after the war (Köhler 1959a). A well structure was mapped not far from the current village Okambonde, which in addition seems like a variant of the place-name OmbujaKambonde. According to the guides, the north-western valley continued to the Okavango and by travelling one day on horses, or two days on foot, it was possible to reach a water place called Okatuwe. Rohrbach interpreted this river arm as identical with the Gunib valley that branches from the Omatako Omuramba south of Otjituuo (Rohrbach 1907, pp. 86-7).

In May and June 1905, patrols from the unit of Rembe reported that the Ganas Omuramba and Epuikiro Omuramba confluence beneath the well-known water place Otjundu. The well site Otjimanangombe was located here. At Ombakaha, more wells were found where “some seem to be enduring”, “or yet if they are filled, they can still be opened again” (Rohrbach 1907, p. 91). Rembe’s unit found water about 40 km downwards from Ombakaha at Osumbo-Osotungondo and again after further 40-50 km at Ombuatjumati, “where two river valleys unite and where wells could be opened”. In October 1905, Epukiro was traversed by three companies under Colonel Deimling. They reported several water places south of Otjimanangombe. One watering place, 45 km downstream from Otjimanangombe, was named “Orlogs end” by the troops, because here the pursued Herero resisted for the last time. In addition, they had “chased out” the Herero from the wells at Kalkfontein, located 30 km east of Epukiro.

One patrol used the well site Ombuatjumati as a starting point for an attempt to reach the Eiseb Omuramba. The reason for this was the water place Gamsvley, which was indicated on the Kriegskarte. They do not seem to have reached the area and in addition, they were not sure whether they actually managed to reach the Eiseb Omuramba. They suspected that they were in the Rooibock-Laagte or in another river bed. Nevertheless, after one day’s travel along the river valley, the patrol met a “group of Bushmen” who stated that there were no water sources further down in the valley. On the other hand, they mentioned that there were water places in the northwest, and the patrol assumed that they were referring to the Nyae Nyae area (Rohrbach 1907, p. 92). However, from the position estimated for this meeting (Fig. 7.1. PM), it is possible that the Bushmen referred to the area of the well cluster surrounding Otjumunguindi, which seems to be the general area for the place Gamsvley.

The patrols also found indications of that the fleeing Ovaherero had used the Grootlaagte in their escape. Since the frontier between Botswana and Namibia was not demarcated, the German patrols were concerned with the risk of trespassing upon British territory. Patrols had also been sent out from the military post at Grootfontein, alarmed by information from “a captain of the !Kung Bushmen” that
Figure 7.1. Reconstructed routes for the migration through Omaheke. Places mentioned in the discussion are indicated on the map.
Wells of Experience

“certain Herero bands, which he regarded as unauthorized intruders” had settled at Gautscha (Bayer 1909, p. 244 cited from Wilmsen 1989a, p.144). Graeff’s patrol reached the Nyae Nyae area, and “in the vicinity of Gautscha he met numbers too strong for him to tackle and fell back on Grootfontein” (BNA 1905a cited from Wilmsen 1989a, p. 145). Three Herero had been killed in the incident in an area which at the time was considered a borderland between Südwestafrika and Bechuanaland. Consequently, the assistant magistrate, Merry, at Tsau in Bechuanaland went out to investigate the German attack and noted after interviews that half the German patrol were white, the others being Damaras (i.e. Herero). In addition, people from the attacked Herero settlement had seen the German patrol again and this time they recognised four local Ju/'hoansi who had been living with them before (BNA 1905b cited from Wilmsen 1989a, p. 145). According to Wilmsen, the Ju/'hoansi who had assisted Graeff objected “to the unauthorized presence of particular Herero groups”, since the affine of Nikodemus was resident to the area (Wilmsen 1989a, p. 145 and above).

During the dry season of 1905, the water deficiency resulted in the pursuit campaign being curtailed; the patrols were consequently withdrawn from the Omaheke and assigned to other duties in the southern parts of Namibia (Rohrbach 1907, p. 95). Occasional patrols in the area were undertaken until 1912 (Chapter 4). A patrol led by Hauptmann Müller reached the waterhole Gautscha in 1911. Here they met !Kung-speaking hunter-gatherers who still made bone points, and who seemed afraid of the arriving soldiers. Müller did not notice the presence of any Veldhereros, Tawana or Herero cattle posts, Ju/'hoansi herders, or native traders that Passarge had reported only thirteen years before in the same area (Müller 1912; Gordon 1992, p. 36). Müller took this as an indication of the area’s remoteness and his account has been widely quoted by proponents for the isolationist theory (Guenther 2002; Lee 2002, 2003).

Wells are not constantly in use in a nomadic landscape. In a pastoral land-use regime, wells can be abandoned for a considerable time in order to allow water and grazing to regenerate, especially during prolonged drought conditions. Historical research indicates that wells could be reopened after decades of non-use (Henrichsen, forthcoming cited from Stern & Lau 1990, p. 4). They could also be abandoned and reopened by other groups: “Because of water we moved here, [to the Ghanzi area] where previously Hereros had lived. My father opened up their old wells and got water” (Russell & Russell 1979, p. 34). Hence, from a land-use historical perspective, the importance of the abandoned wells should not be underestimated, even though they were not in use when Müller visited the Nyae Nyae area in 1911. In addition, it can probably be assumed that many people in Omaheke avoided contact with the colonial forces at this time.

Nevertheless, it is evident from the accounts that the German patrols actively attempted to find well sites in Omaheke where they supposed that Herero refugees would be. During their activities, they identified several unknown well sites, which their guides acknowledged by place-names not documented on the Kriegskarte. This suggests that the indigenous guides assisting the patrols, some of whom apparently Otjiherero-speakers, had prior knowledge of the water places within Omaheke. This can be taken as evidence that the ‘quellen u. wasserstellen’ indicated on the Kriegskarte can be considered as a partial documentation of, and consequently an insight into pastoral well sites or cattle posts in use at least in the second half of the nineteenth century.

The implications of this are threefold. The first implication is that the Kriegskarte can be used as a relative historical-archaeological dating tool for many of the wells that were documented during the archaeological survey. Secondly, the sources can be used for extrapolating additional well sites in Omaheke. Thirdly, although they do not appear in any written or oral accounts, the wells documented in this study provide us with glimpses of a subaltern network of paths and watering places used by herders in Omaheke that have not been revealed until the present study (Fig. 7.1).

Ovatjimba, Cattle posts and sacred cattle

It is important to again consider some characteristic traits of pastoralism already been touched upon in Chapter 5 to gain a deeper understanding of the wells in Omaheke at the time. In that discussion, however, these strategies were situated in an environmental setting of reoccurring droughts. Here it was noted how the system was characterised by localised settlements, an extensive mobility and wide ranging networks or alliances based on cattle loans between cattle owners. By studying the current cattle post system spaced over the southern parts of the research area, it is possible to provide a modern illustration to the nature of such systems. Solely by looking at the owner marks on the cattle in any unspecified cattle pen it can be seen that three to five different owners may have cattle at one single post. Many cattle owners may live elsewhere, but can still have cattle posts with herders in several places in the area, keeping only fragments of the herd in each place. The supervision of the cattle posts is main-
tained by relatives who travel between the posts. The posts in turn are populated by relatives or non-affined workers. Cattle loans and herd splitting is a viable strategy for consolidating family- and cooperative bonds and for spreading risks (see also Bollig 1997, 2000; Kinahan 2001, p. 27).

Headman Binda’s (2001) view of the pre-war conditions of Omaheke indicates families from the western parts and the Namibian highland area kept cattle posts in the “ua Pata Omuramba”, and that the people in Omaheke sent cattle to the “Windhoek area”. However, the notion that Okuruwo (the holy fire) was brought to the settlements in Omaheke indicates that the posts included fairly stable dry season settlements, Ozonganda. In addition, the account may at least indirectly indicate that the people were affined, since the Okuruwo had to be lit on ojumbo wood (A. mellifera or A. luederitzii) brought from the “grand grandfathers Onganda for making the first fire at the new Onganda”.

Regarding the pre-war conditions of Omaheke accounts accumulated in this study, it is indicated that “Ovatjimba” stayed in the vicinity to Eiseb and Otjinoko Omuramba (HB 2001; Kau 2001). It has been common to use an ethnic perspective on Ovatjimba as signifying the identity of a specific group of Otjiherero-speakers who had specialised in hunting and gathering (e.g. MacCalman & Grobelaar 1965; Smith 1992, p. 86, 1998, p. 206-7; Pennington & Harpending 1993, p. 8). However, in present day Omaheke, many younger Herero sarcastically characterise themselves as Ovatjimba, even if they have the nucleus of their own herd with few heads of cattle, goats and sheep located at one or two of the posts. In this case, the concept seem more related to “poor Herero without, or with little own cattle, living in the reserve” (Anonymous). Nevertheless, if Murangi Kamanunu (2001) a seventy year old Omaheke resident is asked, Ovatjimba has a slightly different meaning for him, as that of “cattle-less people subsisting on hunting and by herding other people’s stock” a view confirmed by other elders (HB 2001; Kau 2001; KK 2001). The gain in herding other people’s stock is that it is possible to create the nucleus to the herder’s own herd if this had been lost, or just to add extra milk protein to the bush food. The benefit for the people who herded out stock was that they spread risks and created a network of cattle loans that could be recalled in times of need (Kinahan 2001, p. 35).

Even though the meaning of Ovatjimba comes out differently in the two accounts, it is still clear how the term relates to people without or with little cattle, rather than to an ethnic group. Ovatjimba is an economic status that may change over time depending on the individual’s possibility of gaining access to livestock (Wilmsen 1989a, p. 141, see Lau 1994, p. 122; Gewald 1996, p. 15-20 and Bollig 1998, p. 178-79 for discussions on Ovatjimba). Furthermore, the example shows how social concepts are dynamic and renegotiated over time in order to fit with the structures of the surrounding society (Werner 1998, p. 221).

The German military commander von Trotha noted in his diary from 13 September 1904 (16 days before the ambush on Herero at Ozombu Zo Vin-dimba): “Veld Hereros, women and children, come in big numbers to ask for water” (cited from Pool 1991, p.270). Here it can be worthwhile to also remember Rohrbach’s account, quoted in Chapter 4, stating that Omaheke was rich in cattle before the war. He also noticed that “the principal and leading” Herero and Mbanderu chiefs stayed in the western tracts of the country, but they had cattle posts in the Omaheke. He noted that there were numerous Feldhereros working with tending the cattle (Rohrbach, 1907, p. 85). This agrees with Passarge’s observations from the area ten years earlier (Chapter 4), and Chapman’s observations in the early 1850s, (although from the southern fringe of Omaheke) of “stationed (…) scouts and herdsmen” (Tabler 1971, p. 48) and “Bushmen with flocks of goats and sheep of Sekomi’s” (ibid., p. 52). It is obvious that the term Feld- or Veldhereros is synonymous with the concept of Ovatjimba, impoverished herders or hunters that keep cattle on outlying posts in the peripheral regions to the larger cattle economies. In 1895, shortly before the rinderpest, one of the larger livestock owners, Kambazembi at Waterberg, had 30-40 000 heads of cattle “distributed amongst his various cattle posts” (Pool 1991, p.279).

In addition, traditionally the pastoral networks of Herero and Mbanderu were structured by real or fictive social relationships of bilateral kinship. Herero defined descent via the female line by eanda, which granted rights of inheritance of property. The male line oruzo on the other hand determined access to the ancestors, to social status and to sacred cattle and sheep (Crandall 1996; Kinahan 2001). Among Otjiherero-speaking peoples, sacred cattle had (and still have) an essential role in the spiritual life and an important function for structuring and harmonising the social relationships (Jill Kinahan 2004, p. 2). The oruzo livestock were associated with several taboos and considered the property of the ancestors in the spirit world. The sacred cattle were kept for them until the death of the head of the lineage. At the death of the headman, the cattle were butchered and the horns put on stakes at his grave. The head of the lineage was wrapped in the skin of his favourite ox before he was placed in the grave. All the meat was consumed at the funeral (ibid.).
Sacred cattle should be considered as a consolidation of family bonds and involved in these bonds was also the possibility of borrowing “seed stock” that could be used for creating a nucleus to a new herd (Wilmsen 1989a, p. 141; Kinahan 2001, p. 26-7; above). In 1904, shortly before the battle at Hamakari, oral tradition collected in /Xai /xai mentions that Nikodemus went to the Nyae Nyae-Dobe area in order to receive sacred cattle (Wilmsen 1989a, p. 141). It has already been noted how Mbanderu with cattle went to the Nyae Nyae in 1896, to areas where they had legitimate rights. In other words, this account may serve as an indication that he went to allied peoples who lived in the area to claim oruzo cattle, recall a cattle loan, or borrow cattle for rebuilding his depleted herd. In addition, Alnaes (1979b, p. 4) has collected oral tradition expressing that most of the refugees who managed to cross Omahke had such relations to call upon when they finally arrived in the Ngamiland (cited from Wilmsen 1989a, p. 142). Vivelo (1977) has argued that the commoditisation of previously sacred livestock during the twentieth century was the main drive for the social and economic changes of the Ngamiland Herero in Botswana.

Although derived from a relatively short time period of Omahke’s pastoral history, i.e. the last decade of the nineteenth century to the migration 1904-5, it is possible to gain a series of indications suggesting that:

- Omahke was linguistically heterogeneous including !Kung-, Khoe-, Otjiherero- and Setswana-speakers;
- the Ju/hoansi hunted, kept own livestock or herded other people’s livestock;
- some Otjiherero-speakers hunted, kept own livestock or herded other people’s livestock (see also Chapter 4).

Here is quite good evidence for suggesting that the escape through Omahke was more of a migration through a known pastoral land-use system. Seen in relation to the fact that the German troops controlled all the larger well sites in the main omiramba, Omatako and Epukiro-Otjimbinde, it was a rational choice to aim for a peripheral area and use minor routes over wells in an outlying cattle post system, especially since the Eiseb route seems have been unknown to the Germans. However, it was probably not a question of an organised large-scale migration. Owing to the small scale of the wells, the number of refugees, the lack of water and the threat of clashing with German patrols it seems that it was more a question of survival, where dispersed smaller groups went on their own from well site to well site. The suffering involved is well documented. Thus, rather than perpetuating the view that the refugees fell victims to their own environment, a more sensible explanation is that they went through a pre-existing and at least partially known pastoral landscape to survive an attempted genocide. This is supported by accounts in the oral tradition indicating that wagons were taken as far as the wells at Okatjimbe and Ozombu Ouvire. The purpose was to reach areas where they could activate pastoral alliances and rebuild their lost herds. The next question that will be discussed next is for how long such cattle posts had been kept in Omahke.

The opening and the reopening of the wells

As noted in several of the well sites, a series of wells can be understood as an indication of several herding units’ rights to the same water source. For example, two wells at Epata have names that indicate individual herdsmen who seem to have been contemporary at the place in the late nineteenth century (above). An additional explanation for a grouping of wells can be hydrogeological; the different wells reach different pockets of water of the formation that stores groundwater, or even that the direction of the drainage line has fluctuated over time (Chapter 6). The well cluster also indicates long-term labour investment. When a well ran low and the grazing was exhausted, the nomadic lifestyle allowed the herdsmen to move on, and the groundwater supplies to regenerate. Within such cycles, wells were abandoned and re-opened several times.

As briefly described in Chapter 5, it is generally possible to obtain measurements of rim diameters, and sometimes, when the well is not filled with eroded soils, the depth of wells dug in outcropping calcrete. It was also briefly discussed that the rims of the calcrete wells in Omahke seem to manifest three general forms. One group of calcrete wells can be considered as small and circular. In general, they have a circular form approximately 0.6-1.3 m in diameter, and dug through thinner sheet calcrete. They are more or less 1 to 3 m deep. The second form of calcrete well has an irregular or oval form. They are usually larger than the first group with sizes ranging between 2 m up to 7 m with depths not extending 7 m. The third form is circular and has usually a more formal appearance. The rim diameters tend to lie within the range 1.6-2.8 m with depths between to over 30 m. To some extent the depth of the wells relates to their location on the calcrete caps. The calcrete seem to be thinner in the margins and thicker in the central parts of a local drainage system. Occasionally the three types can be found in close association, which may be used as an indication of a gradual deepening of a well.

The gradual deepening of the wells can indicate a lowering of the water table, but an alternative
Outlining a chronology for the wells in Omaheke

explanation is that an enlarged well signifies increase in outtake. This is related to the diameter, and the depth of a well has little effect on the potential 'yield' from the aquifer (Edwards et al. 1983). The size of a well determines the storage capacity, and must be calculated in terms of the human and livestock populations to be served as well as the duration of abstraction (ibid.). From this perspective, a small well indicates a small outtake, whereas a large well signifies a larger consumption.

If the distribution of different forms of wells is studies, particular patterns can be noted (Fig. 7.2a-d). To begin with, it can be noted that the sediment wells, i.e. wells dug through sand to sub-outcropping calcrete or wells dug in clay (71 wells in 14 sites), are relatively evenly distributed over the research area (Fig. 7.2a). Ozombu Zo Vindimba contains half the documented wells. The small circular calcrete wells are only 12, but they appear in 11 different places all over the research area, from Okaropikho in the south to the Djoxo pan in the north (Fig. 7.2b.). In general, the Herero informants do not recognise the small circular wells and a few informants define them as not dug by the Herero (Kau 2001). The elderly Ju/'hoan whom with whom I spoke in Makuri was not aware of the origin of the small circular wells at Djoxo pan (K /K 2004). The Ju/'hoan Kandaro stresses that before the village of Otjinene, Ovaherero owned the wells (ozombu) in the Omuramba, his n!ore was centred on a water source “in the sand” approximately 2 km west of Otjinene. Although the oral tradition provides little information about the wells, a relative date of the small circular wells that at least indicates that the larger wells were dug later, can be derived from the observation that smaller wells are found close to or within the “rims” of the larger wells (three cases). Owing to the near association, it is not unlikely that many small wells have been enlarged or dug away and are consequently underrepresented in the material.

23 of the calcrete wells can be characterised as oval irregular. The form appears in 10 places distributed over the research area (Fig. 7.2c.). In Epata and Otjineene, thirteen of the wells had an oval irregular form. In the northern part of the research area, similar wells have been documented in /Gam, N/ana, Otjizeandu, Goutscha and at #To/ana, and possibly at Dobe, but this site should best be classified as associated with a sub-outcrop. No informants knows the exact age of the oval/circular wells. Kleophas Kaputuaza stressed that “we will never know [the age of the wells] as the wells have been dug several times” (KK 2001). Some Herero informants define them as “old Herero” wells and define them as “pre-war wells” (i.e. the war of 1904-07) or plainly as “before the roller wells” (HB 2001). Roller wells seem to indicate European type of bucket-wells, which would have appeared some time in the later half of the nineteenth century. Some informants explain the oval form as related to the use of wooden or leather containers thatched on ropes. Another explanation is that the shape is related to that several men passed up the water to the drinking trough (see plate 7.4; Irle 1906, p. 15 for illustrations). In this case, steps were dug in the side of the well for the people to stand on. If the well was deep, the strategy was to put a tree into the well. The people who passed the water buckets would stand on manufactured steps or on the branches (Büttner 1883; Lee 2003, p. 144).

The oval irregular wells in the /Gam area have been used by herders after the repatriation in 1993. The wells seem to predate the current settlement, which was established after Namibian independence. It can be noted that most accounts expressed by the current herders in the area state that the wells were used either ‘in 1904’, during the migration over Omaheke, or in a period specified as ‘before 1957’ the year that signifies the forced relocation of Tswana, Herero and Mbanderu herders from the Crown Land. The dates provided may however show how the memory of the oral tradition is selective and connected to main events that affected people’s lives (Vansina 1965).

The Herero and Mbanderu informants in the /Gam area relates that the wells were found as they appear today, or that they knew where to find them. In the later case, the old people in Botswana, who remembered Namibia, had taught them where to find the wells. Wahepurua Kariko and Vazuva Mbkia-yamena at Otjozondema were both born in the 1930s and they stated that they had used the wells before 1957. For this reason, they had direct knowledge of where to find them. Moreover, they talked about a long continuity of Otjiherero-speakers in this area, even in areas where there are no Herero settlement today, and in time periods that predate the twentieth century. They considered that the whole area between Lake Ngami in the east to /Gam, Nyae Nyae-Dobe and Kaudum in the west (i.e. the limits of the Tswana reserve established in the late nineteenth century, and parts of the Namibian Crown Land from 1922) to be used by ‘Herero, Tswana, Ju/'hoa-nsi and others’. Kariko, for example, tells how he as a young man had opened the wells at “Naneka, Xamsa, Makuri, Djoxo and Goutscha”, where at least the last two have been documented as well sites in this study. Goutscha had two wells (which he referred to as Ovikonda Vrongo) in the 1950s before the relocation to Botswana (WK 2004, see also Al- naes 1979a, b; Wilmsen 1989a; Kandjii 1996).
Figure 7.2a-d. The distribution of different wells. a) Sediment wells, 71 structures distributed into 14 sites b) small circular wells 12 structures distributed into 11 sites c) oval irregular 23 structures distributed into 10 sites d) deep circular wells 44 structures distributed into 10 sites.

The wells described in the sources from the nineteenth century correspond with oval wells (Büttner 1883; Irle 1906). For example, the artist Thomas Baines, who accompanied Chapman on his journey in 1861, drew a well from the Epukiro Omuramba, south of the study area. Its shape matches the general outlook of the oval wells mapped in the survey (Baines 1864, p. 128).

The 44 deep circular wells were documented in 10 sites which are all confined to the southern part of the research area (Fig. 7.2d). The depths of the deep circular wells and their sometimes more formal appearance are most likely an indication of the use of iron spades that would have been present from at least the later half of the nineteenth century. The labour recruitment to the copper and diamond mines in the Cape Colony was extremely active during the turn of the nineteenth century and onwards (Marquard & Standing 1939, p. 249; Alexander 1983, p. 26; Werner 1998, p. 46) and most likely this had the consequence that many Kalahari residents returned with new technology and with skills in sinking deep shafts. It has been documented that when the war 1904 broke out, many Otjiherero-speaking men who worked in the mines in the Cape Colony returned to Namibia to join the war (Werner 1998, p. 46). In addition, the shape of the wells suggests that they were constructed for the use of buckets and rollers. The Afrikaner treks in the 1870s and the more stable Afrikaner settlement between Gobabis and Ghanzi from the 1890s most likely provided an additional influence for the deeper
wells. In 1885, Farini saw a 30 m (100 feet) deep well that was noted for having been dug by Rautenbach in the confluence of Nossob and Auob, shortly south of Omaheke (Farini 1886, p. 287). As discussed in Chapter 4, the Afrikaner communities interacted with the indigenous communities, partly through the ability to dig deep wells (Russell & Russell 1979, p. 17). Rohrbach estimated that the calcrete wells in Epata were up to 20 m deep (Rohrbach 1907, p. 89). This account must be considered as predating, or at least being contemporary with the German campaign in 1904-5.

A further contrast to the small circular and oval irregular wells is that dates can be gained for the deep circular wells. Either the informants name the constructors or have participated in the construction themselves. The deep circular well Kahitjene in Otiinene was said to have been dug in 1923 by the first arrivals to the Epukiro Native Reserve (AT, DK, HK, HT, MH 2001). The name refers to white, muddy or thick water. In Epata, oral tradition concerned with three individual deep circular wells could be retrieved from the villagers (Ep 2001). Two of the wells were acknowledged to have been dug in 1895 and in 1900. A third circular well similar to the other two is said to have been dug by Joseph Kaunuua in 1940. The communal borehole was drilled in this well in 1962. At the same time, they stopped using the other wells. The borehole still functions as the communal borehole for the village. As discussed earlier in this chapter, the deep circular wells in Ozunduno have been explained as related to a hiding place during the war in 1904-07 (above). The deep circular well in Okarunjara was acknowledged as dug by Nikolas Tjivirura in 1957. Kaputuza recalled that he dug his well in Okomungondo 1940-41 and Nathanael Kandjou dug his well in 1936. Three of the wells in the Otjinoko area were associated with the herder Anton Kaute who stayed there in the 1940s (Chapter 5).

All the wells that were documented in the Alexest Omuramba were deep circular. With the exception of one well that seems to have existed when the first settlement at Otjiyemombungu was established in 1927, the majority of the wells in this area are said to be from the 1940s-50s (Chapter 5). Some of the wells have been modernised by rollers, tanks and donkey pumps, a trait that has not been noted for any of the small circular or irregular wells.

It is apparent that the oral tradition of the current Herero community is most closely associated with the deep circular wells and to some extent with the oval irregular wells, at least in the /Gam-Nyae Nyae area. Only four of the deep circular wells were defined as pre-dating the war in 1904-07 within the oral tradition. The absolute majority of the deep circular wells referred to in the oral tradition are related to the period after the establishment of the Epukiro Native Reserve in 1923 (below; Chapter 4). This is further supported by the distribution of the small circular and oval irregular wells over the whole research area; the deep circular wells, on the other hand, are restricted to the southern part of the research area, only appearing within the limits of the Epukiro Native Reserve (Fig. 7.8d.).

The establishment of the reserve in the south and the Crown Land nature conservation area in the north would presumably have resulted in a general abandonment of the wells in the northern part of the research area. Nevertheless, as stated before, some herders continued to open wells for livestock in the conservation area at least until 1957, when they relocated to the Tawana Reserve in Botswana. However, it can be assumed that it was not possible, or even necessary, to invest in the larger wells, since the presence of the herders in the area was illegal, and the pastoral settlement must have been rather limited in the Crown Land in order to not attract the attention from the authorities. The control of the conservation area most likely increased after that the Ju’hoansi settlement scheme was initiated in Tsumkwe in 1959-60, coinciding with the plans for a larger Bushmanland Game park. In 1965, the border fence between Namibia and Botswana was erected, preventing further movements over the national border for the !Kung, Khoe, Otjiherero and Setswana-speakers in Omaheke.

Excavation results from Otjozondema

The wells in Omaheke seems to largely reflect the disruptive effects of the European trade, the rinderpest, and the wars of 1904-7, which resulted in a general collapse of the pastoral economies in the marginal areas. Except for what can be considered as qualified guesses, the origins of the small circular wells and the oval irregular wells are generally unknown to the informants. This could indicate that the small circular and the oval wells are related to an earlier phase of pastoral land-use in Omaheke that predates the living memory and the reforms of the twentieth century. Below I will assess whether or not there is any substance to this notion.

In December 2004, an archaeological test-pit excavation was carried out at the southern well at Otjozondema. Several additional well sites have been documented in the vicinity. Finds of pottery on the surface in association with the well motivated the decision to excavate. As discussed before, few of the wells in Omaheke have archaeological materials in direct association.

The present day village Otjozondema was founded by Herero repatriated from Botswana in
1996. The current name of the village refers to a gift of livestock to the villagers from Paramount Chief Riruako, since the returnees were without cattle when they came from Botswana (WK, VP 2004). In the beginning, the villagers depended solely on the well and a series of pans in the vicinity and in the upper reaches of the #To/anadum. According to the informants, the well sustained the whole village (people, goats, sheep and 90 to 200 heads of cattle) with water over the entire dry season in the period 1997-2002. In 2002, the government drilled a borehole 100 m east of the well. However, the villagers plan to open the well again since the borehole is unreliable (Vot 2004).

The well at Otjozondema is located on a small plateau. A low crest situated to the west of the well seems to be a sub-outcrop of the Aha Hills 40 km north. The environment in the direct vicinity of the well is characterised by an undulating dune and omiramba environment with some scattered pans (Fig. 7.3.). The well structure is located in a low-lying area of a grassy pan and is visible through a shallow depression with steep edges and erosion marks owing to surface drainage (Fig. 7.4). In direct association to the well, the remains of a large *A. erioloba* and a termite mound were noted. Two additional large *Acacias* grow in the area closest to the well. Sampling for a geochemical analysis of soil nutrients was carried out in two directions. The result of the geochemical sampling has been discussed in the previous chapter, although it can be repeated that the soil nutrient distribution coincides with what can be expected for a livestock drinking place.

Three tasks were defined for the excavation. The primary task was to test whether the well and the associated spoil heap areas would yield datable materials and hence provide archaeological dates for the use of the well. The second aim was to define additional activities that may have been associated with the well. The third task was to provide methodological insights that can be used for future investigations of pastoral well sites in the region.
The excavation was initiated by establishing a grid over the area (Fig. 7.4.). The size of the excavation area was limited to 15 x 15 m centred on the lowest point of the well. All surface finds within the excavation area were collected and mapped according to which the square they were found. Since the well is under heavy bioturbation, a more exact registration of the surface finds could not be motivated. Every fifth 50 x 50 cm square and two additional squares associated with what was defined as the main contextual structures of the well, the lowest point and a sediment heap area were dug. When the depth of the pit in the lowest point of the depression was 60 cm, the trench was expanded by a second pit on the southern side, which was also dug to 60 cm. Nineteen squares or approximately 2 % of the surface area of the well structure were excavated. The small area allows a larger scale continuation of the archaeological investigation in the future. Initially, the find registration was by square and every 5 cm layer.
However, the vertical find registration was later changed to each 10 cm layer, since the impression of vertical and horizontal movement of finds within the structure did not justify a more detailed find registration. For example, it was noted that pieces from the same type of textile were found in squares distributed all over the excavated area and at almost all depths.

The sediments in the depression consisted of well-drained Kalahari soils with intrusion of limonite and pebble calcrete. In addition, the sediments contained larger pieces of fractured grey calcrete. During the excavation, some vertical layering of the otherwise homogenous sediments could be noticed (Fig. 7.5).

Neither the well, nor other culturally mediated layers, could be established on stratigraphical grounds or on soil colours. When the villagers used the well, they dug it to a depth of 1.6-1.8 m down to what can be presumed a calcrete sub-outcrop (Vot 2004). This could not be confirmed by the archaeological excavation, which only reached a depth of 60 cm. That calcrete has been broken at the place is indirectly indicated by fractured calcrete chunks, up to 40 cm in size, scattered on the sides of the depression (Fig. 7.3.). The rocks were taken as indications of areas for eroded spoil heaps. The distribution of the potsherds supported the interpretation to some extent. They were confined to the western erosion scar, to the low-lying well area and to the area that was interpreted as the western spoil heap area. It seems that they were transported by surface drainage to the lowest point and during the excavation of the well redistributed to the heap areas. No distinct boundary between the bottom of the spoil heap and the ‘ground surface’ could be defined on stratigraphical observations. However, the archaeological finds in the presumed spoil heap areas appeared to a depth of 20-30 cm, which can be taken as an indication for the base of the spoil heap.

At 0.3 m depth, a clay layer was clearly visible in four sections of the excavated sequence in the depression. Impact on calcrete would release soluble calcium carbonates in the zones of fracture which are later eroded from the spoil heaps and sedimented to a clay layer. The clay layer can be interpreted as reflecting a secondary effect to impact on subsurface calcrete. Based on the stratigraphical observations it seems that for parts of the year, the depression is submerged.

Plate 7.3. Large calcrete rock exposed during excavation.
Outlining a chronology for the wells in Omaheke

Find categories

All sediments were sieved through a 2 mm mesh. The excavation resulted in 387 individual finds collected on the surface (104 finds) and in the trenches (284 finds) (Appendix 5). The find categories included flaked stone and glass, textile, bone, pottery and ostrich eggshell fragments. A test pit was considered as completed when two 5 cm spits on a row were excavated without any finds. Considering that not all trenches were dug to the same depth, the vertical distribution of finds appeared as follows: surface 104 finds (27 %), 0-10 cm 141 finds (36 %), 10-20 cm 80 finds (21 %), 20-30 cm 33 finds (9 %), 30-40 cm 15 finds (4 %), 40-50 cm 11 finds (3 %), 50-60 cm 3 finds (< 1 %). The shallowest squares were all located on the edges and the deep squares in the lowest point of the well area. The two squares in the lowest point still revealed finds at 60 cm depth, which is when the excavation was terminated. The vertical and horizontal pattern of the find distribution matches the general structure of a well. It can be suggested that observations of find distribution is the most diagnostic tool for defining a well structure in unconsolidated sediments that are submerged parts of the year.

Ostrich Eggshell: The most common find category was pieces of ostrich eggshell. 221 fragments were collected in the excavation. Two of the pieces had clear indications of manufactured holes suggesting that they are remains from wrecked water containers (Fig. 7.6e-f). A number of the pieces are darkened black or grey by carbonisation. A few pieces had red and yellow tones, although the majority were natural white. In collections of ethnoarchaeological material culture from the nineteenth and twentieth centuries, it is apparent that ostrich eggshell containers were common and used by all groups in the Kalahari at the time (e.g. Baines 1864). The finds of ostrich eggshell indicate that the depression has been used for collecting drinking water. Bättner (1883) reports that in the nineteenth century, the Herero usually obtained drinking water from the livestock wells. In times of drought, people drank once a day and the livestock every second or third day.

Stone artefacts: The second most common find category was flaked stone. 101 pieces of flaked stone were collected in the excavation. 15 of the pieces were flaked crypto crystalline silcrete (CCS) and 75 of the pieces was fractured quartz. Nine pieces of the quartz can be classified as cores (Callahan et al. 1992), although it is not impossible that some of them have been used for striking sparks in fire making, a technique still used in Omaheke. Four pieces of the quartz were retouched and at least one of these can be classified as a formal tool, a thin blade scraper (Fig. 7.6c). 2 pieces of the CCS had modified edges, 2 others were retouched and one of them should be considered a formal tool, a small scraper significant for Late Stone Age contexts (Fig. 7.6b). The rest of the quartz and the CCS can be considered debris. A small flake of brown-purple bottle glass was found, with characteristics that suggest that it has been knapped (Fig. 7.6a). In addition, 6 small pieces of coarse flaked calcrete (Fig. 7.6d & g) and 3 pieces of quartzite were collected. These were much coarser and larger than the quartz and the CCS.

The general impression of the stone material is that it is of relatively recent Late Stone Age affinity corresponding with similar sites in the area (Wilmsen 1988; Yellen & Brooks 1988). The scrapers can indicate that the place has been used for preparing skins, wood or some other craft. A well site contributes with water and, through its associated vegetation structure, tannin, two of the ingredients for preparing skins. It might be noted that soft skins from the Kalahari were considered as a valuable commodity in the trans-Kalahari trade in the nineteenth century (Tlou 1985; Wilmsen 1989a; Gordon 1992).

Ceramics: 15 sherds of pottery were collected in the excavation. None of the sherds was decorated and consequently they cannot be placed within a typology. 3 of the sherds were black-grey with a smooth surface, resembling the single decorated sherd from Makuri (Chapter 5). However, the temper was different, since it contained large pieces of a black layered mineral and sand. 11 sherds had a grey-yellow surface and sand temper. 1 single sherd had a bright orange-red tint. The temper contained sand and larger fragments of crushed rock, presumably calcrete. The pottery sherds from the well seem to reflect three different wares, but this is a too uncertain indication to draw any conclusions. Different types and amounts of temper and tint may vary on one individual pot. The sherds were confined to the central and the south-western part of the depression.

Faunal remains: 15 small fragments of bone were collected in the excavation. The pieces were small and only one was diagnostic: a fragment of the first phalange from a small goat-sized animal (M. Manyanga, pers. comm.).

Cloth/textiles: 30 pieces of textile were found. The most common type was short-haired wool lump, pieces of canvas and nylon cloth.
The dating of the well

The first thing to note is that the well at Otjozondema has little permanence as an archaeological structure. The well was used for the last time during the dry season 2001 and today, the well structure is only visible through a small depression, through a thin scatter of archaeological finds and fractured calcrete rocks scattered on the edges of the depression.

The main task for the excavation was to date the well. Wilmsen (1982) has published a regression plot based on date and depth for radiocarbon dated open air sites in Ngamiland, Botswana. The plot indicates a clear correlation between depth and date over the long term. For the shorter term, the diagram seems to verify vertical transport rather than contradicting it. The diagram forms three discrete clusters and looking at the cluster of the most recent dates (present to the 9th century), they appear on all depths between 0.1 to 0.4 m. The majority of the finds at Otjozondema appeared on this depth. At Otjozondema, it seems important to acknowledge the impact of the site-specific processes, bioturbation, erosion and excavation, noted above. For this reason, it can be assumed that dates cannot be based on depth or layer, at least not within the depression. In other cases, it can be assumed that it is only viable to date a well on terms of layer if it is clearly distinguishable in the archaeological stratigraphy and not only through the distribution of finds, as in this case.

Another option, at least theoretically, is based on the reversed stratigraphy of a spoil heap associated with a well; i.e. the bottom layer of the sediment was the original top layer before the construction of the well. In the spoil heap, this will be the lowest layer, in turn followed by layers of gradually deeper soils from the well.

An excavation through the spoil heap to the original top layer could result in datable samples. Optically Stimulated Luminescence (OSL) are ideal...
for dating Kalahari sand, since it is an aeolian deposit clearly exposed to direct sun light before the deposition (e.g. Thomas et al. 2003). However, for a number of reasons it seems that OSL sampling would not have been useful at Otjozondema. Samples to be dated with OSL should preferably not be collected from within 30 cm of the present ground surface owing to factors of cosmic radiation. The spoil heaps at Otjozondema were shallow and the lower limit were difficult to define. A related problem is the extreme trampling of the feature. Bioturbated soils should be avoided as the OSL date is calculating the last exposure to sunlight. It was difficult to assess what would be dated if sampling were undertaken within the structure. It can however be suggested that OSL-dating should be considered as a viable option if the sediment heaps contain coarser sediments and is associated with outcropping sheet calcrete. In an excavation of the spoil heap, the calcrete will clearly distinguish the soils from the top layer of the original ground surface. Many of the wells in Omaheke have these characteristics and in future studies it can be valuable to test this method.

Since it seemed difficult to date the actual well structure, the archaeological finds within the structure seemed to present the best opportunity for gaining chronological indications to the use of the well.

The impact on the sub-outcrop can be related to two possible activities. First, it may indicate that the calcrete has been quarried for nodules for stone tool production. Second, it can be understood as reflecting the opening of an aquitard, constituted on a calcrete sub-outcrop. The latter activity should be considered as representing the well site. As discussed in Chapter 5, quartz and silcrete chunks may easily be found in areas with outcropping calcrete, and such places appear in the near vicinity of the well. For this reason, it seems that it has been unnecessary to dig a deep hole through compacted soils to quarry stone material. On the other hand, if the people who dug the well used stone tools, it is possible that they took the opportunity to collect raw material while digging the well. For this reason, I believe that the LSA scatters at Otjozondema should be considered as a secondary activity to the well and could be used as a relative date for the well structure. Association between LSA technology and wells has been established at both N/ama and Dobe, not far from Otjozondema (Kinahan & Kinahan 1984). The flaked glass identified in the well coincides with observations from #Gi and Cho/ana suggesting that stone technology was in use in the area until the late nineteenth century (Chapter 2 and 5).

If the impact on the calcrete can be related to the well, it could be valuable to use information from oral tradition and historical sources. Several authors from the nineteenth century describe the spade (otjihupuro in Otjiherero) used for well digging by the Herero. The otjihupuro was a bowl-shaped piece of wood 30 cm long with narrow ends. The well diggers hold the spade at the narrow endings and scooped the soil from the pit by using both hands (Tabler 1971; Büttner 1883, p. 530; Irle 1906, p. 16). Such spades would however only be useful for removing unconsolidated sediments, such as sand and clay, but insufficient for digging in harder calcrete sediments. However, older Herero informants recall that before iron spades were available, people used sharpened and fire-hardened sticks of the very hard wood Dichrostachys cinerea (Omutjete in Otjiherero; ǃxʼáí in Juʼhoan) for digging wells in calcrete (KK, HB, MK, CK 2001). In 1840, Irle noted how the Herero used “sticks” to dig wells in calcrete (Irle 1906, p. 16). Büttner writes that chalk deposits of the e-rindi (i.e. a pan) formed underground reservoirs that could contain considerable quantities of water. The duricrusts usually deposit in several layers separated by sand (Verhagen 1990). The perched water of the aquitard probably accumulates both over and under the uppermost calcrete layer. When the surface water of the pan was finished, they opened holes through the chalk layers with their wooden sticks (“stücken”) (Büttner 1883, p. 532). Plate 7.4. illustrates a well from Ovamboland in the late nineteenth century. The well on the photograph was apparently dug through thick sand layers. Beneath the sand, a sheet calcrete layer is clearly observable and in addition, it is possible to see a manufactured hole. It is possible that the diggers would locate a solution channel in the calcrete and enlarge it by using the sharpened stick for knapping on the edges.

This could be one explanation for the larger calcrete and quartzite flakes identified in the excavation (Fig. 7.6d & g). At a supposed well site, i.e. a shallow depression with scattered calcrete rocks, it is possible that a deep excavation would result in possible observations of impact on a sub-outcrop of calcrete. Such observations would indicate the opening of a water pocket and it would support the interpretation that the depression denotes a pastoral well site.

The finds within the well structure at Otjozondema indicate that this specific point in the landscape has been used for other purposes than watering livestock. The organisation of the site can be understood as constituted on one large scale activity, i.e. the well, that contain indications of a number, primary as well as secondary, small-scale activities that cannot be separated into layers or discrete activity areas. The structure contains archaeological indi-
A small well dug in the sand. Notice the sheet calcrete in the lowest part of the image at the water surface (NAN 2510). Photo: Courtesy of the National Archives of Namibia.

Cations as having been used for collecting drinking water, for collection of raw material for stone tool production, and for making stone tools. Two radiocarbon dates were obtained from two pieces of ostrich eggshell with remains of rim openings. The idea was that this would give a relatively good chance to acquire dates that at least would reflect the use of the well. In addition, ostrich eggshell remains are little affected by recent carbon contamination, which have made authors suggest that this is a suitable material for radiocarbon dating (Vogel et al. 2001).

The calibrated dates point to the 15-16th centuries (Table 7.2.). Two previous excavations in the research area have provided four radiocarbon dates associated with pottery. At Cho/ana, 3 ceramic sherds with crosshatching were associated with a layer dated to 315 ± 20 BP (Smith 2001, p. 21). Two dates in a layer containing 4 sherds pointed to c.1380 BP. Based on the date and the cross-hatching, the recent sherds were affined Mbukushu and the earlier were associated with Divuyu (Smith 2001, p. 21). The date and the Divuyu affinity of the sherds from Cho/ana might however be open to discussion. The sherds from all levels were small and without obvious profile and any other securely associated decoration elements, which makes it difficult to confirm that they belong to any specific tradition. As described in Chapter 2, cross-hatching occurs on nearly all pottery at almost all stages of the sequence, including the oldest Divuyu and N!oma pottery to the more recent Mbukushu ware. Furthermore, the excavators at Cho/ana noticed the similarities between the more recent Mbukushu pottery and the Divuyu ceramics and acknowledge the possibility that the sherds, as well as other decorated “Bushmanland sherds” (sic) in the area came from the Mbukushu sources (Smith & Lee 1997, p. 1997).

Mbukushu pottery is numerous in the shade zones of the baobab trees in the Nyae Nyae (Chapter 5). A rim sherd, recovered during test excavations at the baobab site Homasi 60 km south of Cho/ana had both comb-stamped incisions in association with cross-hatching. The sherd at Homasi was defined to belong to the Mbukushu tradition based on its decoration (John Kinahan 1986). In addition to tangible characteristics, the sherd at Homasi provided a secure date. The date was based on AMS-measurements of crushed charcoal temper in the sherd itself. The sherd at Homasi was dated to 360 ± 50 BP (Pta-3744), indicating the second half of the sixteenth century.

Table 7.2. Radiocarbon dates from the well at Otjozondema. Dates calibrated by using the atmospheric data from Reimer et al. (2004) and OxCal (Bronk & Ramsey 2006) and corrected for the southern hemisphere by extracting 25 years from the uncalibrated date (Ekblom 2004).

<table>
<thead>
<tr>
<th>LAB NO.</th>
<th>δ13 C‰ PDB</th>
<th>14C BP ± 30</th>
<th>CAL CE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ua-32649</td>
<td>-6,8</td>
<td>405 ± 30</td>
<td>1445 (61.7%) 1523</td>
</tr>
<tr>
<td>Ua-32650</td>
<td>-10,0</td>
<td>425 ± 30</td>
<td>1436 (76.5%) 1523</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>1574 (18.9%) 1626</td>
</tr>
</tbody>
</table>

Considering that the carbonate fraction of ostrich eggshell displays an initial shortage in 14C, which causes the ages to appear 180 ± 120 yr too old (Vogel et al. 2001), the dates from Otjozondema correspond with the dates from the Mbukushu pottery in the Cho/ana and Homasi (John Kinahan 1986; Smith & Lee 1997; Smith 2001; Appendix 5).

Otjozondema in historical sources

Even if it is difficult to provide an exact archaeological date for the use of the well structure at Otjo-
Outlining a chronology for the wells in Omaheke

zondema, it may be possible to argue a terminus ante quem for the use of the well. If the well is not persistent as an archaeological structure, it might be more resolute in the historical records. The Kriegskarte indicate three places as “quellen u. wasserstellen” north and northeast of /Gam; Tuturuga, Naissoba and Kauganna (Fig. 7.6.). The locations of Tuturuga and Naissoba may coincide with the well at Otjozondema. These place-names and presumably also Gautscha and N/ama are derived from Khoe (Passarge 1907, p. 30).

Figure 7.7. Excerpt from Kriegskarte 1904 (Blatt Andara). The general area for Otjozondema is indicated by the arrow.

In the past, it seems that a general rule in the Kalahari was to conserve place-names. An article written by Mark Peters (1972) provides an illustration to the practice. The 186 place-names from Ngamiland were listed in the article originated from seven different languages: Khoesan, Yei, Mbukushu, Tawana, Otjiherero and Kgalagadi. Bushman names comprised the single largest group of place-names, and were found in every part of Ngamiland. In addition, they were defined as the oldest and were still used in many areas that the Bushmen have long since abandoned (Peters 1972). Passarge suggested that the Khoe place-names that appeared in the area surrounding /Gam, where the “Kaukau Bushmen live today” were an indication of that the area initially was inhabited by the Kho-speaking Nharon (Passarge 1907, p. 30). In addition, he noted that !Kung-speakers had moved southward along the Eiseb during the nineteenth century and that they gradually came to outnumber the Kho-speaking Nharon in the area around Ghanzi at the end of the nineteenth century (Passarge 1907, p. 31; see also Kaufmann 1910).

Wilmsen (2003) has further elaborated on this and points out that the 20th century distribution of the !Kung languages in Omaheke mirrors the shape of a “wedge” separating two groups of related Khoe languages. He suggests that the Kho place-names in the Nyae Nyae-Dobe area might indicate a historical process of a southward expansion of !Kung-speakers in the period 1640-1840 AD (Wilmsen 2003). This took place in connection with the displacement of Yei, Mbukushu and Otjiherero-speaking peoples from the central Angola to the Okavango area during the slave trade in the 16th century (Chapter 4). The dates of Mbukushu pottery in the Okavango, in Cho/ana, at Homasi and the two dates gained from the well structure at Otjozondema point in the same direction. I suggest that the well in Otjozondema signify a small cattle post in Omaheke used in the period from the 16th to at least the end of the 19th century.

The pits at #Gi

The pan at #Gi has been noted for its large baobab trees (Wilmsen, 1989a, p. 135) and has been the object of a detailed investigation of a stratified archaeological site (Brooks 1978; Brooks & Yellen 1979; Helgren & Brooks 1983; Brooks 1984; Brooks & Yellen 1988; Brooks 2002). It is located in western Botswana, close to the Namibian border, approximately 70 km northeast of the well site Otjozondema (Fig. 7.9.). The site is characterised by several hunting blinds distributed around the pan margins and by the game trails leading to the pan. In addition to the hunting blinds, the excavations at #Gi revealed a series of pits along the edge of the pan which the excavators interpreted either as fall traps, hunting blinds or the remains of wells (Helgren & Brooks 1983, p. 189). Three of the pits had been “excavated from an old LSA occupation surface through the hardpan [calcrete] into the MSA [-layer], partially removing it” (Brooks & Yellen 1979, p. 28, my insertions). The stratigraphy of the pits and the old LSA ground surface were well defined and contained a wide variety of cultural remains and butchered animal bones. From the stratigraphy and the findings, the pits were interpreted as having “been excavated in LSA times” (Brooks,
Wells of Experience

1978, p. 1). The faunal remains discovered in the excavation at #Gi consisted only of non-domesticated animals.

By using historic parallels from Burchell (1822) and Hodson (1912), the pits were interpreted to be the remains of fall traps, even though the Ju/'hoansi in the Dobe-Nyae Nyae “did not dig pitfalls for trapping large game” (Brooks 1978, p. 2). Their interpretation was supported by one ethnoarchaeological example: “When our archaeological excavations had deepened to the point where the paralleled the ancient deep pits in size and depth, the Ju/'hoansi used our archaeological squares as kudu traps”. For this reason, the site clearly indicated the direct “continuity between the Ju/'hoansi and the Later Stone Age” (Brooks, 2002, p. 219). Brooks and Yellen rejected the alternative that the pits were dug as “small wells to tap underground water”, since they could not find ethnographic or ethnohistorical data which would support such an interpretation (Brooks & Yellen 1979, p. 28). However, in a later paper they report how they had observed three instances of “large recently excavated “wells” for watering domestic stock” in pan contexts similar to #Gi (Brooks & Yellen 1987, p. 76 their own apostrophes).

I believe there are quite good reasons for suggesting that a pastoral well site cannot be excluded on archaeological grounds. To begin with, it can be valuable to address the appearance of the pits at #Gi. The largest pit at #Gi measured 6 by 2 m. One of the smaller pits was circular and measured about 2 m in diameter. All three pits were at least 1.25 and 1.5 m in depth. A fourth pit, located 10 m to the south of the complex, was also circular in outline and about 2 m across (Brooks 1978, p. 1). In addition, a smaller pit 0.7 m in diameter and only 0.4 m deep was situated 12 m southeast from the main complex. The location, the appearance, the forms and the sizes of the pits correspond with the small circular and the oval irregular wells that have been described and discussed above.

The archaeological identification of a well structure may not be as simple as it might seem. In general, it is difficult to base archaeological analogues on shape or the visual appearance of a structure, since a hole dug in the ground cannot directly be assumed to be a pastoral well or having a single or constant function over time (Schiffer 1987; Ullén et al. 1995; Thomas 2003). In order to argue for the interpretation that the pits represent a well site, it seems necessary to provide some additional arguments.

Here it can be noted that a similar archaeological situation is evident in N/ama pan only 50 km west from #Gi. In the case of N/ama, “the hunting blinds were oriented towards a single artificial well and its approaches; as such, the spatial organization of the site provides a relative date” for the wells (Kinahan & Kinahan 1984). In addition, thin Late Stone Age scatters were associated with the hunting blinds and this would place the use of these wells into prehistoric or early historic times, as already discussed in the case of Otjozondjuma (ibid.).

The reinterpretation of the pits at #Gi can also be supported by oral tradition and the historical sources presented in Chapter 5. The Herero informants in the Otjinene area stress that features that can be confused with wells are ondwija, fall traps, which are dug in calcrete in a similar way. The largest difference between a well and an ondwija is that the first is dug at the last dry season water and the latter is dug in connection with game trails leading to the water source. Ju/'hoansi informants in southern Omahaheke recall that pitfalls were dug in the sand connected with game trails and grazing areas away from the water points, which suggests that they should be considered as a second level of the hunting blind system (Chapter 5).

The faunal remains discovered in the pits at #Gi consisted only of non-domesticated animals, which could support an interpretation of the pits as remnants of fall traps. The same line of reasoning have made other authors presume that pastoral strategies were only subsidiary to the hunter-gatherers during the first and most of the second millennium (e.g. Sadr 1997; Frank 2000). However, such lines of reasoning seem to follow a ‘you are what you eat’ argument, which do not consider that herders in southern Africa eat plenty of game, bush-food and ‘shop-food’ in order not to encroach on the herd. Herding in southern Africa tends to focus on milk production and on maintaining large numbers. For this reason, additional food sources are of crucial importance (Een 1872; Büttner 1883; Vivelo 1977; Smith 1992; Blench 2001; John Kinahan 2001). The value of cattle is primarily social, ideological and economical (John Kinahan 1991; Mitchell 2002). Herders may butcher animals at funerals and weddings and sell cattle in order to generate an income; they seldom butcher animals for consumption, as this would decrease the value of the herd (Andersson 1861; Büttner 1883; Vivelo 1977; Kinahan 2001). In addition, Wilmsen (1989a, pp. 226) have provided ethnographical data indicating that the livestock owners in /Xai/xai were successful hunters and that they used much of the game surplus to distribute to Ju/'hoansi who tended the livestock.

Butchering is the activity that initiates the formation of the culturally mediated bone material in the archaeological record. Kill sites related to hunting can be considered as fairly unpredictable. They
largely depend on the movement of the prey. Hunters have for this reason developed extensive knowledge of animal behaviour in the landscape (Smith 1992, p. 37), as indicated by extensive skills in tracking among the Ju/'hoansi and Herero living in Omaheke today. The archaeological counterpart for this type of knowledge is the locations chosen in the landscape for hunting blinds and the ondwija fall traps. Such structures can be interpreted as a documentation of the relation between topography and animal behaviour and in turn representing the hunters' intention of a more controlled and spatially distinct kill site. It seems to be a general rule that the animals are only wounded at the blinds and at the ondwija. Later, they are tracked to a second site where the actual killing takes place.

In contrast to the hunter, the herder can control the movement of the animals and has the opportunity to decide where to kill the animal and for this reason, he can choose a convenient place. The animals to be slaughtered are usually detached from the herd in order to avoid unrest among the other animals. Thus, it can be suggested that the butchering of goats, sheep and cattle are associated to socially and spatially distinct places in the landscape. The only exceptions to this seem to be animals that have been severely injured from predation, have died in the field from age, botulism or from eating Dichapetalum cymosum or other uncontrollable reasons (Lindholm pers. obs.). On such occasions, it is likely that the kill sites can be found in any place in the landscape.

Ethnographic accounts of both domestic and wild animals indicate that the initial butchering to larger pieces frequently takes place at the kill site (Kinahan & Kinahan 1984) and it is possible that this occurred in connection with the settlement, or even at the water point, as have been observed at #Gi (Brooks & Yellen 1987, p. 77). The locations chosen for butchering seem to differ, however (ibid.). The butchering of small animals tends to be carried out in association with the tree line and commonly in the pan margin. Here, it is possible to find shade and the animals can be hung from the trees. It is possible to see the impact on branches on many trees associated with pan environments, as well as to find iron strings and ropes used for this purpose and probably left in the trees for future use (Lindholm, pers. obs.). Nevertheless, larger animals that died near the water tend to be butchered in situ (Brooks & Yellen 1987, p. 77); this can probably be explained by the efforts involved in transporting the body to the generally more convenient tree line. Later, these pieces are consumed either at the butchering place or transported to a settlement (ibid.). From this example it can be assumed, at least theoretically, that a well would contain bones from non-domesticates as well as domesticates.

However, as discussed in Chapter 2, cattle in marginal environments tend to eat bones in order to compensate calcium deficiency and hence they risk botulism (Kinahan 2001). For this reason, settlements are actively cleaned and the butchering of livestock is followed by a new set of separated locales for the bone waste. Here, pits will possibly be dug, in which the collected bones are covered with soil (Kinahan, pers. comm.).

Nineteenth century accounts indicate that settlements, areas where the bone waste pits can be expected, would not necessarily have been located in the same area as the wells. Een, for example, describes that the Herero herders “seldom lived near the water resources”; the livestock was brought out from the cattle enclosures early in the morning, they arrived at the wells mid day and they returned to the settlements at dusk (Een 1872, pp. 171). Büttner gives a similar description and furthermore stresses that the herding system was in a state of change at the time of his observation. More “conservative Herero” located their settlements at a distance up to 3-4 hours away from the wells (Büttner 1883, p. 532). The long distance between the water point and the settlement was motivated by reasons for maintaining pasture, as well as in order to reduce the impact on the vegetation surrounding the water points (ibid.). In the centralised authorises of the Tawana tribes concerned with land, water and grazing it was a general principle that grazing should be controlled in such way that the range quality would not deteriorate (Hitchcock 1985, p. 96).

In addition, predation levels can be presumed to be higher near the water sources in the peripheral areas of the Kalahari. Guns were introduced in large numbers in the later half of the nineteenth century and several authors have noted how quick the numbers of predators and game decreased in the following years (Thomas & Shaw 1991; Lau 1994). In the ethnographic present of the 1960-70s, the settlements of both the Herero and the Ju/'hoansi were located approximately 1.5-2 km from the water points (Binford 1983; Brooks & Yellen 1987). This shift is probably an effect of the far-reaching and profound changes of the southern African landscape, wildlife extinction, rinderpest, wars and the colonial period that characterised the last 150 years (Kjekshus 1977; Hitchcock 1985; Lau 1994, p. 1).

Here it must be noted that most of the archaeological activities in Omaheke have been undertaken in close association with the ethnographic settlement system and the most persistent pans. For this reason, it is possible that archaeologists have been limited by the outlook of the current settlement.
system. However, it would not be surprising if both herders and hunters produce bone assemblages from wild animals, or even bones from butchered game in a well context. Francis Galton describes a scene at a waterhole from the Otjimbibe area similar to the archaeological situation at Gi and Nama, a context with hunting blinds and wells:

“The water lay in pools among the rocks, and there were evident marks of where the water had stood at the preceding evening, and the depth to which it had been drunk out by the animals during the night; by the sides of these holes were the circular walls of loose stones, two or three feet high that the Kubabees Hottentots had built up as screens, from behind which to shoot.

A little way off were crowds of Bushmen; we went to them, and found them clustered round one of a series of deep uncovered wells, about twelve feet across and eight or ten feet deep, and very close together, into which an elephant had been pushed the preceding night by his comrades, as they had scrambled in droves to drink, and there he lay, just killed, and great pieces of flesh were being cut off and hauled up from his carcase” (Galton 1853, p. 271).

When the herders brought the livestock back to the pen, it can be assumed that the wildlife became more active around the water points where the wells are dug. The risk that a well will have an indirect function as pitfall is high when the animals aggregate for their nightly drinks. A young elephant was found decomposing in one well at Nama pan when Jill and John Kinahan surveyed in the Tsumkwe district in 1983 (pers. comm.). Lorna Marshall describes from the 1950s, “No band lived by the big waterhole of Nama while we were in the area. It was deep in the rock and was filled with drowned animals that had fallen in while trying to reach water in their desperate thirst” (Marshall 1976, p. 72). In addition, people fall into wells. One person in Otjinene died during the period for this study by falling into a deep well. Such accidents are also documented by the nineteenth century explorers (Baines 1864, p. 124; Tabler 1971, p. 98). To avoid accidents, the people in Otjinene want to refill the wells on the floor of the Eiseb Omuramba.

The risk that livestock would fall down in a well is most likely smaller. Herding activities are generally based on the principle of controlling the herd. The herd is kept from the water resource until the time to drink. At the well site, control is maintained to avoid unrest and injuries to the animals. In addition, the wells are commonly fenced in such ways that the animals must line up to drink (Büttner 1883; Vivelo 1977). Only a few animals at the time are led into the drinking place. This would be especially important in the last phases of the dry season, when water is extremely scarce and the livestock watered more seldom, every second or third day, to conserve water (Büttner 1883). In addition, if the wells are deep and not in use, they can be sealed by logs and bush fences (Lindholm, pers. obs.).

Site formation processes are complex in the Kalahari. Leopard (Panthera pardus) tracks can occasionally be seen near the wells owing to the large tree vegetation associated with these places. Leopards tend to use large trees for scent marking, as resting place, vantage lookout, or a place to store and protect dead prey animals (Bothma et al. 1994). Once, during the survey, a leopard was found resting at the bottom of a 2 m deep well dug in clay. The shade and the cooling effect of evaporating moisture in abandoned wells probably provide a nice shelter for the leopard, presenting an alternative to rock shelters, porcupine burrows and other concealed cavities (Bothma & Walker 1999, p. 72). In the early 1950s, Elizabeth Marshall Thomas estimates that ten lions, one cheetah, one leopard, and at least five hyenas lived within a few square kilometres and shared the same dry season water source at Gaitscha, an additional well and hunting blind site not far from Gi and Nama (Marshall Thomas 1994). Porcupines (Hystrix africanus) also collect bone and bring them to their lairs (Sinclair pers. comm.). From this, it can be deduced that scavenging and animal behaviour presents an additional explanation for the accumulation of bones at well sites.

My main argument concerned with the faunal remains is that it is difficult to argue that herders would produce assemblages of domestic bone around water points and wells. Even if butchering of domestic animals took place near the water points during the 1960s, it is still not a viable analogue for arguing that domestic bones should be expected in a pastoral well. Thus, in contrast to the assumption of Brooks (2002, p. 223), I argue that we should not expect to find bones from domestic animals on a well site. Instead, it can be suggested that the bone material in the pits at Gi is the result of fall accidents among aggregating game, the shared context of wells and hunting blinds or that the bones reflects scavenger behaviour rather than culturally mediated assemblages.

I suggest that the pits at Gi should be considered as wells. The interpretation is based on the
arguments presented above and the fact that the pits perforate a calcrete layer and, finally, by their association with an aquitard as indicated by the “presumably contemporary, ‘ground water calcrete’ which undulates across the lowest part of the excavation area” (Helgren & Brooks 1983, p. 188). From the re-interpretation of the pits at #Gi to be the remains of wells, we gain a date for an archaeological well site that contains both small circular wells and one oval and irregular well. Based on archaeological finds, stratigraphy and radiocarbon dates from the stratigraphical unit of the wells, three dates were published from the site unit: 110 ± 50 BP (SI-4098), 495 ± 45 BP (SI-4091 A) and 810 ± 60 BP (SI-4091 C) (Helgren & Brooks 1983, p. 187).

Even though the excavators at #Gi acknowledged that the pits could be wells, they could not interpret the pits to be wells. In retrospect, and from my perspective, it is obvious that their archaeological observations and their good documentation do not discount an interpretation of the pits as the remains of wells. Rather, the neo-evolutionary hunter-gatherer category did not allow wells in #Gi from as early as the twelfth century. Wells had to be a recent feature for the model that the Harvard research team intended to construct. That this was the case can be further illustrated by the notion that the hardpan environments “effectively prevented” the Ju’hoansi from excavating wells, owing to their use of wooden digging sticks (Yellen & Lee 1976, p. 34). This is contrasted with the capacity of the twelfth century foragers to dig “through the hardpan” and “partially removing it”, when they dug their pit-falls (Brooks & Yellen, 1979, p. 28). The fall traps at #Gi, I think, form a good example of the ‘tyranny of ethnography’ (Wobst 1978).

Baobabs, pottery and ritual

It has previously been noted that the distribution of pottery in Omaheke is more or less confined to the baobabs in the Nyae Nyae area. As discussed before, the pottery has been viewed from two different perspectives and has also been used for two different interpretations for the pastoral history of the region. One side argues that the pottery signifies the presence of livestock herders, while the other side argues that the exotic materials signify import. The main reason for the ambiguity is probably that there is no self-evident link between pottery and pastoralism, since pottery seems more associated with cereal consumption or ritual (John Kinahan 1986, p. 116, 2001, p. 34).

The two present day villages Makuri and Djoxho in the Nyae Nyae are located on each side of the Homasi baobab, which is now deceased. At Djoxho pan, two small circular wells have been documented (Plate 7.5.). During the survey, an assessment was made of the archaeological surface materials associated with the shade zone of the baobab visible on the photo (Fig. 7.8.). The manuports and the ceramics associated with the baobab can most likely be understood as signifying a tree harvest site connected with the actual procurement of the tree. Other finds that appeared in association wi-
in the shade zone cast by the trees. This can be partly explained by a visual analysis of the sediments indicating an abundance of mixed ashes and charcoal fragments. The levels measured for “pure” Kalahari sediments were usually on pH of 4-5. An experimental chemical analysis on ashes mixed with sandy soils (pH 4.5) from three of the most common tree species (*A. ludefretzi*, *Dichrostachys cinerea*, *A. mellifera*) used for fire-wood in the area resulted in pH levels of 7-9. The ash concentration of the sediments is probably related to that people rest and socialise around fires under the tree when they harvested *baobab* fruits or gathered wild honey. In addition, when honey is known to be in a tree, the Ju/'hoansi light fires underneath and use sticks to smoke out the bees.

The ash concentration becomes more interesting when seen in relation to the scatters of the ceramic sherds in the shade zone. As noted previously, the sherds beneath the *baobab* in the Nyae Nyae are mainly of Mbukushu affinity. In the source area for the ceramics along the Okavango River, such pottery exist in two basic forms, the *kanyungu*, a beaker shaped cooking vessel and the *kandimbe*, a globular, narrow-mouthed storage vessel (Kinahan 1986). At Mbukushu sites along the Okavango River, the ceramic assemblage is dominated by the utilitarian *kanyungu*; meanwhile, the *baobab* sites in the Nyae Nyae are dominated by the *kandimbe*. It seems possible, by the association with the trees, that the pots connected to the *baobabs* in the Nyae Nyae area were used to collect honey from the trees (ibid.). This indicates the selection of one part of the possible pottery assemblage in the production area for a specific setting in the Nyae Nyae area located approximately 180 km south of the Okavango River.

Exactly how long the *baobab* has been spreading in Africa remains to be confirmed by archaeobotany, but as discussed previously, some living examples may be more than thousand years old (Chapter 3). What is clear, however, based on the discussion above and research elsewhere in Africa, is that *baobabs* have a strong relationship with archaeological materials and human settlement (Sinclair 1987; Ekbloom 2004; Macamo 2005; Blench, forthcoming). In addition, Roger Blench has stressed that, “African pastoralists, in particular, often carry *baobab* fruits with them”. As they crack the shell and eat the seeds, trees spring up along former cattle trails. For this reason, it is acceptable “to assume that the species were translocated over the African continent” from the source area in Madagascar “by human action” (Blench, forthcoming).

The *baobabs* are connected with pan environments, and since they have hollow trunks, they are good storage places for water (Blench, forthcoming). As bees and honey were/are regarded as ritually potent, it can be proposed that the context share similarities with rainmakers rock art sites in southern Africa (Lewis-Williams 1987, 1981; Ouzman 1996; Dowson 1999; Sullivan 1999a, pp. 13). Rainmaking sites manifest the concrete association between otherwise disparate landscape phenomena such as rainfall, topography and the causative agency of animal metaphors (John Kinahan 1999). Once, the rocks formed the medium for the engravers and at the same time, the topography allowed the rainmakers to perceive or sense the results of their actions by sounds and scents of the streaming water and other landscape sensations. Rainmaking is concerned with environmental management; failure to do ritual at a certain place at a specific time would affect the rainfall and the environments fertility.

The *baobabs* surrounding the wells at Djoxho present a node in the landscape that is similar to the rock art sites. They form a context where ritual specialists could prepare for the altered consciousness by collecting honey. They could sense the results of their agency by the water that accumulated in the trees and in the two small circular wells on the pan. Continuity in stone technology, ritual specialisation, and increase in ostrich eggshell bead production as exchange for pottery has been defined as archaeological key indications to identify the networks by which pastoralism arrived to the western Namibia in the early first millennium. According to this theory, the process was driven by ritual specialists in contact with livestock herding peoples by far-reaching exchange networks (John Kinahan 1991). At the *baobab* and well site at Djoxho it is possible to argue for import of pottery and possibly a ritual use. Even in an early herding context a strenuous, but still a central part is to dig wells in order to gain water for the livestock. Based on this, I believe that...
Outlining a chronology for the wells in Omaheke

Figure 7.9. The black dots illustrate the distribution of radiocarbon dated archaeological sites with pastoral affinity (based on Kinahan 1995; Sadr 1997, 1998; Bousman 1998; Mitchell 2002; Appendix 5); the dashed line indicates the limit of Late Farming Communities (based on Mitchell 2002, p. 345). The dark grey area illustrates the distribution of the baobab (based on Blench, forthcoming, Map 1); the white dots illustrate the distribution of pastoral well sites documented and discussed in this study.

the wells, the baobabs and the pottery in the Nyae Nyae have a systemic relationship.

It is apparent that the amount of chronological data compiled in this study is still far from sufficient to establish a firm chronology for the pastoral sequence in Omaheke. However, I have provided dates for the use of the wells, mainly from the nineteenth century as well as from prehistoric times. Viewed together, the radiocarbon dates from the wells at Otjozondema, /Xai/xai, the presumed well site at /Gi and the dates associated with Mbukushu pottery at Cho/ana and Homasi point to the possibility that the wells were used from the fifteenth century onwards (Wilmsen 1978; Helgren & Brooks 1983; John Kinahan 1986; Smith & Lee 1997). Previously, I have discussed how this time period seems to have been characterised by a larger influx of people into the region as an effect of the increased movements along the Okavango River (above and Chapter 4).

The wells substantiate the authenticity of a pastoral network of localised key resources in Omaheke with archaeological evidence that is directly linked with the practice of livestock herding. This justifies a regional perspective in which the wells are situated in relation to dates from more secure archaeological contexts (Fig. 7.9; Appendix 5). More work remains to be done, especially by using creative forms of archaeology with the capac-
ity of incorporating what tends to be the main archaeological record of livestock herding: artificial wells and effects in vegetation and soils (e.g. Denbow 1979; Kinahan 1999, 2001).

**The wells in the twentieth century**

To conclude this chapter, I provide a short note on the most recent history of the wells in Omaheke. The Epukiro reserve was established in 1923 with the intention of allocating an area for Otjiherero-speakers from the Windhoek and Gobabis district as well as to settle the Herero “Crown Land squatters” (Köhler 1959, p. 36). If the terminology developed earlier in the chapter is applied, these squatters should presumably be considered Ovatjimba, or impoverished pastoralists that herded other people’s stock. Presumably, they had stayed at peripheral cattle posts in Omaheke outside the colonial control after the disruptive decade in the turn of the twentieth century.

If the distribution of the wells can be considered as a partial documentation of the pastoral land-use system that predated the twentieth century, it is apparent that the extent of the area that was allowed to sustain livestock herding decreased considerably after the land allocations that were imposed in 1923. The first Herero reserve followed the Epukiro Omu-ramba and comprised only 1780 sq km (178,000 hectare). In 1925, the northern border of the reserve was moved to the Eiseb Omuramba. In 1934, the northern border of the reserve was further extended to comprise an area of c. 7430 sq km. In 1955, the Epukiro Native Reserve was the largest reserve within the Police Zone with an area of c. 9978 sq km (Köhler 1959a, p. 36).

Initially, the Epukiro Native Reserve was relatively small and had a limited population. It can be assumed that some of the residents had already been present in the area when it was established in 1923 (Köhler 1959a p. 38). The population grew rapidly during the first decade following its implementation. The Otjiherero-speaking population grew from 53 individuals in 1923 to 1,847 in 1934 (Köhler 1959a, p. 38). Owing to the influx of people, the reserve had to close in the year of 1932-3. Although difficult to confirm at this stage, it is also possible that the expansion of the reserve to the north in 1925 and 1934 can account for parts of the population increase. However, it can be assumed that the majority of the residents had no pre-existing links to the area, since they had been moved from areas elsewhere Gobabis and Windhoek.

More detailed demographic information is available for the time period 1946-56. During this period, the population in the Reserve was relatively stable, pending between 2313 (1956) and 2818 (1954) individual with an average population of 2622. The statistics also provide information of ethnic affinity. The Herero was the single largest group of the reserve, comprising c. 93% of the population. The second largest group, the Bushmen comprised c. 6% of the population and the rest was affiliated to Khoe, Tswana, Okavango, Ovambo, Bergdamara, Bastards and coloureds (sic) (Köhler 1959a, pp. 38-40). The only “unstable element” of the population of the reserve was the Bushmen (ibid.). They left the dry season settlements after the first rains and only returned in September or October. Many Bushmen were more or less attached to certain families and when they returned, they lived with them and helped with watering and herding: “From what both sides relate, the relationship was a voluntarily one, not one of serfdom” (Köhler 1959a, p. 49). The relations between the Ju’hoansi and the Herero in the reserve was also characterised by conflict, and cattle thefts seem to be the main cause for tensions between the groups. Even though cattle theft is usually seen at through the lens of ethnic affinity, I would argue that the practice should rather be understood as an expression of poverty and opportunism. Moreover, Köhler states that a number of more or less Otjiherero-speaking Bushmen that had formerly worked for the Herero “were said to have left the reserve” for employment on the European farms in the south (Köhler 1959a, pp. 43-4). Initially, the reserve catered for social relationships that existed before the establishment of the reserve intertwined with new social forms that were induced by the reserve policies (Lindholm, forthcoming).

The aggregation of people demanded and was mediated by an increased yield of water for the livestock. Two boreholes had been drilled in Epukiro in 1924, directly following the establishment of the reserve (Köhler 1959a p. 37). In the Epukiro reserve, six additional boreholes were drilled in 1926, and in 1933, 12 boreholes existed in the vicinity of Epukiro (ibid.). An inventory of the wells and the water resources in the Epukiro Native Reserve was carried out by the reserve’s welfare officer, T. A. Burness, in 1939 (NAN 1939c). Burness later applied for a blasting certificate for Joel Muundjua in order to open up wells in the reserve by explosives (NAN 1945e-c). In addition, he expressed the “serious position of the water supply in the reserve” (NAN). The lack of water was presumably an effect of the increased population in the area.

In 1946, the new welfare officer for the Epukiro reserve, C. V. McIntyre, reported that the existing boreholes in the reserve were in a bad condition. Several boreholes were abandoned and spare parts and new installations for the wells and the boreholes were required. In 1947, McIntyre ad-
dressed the Magistrate in Gobabis: “the water table
dips sharply and is not at all easily found by means of
wells, several dry wells have already been sunk in
the area. However, I still consider that there are possi-
bilities of obtaining water by means of wells” (NAN 1947).
However, the “sinking of a well about six feet in diameter is a lengthy, tiring and costly
procedure and when no water is found the Natives
become discouraged and really they cannot be
blamed. Therefore I beg to suggest that the Reserve
be supplied with a manual boring machine (…) with
this machine the Natives could sink a prospect hole
(…) and then if water is found they could open up a
well with the certain knowledge that their efforts
would not be wasted” (NAN 1947).

In the 1950s, the water question became even
more acute in the reserve. Boreholes were intro-
duced at all the larger settlements, usually drilled in
one of the already existing wells. Works on improv-
ing some of the existing wells were also undertaken,
but several of the wells were abandoned at this time.
Estimated from modern studies on the grazing range
for cattle (8-12 km) it can be estimated that c. 3360
sq. km or 30 % of the total area of Epukiro Native
Reserve was under dry season grazing pressure
around 1955 (Scoones 1995; Bollig & Schulte 1999;
Katjiua & Ward 2006). The policy that followed the
Odendaal commissions report in 1964 advocated a
“borehole programme [which] would make excellent
new pasture lands available for future expansion of
stock farming” in the reserves (SWA 1964, p. 297).
The purpose was to increase the carrying capacity of
the land and to reduce the effects of overstocking
and presumed land degradation in the reserves (Sul-
vilan 1999b). One strategy for achieving this was to
spread out the grazing pressure. To be able to this, it
was important to gain access to the waterless zones.

The new boreholes increased the area for dry
season grazing with approximately 45-50 % in the
reserve area. The main part of the new lands was
located in areas that were probably not under dry
season grazing before (Köhler 1959a; Chapter 5).
The introduction of boreholes in the outlying areas
established a more or less permanent grazing regime
with lower mobility. I imagine that this resulted in
that the practices of stimulating tree and bush vege-
tation of the key resource areas became active not
only at the well sites in the omiramba, but also in
association to the pans in the plain area (Chapter 6).

In the 1960s, eastern Hereroland was enlarged in the
northern parts at the expense of the nature conserva-
tion and the Ju/’hoansi who lives in this area (Hitch-
cock 1996; Powell 1998).

In 1951, shortly before the major shifts of the
reserve system in 1955-64, the Marshall expedition
travelled through Epukiro Reserve on their journey
to the Nyae Nyae for ethnographical fieldwork. It is
interesting to review the way the expedition used to
reach Gautscha, their main study site in the Nyae
Nyae area.

“The pan was reached by travelling east
from the Epukiro Native Reserve along
the Eiseb Omuramba, turning north near
the border to Gham, thence north to
Nami pan (unmarked on most maps) and
Gautscha (…). On the return trip we
travelled north via Gura Pan and Siga-
rete where we turned west along the
track to Samangeigei (or Amangeigei),
Karakuwise, and Nurugas” (Leptionka
1973).

Not surprisingly, the route used by the Marshall
expedition traverses all well locations that were
documented in the archaeological survey. Further-
more, the route indicates places that have been ac-
nowledged as pastoral wells in the historical ac-
counts from the nineteenth century reviewed in this
thesis. The journey of the Marshall family makes the
historicity of the wells in Omaheke even more tan-
gible.
Wells of Experience
Usefulness?
Charlotte Damm (2005, p. 84) has recently asked whether the Kalahari debate is important for a wider context than the academic community, and if the Khoesan groups in concern would agree that the issues debated are of major concern. Damm’s general point of view, stressing that narratives, written by historians and archaeologists, should be told in such ways that they are sensitive to questions and issues of interest to indigenous groups is not only agreeable, it is a necessary task, especially if a post-colonial point of view is accepted (e.g. Källén 2004, pp. 25).

Smith & Lee (1997) write that the Ju/'hoansi had never been asked for their opinion about the issues raised in the Kalahari debate. In order to fill this gap, they carried out a collaborative research project with the local residents in the Nyae Nyae. Together with their informants they excavated the site Cho/ana, introduced in Chapter 2, and undertook interviews with elderly Ju/'hoansi concerning the past.

The Ju/'hoa elders told that the first glass beads and metals arrived in the region with the first Europeans in the nineteenth century. Moreover, they insisted that no outsiders “occupied their area or even visited” it in the past (Smith & Lee 1997, p. 57). The authors uses the account to establish the argument that early farming communities with metallurgy, for example at the sites Divuyu (occupied in the 6th -9th centuries) and N'oma (10th -12th centuries), had little effect on the Ju/'hoansi in the later parts of the twentieth century (1997, p. 57).

Being in favour of their attempt to use a participatory research approach, I am still uncertain what the implications of their conclusions are. At least it can be said that what Smith and Lee perceive as the largest gain in using a participatory research approach, may also be the greatest bias, not only for our understanding of the history, but also for the future relations of the peoples that inhabit Omaheke. In order to address this issue, the final chapter will be devoted to a discussion of some critical aspects involved in collaborative research approaches as these have gained popularity in the Omaheke over the last decade (Smith & Lee 1997; Scott 2003; this study).

When reading research reports about the different groups in Omaheke it is not difficult to note how passive essentialist theories of ethnicity have been applied on the Nyae Nyae-Dobe Ju/'hoansi; meanwhile, Herero and Afrikaners have been used as examples of active instrumental ethnicity (Marshall 1976; Vivelo 1977; Lee 1979; Russell & Russell 1979). Such views have usually resulted in an avoidance of the Ju/'hoansi who were involved in the cattle economy (perhaps as well diggers) and who did not conform to the expectation of what signified a hunter-gatherer (Suzman 1999, p. 6). This is perhaps most clearly stated in a quotation of Nancy Howell: “we focus upon bush camps, upon hunting, upon old fashioned customs, and although we remind each other once in a while not to be romantic, we consciously and unconsciously neglect and avoid the !Kung who don’t conform to our expectations” (Howell 1988, p. 7).

Owing to theoretical developments in the field of hunter-gatherer research over the last decade, today it is not necessary to avoid the livestock herding Ju/'hoansi. In a recent paper, Allison Brooks has expressed that a place such as Omaheke illustrates “a space where Khoisan hunter-gatherers could explore a variety of subsistence practices, including a clientship with Bantu-speaking agriculturalists to the east and southwest”, and furthermore, to shift “from pastoralism back to hunting and gathering and then again to pastoralism, as circumstances and climatic conditions allowed” (Brooks 2002, p. 215). Her analysis as well as Ikeya’s (1993) study of goat herding hunter-gatherers in central Kalahari and the recent contribution of Sadr (2003, cited in Chapter 2) point to the same dynamics. In addition, their suggestions correspond in several ways with the original propositions of Denbow and Wilmsen (1986) and the evidence accumulated in this study. However, recently these studies have used the evidence to propose a model that indicates that the practice of livestock herding and ownership of animals is not necessarily significant for pastoralism.

Recently it has been suggested that the livestock herding hunter-gatherers in Omaheke actively resisted to pastoralism. It has been argued that hunter-gatherers, rather than solely being explained by economy and isolation, should be understood as
reflecting a specific mind, ethos or an actively maintained identity. The persistent ethos resulted in that until very recently, the Kalahari hunter-gatherers had the "capacity for retaining political independence and cultural autonomy despite considerable outside pressure" (Guenther 2002, p. 128; Lee 2003, p. 223).

I do not argue against the view of Ju/'hoansi autonomy or strong identities among any people in Omaheke (Katz et al. 1997; Werner 1998). Nor do I argue against the theory that people made stone tools or hunted and gathered in the region. In the few cases where the archaeological record is not too ambiguous, it is indicated that people did make stone tools; that they did hunt and procure bush food resources, as well as some dug wells for livestock. What I might be more concerned with and even argue against is the general research agenda that seem to see the identification of hunter-gatherers as an end in itself. Usually, as Kusimba has argued, this research is based on "a circularity of interpretation where the nature of the society is assumed from the start" (Kusimba 2005, p. 354). When evidence accumulates that question the assumed nature of society (for example ownership of livestock), which actually suggest the possibility of gaining an alternative understanding of the region's land-use history, the definition of hunter-gatherer is changed, rather than abandoned. This perspective is responsible for setting up an antithetical relationship based on "a specific contrast of an ideological nature that may have forced" the separation between pastoralists and hunter-gatherers (Smith 1996, p. 475).

What might be the largest problem with this approach is that it will isolate Omaheke, separate the different peoples that live there today and create a fragmented and ethnically constituted history. The perspective will presumably also fail to recognize the value of an alternative understanding of the history of the region.

The point I want to make is perhaps best illustrated by viewing a series of photos documented in the photo archive at the National Archives in Windhoek (Plate 8.1.). Judged from the inscription "Epukiro 1904" on the first five photos, they were presumably taken at the German military post at the time for the Herero migration through Omaheke, possibly only 30 to 90 km north of Epikuro. A major concern of the German forces was to restrict the uprising and consequently they established several camps for placing the indigenous peoples under German military control (Drechsler 1980; Gewald 1999).

The first photo illustrates "Epukiro Herero 1904"; the women documented might have been among the 8889 Herero prisoners who were taken prisoners until 11 January 1905 (NAN 1904b; Pool 1991, p. 280). The child in the second photo of a small group of "Epukiro N/ama 1904" shows clear signs of malnutrition (NAN 1904d). It should be noted that no men appear on the images of the Herero and N/ama at Epukiro. Köhler (1959a, p. 35) wrote that many old people, women and children returned to Epata and Epukiro because of their small chance of getting through Omaheke. The next photograph illustrates a large group of "Epukiro Tswnas 1904" (NAN 1904e). As late as the 1950s, the Epukiro mission had a considerable Tswana population (Köhler 1959a, p. 40). The fourth image illustrates a unit of partly uniformed "Witbooi Oxdrivers of "Halbbatterie" Stohlman (NAN 1904f). The single man and the three children noted as "Epukiro Bushmen 1904" on the fifth photo can be presumed to have been either Nharon but most likely Ju/'hoan (NAN 1904c; Passarge 1907; Kaufmann 1910). That the two boys to the left carry sticks usually used for herding livestock can be taken as an indication that the man and the boys were working as herders on one of the cattle posts in the area, or even that they kept their own livestock. This issue is probably more related to the eye of the beholder.

If the photos from Epukiro can be considered a snapshot insight into the people who lived in the area at the time, it is easy to note that the socio-linguistic heterogeneity of the southern parts of Omaheke was significant (see Hitchcock 1985, Table 5.1., p. 90 for the south-eastern part of the Kalahari). The photograph of the ox-drivers from a German artillery unit illustrates that the indigenous peoples occupied roles that may be unexpected and that seldom appear in ethnographical descriptions of pastoralists. A final example of the dynamic social constellations that may have taken place in the Kalahari is documented on an undated photo where the note in Afrikaans on the back states "Wilde boesmans met Hererowroe" (NAN A.449).

The view of Omaheke provided by the photos and by several cases referred to in this study contrasts with the "conventional European wisdom" of the twentieth century (Gordon 1992, p. 23), primarily the notion that the peoples in southern Africa maintained different and separate economies and occupied discrete culture areas. For this single reason, I suspect that the task of identifying hunter-gatherers, and presumably also pastoralists, may obscure several important relations between Khoe-, Kung-, Otjiherero- and Setswana-speakers in the Kalahari that may be more relevant for understanding the region's pre-colonial history. However, I would still argue that ownership of animals, engagement in external contacts and alliances and the ability (or necessity) of shifting between
hunting and herding may be significant traits of land-use in Omaheke.

The archaeological record of Omaheke reflects that the people who lived in the region hunted, gathered, herded and traded within wide-ranging and dynamic networks of contact and interaction. What we know for sure is that for the greatest and earliest part of the history of Omaheke it is extremely difficult to denote specific ethnicities, since we have to depend solely on archaeological materials. Although archaeological materials can be assumed to express the activity of ethnicity, it must be appreciated that they are extremely homogenous in Omaheke and constantly mute in regard to the issue of which language the makers were speaking. The purpose of digging a well for example was not primarily to signify ethnicity. The purpose of a well (in addition to producing water) was to signify an autonomous herding unit’s right to the local water source and the associated grazing. Similar to the practice of wells, I do not consider hunting and gathering as a part of a specific ethnicity, as such activities has to be consid-
Wells of Experience

...ered to be the basis for almost all rural people in southern Africa, no matter to which ethnicity they belong (Kusimba 2005). People move between different economies and hunting and gathering form a generalist strategy shared by most peoples as an insurance for coping with an unpredictable socio-environmental universe that mediates the herding of livestock, at the same time as it imposes constraints to it.

In addition, when the wells appeared in the survey it became difficult to perceive Omaheke as an area that kept people apart. In particular, it seemed as though the boundaries of the modelled contact situation were only reflected in the cordon fences and in the name of the different territories, not in the distribution of the wells, nor in other features of the archaeological record. The exception was the pottery scatters, that were all confined to the baobabs in the Nyae Nyae. The documented nineteenth century place names from the region manifest a linguistic heterogeneity. Several places with wells and in direct association to the well system reconstructed in this study, for example Cho’ana, Xai’xai, Otiariaua and Epukiro are noted in the historical and ethnographical sources as places for trade, barter and hxaro (Wiessner 1977; Wilmsen 1989a; Smith & Lee 1997; Scott 2003). Rather than reflecting the exclusive practice of one group, the socio-economic practices of Omaheke seemed highly intertwined by their joint associations to the same points in the landscape.

Judging from historical sources and the archaeological record, the settlement system in Omaheke seems to correspond with what other authors have called “population of mixed origins” (Schapera 1953), “a complex picture of interethic distribution and interaction” (Gordon 1992, p. 23), “checkerboard pattern” (Lau 1994, p. 7), or a “hybridised culture” (Blundell 2004, p. 25), “multiethnic and multieconomic mosaics” (Kusimba 2005, p. 354). It is constituted on “organizational mechanisms of incorporation” (Hitchcock 1985, p. 89), presumably related to the social dynamic strategies associated with “the ecological cycle of hunting and herding” (Elphick 1977).

In order to answer Damm’s (2005, p. 84) question posed in the introduction to this chapter, I think the Kalahari debate is of major concern for peoples in the Kalahari in general and the Ju’hoansi in particular. If archaeological and anthropological research would solely inform a small academic discourse dealing with “a crucial stage of human evolution” no harm would probably be done in perpetuating dichotomies between different groups in the region (Lee & DeVore 1968). The problem becomes more difficult to overlook as soon as the knowledge extends from the academic context to applied research. Many natural scientists, development workers and conservationists working in southern Africa use archaeological and anthropological sources when they write the conventional ‘cultural background’ chapters to their studies or projects.

The well-meaning motive for natural scientists writing such chapters is to be sensitive and acknowledge the culture of the local people. However, at the same time they use the sources in a neutral way, without considering that many of the ethnographical works lack sensitivity to the historical processes that resulted in the ethnographic present of the 1960s. This problem can be illustrated by a quote from a journalist/nature conservationist who is active in the region. He stressed that the “unspoilt habitat” of the Nyae Nyae area is a “conservationist’s dream”, but the problem “is that Eastern Bushmanland is inhabited by about 500 Bushmen who are struggling to make the transition from the Stone Age to the 20th Century in the space of about 20 years” (Jones 1989, p. 87). Presumably he had not carried out his own anthropological and archaeological research to confirm this opinion, but had formed it after reading research concerned with the Ju’hoansi, stressing that they were “an apparent relic” which had only transformed in “the past 20 years” (Yellen 1990, p. 72-3). The notion that a hitherto pristine hunter-gatherer society suddenly loses their original culture owing to the modernisation is clearly influenced by an “essentialist discourse” (Molin 2005, p. 61).

Powell (1998) maintains that the static essential view on the Ju’hoansi could also infer a false idea of equilibrium. This in turn may obscure the opportunism, diversity and flexibility emergent properties of their land-use, which in turn harmonise with the properties of a non-equilibrium ecosystem. For this reason, it seems as though the critical historical perspective is valuable for development projects and conservationist interventions active in the region (see also Sullivan 1999a). This is more particularly so in the light of recent trends in the dryland ecology, which shows a larger appreciation for the indigenous understanding of the management of dryland ecosystems (e.g. Bollig & Schulte 1999; Kinahan 2001; Katjiua & Ward 2006).

An integrated perspective

The alternative history of Omaheke suggests that the area was a decentralised area with small, sparsely distributed cattle posts. Some of them were probably associated with the larger cattle economies in the east and west. The disruptive processes of colonialism resulted in that livestock herding was more or less abandoned in large parts of Omaheke.
Other areas saw a considerable intensification in livestock production owing to a concentration of Herero and Mbanderu livestock owners from elsewhere in Namibia. In this setting, new technology and new settlement patterns were introduced and new social forms for land-use were established (Lindholm, forthcoming). “By 1990, while Otjiherero speakers emerged as the wealthiest of all Namibian communal-area farmers in terms of livestock capital, San living in the Herero communal areas were possibly the worst off of all San in Namibia” (Iken et al. 1994 cited from Suzman 2001, p. 36). In the Nyae Nyae area, which currently is under exclusive use of the Ju'hoa, other problems are faced. Daniels (2003, p. 59), for example, has pointed out that Ju'hoansi’s “vulnerable social structures, poverty and insecurity” involve a threat from stronger and better-organised ethnic groups, for example the recently re-patriated Herero from Botswana, who often perceive “land occupied by the San to be ‘open land’”.

The Herero well diggers of today are presumably the latest in a row of people who have opened wells for livestock in Omaheke. My purpose for carrying out research with people who had dug wells in Omaheke was straightforward: to see whether the wells were known in the local community, to collect names of the wells, to complete an inventory and gain insights in the activities that are associated with the wells. During the study, however, it was noticed how the Herero informants actively used the wells for expressing their identity and history. One obvious example is the commemoration of the war of 1904-07 that was arranged at the well site Ozombu zo Vindimba in October 2004. However, this is not surprising, since the trauma of the genocide attempt in 1904 created strong historical ties to the area. In addition, the subsequent life in the Epukiro reserve came to provide a strong basis for the social and economic reconstruction of the Herero society after the war (Almagor 1980; Krüger & Henrichsen 1998; Werner 1998; Krüger & Henrichsen 1998; Gewald 1999, 2000; Henrichsen 2000). In addition, many Herero in the older generation refer to wells in areas not occupied by them today, for example the Nyae Nyae area, when talking about the precolonial history (Chapter 7). Krüger and Henrichsen (1998, p. 153-56, 160) have discussed this issue and how “the vision of Ejuru” consisted of a landscape of pastures and wells, partly derived from a pastoral image of an ideal landscape, partly derived from the precolonial settlement system. The contents became landmarks of a symbolic map of land claims in the re-pastoralisation of the Herero during the twentieth century. However, the long association to Omaheke in older people’s accounts should be seen in contrast to accounts by younger Herero, who usually do not acknowledge any roots to the Omaheke area. They stress that they were forced to live in Omaheke during the colonial rule by the policy of Native Reserves. For this reason, they stress that they have no historical links with this part of Namibia and claim ancestral land (often by referring to places indicating well sites) on the commercial farmlands situated south of the old reserve (Anonymous).

It is also clear that wells have taken part in cases of land-use related conflicts between different groups in Omaheke (Marshall 1976; Wiessner 1977, p. 54-5; Katz et al. 1997, pp. 29-44). Hitchcock (2000), for example, reports that tensions between Mbanderu and Dobe Ju'hoansi in the 1970s resulted in that the Ju'hoa with the help of development organisations dug wells to gain actual rights over the surrounding grazing land. In addition, in 1974 a group of people began to dig a well at a pan about 30 kilometres south of /Xai/xai. The group decided to exclude the n'ore kxau (Ju'hoa; the custodian of a territory) of the area since he did not want to help with digging the well. Consequently, the n'ore kxau decided to prevent further digging of the well since he feared that he might lose his rights to the area (Wiessner 1977, p. 54-5). An additional example is provided by a note from the welfare officer in the Epukiro reserve, who expressed that the “area [Otjiherero Omuramba] in which it is proposed to prospect for water is at present occupied by Bushmen and the Hereros are nervous of them (advisedly so, in my opinion); every effort should therefore be made to avoid trouble and conflict with them which might lead to something really serious” (NAN 1947, my insertion).

Nevertheless, the intimate link between the wells and the contemporary Herero society and oral tradition may involve that the role of a series of other people who lived and lives in and around Omaheke, mainly Khoekhoen, Khoesan- and possibly Setswana- and Sekgalagadi-speakers, are excluded from the understanding of the wells. Earlier in the thesis, I discussed the problems involved with the historical accounts, and oral tradition poses a similar dilemma. Thus, the situation of the Herero and the wells is parallel to when peoples, other than the Ju'hoa, are excluded from the archaeological site at Cho/ana (Smith & Lee 1997, p. 57). Here it has to be acknowledged that the exclusion is not only an effect of the selectivity of the historical accounts or the exclusivity of the Herero or Ju’hoa oral traditions. The issue is equally an effect of the view of several anthropologists on the history of Omaheke (e.g. Katz et al. 1997). This view established that pottery, wells and metals
should not be considered as a direct part of the Ju/'hoansi history and that stone tools cannot be considered as a part of the Herero past. That this is the case can be understood by reading almost any archaeological textbook on southern African archaeology: the Ju/'hoansi is discussed in terms of the Late Stone Age and the Herero in the chapters dealing with Late Iron Age. Nicholas Walker (1998, p. 66) has considered this as a “technological straight-jacket”, by which “associations have been ignored, not recognised or inadequately accommodated”. The combination of ethnic and technological perspectives has created simplistic models that effectively obscure social and economic interplay between different groups in the Kalahari.

The question is – now with direct reference to the introduction of this chapter – how a century long continuity of separate development and disintegrating theories has influenced the Ju/'hoansi perception of their past. The contemporary reality of Omaheke is a series of discrete culture areas to some extent separated by the fences and it is not implausible that the separation has influenced people’s perception of their history. Similar to the ways in which cultural identity and language are renegotiated, expressions of the past are also dynamic and adjusted in order to fit with, and make sense to, the contemporary reality (e.g. Vansina 1965; Almagor 1980). This is valid for the anthropologist, archaeologist as well as for the peoples in Omaheke, whether they consider themselves as Ju/'hoansi or Herero. Pierre Bourdieu has expressed that the “individual and collective representation that agents may acquire of the social world and of their place in it may well be constructed according to completely different categories, even if, in their everyday practices, these agents follow the laws immanent in that universe through the mediation of their sense of place” (Bourdieu 1987, p. 8). For this reason, it is important to acknowledge that oral testimony on the wells and additional archaeological materials can be problematic when it is used for historical purposes, especially in a setting such as Omaheke, where politics of land, ethnic competition and dominance are extremely sensitive questions (Powell 1998; Sweet 1998; Suzman 2001). This implies that reliability of oral tradition and the problems of defining cultural affinity -of the wells and additional archaeological materials- are important to take into consideration (Denbow 2002). Such issues are relevant to consider when assessing the result of my study, when reading the paper of Smith & Lee (1997), or other studies that integrate the rich knowledge of the local communities as a part of the methodology.

In order not to project presumptions based on the historical developments of the twentieth century on the past (in Omaheke most profoundly identified by the Crown Land in the north and the Epukiro Native Reserve in the south), I think it is valuable to take an integrated view on the archaeology and the history of Omaheke and to avoid associating archaeological materials to specific peoples or language groups. John Molin (2005, pp. 62) has addressed this issue in his study of identity formation among the Damara guides who work at the rock art site at Twyfelfontein in western Namibia. Although they have been living in the area for a considerable time and today work with guiding tourists to the paintings, they clearly are alienated from the archaeological site because of their ethnic affinity. Molin (2005, p. 62) argues that by connecting archaeological sites to specific ethnicities, “there is a risk that people belonging to other ethnic groups will be totally estranged from a heritage that is, in reality, meaningful to them as well” (see also Ndoro 2001).

From my point of view, it might be fruitful to avoid views that imply that the Herero represent an “African Pastoralist Community” (e.g. Pennington & Harpending 1993), that some Ju/'hoansi are impure, acculturated or non-traditional hunter-gatherers (e.g. Guenther 1976), and that the Nyae Nyae-Dobe Ju/'hoansi were true hunter-gatherers until the 1960s (e.g. Lee 2003). These are simplified abstractions that will most likely degrade under the continuous scrutiny of approaches using diachronic and critical perspectives, within broader comparative frameworks.

James Suzman (1999, pp. 159), who has produced an ethnography that departs from this issue concludes his study by discussing how the Ju/'hoansi in the southern Omaheke consider themselves “as captives of others’ images of them”, an opinion that was stressed by many Khoesan-speaking peoples at a conference in Gaborone in 1993. In addition, it is important to note that other groups in Omaheke, for example the Herero, are caught within similar popular caricatures, inferring wealth, overstocking and land degradation (e.g. Katz et al. 1997). The use of linguistic and ethnic nomenclature may easily infer a false homogeneity that allows caricatures.

However, as Gewald (2002) reminds us, it is important to acknowledge that people that speak the same language do not form a single continuous whole, nor are they bound by a single unitary economy and history. It is probably equally problematic to assume that different linguistic groups in Omaheke are historically different, even if they maintained clearly discernable identities and autonomous social constellations. If a critical approach to these categories is not taken, the main result will be the continuous reproduction of di-
Discussion

chotomies such as hunter-gatherer vs. pastoralist, acculturation vs. re-pastoralisation or victims vs. encroachers, poor vs. rich or even environmentalists vs. land degraders. There is a great risk in this in that the inherited convictions and images of Africa related to the colonial views on the region will continuously be projected on the past. Current distances between people in the Kalahari are spatial, social and economic, not temporal: “there are no alien cultures, only alienating ways of categorizing diversity” (Wilmsen 1999b, p. xiv).

The integrated perspective suggested above may attract critique. Sadr has criticised the concept of pastoralism for masking “a lot of interesting local variability in subsistence strategies” (2003, p. 209). Alan Barnard (1992a) and more recently Geoffrey Blundell (2004) have criticised the revisionist emphasis on political economy. They point out that production and exchange relations do not create the deep cultural structures and identities that are significant for different people in the Kalahari (Barnard 1992a, p. 298). Furthermore, the current historical perspective is largely responsible for producing a view of one-sided incorporation and a view that fails, according to Blundell (2004, p. 25), to acknowledge how the Khoesan groups in southern Africa may have contributed to a hybridised culture in non-economic and non-political ways. Their comments on the debate are of crucial importance for future research in the area. Nevertheless, I do also think that we should not abandon the question related to the original subject matter: i.e. whether or not the peoples who lived in Omaheke were integrated in a hybridised culture. In addition, I believe that one strategy for realising the research they suggest is to aim for re-establishing the historic connections (Wilmsen 2002, p. 841) by carrying out investigations of areas and themes “pertinent to all historicities”, in order to understand the role of the past for the present outlook (Damm 2005, p. 84). This will definitely allow better analytical tools for understanding the hybridised culture of Omaheke. I hope that this may also result in a better understanding of the ecological, social, ideological and symbolic relationships that evolved and were shaped in the region before and during the twentieth century. One ambition of this study has been to contribute to such understandings by pointing out that the wells, one of the most obvious connections between people in Omaheke, is a profitable platform for discussing how social and ecological circumstances produced an interconnected landscape.

Finally and as a general conclusion of this study I suggest that the wells in Omaheke signify the labour of peoples with common or separate histories, with or without own herds, but probably talked about in relation to herds. Being a part of a cattle economy does not mean being equal in terms of access to land, water or livestock, to work effort or in sharing its profits. It cannot be presumed that everybody kept large herds within a pastoral economy, even if they actively participated in it and contributed to it by hunting, trading, rain-making and herding. My study of the wells does not imply that the research focus is on the people with large herds with structural advantage before others without herds or with an economical bias towards hunting, crafts or trading. The labour intensity of pastoral land-use, mainly the digging of wells, seem rather to constitute a more or less integrative force in the landscape, where people were included rather than excluded on ethnic or economic grounds. Omaheke has been and is still framed by dynamic systems for resilience, adaptability and identity. All people in Omaheke, no matter their past or current status, should consider themselves as well diggers and the *Wells of Experience* is part of their legacy.
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# APPENDICES

## APPENDIX 1. People in Omaheke who acted as informants and shared their knowledge about the wells and the past in Omaheke.

<table>
<thead>
<tr>
<th>NAME</th>
<th>VILLAGE</th>
<th>INITIAL</th>
<th>DATE FOR INTERVIEW</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mrs Ahuwa Tjatindi</td>
<td>Otjinene</td>
<td>AT</td>
<td>2001-10-19</td>
</tr>
<tr>
<td>Mr Benjamin Ambira</td>
<td>Erindi Roukambe</td>
<td>BA</td>
<td>2004-11-29</td>
</tr>
<tr>
<td>Mr Billy Katjatenya</td>
<td>Otjinene</td>
<td>BK</td>
<td>2001-10-14</td>
</tr>
<tr>
<td>Mr Bernard Katjiwanjo</td>
<td>Oljiwaneko</td>
<td>Bka</td>
<td>2001-10-04, 2001-10-05</td>
</tr>
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<td>Mr Bernard Kapari Kandanga</td>
<td>Okozonduzo</td>
<td>Bkk</td>
<td>2002-10-30</td>
</tr>
<tr>
<td>Mr Bonya Tjhere</td>
<td>Otjumunguindi</td>
<td>BT</td>
<td>2001-10-04</td>
</tr>
<tr>
<td>Mr U. J. Kambirongo</td>
<td>Otjohi</td>
<td>CK</td>
<td>2001-10-21, 2002-10-22, 2004-12-02</td>
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<td>Mr Kandaro</td>
<td>Otjinene</td>
<td>Cka</td>
<td>2002-11-04, 2002-11-05</td>
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<td>Mr David Kakundja</td>
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<td>DK</td>
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<td>Mr Foster Hange</td>
<td>/Gam</td>
<td>FH</td>
<td>2004-12-06</td>
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<td>Mr Guvitjita Marenga</td>
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<td>GM</td>
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<td>Otjiarua</td>
<td>HB</td>
<td>2001-10-19</td>
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<td>Mrs Hiazonju Karezupi</td>
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<td>HK</td>
<td>2001-10-19</td>
</tr>
<tr>
<td>Mr Hionganda Tjiptekera</td>
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<td>HT</td>
<td>2001-10-19</td>
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<tr>
<td>Mr Josef S. Dauth</td>
<td>Okaropiko</td>
<td>JSD</td>
<td>2002-11-05</td>
</tr>
<tr>
<td>Mr Justice Upimbili</td>
<td>/Gam</td>
<td>JU</td>
<td>2002-10-20</td>
</tr>
<tr>
<td>Mr Kahihowa (1925)</td>
<td>Otjiyetjombungu</td>
<td>K</td>
<td>2001-10-11</td>
</tr>
<tr>
<td>Mr Kagece /Kaeece</td>
<td>Makuri</td>
<td>K.K</td>
<td>2004-12-11</td>
</tr>
<tr>
<td>Mr Master Kau (1931)</td>
<td>Otjinko</td>
<td>Kau</td>
<td>2001-10-18</td>
</tr>
<tr>
<td>Mr Kazapua (1927)</td>
<td>Otjinoko</td>
<td>Kaz</td>
<td>2001-10-05</td>
</tr>
<tr>
<td>Mr Kleophas Kaputaaza (1917)</td>
<td>Okumungondo</td>
<td>KK</td>
<td>2001-10-05</td>
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<tr>
<td>Mr Kazukokape Kambungu</td>
<td>Otjinene</td>
<td>Kka</td>
<td>2001-10-19</td>
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<td>Mrs Kazepu Kuruvo</td>
<td>Otjinene</td>
<td>Kku</td>
<td>2001-10-19</td>
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<td>Mr Kazerwa Ndizera</td>
<td>Okarunjara</td>
<td>KN</td>
<td>2002-11-02</td>
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<tr>
<td>Mr Katakini Nderuru</td>
<td>Otjinjingandu</td>
<td>Knd</td>
<td>2004-11-29</td>
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<tr>
<td>Mr Katiuza Rukero</td>
<td>Otjinjingandu</td>
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<td>2004-11-29</td>
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<tr>
<td>Mr Leonard Kavetuna</td>
<td>Omapumba</td>
<td>LK</td>
<td>2002-10-29</td>
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<tr>
<td>Mrs Muveza Hindundu</td>
<td>Otjinene</td>
<td>MH</td>
<td>2001-10-19</td>
</tr>
<tr>
<td>Mr Murangi Kamanunu</td>
<td>Otjinene</td>
<td>MK</td>
<td>2001-10-15, 2004-12-02, 2004-12-03</td>
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<tr>
<td>Mr Nathanael Kandjou (1919)</td>
<td>Kazapamba</td>
<td>NK</td>
<td>2001-10-20</td>
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<tr>
<td>Mr Rii Kambirongo</td>
<td>Erindi Roukambe</td>
<td>RK</td>
<td>2004-11-29</td>
</tr>
<tr>
<td>Mr Stefanus Kavita</td>
<td>Ombujunjama</td>
<td>SK</td>
<td>2001-10-22</td>
</tr>
<tr>
<td>Mr Sammy Upora</td>
<td>Okakarara</td>
<td>SU</td>
<td>2002-10-21, 2002-10-22</td>
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<tr>
<td>Mr Wahepurua Kariko (1939)</td>
<td>Otjozondema</td>
<td>WK</td>
<td>2004-12-09</td>
</tr>
<tr>
<td>Mr Vazuva Mbokiaoyamena (1936)</td>
<td>Otjozondema</td>
<td>VM</td>
<td>2004-12-09</td>
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<tr>
<td>Survey</td>
<td>Makuri</td>
<td>Vma</td>
<td>2002-10-18, 2004-12-12</td>
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<td>Visits to the village</td>
<td>Ombujunjama</td>
<td>Vo</td>
<td>2001-10-13, 2001-10-22, 2002-11-02</td>
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<td>Villagers attending excavation</td>
<td>Otjozondema</td>
<td>Volt</td>
<td>2004-12-08</td>
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<td>Meeting with the elders</td>
<td>Otjiyetjombungu</td>
<td>Volj</td>
<td>2001-10-11</td>
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<tr>
<td>Meeting with the elders</td>
<td>Otzunduno</td>
<td>Voz</td>
<td>2001-10-15</td>
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<tr>
<td>Okahitua villagers</td>
<td>Okahitua</td>
<td>Oka</td>
<td>2002-10-30</td>
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<tr>
<td>At the borehole in Epata</td>
<td>Epata</td>
<td>Ep</td>
<td>2001-10-06</td>
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</table>
APPENDIX 2. Archaeological site indications documented during the survey. FLS; flaked stone, OES; ostrich eggshell, CER; ceramics, ENG; engravings on baobab, PEG; peg ladder

<table>
<thead>
<tr>
<th>FW</th>
<th>WP</th>
<th>LOCATION</th>
<th>S</th>
<th>E</th>
<th>Site indication</th>
<th>NO</th>
<th>CONTEXT</th>
<th>DESCRIPTION</th>
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<tr>
<td>L00 24</td>
<td>Baraka</td>
<td>-19.66 20.79</td>
<td>Baobab</td>
<td>1</td>
<td>Pan margin</td>
<td>FLS; OES; CER; ENG; F.G. Olivier</td>
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<tr>
<td>L00 8</td>
<td>Djoxho</td>
<td>-19.68 20.62</td>
<td>Baobab</td>
<td>1</td>
<td>Pan margin</td>
<td>FLS; OES; CER; ENG; PEG; 19th century annularware</td>
<td></td>
<td></td>
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<tr>
<td>L00 8</td>
<td>Djoxho</td>
<td>-19.68 20.62</td>
<td>Baobab</td>
<td>1</td>
<td>Pan margin</td>
<td>FLS; OES; CER; ENG; PEG; Hollow baobab, archaeological material inside</td>
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<td>L00 9</td>
<td>Djoxho</td>
<td>-19.68 20.62</td>
<td>Baobab</td>
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<td>Pan margin</td>
<td>FLS; OES; CER; ENG; PEG</td>
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<td>Pan margin</td>
<td>FLS; OES; CER; ENG; PEG; Hollow baobab, archaeological material inside</td>
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<td>Baobab</td>
<td>1</td>
<td>Pan margin</td>
<td>FLS; OES; CER; ENG; PEG</td>
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<tr>
<td>L00 38</td>
<td>Gautscha</td>
<td>-19.81 20.58</td>
<td>Baobab</td>
<td>3</td>
<td>Pan margin</td>
<td>FLS; OES; CER; ENG; Engraving 1811, 1130, 1950-80</td>
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<td>L00 43</td>
<td>Gura</td>
<td>-19.81 20.58</td>
<td>Baobab</td>
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<td>Pan margin</td>
<td>FLS; OES; CER; ENG; Engraving 1811, 1130, 1950-80</td>
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<td>L00 19</td>
<td>Homasi</td>
<td>-19.65 20.66</td>
<td>Baobab</td>
<td>5</td>
<td>Pan margin</td>
<td>FLS; OES; CER; ENG; One core in CCS</td>
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<td>L02 241</td>
<td>Makuri</td>
<td>-19.96 20.73</td>
<td>Baobab</td>
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<td>Pan margin</td>
<td>PEG; Engraving NL 89</td>
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<td>L02 245</td>
<td>Makuri</td>
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<td>Pan margin</td>
<td>PEG</td>
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<td>Makuri</td>
<td>-19.67 20.71</td>
<td>Baobab</td>
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<td>Pan margin</td>
<td>PEG; CER thin pottery scatter with one decorated sherd</td>
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<td>L02 254</td>
<td>Makuri</td>
<td>-19.69 20.71</td>
<td>Baobab</td>
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<td>A thin scatter CCS</td>
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<td>L00 63</td>
<td>Tsumkwe</td>
<td>-19.59 20.51</td>
<td>Baobab</td>
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<td>Pan margin</td>
<td>FLS; ENG; CER; PEG; Outside the village centre</td>
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<td>L00 33</td>
<td>Vortrekker tree</td>
<td>-19.30 20.66</td>
<td>Baobab</td>
<td>1</td>
<td>Pan margin</td>
<td>Engravings Clatz, Efme, Siöberg, 1876, 1883, 1884, 1891, 1900</td>
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<tr>
<td>L01 205</td>
<td>Otjiene</td>
<td>-21.12 18.82</td>
<td>Big excavation</td>
<td>1</td>
<td>Omuramba</td>
<td>Presumably not a well, seem relatively recent</td>
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<td>L00 3</td>
<td>Audax pan</td>
<td>-21.33 18.55</td>
<td>Elephant jaw</td>
<td>1</td>
<td>Pan</td>
<td>Encapsulated by calcrete</td>
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<td>L00 40</td>
<td>Gautscha</td>
<td>-19.81 20.58</td>
<td>Grave</td>
<td>1</td>
<td>Pan margin</td>
<td>Toma Tsamko 1911-1988</td>
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<td>L02 325</td>
<td>Omapumba</td>
<td>-20.71 18.16</td>
<td>Grave</td>
<td>1</td>
<td>Om. margin</td>
<td>Stone structure 2 m x 1.3 m, west-east direction, larger stones in short ends</td>
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<td>L01 224</td>
<td>Ombujunjama</td>
<td>-21.00 19.17</td>
<td>Grave</td>
<td>2</td>
<td>Pan margin</td>
<td>20 m apart not visible at ground surface</td>
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<td>L04 388</td>
<td>Ombujunjama</td>
<td>-21.00 19.17</td>
<td>Grave</td>
<td>3</td>
<td>Pan margin</td>
<td>From 2001</td>
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<td>L04 391</td>
<td>Ozombu Zo Vindimba</td>
<td>-21.02 18.88</td>
<td>Grave</td>
<td>2</td>
<td>Om. slope</td>
<td>Two stone structures a few meters apart</td>
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<td>L04 390</td>
<td>Ozombu Zo Vindimba</td>
<td>-21.02 18.88</td>
<td>Heliograph mound</td>
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<td>Om. slope</td>
<td>Reconstructed during the commemoration ceremonies in 2004</td>
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<td>L00 2</td>
<td>Audax pan</td>
<td>-21.33 18.55</td>
<td>Hunting blind</td>
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<td>Pan</td>
<td>FLS; Encapsulated by calcrete, Kinahan &amp; Kinahan 1984</td>
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<tr>
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<td>Gautscha</td>
<td>-19.81 20.58</td>
<td>Hunting blind</td>
<td>10</td>
<td>Pan</td>
<td>FLS; Under water oct 2000, Kinahan &amp; Kinahan 1984</td>
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<td>Nama</td>
<td>-19.92 20.72</td>
<td>Hunting blind</td>
<td>9</td>
<td>Pan + margin</td>
<td>FLS; An additional blind found in 1999, Kinahan &amp; Kinahan 1984</td>
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<td>L02 383</td>
<td>Otjumunguindi</td>
<td>-20.64 19.96</td>
<td>Hunting blind?</td>
<td>1</td>
<td>Om. margin</td>
<td>Possible hunting-blind, ancient calcrete outcrop in a possible ambush location</td>
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<td>L02 384</td>
<td>Otjumunguindi</td>
<td>-20.63 19.96</td>
<td>Hunting blind?</td>
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<td>Om. margin</td>
<td>Two rows of stones on each side of a gully through omuramba side</td>
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<td>L01 144</td>
<td>Epata</td>
<td>-21.07 18.88</td>
<td>Large tree</td>
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<td>Om. margin</td>
<td>Large A. erioloba called Okomuvya kotiku</td>
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<td>Code</td>
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<td>Otjinene</td>
<td>-21.11</td>
<td>18.84</td>
<td>Large tree</td>
<td>1 Omuramba</td>
<td>Large A. erioloba road tree, tradition associated with 1905-5</td>
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<td>L01</td>
<td>Otjumunguindi</td>
<td>-20.65</td>
<td>20.08</td>
<td>Log trap</td>
<td>1 Om. margin</td>
<td>Log trap in association to animal burrows, calcrete ridge</td>
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<td>Otjumunguindi</td>
<td>-20.65</td>
<td>20.07</td>
<td>Log trap</td>
<td>3 Om. margin</td>
<td>Log traps in association to animal burrows, calcrete ridge</td>
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<td>Kapilingi</td>
<td>-20.63</td>
<td>19.87</td>
<td>Large tree</td>
<td>1 Omuramba</td>
<td>Soil chemistry and mapping of remains on surface</td>
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<td>L01</td>
<td>Epata</td>
<td>-21.09</td>
<td>18.85</td>
<td>Omuramba</td>
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<td>Fall trap according to the oral tradition</td>
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<td>Okarunjara</td>
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<td>36</td>
<td>Fall trap according to the oral tradition</td>
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<td>Waterberg</td>
<td>-20.35</td>
<td>17.26</td>
<td>Rock engraving</td>
<td>2 Hill</td>
<td>Waterberg plateu</td>
<td></td>
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<td>L02</td>
<td>Otjohi</td>
<td>-20.60</td>
<td>20.45</td>
<td>Rock hole</td>
<td>8 Om. margin</td>
<td>Solution channels in sedimentary rock outcrop, used as water source</td>
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<td>L02</td>
<td>Gam</td>
<td>-20.28</td>
<td>20.84</td>
<td>Rockshelter</td>
<td>1 Om. margin</td>
<td>Bone fragments split on the length</td>
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<td>L02</td>
<td>Otjumunguindi</td>
<td>-20.60</td>
<td>20.45</td>
<td>Rockshelter</td>
<td>1 Om. margin</td>
<td>Few pieces of flaked quartz associated with the talus</td>
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<tr>
<td>L02</td>
<td>Waterberg</td>
<td>-20.35</td>
<td>17.26</td>
<td>Rockshelter</td>
<td>2 Hill</td>
<td>Large rock shelter near rock engraving site</td>
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<tr>
<td>L00</td>
<td>Djoxho</td>
<td>-19.68</td>
<td>20.62</td>
<td>Pan margin</td>
<td>1 Omuramba</td>
<td>Open area with bigger pieces of knapped CCS</td>
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<tr>
<td>L00</td>
<td>Dobe pan</td>
<td>-19.42</td>
<td>20.59</td>
<td>Scatter</td>
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<td>Grinding stone for ochre</td>
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<tr>
<td>L02</td>
<td>Eiseb</td>
<td>-19.10</td>
<td>20.61</td>
<td>Scattered</td>
<td>1 Omuramba</td>
<td>Flakes associated with a vein in calcrete outcrop</td>
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<td>Epata</td>
<td>-21.07</td>
<td>18.88</td>
<td>Scattered</td>
<td>1 Omuramba</td>
<td>Flaked quartz pebble, core? firestone?</td>
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<tr>
<td>L02</td>
<td>Epata</td>
<td>-21.07</td>
<td>18.87</td>
<td>Scattered</td>
<td>1 Omuramba</td>
<td>Quartz debris, heavily disturbed area, not a distinct scatter</td>
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<tr>
<td>L02</td>
<td>Epata</td>
<td>-21.07</td>
<td>18.88</td>
<td>Scattered</td>
<td>1 Omuramba</td>
<td>Flaked CCS not far from the pan with main scatter (L01 143)</td>
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<tr>
<td>L02</td>
<td>Gunib</td>
<td>-19.73</td>
<td>18.53</td>
<td>Scattered</td>
<td>1 Om. margin</td>
<td>Eroded river cutting, 20 flakes CCS, quartz in 1 sq metre</td>
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<tr>
<td>L02</td>
<td>Kaiziuse</td>
<td>-19.72</td>
<td>18.52</td>
<td>Scattered</td>
<td>1 Omuramba</td>
<td>CCS 22 pieces</td>
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<tr>
<td>L02</td>
<td>Kaiziuse</td>
<td>-19.72</td>
<td>18.52</td>
<td>Scattered</td>
<td>1 Om. margin</td>
<td>CCS 17 pieces</td>
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<tr>
<td>L00</td>
<td>Nhoma</td>
<td>-19.10</td>
<td>20.61</td>
<td>Scattered</td>
<td>1 Om. margin</td>
<td>CCS &amp; volc. mtr gravel river cutting. Trimming flakes</td>
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<td>L00</td>
<td>Nyae Nyae</td>
<td>-19.09</td>
<td>20.62</td>
<td>Scattered</td>
<td>1 Pan margin</td>
<td>A few pieces flaked CCS</td>
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<td>L04</td>
<td>Otjinene</td>
<td>-21.13</td>
<td>18.82</td>
<td>Scattered</td>
<td>1 Omuramba</td>
<td>6 pieces of flaked CCS</td>
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<td>Otjohi</td>
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<td>20.45</td>
<td>Scattered</td>
<td>1 Om. margin</td>
<td>Flaked quartz, CCS on outcrop near the settlement</td>
<td></td>
<td></td>
</tr>
<tr>
<td>L02</td>
<td>Otjohi</td>
<td>-20.61</td>
<td>20.45</td>
<td>Scattered</td>
<td>1 Om. margin</td>
<td>Large calcrete outcrop, marble? impact on rocks quartz, CCS debris</td>
<td></td>
<td></td>
</tr>
<tr>
<td>L00</td>
<td>Otjoozondjupa om</td>
<td>-20.26</td>
<td>19.54</td>
<td>Scattered</td>
<td>1 Om. margin</td>
<td>Flaked debris associated with calcrete outcrop</td>
<td></td>
<td></td>
</tr>
<tr>
<td>L04</td>
<td>Ozmombu Zo Vindimba</td>
<td>-21.02</td>
<td>18.89</td>
<td>Scatter</td>
<td>1 Om. slope</td>
<td>31 iron beads, found by villagers during bush clearing</td>
<td></td>
<td></td>
</tr>
<tr>
<td>L04</td>
<td>Ozmombu Zo Vindimba</td>
<td>-21.06</td>
<td>18.87</td>
<td>Sediment heap</td>
<td>1 Om. slope</td>
<td>Not associated with a well</td>
<td></td>
<td></td>
</tr>
<tr>
<td>L01</td>
<td>Ombuujunjama</td>
<td>-21.00</td>
<td>19.16</td>
<td>Settlement</td>
<td>5 Pan margin</td>
<td>At least five settlement areas identified by residues on ground surface</td>
<td></td>
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<tr>
<td>L01</td>
<td>Otjoozahewa</td>
<td>-20.81</td>
<td>18.84</td>
<td>Standing stone</td>
<td>1 Pan margin</td>
<td>c. 2 m x 1.3 m graves?</td>
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<td>Cont. WP</td>
<td>LOCATION</td>
<td>S</td>
<td>E</td>
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<td>NO CONTEXT</td>
<td>DESCRIPTION</td>
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</tr>
<tr>
<td>L02 376</td>
<td>Omungondo</td>
<td>-20.84</td>
<td>19.12</td>
<td>Stone cairn</td>
<td>3 Omuramba</td>
<td>quadranic c. 1.5 m x 1.5 m large stone on north side</td>
<td></td>
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</tr>
<tr>
<td>L01 163</td>
<td>Otjiarua</td>
<td>-21.21</td>
<td>19.24</td>
<td>Stone cairn</td>
<td>7 Pan margin</td>
<td>Cluster different sizes</td>
<td></td>
<td></td>
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<tr>
<td>L01 196</td>
<td>Otjinene</td>
<td>-21.12</td>
<td>18.82</td>
<td>Stone cairn</td>
<td>1 Omuramba</td>
<td>1.6 m x 0.8 m height c. 40 cm</td>
<td></td>
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<tr>
<td>L01 208</td>
<td>Otjinene</td>
<td>-21.14</td>
<td>18.80</td>
<td>Stone cairn</td>
<td>30&lt; Omuramba</td>
<td>Various sizes</td>
<td></td>
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<td>L04 467</td>
<td>Otjinene</td>
<td>-21.07</td>
<td>18.87</td>
<td>Stone cairn</td>
<td>1 Omuramba</td>
<td>1.4 m x 0.8 m height c. 20 cm</td>
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<td>L00 62</td>
<td>Otjozondjou om</td>
<td>-20.46</td>
<td>18.97</td>
<td>Stone cairn</td>
<td>3 Om. margin</td>
<td>1.6 m x 0.9 m height c. 40 cm</td>
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<tr>
<td>L01 46</td>
<td>Otjumungundii</td>
<td>-20.63</td>
<td>20.02</td>
<td>Stone cairn</td>
<td>1 Omuramba</td>
<td>Circular stone cairn, 2 m in diameter, height 60 cm</td>
<td></td>
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<tr>
<td>L02 271</td>
<td>Aha</td>
<td>-19.86</td>
<td>20.91</td>
<td>Tree harvest</td>
<td>1 Hill side</td>
<td>Mangetti harvest place, associated with a baobab</td>
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<tr>
<td>L02 256</td>
<td>Erindi Rombahe</td>
<td>-21.18</td>
<td>20.28</td>
<td>Tree harvest</td>
<td>1 Pan margin</td>
<td>Calcrite manuports on distance from pan, oral tradition of ohambo grazing</td>
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<tr>
<td>L01 210</td>
<td>Erindi Roukambe</td>
<td>-21.14</td>
<td>19.10</td>
<td>Tree harvest</td>
<td>1 Pan margin</td>
<td>Calcrite manuports on distance from pan, oral tradition of ohambo grazing</td>
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<tr>
<td>L02 123</td>
<td>Ombujurjama</td>
<td>-19.68</td>
<td>20.71</td>
<td>Tree harvest</td>
<td>1 Pan margin</td>
<td>Calcrite manuports on distance from pan, oral tradition of ohambo grazing</td>
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<tr>
<td>L02 287</td>
<td>#To//ana</td>
<td>-20.21</td>
<td>20.96</td>
<td>Well</td>
<td>1 Pan Outcrop</td>
<td>calcrite manuports on distance from pan, oral tradition of ohambo grazing</td>
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<tr>
<td>L00 1</td>
<td>Audax pan</td>
<td>-21.33</td>
<td>18.55</td>
<td>Well</td>
<td>1 Pan Outcrop</td>
<td>diam; 3.5 m x 1.8 m; depth; 7 m; oval irregular; Ohambo after 1993</td>
<td></td>
<td></td>
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<tr>
<td>L00 30</td>
<td>Dixojo pan</td>
<td>-19.68</td>
<td>20.62</td>
<td>Well</td>
<td>1 Pan Outcrop</td>
<td>diam; 0.6 m; depth 0.45 m; small circular; filled with sediment</td>
<td></td>
<td></td>
</tr>
<tr>
<td>L02 267</td>
<td>Dixojo pan</td>
<td>-19.68</td>
<td>20.62</td>
<td>Well</td>
<td>1 Pan Outcrop</td>
<td>diam; 0.6 m; depth 0.45 m; small circular; filled with sediment</td>
<td></td>
<td></td>
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<tr>
<td>L00 31</td>
<td>Dobe pan</td>
<td>-19.42</td>
<td>20.59</td>
<td>Well</td>
<td>1 Suboutcrop</td>
<td>Kinahna &amp; Kinahan 1984</td>
<td></td>
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<td>L00 31</td>
<td>Dobe pan</td>
<td>-19.42</td>
<td>20.59</td>
<td>Well</td>
<td>1 Suboutcrop</td>
<td>Kinahna &amp; Kinahan 1984</td>
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<td>L00 31</td>
<td>Dobe pan</td>
<td>-19.42</td>
<td>20.59</td>
<td>Well</td>
<td>1 Suboutcrop</td>
<td>Kinahna &amp; Kinahan 1984</td>
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<td>L00 31</td>
<td>Dobe pan</td>
<td>-19.42</td>
<td>20.59</td>
<td>Well</td>
<td>1 Suboutcrop</td>
<td>Kinahna &amp; Kinahan 1984</td>
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<td>Dobe pan</td>
<td>-19.42</td>
<td>20.59</td>
<td>Well</td>
<td>1 Suboutcrop</td>
<td>Kinahna &amp; Kinahan 1984</td>
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<td>L00 31</td>
<td>Dobe pan</td>
<td>-19.42</td>
<td>20.59</td>
<td>Well</td>
<td>1 Suboutcrop</td>
<td>Kinahna &amp; Kinahan 1984</td>
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<td>L00 31</td>
<td>Dobe pan</td>
<td>-19.42</td>
<td>20.59</td>
<td>Well</td>
<td>1 Suboutcrop</td>
<td>Kinahna &amp; Kinahan 1984</td>
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<td>L00 31</td>
<td>Dobe pan</td>
<td>-19.42</td>
<td>20.59</td>
<td>Well</td>
<td>1 Suboutcrop</td>
<td>Kinahna &amp; Kinahan 1984</td>
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<td>-19.42</td>
<td>20.59</td>
<td>Well</td>
<td>1 Suboutcrop</td>
<td>Kinahna &amp; Kinahan 1984</td>
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<td>L00 31</td>
<td>Dobe pan</td>
<td>-19.42</td>
<td>20.59</td>
<td>Well</td>
<td>1 Suboutcrop</td>
<td>Kinahna &amp; Kinahan 1984</td>
<td></td>
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<td>L00 31</td>
<td>Dobe pan</td>
<td>-19.42</td>
<td>20.59</td>
<td>Well</td>
<td>1 Suboutcrop</td>
<td>Kinahna &amp; Kinahan 1984</td>
<td></td>
<td></td>
</tr>
<tr>
<td>L01 145</td>
<td>Epata</td>
<td>-21.07</td>
<td>18.87</td>
<td>Well</td>
<td>1 Omuramba Outcrop</td>
<td>diam; 2 m x 1.3 m; depth 1 m; oval irregular; filled almost completely</td>
<td></td>
<td></td>
</tr>
<tr>
<td>L01 146</td>
<td>Epata</td>
<td>-21.07</td>
<td>18.87</td>
<td>Well</td>
<td>1 Omuramba Outcrop</td>
<td>diam; 1.8 m; depth 16 m; deep circular; massive spoil heap</td>
<td></td>
<td></td>
</tr>
<tr>
<td>L01 147</td>
<td>Epata</td>
<td>-21.07</td>
<td>18.87</td>
<td>Well</td>
<td>1 Omuramba Outcrop</td>
<td>diam; 1.9 m; depth; 20 m; deep circular; Acacia on top of spoil heap (40 cm in diam.)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>L01 148</td>
<td>Epata</td>
<td>-21.07</td>
<td>18.87</td>
<td>Well</td>
<td>1 Omuramba Outcrop</td>
<td>diam; 2 m; depth 16 m; deep circular</td>
<td></td>
<td></td>
</tr>
<tr>
<td>L01 149</td>
<td>Epata</td>
<td>-21.07</td>
<td>18.87</td>
<td>Well</td>
<td>1 Omuramba Outcrop</td>
<td>diam; 5 m x 1.8 m; depth 7 m; oval irregular; Wear on sheet calcrite</td>
<td></td>
<td></td>
</tr>
<tr>
<td>L01 150</td>
<td>Epata</td>
<td>-21.07</td>
<td>18.86</td>
<td>Well</td>
<td>1 Omuramba Outcrop</td>
<td>diam; 2 m; depth 10 m; deep circular; dug in an oval irregular well (4 m x 3.5 m)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>L01 151</td>
<td>Epata</td>
<td>-21.08</td>
<td>18.86</td>
<td>Well</td>
<td>1 Omuramba Outcrop</td>
<td>Still in use, overbuilt</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cont. WP</td>
<td>LOCATION</td>
<td>S</td>
<td>E</td>
<td>Site indication</td>
<td>NO</td>
<td>CONTEXT</td>
<td>DESCRIPTION</td>
<td></td>
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<td></td>
</tr>
<tr>
<td>L01 152</td>
<td>Epata</td>
<td>-21.07</td>
<td>18.87</td>
<td>Well</td>
<td>1</td>
<td>Omuramba Outcrop</td>
<td>diam; 5 m x 3 m; depth 5 m; oval irregular; collapsed side</td>
<td></td>
</tr>
<tr>
<td>L01 153</td>
<td>Epata</td>
<td>-21.07</td>
<td>18.87</td>
<td>Well</td>
<td>1</td>
<td>Omuramba Outcrop</td>
<td>diam; 1.6 m; depth 3 m; deep circular; Filled with soils</td>
<td></td>
</tr>
<tr>
<td>L01 225</td>
<td>Epata</td>
<td>-21.08</td>
<td>18.86</td>
<td>Well</td>
<td>1</td>
<td>Omuramba Outcrop</td>
<td>diam; 1.9 m; depth; 27 m; deep circular; modernised, trough</td>
<td></td>
</tr>
<tr>
<td>L01 226</td>
<td>Epata</td>
<td>-21.08</td>
<td>18.86</td>
<td>Well</td>
<td>1</td>
<td>Omuramba Outcrop</td>
<td>diam; 1.7 m; depth 20 m; deep circular</td>
<td></td>
</tr>
<tr>
<td>L02 299</td>
<td>Epata</td>
<td>-21.08</td>
<td>18.85</td>
<td>Well</td>
<td>1</td>
<td>Omuramba Outcrop</td>
<td>diam; 5 m x 1.5 m; depth 5 m; oval irregular</td>
<td></td>
</tr>
<tr>
<td>L02 300</td>
<td>Epata</td>
<td>-21.08</td>
<td>18.85</td>
<td>Well</td>
<td>1</td>
<td>Omuramba Outcrop</td>
<td>diam; 4.5 m x 3 m; depth 6 m; oval irregular</td>
<td></td>
</tr>
<tr>
<td>L02 301</td>
<td>Epata</td>
<td>-21.08</td>
<td>18.86</td>
<td>Well</td>
<td>1</td>
<td>Omuramba Outcrop</td>
<td>Drinking through, stones; depth; 25-30 m, still water inside.</td>
<td></td>
</tr>
<tr>
<td>L02 302</td>
<td>Epata</td>
<td>-21.08</td>
<td>18.86</td>
<td>Well</td>
<td>1</td>
<td>Omuramba Outcrop</td>
<td>Oval in the rim, seems to have been deepend from an oval irregular well</td>
<td></td>
</tr>
<tr>
<td>L02 306</td>
<td>Epata</td>
<td>-21.08</td>
<td>18.86</td>
<td>Well</td>
<td>1</td>
<td>Omuramba Outcrop</td>
<td>Filled</td>
<td></td>
</tr>
<tr>
<td>L02 307</td>
<td>Epata</td>
<td>-21.08</td>
<td>18.85</td>
<td>Well</td>
<td>1</td>
<td>Omuramba Outcrop</td>
<td>diam; 6 m x 3 m; depth 7 m; oval irregular</td>
<td></td>
</tr>
<tr>
<td>L02 307</td>
<td>Epata</td>
<td>-21.08</td>
<td>18.85</td>
<td>Well</td>
<td>1</td>
<td>Omuramba Outcrop</td>
<td>Dug in a cluster</td>
<td></td>
</tr>
<tr>
<td>L02 307</td>
<td>Epata</td>
<td>-21.08</td>
<td>18.85</td>
<td>Well</td>
<td>1</td>
<td>Omuramba Outcrop</td>
<td>Dug in a cluster</td>
<td></td>
</tr>
<tr>
<td>L02 307</td>
<td>Epata</td>
<td>-21.08</td>
<td>18.85</td>
<td>Well</td>
<td>1</td>
<td>Omuramba Outcrop</td>
<td>Dug in a cluster</td>
<td></td>
</tr>
<tr>
<td>L02 240</td>
<td>Gam</td>
<td>-20.25</td>
<td>20.82</td>
<td>Well</td>
<td>1</td>
<td>Pan Outcrop</td>
<td>diam; 8 m x 5 m; depth 1 m to water surface, Marshall 1976</td>
<td></td>
</tr>
<tr>
<td>L00 37</td>
<td>Gautscha</td>
<td>-19.81</td>
<td>20.58</td>
<td>Well</td>
<td>1</td>
<td>Pan Outcrop</td>
<td>oval irregular</td>
<td></td>
</tr>
<tr>
<td>L00 37</td>
<td>Gautscha</td>
<td>-19.81</td>
<td>20.58</td>
<td>Well</td>
<td>1</td>
<td>Pan Outcrop</td>
<td>oval irregular</td>
<td></td>
</tr>
<tr>
<td>L00 42</td>
<td>Gura</td>
<td>-19.81</td>
<td>20.58</td>
<td>Well</td>
<td>1</td>
<td>Pan Outcrop</td>
<td>oval irregular</td>
<td></td>
</tr>
<tr>
<td>L00 42</td>
<td>Gura</td>
<td>-19.81</td>
<td>20.58</td>
<td>Well</td>
<td>1</td>
<td>Pan Outcrop</td>
<td>oval irregular</td>
<td></td>
</tr>
<tr>
<td>L02 333</td>
<td>Kaiziuse</td>
<td>-19.72</td>
<td>18.52</td>
<td>Well</td>
<td>1</td>
<td>Suboutcrop</td>
<td></td>
<td></td>
</tr>
<tr>
<td>L02 334</td>
<td>Kaiziuse</td>
<td>-19.72</td>
<td>18.52</td>
<td>Well</td>
<td>1</td>
<td>Suboutcrop</td>
<td></td>
<td></td>
</tr>
<tr>
<td>L02 335</td>
<td>Kaiziuse</td>
<td>-19.72</td>
<td>18.52</td>
<td>Well</td>
<td>1</td>
<td>Suboutcrop</td>
<td></td>
<td></td>
</tr>
<tr>
<td>L02 336</td>
<td>Kaiziuse</td>
<td>-19.72</td>
<td>18.52</td>
<td>Well</td>
<td>1</td>
<td>Suboutcrop</td>
<td></td>
<td></td>
</tr>
<tr>
<td>L02 337</td>
<td>Kaiziuse</td>
<td>-19.72</td>
<td>18.52</td>
<td>Well</td>
<td>1</td>
<td>Suboutcrop</td>
<td></td>
<td></td>
</tr>
<tr>
<td>L02 338</td>
<td>Kaiziuse</td>
<td>-19.72</td>
<td>18.52</td>
<td>Well</td>
<td>1</td>
<td>Suboutcrop</td>
<td></td>
<td></td>
</tr>
<tr>
<td>L02 339</td>
<td>Kaiziuse</td>
<td>-19.72</td>
<td>18.52</td>
<td>Well</td>
<td>1</td>
<td>Suboutcrop</td>
<td></td>
<td></td>
</tr>
<tr>
<td>L02 340</td>
<td>Kaiziuse</td>
<td>-19.72</td>
<td>18.52</td>
<td>Well</td>
<td>1</td>
<td>Suboutcrop</td>
<td></td>
<td></td>
</tr>
<tr>
<td>L02 341</td>
<td>Kaiziuse</td>
<td>-19.72</td>
<td>18.52</td>
<td>Well</td>
<td>1</td>
<td>Suboutcrop</td>
<td></td>
<td></td>
</tr>
<tr>
<td>L02 342</td>
<td>Kaiziuse</td>
<td>-19.72</td>
<td>18.52</td>
<td>Well</td>
<td>1</td>
<td>Suboutcrop</td>
<td></td>
<td></td>
</tr>
<tr>
<td>L02 343</td>
<td>Kaiziuse</td>
<td>-19.72</td>
<td>18.52</td>
<td>Well</td>
<td>1</td>
<td>Suboutcrop</td>
<td></td>
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</tr>
<tr>
<td>L02 344</td>
<td>Kaiziuse</td>
<td>-19.72</td>
<td>18.52</td>
<td>Well</td>
<td>1</td>
<td>Suboutcrop</td>
<td></td>
<td></td>
</tr>
<tr>
<td>L02 345</td>
<td>Kaiziuse</td>
<td>-19.72</td>
<td>18.52</td>
<td>Well</td>
<td>1</td>
<td>Suboutcrop</td>
<td></td>
<td></td>
</tr>
<tr>
<td>L02 346</td>
<td>Kaiziuse</td>
<td>-19.72</td>
<td>18.52</td>
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<td>diam; 1.9 m; depth 16 m; deep circular</td>
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<td>Otjozabanui</td>
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<td>Well</td>
<td>2</td>
<td>Om. margin</td>
<td>Sand; Two depressions, no calcrete</td>
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<td>Outcrop; diam: 1.6 m; small circular; filled with dried black cotton</td>
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## APPENDIX 3. Archaeological well sites (ARC), reconstructed well sites (REC), historical sources and place names.

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**APPENDIX 4.** The archaeological excavation at Otjozondema, Otjozondjupa Region, Namibia, presented through 3 tables.

**Table 1.** Otjozondema archaeological material according to square and level: f; flaked stone, o; ostrich eggshell, t; textile, p; pottery, w; wood, c; charcoal; light grey excavated levels without finds; dark grey non-excavated levels.

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<th>6500-5000</th>
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<td>50 cm</td>
<td>60 cm</td>
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<tr>
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<td>f, o</td>
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<td>f, o, t, b</td>
<td>f, o, t, p, w, f, o, t, p, f, o</td>
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<td>f, o, t, p, b</td>
<td>f, o, t, b</td>
<td>f, o, t, p, f, o</td>
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<td>f, o, t, p, b</td>
<td>f, o, t, b</td>
<td>f, o, t, p, f, o</td>
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<tr>
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<td>50 cm</td>
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<td>f, o, t, p, b</td>
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<tr>
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<td>5500-6500</td>
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<td>f, o</td>
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<td>f, o, t, p, b</td>
<td>f, o, t, b</td>
<td>f, o, t, p, f, o</td>
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<tr>
<td>40 cm</td>
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<td>f, o, t, b</td>
<td>f, o, t, p, f, o</td>
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<tr>
<td>50 cm</td>
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<td>f, o, t, b</td>
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<tr>
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<td>f, o, t, p, b</td>
<td>f, o, t, b</td>
<td>f, o, t, p, f, o</td>
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Table 2. The pottery that was found during the excavation at Otjozondema: Ware 1; black-grey with smooth surface, temper of layered black mineral and sand, Ware 2; grey-yellow surface and sand temper, Ware 3; bright orange tint, temper of sand and crushed rock.

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Table 3. The flaked stone that was collected during the excavation at Otjozondema. Classification of fractured quartz based on Callahan et al. 1992; Knutsson 1998.

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APPENDIX 5. Selected radiocarbon dates for sites with pastoral affinity. Dates calibrated by using QuickCal2005 ver.1.4 (Weiniger et al. 2005) and corrected for the southern hemisphere by extracting 25 years from the uncalibrated date (Ekblom 2004).

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<td>1092 ± 55</td>
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7 Chami, F. 1994. The Tanzanian Coast in the First Millennium AD: an archaeology of the iron working, farming communities (with microscopic analyses by A. Lindahl). Uppsala. 120 pp., 27 figs., 19 maps, 3 plates.

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