Pastoral pasts in the Amboseli landscape

An archaeological exploration of the Amboseli ecosystem
from the later Holocene to the colonial period

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Abstract

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The Amboseli ecosystem, home of Amboseli National Park, is renowned for its extraordinary biodiversity, and has long drawn the attention of conservationists and ecologists hoping to safeguard the healthy functioning of this Kenyan rangeland and the pastoral traditions that have brought this landscape into being. There is major concern currently however, as present day Amboseli pastoral livelihoods are said to be in decline owing to rangelands being settled, fenced, and converted to farmland. The processes by which pastoral livelihood diversification is occurring in this landscape have historical roots, and appreciating this context is an important component of understanding current trends in socio-economic and environmental adaptability and sustainability. Yet, the human history of Amboseli's ecosystem tends to be conceptualised and discussed by scholars in terms of a narrow and ahistorical model of subsistence-based pastoralism. The research presented in this thesis provides an alternative history of pastoral pasts in Amboseli.

In more specific terms, the primary focus of this thesis is detailing and analysing the results of archaeological surveys and the excavation of ten sites located on Olgulului/Ololarashi group ranch, an archaeological *terra incognita*. These date to varying stages of the last few millennia. Inspired by the interdisciplinary approach of historical ecology, these exploratory archaeological findings are contextualised and integrated with archival, palaeoenvironmental, ecological, linguistic, and local knowledge sources. In doing so, I present a culture history of Amboseli, and an examination of the evidence for livestock herding in this landscape organised into three parts: the mid-Holocene arrival of domestic stock and emergence of specialised pastoralism; the Early to Late Iron Ages; and finally, the 19th century and colonial period. Throughout these chapters, a continuous theme discussed is the multitude of ways in which cultivation and trade have featured in the Amboseli landscape and contributed to the livelihoods of pastoral people inhabiting this ecosystem. In delving into the history of pastoralism in Amboseli, it is apparent that both its occupants' livelihoods and the landscape itself must be understood as having been shaped by a heterogeneity of economic pursuits and resource use strategies.

Keywords: Pastoralism, Amboseli, Historical Archaeology, Eastern Africa, Eastern African Iron Age, Maasai, Pastoral Archaeology, Usable Pasts

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1 Introduction

East Africa boasts some of the most impressive and extensive savanna mosaics in the world, due to the rich volcanic soils and the spatio-temporal variations in climate, vegetation, wildlife, hydrology, and socio-economic activities that characterise this area. The Amboseli basin or *Empusel*, meaning salty dust place in KiMaasai, forms part of this variability. The basin itself is some 600 km² and confined largely within what is today Amboseli National Park. Western (1973) describes the entire Amboseli ecosystem as nearly 8500 km² of rangelands surrounding the park that more or less equate to the boundaries of what is currently Loitokitok division, Kajiado County, Kenya (Fig. 1.1). This area is herein after referred to as Amboseli.

Fig. 1.1 The Amboseli ecosystem/Loitokitok Division administrative boundary

Amboseli ecosystem/Loitokitok Division is outlined in red. Italicised names in white are National Parks. Capitalised names in black are group ranches. World Imagery provided by Esri, DigitalGlobe, GeoEye, i-cubed, USDA FSA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo, and the GIS User Community.

Amboseli is internationally renowned for being one of Kenya's 'conservation jewels', a landscape recognised to have long been inhabited by people, livestock and wildlife (BurnSilver et al. 2008: 225). Moreover, ecologists and conservationists are increasingly in agreement that the abundance and diversity of wildlife that occupy Amboseli can be understood as 'an artifact of traditional Maasai pastoralism' (Browne-Nuñez 2011: 300). As is elaborated on in Chapter 2, in savanna rangelands like Amboseli, pastoralism is a livelihood

gaining in acceptance by those in the conservation community due to its compatibility with the healthy functioning of biodiverse ecosystems. However, in recent years, so-called traditional pastoral lifeways are thought to have been in decline and society in Amboseli is said to have changed from a homogenous community of subsistence herders to a diversified Maasai population encompassing an ever expanding number of farmers from other ethnic groups (Browne-Núñez 2011: 306; Western and Manzanillo-Nightingale 2004: 5). In writing this thesis my aim has not been to examine how contemporary socio-economic issues are transforming pastoralism and rangeland functioning in Amboseli per se, but instead to afford a greater degree of historical context to these developments.

Archaeologically speaking, Amboseli could be rightly considered a *terra incognita*, and thus a main contribution of this thesis has been conducting a survey and a series of excavations in a study area south of the National Park. As this research has been largely exploratory in nature, the scope of my research questions have likewise been necessarily broad. Drawing on palaeoenvironmental, archival, ethnographic, ecological, linguistic and material lines of evidence I have undertaken a study of the diversity of livelihoods and cultural groupings in the Amboseli ecosystem, with an emphasis on understanding pastoralism, cultivation, and the networks and relations of exchange that have linked people within and beyond this landscape. The temporal focus of this thesis is equally wide-ranging, and while the data largely pertains to the last millennium, my research on pastoralism in Amboseli spans the mid-Holocene inception of herding in eastern Africa to the end of the colonial period. The picture emerging from the results of these inquiries diverges from the way that traditional pastoralism in this landscape has typically been portrayed.

Overall, fluidity and resourcefulness are characteristics that should be understood as central to pastoral livelihoods, and from at least the 19th century, the adaptability of Maasai herders in Amboseli has regularly been underpinned by exchange and assimilation with people in other economic and ethnic groups within and beyond this landscape. In this thesis I also demonstrate that agriculture in Amboseli can be traced back to the 17th century though cultivation practices likely have a much deeper history. A core message throughout the chapters that follow is that the heterogeneity and fluidity of past livelihoods in Amboseli contrasts with the otherwise common essentialist portrayal of this landscape having been inhabited by traditional, hermetic, and ‘pure’ pastoralists. Thus my central argument in this thesis, challenging notions of ‘pure’ pastoralism, is in ways a repetition of a point that has been belaboured many times over by historians, anthropologists, archaeologists, and others, albeit drawing on a deeper historical time perspective than most (e.g. Bollig et al. 2013; Fratkin 2001; Galaty and Bonte 1991; Homewood 2008; Lane 2015a; Spear and Waller 1993; Waller 1979, 1985a,b). Also at the crux of this thesis, however, is the contention that if we hope to understand the processes by which people, wildlife and livestock have lived in and shaped the Amboseli landscape over the *longue durée* we must embrace complexity in our perceptions of traditional pastoralism. An historical understanding of pastoralism in Amboseli allows for us to problematise limited conceptualisations of herding that threaten to erase the potential multiplicity of livelihood practices that may have actively contributed to the ecological diversity of this landscape today. This research is of significance, as failing to revise perceptions of pastoral pasts in Amboseli ultimately hampers our ability to investigate and produce informed projections of future land use change on the short and long-term scales.

I recognise there are many challenges inherent in attempting to craft a definition of pastoralism that can be consistently and meaningfully applied in the Amboseli context over the course of millennia. Across the world today pastoralism is a livelihood that manifests in a multiplicity of forms, and can be categorised in accordance to patterns of mobility, herd compositions, or the relative economic contributions of livestock (e.g. Dong 2016; Ingold

1980), though we should not anticipate that these elements have been stable among all people who have ever practiced animal husbandry in Amboseli. Even Gifford-Gonzalez's (2005: 188) widely-used definition of pastoralists as those 'who depend primarily on the products of their hooved domestic animals, and who organise their settlement and mobility strategies to suit the dietary needs of their livestock' has its shortcomings. There are those in Amboseli today who identify as being Maasai and thus 'people of cattle' but who possess no actual livestock. As Spear (1993) has demonstrated with the Arusha, membership within a pastoral community need not demand livestock herding per se. In writing this thesis I have come to conceive of pastoralism in Amboseli as being a mode of production entailing a wide range of varying and flexible livelihood practices that includes, but is not limited to, stock-keeping. Furthermore, I argue that we must critically approach historical evaluations of hunting, herding, and farming as separate modes of production in Amboseli, as failing to do so ignores the evidence of how these have actually functioned as facets of a larger diversified and entangled socio-economic landscape.

In this, my introduction, I detail the main theoretical influences that feature in my research and interpretations, and define the framework for my investigation of pastoralism in Amboseli. Firstly, I discuss how this thesis can be considered a culture history of Amboseli in its organisation and focus which are both directed towards presenting a foundational outline of the evidence for pastoral occupation in this landscape through time. In recognition of the theoretical inadequacies of a culture historical approach, I also draw heavily on the research program that is historical ecology in my emphasis on landscape, material culture, engagement with local knowledge, and desire to make archaeology useful in Amboseli. An outline of the chapters included in this thesis concludes my introduction.

1.1. A contemporary twist on the culture historical approach

Culture historical approaches have a long tradition in African contexts, and have been described as the 'bread-and-butter' for archaeologists researching later Holocene time periods south of the Sahara (Ashley 2005: 18). Culture history, with its emphasis on geographically and temporally bounded type *fossils* (Childe 1935: 1) and homogenous and internally immutable archaeological cultures, has however been rightly critiqued as intellectually restrictive (Stahl 2001: 14-15; Ucko 1993). Still, in many areas of the world there is justification for adhering to simple and widely digestible spatio-temporal frameworks and for producing rudimentary categorisations of archaeological data before beginning to engage in more complex lines of enquiry (Ashley 2005: 96; Paddaya 1994: 139), and Amboseli is no exception.

Table 1.1 Archaeological periods and age ranges referred to within this thesis

Archaeological period	Approximate date range
Pastoral Neolithic	c. 4500–1300 BP
Early Iron Age	c. 2000–1700 BP
Middle Iron Age	c. 1700–1000 BP
Late Iron Age	c. 1000–200 BP

As Amboseli is such an archaeologically unknown area, it has been imperative to craft a skeletal framework of empirical basics pertaining to artifact and site type, chronology, distribution, and preservation, and culture history provides a functional structural model by which to achieve this. In full recognition of its theoretical shortcomings, this thesis draws on culture historical approaches, most notably in the organisation of chapters using the familiar

Pastoral Neolithic Early, Middle and Late Iron Age chronological rubric (Table 1.1), all the while engaging, albeit critically, with certain East African *fossiles directeurs* as the need arises. Additionally, I place much focus on pastoralism in Amboseli though I acknowledge that situating livestock herding at the thematic core of this research threatens to relegate other livelihood activities to the periphery, or subsume them under the heading of internal variation.

In order to break away from tired formulas of societal homogenisation that typify culture history, I embrace a more contemporary and flexible conceptual approach and envision society as complex and multivalent with transformation and continuity being the product of both internal and external stimuli. This is a culture history of Amboseli that is heavily influenced by the post-processual turn in archaeology (e.g. Hodder 1985) which has allowed us to appreciate society as inherently dynamic and material culture as more than a reflection of discrete ethnic, linguistic or economic groups. Additionally, though structuring my chapters using general chronological demarcations has some utilitarian merit, these boundaries must be understood as largely arbitrary framing devices rather than representative of wholly significant cultural eras. In drawing on recent developments in postcolonial historical African archaeology (e.g. Pikirayi 2004; Schmidt and Walz 2007: 130; Reid 2016; Straight et al. 2016) which have avoided delineating between history, textual source material, and thus the colonial encounter on the one side and an enormous and amorphous pre-history on the other, I consider pre-historic pastoralists a non-entity, as ‘if there is evidence, there can be history’ (McCall 2005: 1).

From this standpoint, my focus in this thesis has not been on documenting the beginning and end of cultural eras and thus periods of rupture in Amboseli. I have sought to consider variability in the archaeological record not as an expression of homogeneity bounded by episodic change, but as a cumulative trend or pattern spanning the entire history of pastoralism in Amboseli. Importantly, rather than promulgating a single coherent picture of livelihoods, land use and exchange in this landscape, I have made a concerted effort in the chapters that follow to present the noise and disjuncture, and to acknowledge the many remaining gaps in the data. Writing the definitive history of pastoralism in Amboseli is an impossible project, but this thesis is a first step towards building a comprehensive and detailed understanding of pastoral livelihoods and landscape over time that will serve as recourse for future inquiries.

1.2. Historical Ecology

Historical ecology as a research program has been highly influential in the writing and overall execution of this thesis. Historical ecology is gaining in popularity among archaeologists working in East Africa as it champions the integration of archaeological, historical, anthropological and ecological data and perspectives (e.g. Davies 2010; Lane 2010; Stump 2010, 2013a). Rather than being constrained within the bounds of a single methodology or theory, the appeal of historical ecology lies in its dismantling of conceptual nature/culture binaries, utilisation of landscape as a key unit of analysis, and its critical engagement with the politics and ethics of conservation and resource management (Armstrong et al. 2017; Balée 1998; Crumley 1994, 2017). In what follows, I discuss how I have drawn on various conceptual and practical tools in producing a history of pastoralism in Amboseli, and how they relate to the avowedly interdisciplinary historical ecology approach.

1.2.1. Landscape and material culture

Historical ecologists recognise that people play a key role in transforming the landscapes they inhabit and that societies are likewise entangled in complex human-environmental interactions (Balée and Erickson 2006; Crumley 1994). As is expounded on in Chapter 2, human induced transformations are not assumed to be detrimental to the environment, but rather people are acknowledged to have the capacity to enhance biodiversity and landscape heterogeneity (Balée and Erickson 2006: 3). Landscapes, as used in this context, are the manifestations of the relations between humans and their environments (Balée 1998; Crumley 1994). They are the result of processes wherein ‘both people and their environments are continually bringing each other into being’ (Ingold 2000: 87). Just as physical aspects of landscapes are in perpetual flux, landscapes are also regularly re-imbued with social meaning (Ashmore 2002; Gosden 1994). Yet, culture and history are not under constant erasure, but are instead inscribed in landscapes, presenting themselves in palimpsest formations that can be investigated from varying perspectives, and using diverse techniques (Balée and Erickson 2006: 7). While admittedly the idea of landscape as employed in historical ecology is broad, this thesis finds commonality with most landscape archaeologies in that the focus is moved beyond the bounded entity that is the site, with analysis operating on multiple spatial and temporal scales.

A multi-scalar approach is well-suited to investigating Amboseli, as the idea of the Amboseli landscape as employed in this thesis is ultimately a construct. It is a useful and relatable construct, as the area is demarcated by both state lines and in accordance with empirical evidence for animal migrations, prompting the classification of this space as an ecosystem (Western 1975, 2007). Still, it would be remiss to not address the problematic idea that Amboseli is a perfectly bounded entity with the basin being the central focus of all activity. Doing so runs the risk of perpetuating a notion that the National Park is the most significant feature in this landscape, glossing over how conceptualisations of the Amboseli landscape are in many ways a product of colonial geographies. European colonialism the world over was linked to diverse acts of landscape transformation, though very often the creation of entirely new borders and boundaries in processes that laid claim to territories inhabited by colonised people (Gosden 2004: 25-33), as was the case in Amboseli. The high densities of wildlife within Amboseli National Park and their movements through the wider area must thus be partially understood as a legacy of some areas being gazetted, and so ‘protected’ and others not. This is all to demonstrate that the Amboseli landscape should be conceived of as unbounded and fluid, influenced by present and past human land use and policy.

In essence, landscapes are dynamic, multi-scalar, and to quote Barbara Bender (2006: 304) they ‘refuse to be disciplined’. To cope with this complexity, landscape historical ecologies are well served to embrace diversity rather than uniformity in their research approach (Lane 2010). As such, Chapters 4 and 5 of this thesis draw on concepts of ‘off-site archaeology’ (Foley 1981a,b) and more traditional on site excavations in addition to post-processual ideas that see space as ‘socially constructed and constitute of social relations’ (Robin and Rothschild 2002: 161). Additionally, throughout this thesis I incorporate literature pertaining to the history of the wider East African region in order to better contextualise and understand pastoral pasts in Amboseli.

The influence of Bourdieu’s (1977, 1984, 1990) concepts of habitus and theory of practice and Latour’s (2005) Actor-Network Theory can be seen in historical ecology in its consideration of how ways of being in the world are the product of people experiencing and shaping landscapes and the non-human entities within them (Armstrong et al. 2017; Balée 2006; Meyer and Crumley 2011). Paralleling conceptualisations of landscape employed here, materials have socially constructed meanings, and social practices are, in fundamental ways,

constituted by the making, exchange and consumption of things (e.g. Hodder 1982; Miller 2005; Tilley 2006). Admittedly, material culture studies are not typically highlighted under historical ecological research approaches (though see Lane 2010). However in the sense that material objects are productive of cultural processes, matter in the configuration of livelihoods in Amboseli, and constitute part of the physical landscape, it follows that my engagement with things is discussed here.

My approach to discussing how material objects, exchange, and livelihoods articulate in Amboseli through time draws on ‘biographical’ studies of material culture. Biographical approaches are inspired by Appadurai’s (1986) edited work *The Social Life of Things*, which looked beyond the tired dualism of ‘traditional’ and ‘modern’ economies to instead investigate how and when objects enter into exchange. In examining the biographies of material things, our attention is directed to the way that objects circulate through various contexts, having impacts on the people who encounter them (Stahl 2010: 157). In Chapters 4-8 of this thesis I review how certain object categories such as obsidian, ceramics, iron implements, beads, salt, and numerous cultivars may have been produced, exchanged and consumed in Amboseli and the wider region. The level of detail and certitude in these discussions naturally varies, especially because the archaeological record, devoid of evidence based on language, is challenged to divulge much on how things were imbued with meaning and re-contextualised in time and space (Stahl 2004a: 52). Chapter 8 features the most comprehensive accounts of how exchange relations are part of ‘the substance of social life’ (Thomas 1991: 7), as I incorporate insights generated by local people in Amboseli during interviews pertaining to the histories of various archaeological artifacts. Heeding the advice of Stahl (2004a: 52), I do not, however, set out to replicate the research aims of anthropologists or historians in my engagement with biographical approaches, but rather frame my inquiries in a manner compatible with my evidence which is material, quotidian, and enables a local view on wider regional and global processes.

Thus an important contribution of biographical approaches to my thesis has been bringing the focus onto how material objects recovered in Amboseli speak to the relations between people in and beyond the landscape. This has allowed for an examination of how pastoral livelihoods in Amboseli have long been socially and economically connected in complex inter-regional and global ‘entanglements’ (Thomas 1991; Stahl 2010). These entanglements again speak to the ways in which the Amboseli landscape, and the people who have inhabited it, have been intrinsically linked rather than sealed off from the wider East African world.

1.2.2. Local engagement

In a recent priority question setting exercise for historical ecologists, a key issue identified was the importance, but also complexity, of achieving meaningful collaboration with local and Indigenous people (Armstrong et al. 2017). Throughout the course of researching and writing this thesis, I have strived to take an approach wherein my methods and interpretations have been open to the input and consent of people living in Amboseli. This is archaeological research, though it is in some ways methodologically inspired by anthropology and the ethnographic model. Archaeologists and anthropologists are of course practically and theoretically connected. There has been considerable intellectual exchange between the two disciplines, for instance archaeology offering a unique temporal perspective on landscapes (Ingold 1992: 694) and anthropology providing ethnographic analogies (e.g. Grillo 2012). Certainly the wealth of knowledge held by local people pertaining to past and current pastoral practices in Amboseli provides a depth of understanding to how livestock herders operate in this landscape, and is inviting of archaeological comparison. Yet, engaging with local people with the sole intent of developing archaeological analogies is not exactly the most

postcolonial endeavour (González-Ruibal 2014: 11). Rather, I have sought to incorporate a diversity of interpretations and perspectives pertaining to the Amboseli landscape, and to the material culture recovered from within it, in pursuit of a more informed but also imperfectly collaborative archaeological process.

It is important to note that in the writing and researching of this thesis, engagement with local histories and knowledge was done with critical awareness of the risks of producing misleading ‘ethnographic pasts’ (Stahl 2001: 22,25), or implying that local people are in any way attuned to a timeless way of life (Stump 2013a: 280). It would be both ethically and empirically problematic to mine local people for their knowledge and in the process burden them with the task of generating a complete history of pastoralism in Amboseli. That being said, the value of local knowledge as a resource for understanding the history of Amboseli is immense in that the act of experiencing landscapes and individual and collective memories of landscapes are part of the creation of landscape histories (Ashmore 2002; Bender 1993; Low 2000). Many phenomenological approaches to understanding landscapes in archaeology are in relation to the experience of the archaeologist. Ingold (1993: 152) has called the practice of archaeology, of seeking pasts in the landscape, a form of dwelling in itself. However, local people, people who have lived their lives in particular landscapes and are the recipients of intergenerational and place-based knowledge, are recognised to have perspectives that are unique from the non-local archaeologist. Being local in Amboseli is linked to being part of the landscapes’ histories and incorporating those histories into a living process that includes the present; it has been my aim to critically discuss aspects of these histories throughout this thesis as they relate to more contemporary pastoral livelihoods rather than to a romanticised and static pastoral way of life.

Though I have strived to bring a degree of collaboration to this process, I have made the decision to avoid calling this an example of community archaeology. While Amboseli is the location of widely cited examples of ‘community-based conservation’ (e.g. Western and Wright 1994), there is also recognition that development organisations, researchers, and conservationists alike are faced with an enormous challenge trying to cultivate the breadth of relationships relevant to community project planning and benefit sharing (Belsky 2009; Brockington et al. 2008). This is because communities are vast heterogeneous networks of social relations shaped by any number of factors that are not spatially or temporally finite (e.g. Agrawal 1999: 93; Amit and Rapport 2002; Watts 2000). Community management projects, while espousing inclusiveness can seldom help but exclude some members within communities of relevance (Agrawal 2001: 1623). Notably, while conducting my own fieldwork, all of my interviews were with people who identified as Maasai, as they are the dominant pastoral people in this landscape, though they are of course not the only ethnic group represented in Amboseli.

It is true that this research aimed to appreciate, contextualise and learn from the outlook of local people on their own history, not just in formal interviews and exercises, but also in informal conversations and observations. Still, a problematic reality remains in that Euro-American scholars and institutions dominate in the production of archaeological knowledge (González-Ruibal 2010: 41; Lane 2011a: 8). I do not presume to present a complete history of Amboseli in accordance with local knowledge systems or ways of structuring time and space, approaches that have been called for by those wishing to incorporate local/Indigenous epistemologies into African archaeology (Andah 1995: 173; Schmidt 1995: 119). I acknowledge that the research methodology, aims, and formulation of historical ‘mentions and silences’ (Stahl 2001: 1-2; Trouillot 1995: 48-49) are all ultimately the product of my own design, and while local people were influential to this process, the scope for proposing research questions and formatting interpretations was imbalanced. For the aforementioned

reasons, this research is not presented as having achieved community consensus. Instead, this thesis can only claim to have consulted multiple perspectives on remains of the past in the present.

In sum, this research has endeavoured to be a process where ‘influence flows in multiple directions rather than only one way’ (Agrawal 2005: 179), and there were many challenging power dynamics inherent to this enterprise. For instance, it is an inescapable reality that my ultimate mobility and material wealth as a PhD student from a Swedish institution stands in contrast to many people living in Amboseli. Power and authority were by no means exclusive to me in my capacity as a researcher and employer however. The people I interacted with in Amboseli were my teachers, guides and gatekeepers. The process of building relationships and pursuing collaboration in this context was in truth at times clumsy, with mutual understanding being a goal moved towards both gradually and tentatively. In this respect, certain ethnographic approaches have been of inspiration throughout the completion of this thesis. As ethnographers accept, it is an impossibility to adopt an objective and omniscient position, but despite the ethnographer being a flawed ‘instrument of cultural translation’ it is still possible to produce empathetic and critical research (Scheper-Hughes 1995: 417-418). This thesis could thus be considered as an act of translating history (*sensu* Clifford 1997: 39-41), wherein local knowledge sources were translated in an imperfect process that allowed me to make many of the insights I gained from engaging with local people accessible and valid to a wider audience.

1.2.3. Making archaeology useful in Amboseli

This thesis was undertaken as part of the Resilience in East African Landscapes project (www.real-project.eu), an early career researcher training and mobility network, which brought together ecologists, archaeologists, anthropologists, geographers, historians, and agronomists to examine diverse aspects of socio-ecological variability, transformation, and, of course, resilience in eastern Africa. Resilience is a concept that is naturally suited to deep time studies, and the past could be considered a ‘ready-made testing ground’ for hypotheses pertaining to the sustainability of socio-ecological systems under conditions of environmental, economic, or cultural transition (Stump 2013a: 279-280). While I acknowledge that resilience theory can allow archaeologists to produce useful histories that speak to issues that matter to African communities in the present day, I do not employ resilience as a key conceptual framework in this thesis. In what follows I discuss why this is, and also dig into the concept of ‘usable pasts’, which I have found facilitates a more appropriate and directly beneficial application of the evidence gathered during the course of my research.

Resilience has been commonly conceptualised as the magnitude of perturbations or change that a complex and dynamic system can adjust to before the structural and functional properties of that system experience significant shifts (Gunderston and Holling 2002; Redman and Kinzig 2003). In this thesis engagement with such formal conceptualisations of resilience is avoided, however. This is principally because issues of archaeological visibility complicate examinations of the socio-ecological properties of past pastoral livelihood systems in Amboseli. Even if, for example, it were possible to fully know the more technical aspects of pastoral land use through time, such as settlement distribution patterns and livestock/human densities, there would still be the matter of understanding the socio-cultural aspects of past herding strategies that facilitated and maintained these trends. While it is not an impossibility to use archaeological data in conjunction with historical and palaeoenvironmental evidence to address questions of resilience, doing so for the entirety of the Amboseli landscape is beyond the scope of this thesis. Proponents of resilience theory likewise recognise the challenges of using archaeological data to generate historical detail at the scale necessary to test socio-

ecological models and conclusively identify long-term sustainable management practices (Stump 2010, 2013a,b). Given the exploratory nature of fieldwork in Amboseli, and the temporal scale of my inquiries, resilience theory as described above was found to be an inappropriate concept by which to discuss pastoral livelihoods through time in this thesis.

In addition to the practical limitations of using resilience theory as a framework for exploring Amboseli's past, examinations of resilience in pastoral systems in eastern Africa have been critiqued for overemphasising the rigidity and fragility of livelihoods (Derbyshire 2017: 53-54). Derbyshire (2017: 310) offers an alternative conceptualisation, finding resilience among pastoralists in Turkana in the constant subtle reorientations of daily practices and broader livelihood configurations. The notion of resilience as employed by Derbyshire (2017) highlights the dynamism, complexity, and inherent open-endedness of culturally entrenched knowledge which ceaselessly integrates, rather than resists, change. However, the utility of similar acknowledgments of the long history of flexible and adaptive behaviour among rural African communities (e.g. Niemeijer 1996) have drawn the ire of Stump (2010: 1257) in his remark that 'such a conclusion is so wide-ranging that it could be made in the absence of historical data in that it is effectively a statement that individuals in Africa generally cope to some extent.' Still, resilience as conceptualised by Derbyshire (2017) has appeal in Amboseli as, for one, it liberates discussions of pastoral livelihoods in the 20th/21st century from the pervasive idea that globalisation and capitalism are the inevitable harbingers of 'pessimism and loss' (Moore 2011: 5). Though the term is employed minimally in the following chapters, where it does appear I equate resilience with such a notion of open-ended adaptiveness.

Rather than designing this research to assess the resilience and sustainability of local practices, and subsequently evaluate whether or not they should be abandoned or encouraged, I have determined that the temporal and spatial resolution of the lines of evidence drawn on are better suited to problematise and intercede in the way that Amboseli's history is currently presented within conservationist and development contexts. This approach aligns with the notion of usable past which in its broadest conception is the application of historical research to generate insights of value to contemporary people (Andah 1995; Stump 2010, 2013a). Archaeological projects that contribute as usable pasts are often those that check unsubstantiated or fragmentary historical narratives that are directed at legitimising interventions by presenting local resource use strategies as either sustainable or ruinous (Stump 2013a: 281). This thesis presents a usable past of Amboseli in that it highlights how agriculture, often maligned as a recent and environmentally destructive resource use strategy that is at odds with pastoralism (see Chapter 2), has a far longer presence in the landscape than was previously thought, and draws attention to how the history of cultivation and livestock herding are in many ways entangled. Additionally, I call into question the representation of pastoralism in Amboseli as a livelihood that can be historically understood as having been disconnected from the wider regional and even global economy. These initiatives are also congruent with a historical ecological approach in that we should evaluate the Amboseli landscape as the product of an intricate and ongoing history of human action, the impacts of which can be examined without the *a priori* assumption that certain behaviours are 'conservationist or anticonservationist' (Balée and Erickson 2006: 12). Indeed, historical ecology and usable past approaches have a history of being successfully integrated by archaeologists working in East African contexts (Lane 2010).

As a point of clarification, this thesis orients itself towards an applied archaeological rather than a hybrid archaeological approach, despite featuring an engagement with local knowledge. Stump (2013a: 276) detects an incompatibility between usable pasts, which derive their influence and thus utility from being viewed as empirical, and what he calls hybrid archaeologies which blend local conceptions with 'Western' historical interpretations.

The incongruity supposedly lies with how hybrid archaeologies strive to incorporate local conceptions of history based in local epistemologies, and in so doing weaken the ‘authority’ of ‘Western’ empiricist archaeology through the implication that the latter is somehow deficient (ibid.). This research is not an example in hybrid archaeology as defined by Stump (2013a), for while I have engaged with local perspectives, I do not claim to have produced a history of Amboseli in negotiation with local epistemologies that are in some way markedly different from ‘Western’ historical interpretations. It is important to note however that there is no inherent distinction between ‘archaeological’ and ‘local/Indigenous’ knowledge systems, as such a dualism would imply that these categories are closed and fixed rather than continuously changing and capable of influencing each other (Lane 2011a: 11). Additionally, post-modernist and deconstructionist critiques have demonstrated the limited and contextually relevant character of even empirical science (ibid.), and as Stump (2013a: 271) also recognises, local knowledge is not inherently unscientific.

1.3. Thesis structure

Following on the brief introduction to the Amboseli ecosystem in this opening chapter, Chapter 2 delves deeper into the dynamics of biodiversity and pastoral functioning in the landscape. This chapter explores in greater detail how more contemporary pastoralists in Amboseli have influenced the rangelands they live within, and how those practicing animal husbandry manage their herd compositions and mobility patterns in this complex ecosystem. Within Chapter 2 I also examine how the Amboseli ecosystem is perceived to be undergoing transformation with negative implications for livestock and wildlife, drawing attention to how conservation interventions are targeted to promote certain aspects of pastoral livelihoods over others. Finally, I focus on how traditional pastoralism in Amboseli is largely conceptualised in conservation and ecological literature, and how it fails to consider the breadth of livelihood activities that have historically featured in this landscape.

The methods by which I have collected, analysed and interpreted the data around which this thesis was constructed are detailed in Chapter 3. I provide an overview of the survey design and execution, the methods used to identify traces of pastoral settlement in the archaeological record, and how excavations were implemented. The means by which ceramics, lithics, ‘special finds’, and zooarchaeological and macrobotanical remains were analysed also features here. Additionally, I discuss how drawing on archival and historical texts has shed light on the manner in which pastoralists were perceived and governed in Amboseli in the 19th and 20th centuries. Elaborating on section 1.2.2., a more detailed description of the means by which I have engaged with local knowledge sources, including interviews and participatory mapping exercises, concludes this chapter.

Chapter 4 contains the results of survey work in my study area in Amboseli. I begin by reviewing how Robert Foley’s 1981 PhD thesis ‘Off-site archaeology and human adaptation in Eastern Africa’ has been highly influential in my approach to detecting patterns in the distribution of artifacts. While I find Foley’s (1981a) models for Pastoral Neolithic and Maasai herder land use in the Amboseli basin to be lacking, in the sections following I demonstrate that the results of my own survey largely substantiate his earlier findings indicating that the landscape is subject to aggradation. Within this chapter I of course also present an outline of the artifacts encountered during the 2015 survey, before delving into how vegetation cover, geology, and hydrology appear to have impacted the dispersal and recovery of ceramics and lithics. The remainder of the survey chapter discusses how the distribution of artifact types does or does not approximate the distribution of mid-20th century pastoral settlements in the study area, and whether or not settlements and artifacts appear to

be consistently situated in relation to various resources in the landscape. I argue that off-site archaeological approaches are highly relevant to understanding pastoral landscapes, particularly with regards to how taphonomic factors have influenced the distribution and recovery of archaeological remains, though I stress that the rationale behind which areas in Amboseli are occupied and re-occupied cannot be entirely understood using remote sensing techniques alone.

In Chapter 5 I present the results of excavations at the 10 sites selected for further investigation during fieldwork in Amboseli. This chapter commences with a discussion of the variety of ‘classic’ Maasai pastoral settlement types in order to illustrate the diversity of archaeological impressions that livestock herders may leave behind in the landscape. The bulk of this chapter is devoted to describing the stratigraphy and finds encountered during the excavation of sites in Amboseli. The majority of these sites would seem to date to the Late Iron Age (1000-200 BP), though some of the occupation horizons encountered span into the 20th century.

Chapters 6, 7, and 8 draw together the findings from the survey, excavations, historical texts, local knowledge sources and existing literature to present a chronological history of pastoral livelihood practices in Amboseli. Beginning with the Pastoral Neolithic, Chapter 6 delivers an overview of the evidence for the emergence of livestock and specialised pastoralism in eastern Africa, and examines the *fossiles directeurs* which may attest to an early pastoral occupation in Amboseli. This chapter both provides context for discussions of pastoralism in the Iron Age, and also highlights how East Africa’s specialised herders did not become established in a vacuum, but were instead part of a diverse socio-economic landscape wherein it seems people regularly participated in long-distance exchange. I further make the case that the available data pertaining to cultivation during the Pastoral Neolithic is at present insufficient to determine how significant a role purposefully managed plant resources played in the emergence of specialised pastoralism, and that they need not be discounted. In Chapter 6 I also bring in the concept of the East African ‘moving frontier’ (Lane 2004) to discuss the varied tempo and processes by which transitions to pastoralism occurred, a concept invoked again in Chapter 7 in reference to the emergence of Iron Age elements such as metal working, Urewe and Kwale ceramic wares, and certain agricultural practices. My initial focus in Chapter 7 is on the Early and Middle Iron Age in Amboseli, for which there is very little direct archaeological evidence, though again this discussion provides context for developments in the Late Iron Age. The remainder of Chapter 7 reviews information on the key archaeological sites, land use patterns, ceramic types, and linguistic and palaeoenvironmental data available for Amboseli, before finally turning to what is known about trade and cultivation in this landscape over the last millennia. Two important findings are 1) that agriculture was practiced in the Amboseli landscape in the Late Iron Age, and 2) objects of exchange attest to how livelihoods in Amboseli in the Late Iron Age were shaped by regional and global entanglements. I apply the concept of ‘mosaics’ (Kusimba and Kusimba 2005) to describe the socio-economic landscape in which pastoralism functioned in Amboseli in the Late Iron Age, highlighting the heterogeneity of livelihood practices, settlement patterns, linguistic groups, and material culture styles that are characteristic of this time. In something of a departure from the chapters proceeding it, Chapter 8 draws more heavily on historic textual and local knowledge sources in an exploration of pastoralism in the 19th century, and during the colonial period in Amboseli. This chapter begins with an overview of trade in the Amboseli region in the 19th century, and discusses how certain production systems on nearby Mt. Kilimanjaro were impacted by exchange routes oriented towards the coast. In the following section, evidence for the ‘origins’ and trajectories of the Maasai in Amboseli is reviewed, directing attention to the role that hunting and cultivation

played for these ‘traditional’ pastoralists, and in the landscape overall. This leads to a consideration of how just as agricultural production was modified on Kilimanjaro in the 1800s, pastoralism as practiced by the Maasai in Amboseli and throughout eastern Africa at this time should be understood as a product of the particular socio-economic and environmental context of the 19th century. Moving into the 20th century, I discuss how the colonial encounter brought about transformations in pastoral rangelands, livelihoods and pathways to accumulation in Amboseli. Undeniably, the colonial period entailed unjust and disastrous interventions and re-orderings, the legacies of which can still be seen today. However, my aim in this chapter is to mark a break with presuppositions that cling to the idea that the colonial period was a time when pastoral traditions in Amboseli became entirely mired in erosion and loss. Relations of exchange in Amboseli linking agriculturalists, hunters, and herders in actuality exhibit continuities through the 19th and 20th centuries, attesting to the resilience of these livelihood entanglements.

In the concluding chapter I return to some of the themes that feature in this introduction, for a final exploration of the central arguments and findings of this thesis. I further discuss the implications of the research presented here, revisiting the points broached in Chapter 2 with regards to how pastoral pasts and futures in Amboseli are conceptualised by the organisations and individuals in the conservation and ecology community who have an influential role in determining the development initiatives to be introduced to this landscape.

2 Amboseli from an ecological perspective

This chapter introduces the Amboseli ecosystem, providing a general description of the geographic and climatic conditions of the area, followed by a discussion of wetland, vegetation, and wildlife dynamics. As livestock are widely recognised to be important species in the landscape, this chapter devotes a section to examining how pastoralists influence rangeland functioning in Amboseli. I also review the history of Amboseli as discussed by ecologists and conservationists, focusing heavily on the traditional or essentially 20th century ways that pastoralists are supposed to have existed in this ecosystem, and how and why these traditions have been changing. The narrative for traditional pastoralism as embraced by ecologists in Amboseli challenges ill-conceived, colonial era tropes that led to herders being excised from savanna ecosystems in the name of conservation, and to rangelands being converted to farmlands in order to enhance their ‘productivity’. However, an issue that the remainder of this thesis seeks to address is that in some critical ways ‘baseline’ pastoral conditions in Amboseli as conceived by ecologists and conservationists are unsupported by the evidence produced by historians, archaeologists, palaeoecologists and anthropologists working in East Africa.

2.1. Dynamics of biodiversity

The Amboseli basin formed during the Pleistocene when the area was covered by a lake. Vast deposits of lacustrine silts and clays were laid down, reducing the relief of the topography and constricting drainage (Foley 1981a: 93). The lake has since receded, and while its levels have fluctuated, subsequent to the Late Pleistocene (c.100,000-20,000 BP), the environment is best characterised as swampy and marshy during periods of high water as opposed to open lake conditions (Behrensmeyer and Boaz 1981; Williams 1972). Today, the Amboseli ecosystem abuts the Kenyan-Tanzanian border, encompassing the lower northern slopes of Mount Kilimanjaro, the Chyulu Hills to the east, basement plains to the north, and scattered granitic outcrops and volcanic cones to the west (Croze and Lindsay 2011: 12). Soils range from a complex of Luvisols and Cambisols in the north, to the saline and sodic lacustrine plains of the Amboseli basin, to well-drained Pleistocene volcanics on the foothills of Mt. Kilimanjaro (Touber 1983). Recent volcanic soils also exist in the Chyulu Hills and the rocky, basement derived, Central hills (ibid.). To the south of the Amboseli basin the land rises sharply towards Kilimanjaro and the Kenya-Tanzanian border, while wetlands dot the landscape on an east-west transverse.

Amboseli lies in the rain shadow of Mt. Kilimanjaro, but there is considerable variability in the quantity and distribution of precipitation across the ecosystem with agro-ecological zones ranging from sub-humid to semi-arid. In the forest zone on the northern slopes of Kilimanjaro on average 800 mm of rainfall falls each year (Meijerink and van Wijngaarden 1997: 112). The Chyulu slopes may experience localised rainfall of 500-600 mm annually (BurnSilver et al. 2008) with higher elevation areas supporting montane evergreen forests and rainfall approaching 1000 mm per annum (Kamau and Medley 2014). The Amboseli basin itself is best characterised as a semi-arid savanna, as rainfall within the lower elevations of the watershed averages 340 mm each year (Altmann et al. 2002). Being located in eastern Africa,

the rainfall regime is bimodal due to the movement of a band of low pressure called the Intertropical Convergence Zone (ITCZ). Between March and May the long rains fall in Amboseli as the ITCZ passes over, moving north, and from October to December, the ITCZ moves south again, bringing the short rains (Croze and Lindsay 2011; Swift et al. 1996). Historically, the movements of the ITCZ have changed with global temperatures and regional atmospheric forcing. As in other semi-arid savannas, ecosystem functioning is highly influenced by the seasonal and spatial availability of water.

Arguably, the wetlands within the arid Amboseli ecosystem are the landscapes most defining feature (Fig. 2.1). These wetlands are charged by groundwater seeps and springs fed through an underground drainage system with water originating on the forested catchments and volcanic soils of Mt. Kilimanjaro and the Chyulu Hills (Croze and Lindsay 2011: 13; Meijerink and van Wijngaarden 1997). Lake Amboseli is another hydrological feature in the landscape fed by groundwater, though currently it boasts only ephemeral, shallow, and highly saline waters (Meijerink and van Wijngaarden 1997). The wetlands found to the south-west of Lake Amboseli are likely to have once drained into it, creating a deltaic environment (Behrensmeyer and Boaz 1981). Rainfall and surface flow from flood spreading and rivers also contributes to the volume of water in the wetlands and the lakebed.

Fig. 2.1 Location of Amboseli wetlands discussed in this thesis

World Imagery provided by Esri, DigitalGlobe, GeoEye, i-cubed, USDA FSA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo, and the GIS User Community.

While it seems intuitive that when the water in the wetlands and lakebed are at their highest levels there would be an expansion of forest vegetation cover, this is not always the case in Amboseli. As the groundwater rises in the basin, and the wetlands expand, the high rate of evapotranspiration can lead to pronounced soil salinity, adversely impacting the salt intolerant *Acacia* woodlands (Western and van Praet 1972). Another noteworthy consequence of increased water availability and high evapotranspiration rates in the Amboseli basin is the formation of calcrete pans and ridges that temporarily reduce vegetation cover (Foley 1981a: 82). There are a number of ways that calcrete can form in Amboseli, including through the flow of dissolved carbonate in groundwater. This kind of non-pedogenic calcrete formation occurs in areas where the water table is high (Chen et al. 2002: 15), and forms in the

Amboseli basin most aggressively under the same conditions that result in soil salinisation. Thus, when the groundwater table and evapotranspiration rates are both high, there may be a decline in the woodlands and concomitant increase in the grasslands and halophytic (salt tolerant) species such as *Sueda monoica*.

The dynamics impacting Amboseli's groundwater table and ecosystem functioning overall are conditioned by local and regional environmental factors operating on various temporal scales. On a global scale, extremes in rainfall over eastern Africa may occur due to the El Niño Southern Oscillation (ENSO) cycle that brings increased rainfall during El Niño years, and drought conditions during La Niña episodes. Vegetation cover and land use on the slopes of Kilimanjaro and Chyulu also both influence forest-atmosphere exchanges and, surface and sub-surface hydrology. As the wetlands are fed by water originating in these highland areas, what happens there directly impacts ecosystem functioning in the lowlands. On the local scale, vegetation is similarly important as different plant species have varying impacts on evapotranspiration, and plant biogeography is a controlling factor for inflow channelling and erosion (Irungu 1992; Western and Maitumo 2004). Hydrological conditions in wetlands may also be altered by more direct anthropogenic and animal activities such as trampling, wallowing, digging, and water offtake (Butler 2006; Ellery et al. 2000). These interactions are complex, and fluctuations in wetland water levels cannot be easily attributed to any one factor.

The entire Amboseli ecosystem is conditioned by the uneven distribution of water. The flora of Amboseli includes broad tropical forests and woodlands on Mt. Kilimanjaro and the Chyulu Hills transitioning to riverine forests, open grasslands and seasonally flooded plains in the lowland areas. In the drier lowlands *Commiphora* and *Acacia* woodland vegetation is morphologically adapted to reduce water loss, increase water storage, or comes equipped with root systems that can efficiently access ground and surface water (Sarkar 2006: 5). In the wetlands, around certain water points (i.e. rivers, springs, and wells), and in highland areas green foliage can be found year round, sustaining a unique blend of grasslands, woodlands and aquatic life in the landscape. Throughout the highlands and lowlands, crops are grown for consumption and sale anywhere that water can be regularly accessed. Beyond these areas, growing beneath the *Commiphora* and *Acacia* trees, lies a sea of halophytic grassy/scrubby vegetation that yellows as the dry season progresses. The grasses of Amboseli sprout quickly in response to precipitation though, and lush pastures spread rapidly with the start of the rains (Swift et al. 1996; Western and Lindsay 1984). The mobility of migratory grazing animals and the species that live off of them is largely structured by the dry and wet season availability of water and pasture in Amboseli.

The Amboseli ecosystem supports a stunning array of life (Fig. 2.2), though in terms of biomass and visibility, elephants dominate the landscape today (Croze and Lindsay 2011: 11). Of all the mobile herbivores in Amboseli, elephants (*Elephas loxodonta*) stand out as a 'keystone species' (Paine 1995), as they play a significant role in modifying the environment. Elephant populations in Amboseli National Park have been increasing and have become less mobile since the mid-20th century (Croze and Lindsay 2011: 27-28). As a result, elephants have heavily grazed and impeded the recovery of *Acacia* woodlands (Western and Maitumo 2004). In contrast, outside the park it has been found that 'cattle create trees' (ibid. 119). Here, the presence of humans to a large degree deters elephants, and livestock grazing also serves to crop the herb layer allowing tree seedling growth (Western and Maitumo 2004). The extent to which elephants are driving the contraction of woodlands in Amboseli remains contentious (see Spinage 2012), though elephants undeniably retain the title of 'flagship' species in the National Park (Western 1989), being the charismatic megavertebrates most closely associated with conservation in Amboseli.

Fig. 2.2 Scenes of the Amboseli ecosystem

i) wildlife and livestock grazing in Enkong'u Narok; ii) hippopotami submerged in Sidai Oleng, Kimana; elephants travelling through Olgulului/Ololarashi G.R. into Amboseli National Park

While large mammals get most of the attention, the biodiversity of the environment is not contingent on one or two species, but rather the interplay between many dynamic parts including soil biota and microfauna. Dung beetles (Scarabaeinae), for instance, play an important role in consuming and redistributing dung, as well as nutrient cycling, soil aeration, and secondary seed dispersal processes in savanna environments (Nichols et al. 2008). Dung beetles also reduce hemotophagic and detritivorous flies that breed in dung, as well as dung-dispersed nematodes and protozoa (ibid.). Calves grazing on pastures without dung beetles have been found to acquire four times more endoparasites than calves on pastures with normal dung beetle populations (Fincher 1975). Diverse species of invertebrates promote the health of vegetation, wildlife, livestock, and humans in savanna environments in numerous ways. Soils modified by dung beetles and also termites are richer in nutrients such as phosphorus, potassium, nitrogen, calcium, and magnesium (Grant and Scholes 2006; Yamada et al. 2007). Like dung beetles, termites disperse dung particles, but termites also impact nutrient cycling through dung comminution, encouraging microbial consumption and further decomposition (Nichols et al. 2008). Dung beetle and termite activity is linked to increases in plant yields and nutrient levels, providing good quality forage for herbivores (Bang et al. 2005; Grant and Scholes 2006). Given that termite mounds (Boles 2017: 190) and dung beetles (Smith et al. 2014) are suggested to manifest in higher concentrations in livestock enclosures the relationship between pastoralists and termites/dung beetles may be described as mutualistic.

From the soil microfauna to the panoply of birdlife and mammals large and small, there are countless other organisms in Amboseli that contribute to the functioning of the ecosystem (see Okello 2004; Western 1973) and it is simply not within the scope of this thesis to discuss them all. Yet for much of the last century the most abundant large mammal species in Amboseli have been livestock. Estimates of average wildlife population numbers in the Amboseli ecosystem are imperfect, but a recent study suggests there is something in the order of 60,000 wild herbivores and 400,000 domestic stock in the landscape (Western and Manzollilo-Nightingale 2004). The following sections explore how pastoral livelihoods are entwined with the ecology of Amboseli.

2.2. Pastoral rangeland management

Savanna ecosystems like Amboseli are incredibly diverse but they are all characterised by the same vegetation structure: discontinuous tree cover in a continuous grassland (Ratnam et al. 2011). The open grasslands of savannas are ideally suited for pastoralism and vice-versa; savannas may actually be considered more the product of fire and herbivory than any other factor (Skarpe 1992). Unfortunately, pastoralists have too long been held responsible for the degradation of savanna environments. Since the colonial period policies developed to ‘improve’ pastoral grazing systems have too often led to a loss of communal rangeland, with detrimental impacts for pastoral people.

While early studies often portrayed pastoralism as maladaptive and destructive to rangelands (Brown 1971; Herskovits 1926; Stebbings 1935), later researchers emphasised how well pastoralists adapt to existing ecological conditions, and rarely modify their environments in concerted ways (Western 1982: 193). Livestock overgrazing and intensive localised trampling can of course diminish the capacity for grass to regenerate, particularly after droughts, potentially leading to increased soil-erosion during periods of higher rainfall and reduced forage availability overall (Dunne et al. 2011; Groom and Western 2013). Yet, damaging levels of grazing seen in Kenya today can frequently be attributed to external pressures such as restrictions on mobility and rangeland contraction, rather than the presence of pastoralists in and of themselves (Boles et al. in prep). Moreover, pastures that are overgrazed do not

necessarily suffer long-term degradation, further challenging the idea that large livestock populations are harmful to savannas (Homewood and Rodgers 1984). Beyond the spectre of overgrazing and the ‘benign’ pastoral presence there is now a dawning realisation that pastoralists can actually play a significant role in savanna landscapes, promoting rather than negating biodiversity. Some of the more widely recognised pathways by which contemporary livestock herders exert influence on rangelands in Amboseli are discussed below. Though this is by no means an exhaustive list, it serves to highlight just how interconnected herders are with savanna ecosystem functioning.

2.2.1. Pastoral glades

Grazing certainly has the immediate effect of diminishing pasture, but mobile livestock and other herbivores also deposit nutrients throughout the landscape in their dung and urine, all of which boosts grassland productivity (Reid and Ellis 1995: 984; Turner 1998a,b; Young et al. 1995). Temporary livestock enclosures inhabited by pastoralists and their animals (Fig. 2.3) result in especially large accumulations of dung. Within these abandoned settlements, seeds that were brought to site in the dung of animals, or by people, are left to germinate in nutrient rich soils resulting in distinct vegetation successions (Muchiru et al. 2008, 2009). Species that grow on abandoned settlements tend to provide good pasture, abundant in protein and low in fibre (Stelfox 1986). The high-quality forage that flourishes on abandoned settlements attracts grazers, and grazing in itself can actually increase grass productivity and leaf nutrient concentrations, encouraging yet more grazing, leading to a positive consumer-resource interaction (Craig 2010; McNaughton 1984, 1984). Compounding this effect is the continuous accumulation of soil-enriching dung in these spots, all resulting in the formation of what have come to be called ‘glades’ (Fig. 2.4) (Augustine and McNaughton 2003; Muchiru et al. 2008, 2009). In Amboseli, within twenty years of abandonment the biomass on a glade may be twice as high as the surrounding environment, and significantly more biodiverse (Muchiru et al. 2009). Glade biodiversity encompasses more than just nutritious pasture for livestock however.

For example, people deliberately sow domesticated crops on former livestock compound sites in highland and lowland areas of Amboseli where rainfed and irrigation agriculture is practiced (BurnSilver 2009: 173), as these sites are especially fertile. Maasai people are most widely acknowledged for their impressive knowledge of wild plant life however, using the vegetation in and around settlement sites for construction materials, fuel, food, medicine, veterinary applications, brewing of alcohol, and ceremonial proceedings, all with potential impacts on their distribution and availability (Kiringe and Okello 2005). For instance, the pruning of trees for firewood and construction purposes around pastoral settlements can result in their accelerated growth (Okello et al. 2001). Many useful plant species thrive in the growing conditions of abandoned pastoral settlements, including wild edible leafy greens¹ (e.g. *namungwa*, a species of *Amaranthus*) calabash gourds² (*Lagenaria siceraria*), and tobacco³ (*Nicotiana tabacum*). Greens, gourds and tobacco are collected from pastoral glades in Amboseli though they need not be intentionally planted and encouraged.

¹ Interview with Tatia Ene Lopenyet in Kimana, April 20 2015; Interview with Nateera Sesu in Olgulului/Ololarashi G.R. August 27 2015.

² Discussion with John Lembakuli in Olgulului/Ololarashi G.R., field notes, August 6 2016.

³ Interview with Peneti in Olgulului/Ololarashi G.R., September 14 2015.

Fig. 2.3 Contemporary pastoral settlements in Amboseli, aerial view

Photo credit: Paul Lane

Fig. 2.4 A pastoral glade in Olgulului/Ololarashi G.R.

*This settlement was abandoned some 10 years prior. Note the *Acacia tortilis* trees and clear distinction in sediment colour along the perimeter of the glade.*

The most widely cited example of low-level cultivation across pastoral rangelands in East Africa is that of *Acacia tortilis*. In Amboseli pastoralists bring their livestock to feed on *A. tortilis* pods (*sagalam*) often shaking tree branches so that the pods will fall, and collecting them to distribute among their animals. Pastoralists will also preferentially build their settlements in close proximity to large *A. tortilis* trees, and will elect not to cut their branches for fuelwood (Jensen 1984: 202). As the pods are consumed the process of digestion and re-deposition within nutrient rich livestock enclosure sediments, in turn, helps to stimulate their ongoing localised germination and survival (Lamprey et al. 1974; Lane 2016a; Reid and Ellis 1995). In the unique growing conditions characteristic of pastoral glades in Turkana, concentrations of *A. tortilis* thrive, and herders have even developed a system of usufruct rights to control access to these groves (Barrow 1990). Likewise, the Samburu afford special protection to *A. tortilis* trees, and the use of seed pods is strictly regulated on both the clan and household level (Pas 2018). Such a situation is also present in Amboseli, where *A. tortilis* trees near a settlement may only be freely accessed by the people who occupy that settlement.⁴ The use, protection, and encouragement of plants in and around pastoral settlements are still understudied particularly with regards to how pastoral people have more or less directly controlled the range and composition of certain useful plant species in the landscapes they inhabit.

Research is increasingly indicating that glade formations are functionally important for a wide range of taxa, including elephants (Veblen 2012), birds (Gregory et al. 2010), even geckos and arthropods (Donihue et al. 2013). The extent to which glades have shaped Amboseli's ecosystem today cannot be overstated; there are estimates that over the course of a century some 20% of land in Amboseli has been directly impacted by pastoral settlements (Muchiru et al. 2009). Considering that pastoralists have inhabited East Africa for millennia, and that the soil nutrient compositions of glades can be distinct from background sediments for just as long (Boles and Lane 2016; Shahack-Gross et al. 2008), it is impossible to understand the functioning of savanna ecosystems today without taking into account the presence of livestock and herders, and the glades they play a hand in creating.

2.2.2. Wells

Unlike glades, the transformative potential of hand-dug wells in savanna ecosystems has yet to be as fully explored from an archaeological and ecological perspective, though they are common throughout pastoral lands in eastern Africa, and regularly feature in oral historical traditions in Amboseli suggesting they have been built and maintained for centuries. There are numerous kinds of wells (*ilchurroi*) that exist in Amboseli today (Fig. 2.5). Some wells are more permanent and are dug into high water table areas or may tap into springs. These *ilchurroi* can be several metres deep and feature internal subterranean walkways and troughs for livestock to access water. Such large wells require considerable labour investments, and some Maasai people in Amboseli choose to hire expert well diggers from other communities (e.g. Waarusha and Datoga) with their own unique architectural styles, resulting in a diversity of well types across the landscape. Other *ilchurroi* wells are far more ephemeral, dug in a matter of hours into river beds during the wet season and used but for a few days before new ones must be constructed. There are also Iloogolala wells, which are said to have been built by the 'ancestors of the ancestors'⁵ of the Maasai in the 19th century. Iloogolala wells are shallow pans, tens of metres across that provide drinking water during and after the rains, and mineral licks and preferred grazing all year round. While these features could potentially be

⁴ Email correspondence with Nelson Ng'ida, April 6 2018.

⁵ Interview with Kali Mukaie in Olgulului/Ololarashi G.R., August 23 2015.

‘naturally’ occurring, during fieldwork, I observed that when large *ilchurroi* are abandoned, they collapse and form pans. Through time, the continued wallowing, tramping, and digging of livestock, wildlife, and even people could very easily lead to an expansion of these pans, creating exactly the kind of large landscape features that Maasai call Iloogolala wells.

Fig. 2.5 Pastoral wells encountered in Amboseli

Hand dug wells continue to be highly valued by pastoralists and economic assessments show that they regularly outperform boreholes in cost-benefit terms (Rutten 2005). Wells do not just simply afford water to livestock and wildlife. The creation of wells can, for example, serve to divert wild and domestic grazing loads away from other pre-existing water sources in a landscape (Croze and Lindsay 2011: 16), mitigating against the localised exhaustion of resources. Much like pastoral settlements, wells also act as nodes for livestock and wildlife activity, influencing the geochemical structuring of savanna soils. For example, in a study undertaken in Omaheke, Namibia it was found that soil nutrient levels adjacent to pastoral wells are elevated as a result of repeated livestock defecation (Lindholm 2006: 106). The vegetation around these wells was also found to be woodier than the background bushland, even more so than waterpoints exclusively used by wildlife (Lindholm, 2006: 96). Lindholm

(2006: 96-97) hypothesised that the presence of pastoralists at wells can deter elephants from grazing and impeding the survival of trees. Certain parallels between Omaheke and Amboseli pastoral wells can be drawn, but one of my research assistants in Amboseli, John Lembakuli, stressed that a considerable amount of labour is expended on rebuilding wells after elephants and other wild animals with a certain disregard for their architecture pay a visit. Moreover, as a matter of safety, I was advised by Lembakuli to not survey these wells unaccompanied as they are known to be both bushy and wildlife abundant. Anecdotal evidence suggests that in Amboseli wells do not repel wildlife nearly as much as they attract it. Much like pastoral glades, pastoral wells should also be considered biodiversity hot spots in the landscape that may persist and even expand over the course of centuries through comparable graze productivity and water availability feedback cycles.

2.2.3. Fire

Beyond intentional burning, the interaction between fire and herbivory is important. For one, grazing lawns serve to disrupt the spatial connectivity of vegetation resulting in uneven fuel patches and burning areas, especially during drier periods (Archibald 2003). Variable burning regimes enhance the heterogeneity and biodiversity of rangelands (Beale et al. in press; Fuhlendorf and Engle 2001). Fire can also promote the growth of new and highly palatable shoots, improving the quality of pasture that grazers rely on (Archibald and Bond 2004). Like all herbivores, livestock are closely implicated in fire-herbivory dynamics, and intentional anthropogenic burning of vegetation can further ecosystem impacts. In the Chyulu Hills people burn to control pests and diseases, to promote pasture productivity, to clear new lands for cultivation and hunting, and for safer movement through densely vegetated areas (Kamau and Medley 2014). Another reason Maasai pastoralists ignite fires in select areas at certain times is to limit the accumulation of interconnected fuel loads, reducing the risk of pasture damaging late dry season blazes (Butz 2009). Pastoralists both directly and indirectly influence fire regimes in Amboseli, potentially to the benefit of wildlife and livestock alike.

2.3. Pastoral functioning in the Amboseli context

While unsubstantiated associations between pastoralism and environmental degradation have proved frustratingly persistent, there is a growing recognition that the presence of livestock can actually contribute to healthy savanna ecosystem functioning. More recently, researchers and conservationists in Amboseli have been at the vanguard in terms of recognising that attempts to separate pastoral and wildlife ecology have had deleterious effects on the environment (Western and Gichohi 1993; Western and Nightingale 2003:20). Across the world many of the most biodiverse landscapes feature long established anthropogenic management practices (Denevan 2016), and discontinuing the management practices of local people has been shown on a number of occasions to lead to a decline in species diversity and landscape heterogeneity (Agnoletti 2006; Ekblom 2015; Foster 2002). As such, there have been concerted efforts to understand how pastoralists have ‘traditionally’ adapted to the Amboseli ecosystem, and vice-versa.

Describing pastoral traditions in Amboseli in an entirely comprehensive manner is not of course possible in this thesis, let alone a single chapter sub-section. Additionally, pastoral livelihoods and the broader socio-economic context in which they function are continually transforming, and thus any comparative statements relating to the traditional state of the Maasai as a collective runs the risk of over-generalisation. Regardless, presented here is a

brief outline of how 20th century Maasai pastoralists in Amboseli have managed their herds and mobility, two aspects that lie close to the heart of animal husbandry in this landscape.

Fig. 2.6 Herding cattle in Olgulului/Ololarashi G.R.

2.3.1. Herd compositions

Periodic localised deficits in forage are unavoidable in semi-arid savanna ecosystems like Amboseli, and pastoralism has developed in this landscape in accordance with this reality. Pastoralists in Amboseli today may keep cattle, sheep, goats, donkeys or camelids, and most often combinations thereof, but livestock breeds favoured by pastoralists in highly seasonal and drought prone rangelands must be able to adjust physiologically to fluctuations in food and water availability (Western and Finch 1986). The most common cattle breed observed in Amboseli in the 20th century was the Small East African shorthorn Zebu (Scarpa et al. 2003) of the broader *Bos indicus* group (Fig. 2.6). While Zebu cattle are not renowned for their milk yields, they have an impressive tolerance to heat and aridity, and are able to withstand forage deficiencies far better than most *Bos taurus* breeds (Lampkin and Lampkin 1960; Marshall 1989). Still, all cattle are obligate drinkers, ideally consuming some 60 litres of water each day and primarily subsisting on short/low growing grasses and forbs (Pratt and Gwynne 1977). Ovicaprids, on the other hand, can thrive in more arid conditions and breed more quickly (Dahl and Hjort 1976). While cattle are valued more than small stock, herds that are diversified with sheep and goats are more resilient overall from disease and unfavourable environmental conditions. Sheep (*Ovis aries*) are considered grazers but will browse, as they tend to be herded together with goats (Blackburn and Field 1990). Sheep breeds in Amboseli include Red (Brown) Maasai Sheep, Black-headed Somali Sheep, and some Dorpers. Goats (*Capra hircus*) largely consume browse (Pratt and Gwynne 1977), and the Small East African Goat breed is typical of herds in Amboseli. Finally, there are donkeys (*Equus africanus*), whose value does not lie directly in their quality as a food source. Donkeys are noted for their low maintenance requirements, as they are more disease resistant than other livestock breeds, can dig for their own water, and feed on both graze and browse (Aganga and Tsopito 1998; Marshall 2007; Marshall and Weissbrod 2011). Donkeys in Amboseli are considered ‘women’s animals’ (Marshall and Weissbrod 2011) critically important for transportation and mobility, but not meat or milk.

Aside from donkeys, herd management is geared towards mixed meat and milk production, a considerably more efficient system than meat off-take alone (Blaxter 1962; Western 1973, 1982). This is especially true in East Africa where the timing of cow conception rates is

largely determined by grazing conditions, which in turn are dependent on the two rainy seasons (de Leeuw et al. 1984). A bimodal rainfall regime allows for a longer birthing season, and thus more milk production throughout the year. Female livestock comprise the majority of the herd in pastoral systems where dairy production takes primacy over meat (King et al. 1984). As such, male calves may make up 20% of a typical Maasai herd but this number declines precipitously once they reach finishing weight and are slaughtered, with only a few mature steers and bulls being retained (King et al. 1984; Roderick et al. 1998). Likewise, female sheep and goats far outnumber breeding males and castrates in the average Maasai herd (King et al. 1984), though in comparison to small stock, cattle are rarely slaughtered for consumption.

Pastoralists in East Africa have drawn the ire of rangeland management ‘specialists’ for their large cattle herds, which have been deemed inefficient and motivated by a desire for prestige over ecosystem functioning (Brown 1971; Ruthenburg 1971). Such thinking is premised on grazing systems with predictable rainfall and forage (so-called equilibrial systems) where livestock populations are moderated by competition, and conservative stocking rates are encouraged so that pasture shortages during dry years do not bring drastic drought mortality (Caughley 1979). In non-equilibrial grazing systems forage production is highly unpredictable and variable and competition over resources features minimally in regulating populations (Ellis and Swift 1988; Wiens 1977). Rather, livestock populations are controlled by severe droughts, especially those that last longer than a year (Homewood and Lewis 1987; Oba 2001; Scoones 1990). Among ecologists, there is growing acceptance that ecosystems and their components are subject to change and that both equilibrium and non-equilibrium dynamics are found in rangelands (Briske et al. 2003; Fernandez-Gimenez and Vetter 2005). In response to the considerable spatial heterogeneity and climatic variability of semi-arid savannas, pastoralists have embraced variable and adaptive approaches to stocking rates and herd management.

In ecosystems where losses are to be predicted, large herds built up over good seasons are a way of storing surplus reserves to be relied upon in poor seasons (Western and Finch 1986: 88). The stocking rate and herd composition judged to be sustainable will vary depending in part on environmental factors. Breaking up larger herds is advantageous as the depletion of herbaceous biomass is acute during periods of drought and intensifies at when stocking rates are high (Fynn and O’Connor 2000). Resource competition may also be alleviated through kin and non-kin alliances that allow herds to be more widely distributed (Aktipis et al. 2011; Dombrowski 1993: 28). During stressful conditions when milk production ebbs, an overall reduction in stocking rates may further serve to relieve competition and meet dietary requirements through both consumption and sale of livestock and pastoral products (Western and Finch 1986: 87; Zaal and Dietz 1999). Increasing the ratio of small stock to cattle may also be appropriate when grazing and water resource availability is curtailed (Desta and Coppock et al. 2004). Additionally, wildlife, termed ‘second cattle’ by some Maasai, may also be turned to during times of scarcity, as wild animals offer a meat reserve that herders may eat until their livestock numbers have recovered (Western 2008). After severe droughts when continued offtake has reduced the rate of herd recovery, the rapid metabolic rate and milk response of cattle during realimentation is of importance, favouring dairy over meat-based pastoral production strategies (Western and Finch 1986: 89). The social ties that pastoralists create and maintain in no small part through gifting, loaning and exchanging livestock are also relied on to facilitate herd recovery through stock loans, or by assembling raiding parties (Western and Manzollillo-Nightingale 2004: 3). Thus pastoralists in Amboseli who own large herds manage their animals to produce milk over meat, for their capacity to withstand periodic grazing deficits, and for their social and economic value.

We must not, however, overlook that there are great disparities in the sizes and compositions of herds owned by various individuals in Amboseli, especially as development projects are so frequently deployed as if pastoralists were a homogenous group (Bekure and Grandin 1991: 3). Age and gender are key axes of social organisation among many Maasai people, with male elders in general exercising the most control over livestock wealth (Hodgson 1999). Persistent economic inequality is not just characteristic within pastoral families however, but is seen across herding households (Bogerhoff Mulder et al. 2010). The distribution of cattle in Amboseli is incredibly uneven, with the top 10% of households owning 45% of the livestock (Homewood et al. 2009: 371). Poorer households tend to have higher small stock to cattle ratios, and wealthier households own more improved hybrid cattle breeds that require more resource input but command higher market prices (Zaal and Dietz 1999: 188-189). To some extent herd wealth is distributed among pastoralists in accordance with the Maasai saying that ‘a successful man is like a tree on a hot sunny day; he shelters many people under his shade’ (Bekure and Grandin 1991: 2). It is true that material, relational and embodied wealth intersect, and that social levelling mechanisms protect both the receiver and the giver, but this does not foster entirely egalitarian production systems (Bogerhoff Mulder et al. 2010). Instead, fluctuations in herd gains and losses that are so typical in arid rangelands lead to the development of significant livestock wealth differentials (Bradburd 1982: 101). The world over, herders with large livestock holdings can support larger families and direct their labour to enhancing livestock productivity (Bogerhoff Mulder et al. 2010). As a result, they can maintain the status of their families and continue to attract dependents and political allies who supply them with labour, but also important knowledge on trade, resource availability, issues of security, and the connections required for advancement, allowing the wealthiest herders to more consistently recover after stock losses better than their poorer counterparts (Dahl and Hjort 1979: 25-27; Grandin 1989; Waller 1999). To a certain extent pastoralists balance a variety of economic interests, and within pastoral communities there are often segments that pursue different specialisations (e.g. blacksmiths, hunters, cultivators, salt collectors), but those Maasai who do not possess large numbers of livestock often cope with stock loss by moving out of herding altogether (Waller 1999). An important strategy for survival among pastoral Maasai in Amboseli is the ability to avoid becoming demographically or economically detached, thus allowing those who have small herds or no herds at all to cross socio-economic boundaries as required. As discussed in Chapter 8, during the 19th and 20th centuries at least, pastoralism in Amboseli has entailed a multi-faceted mobility permitting Maasai individuals to move in and out of livestock herding as domestic stock numbers rose and fell in response to dynamic social, economic, political, and of course, environmental factors.

2.3.2. Mobility

Pastoral mobility can be considered at various temporal and spatial scales, and along geographic and economic lines. The physical movement of pastoralists and their livestock through landscapes is, however, one vital factor for maintaining herds where water and pasture are unevenly and often seasonally distributed (Coppolillo 2000; McCabe 1994; Western 1982). Pastoralists obtain higher stocking densities while simultaneously mitigating against overgrazing and localised environmental degradation in Amboseli when their freedom of movement is less curtailed (Groom and Western 2013). Herds are moved each day to access key resources, and as resource availability varies according to season, pastoral households reposition themselves in kind. While they are not the only determinants to pastoral mobility, the changing availability of water and pasture are important factors in shaping the

movement of pastoralists, contributing significantly to the way herders temporally structure their lives.

In terms of daily movement, herds in Amboseli are subdivided in accordance with their foraging requirements. Pasture near the settlement is reserved for juvenile cattle and small stock (Western and Dunne 1979). Adult cattle are grazed at a greater distance but typically within c.8 km, or a single day's travel (there and back), of the family settlement (Western and Dunne 1979; Western and Finch 1986). Within households labour is then divided in part between those tending herds in proximity to the settlements, and those traveling farther afield with the cattle.

At the inter-annual scale, pastoralists in Amboseli are suggested to have traditionally had a transhumant mobility pattern that mimics the movement of wild herbivores. The Maasai dispersal system in Amboseli is based upon a network of settlements created and occupied by households or collections of households over the course of years (Western and Dunne 1979). Dry season settlements, located near permanent sources of water such as the wetlands of Amboseli or in proximity to perennial hand-dug wells, are currently recognised to be the core settlement types (Worden 2007: 21). While wetland vegetation in Amboseli is available year round, it is also highly fibrous and low in protein (Western and Lindsay 1984), thus with the onset of the rains, pastoralists relocate to their wet season dispersal areas.

Likewise, Western and Lindsay (1984) have observed that as drier conditions emerge in Amboseli wild herbivores move towards the wetlands where they can access pastures of decreasing quality but increasing availability. Larger herbivores move down the forage-quality gradient first, leaving behind plants undergoing new growth with higher nutrient contents for smaller animals (McNaughton 1984). Accessible forage depletes gradually within the wetlands, and with the arrival of wetter conditions, wild and domestic animals disperse across the landscape to access higher quality pastures (Western 1973, Western and Dunne 1979). Mobile herbivores within Amboseli generally retreat to the basement plains in the north and to the volcanic foot slopes in the south during the rainy season (Western 1973, 1975), and this strategy seems to have also been generally followed by livestock herders.

A household's settlement network will ideally allow for flexibility (Worden 2007: 21), and thus strict adherence to the mobility pattern outlined above is unheard of in Amboseli. Indeed, the mobility of pastoralists in East Africa is neither 'unpredictable and stochastic [n]or regular and orderly' but instead encompasses elements of both (McCabe 1994: 85). During interviews with Maasai pastoralists in Olgulului/Ololarashi, I was commonly told by people that they had lived in the Chyulu Hills, in the Amboseli basin, and on the lower northern slopes of Kilimanjaro, but also in Kisongo Maasai territories in north-eastern Tanzania.⁶ Throughout the 20th century, many individuals who currently reside in Amboseli had also spent part of their lives beyond the boundaries of the Kisongo section altogether, among Kaputei and Matupato Maasai sections for example, or in Makueni, an area that is predominantly occupied by Akamba people.⁷ It was explained to me during these interviews that moving livestock across the unofficial borders of the Amboseli ecosystem may happen as a result of drought or disease, though other factors can be equally influential. Choices regarding mobility are made to optimise access to good pastures, but also to seek or avoid conflict, to liaise with neighbours and friends, and to visit towns and centres of trade (Galaty 2013: 478; McCabe 1994). Diverging from the patterns of seasonal mobility described above are for example

⁶ E.g. interview with Tatia Ene Lopenyet in Kimana, April 20 2015; Interview with Leah in Kimana, April 21 2015.

⁷ E.g. interview with Nooltetein in Kimana, March 4 2015; Interview with Ronkoyieni in Olgulului/Ololarashi G.R., September 11 2015; Interview with Kaputiti ene Kasaine in Kimana, August 22 2015.

Maasai who engage in farming, as they are more likely to have some members of their families residing on a permanent basis in proximity to fields, with the remainder practicing transhumant migration (Coast 2002: 93). In addition, poorer pastoral households may tend to become sedentary and spend more time in proximity to urban areas where casual work can be found as opposed to households with larger livestock holdings that are more likely to be based at greater distances from trading centres (Homewood et al. 2009: 385). Wealthier herders also have the option of leasing land for grazing, and may travel across the Amboseli landscape to do so (Southgate and Hulme 2000: 90,101). Well-connected herders who have established claims or negotiated access to larger areas of land are less circumscribed in their movements than those who are, for example, not registered as group ranch members (ibid.). Pastoral mobility among the Maasai must be understood as multi-scalar in organisation featuring decisions made at the individual, family, household and neighbourhood level in response to dynamic social, political, economic, and environmental conditions. Such conditions fluctuate within and across larger systems of territorial governance where ethnic affiliations and geo-political borders exert influence, but do not necessarily present insurmountable barriers to movement.

2.4. Pastoralism and wildlife in decline

If you were to cease reading this chapter at this sentence, you might be happy to assume that the Amboseli ecosystem is functioning marvellously well, supporting a large and biodiverse wildlife population in synch with pastoralists and their livestock. Alas, the situation is more complex. In a 35-year study monitoring herbaceous biomass, rainfall, and grazing pressure, Western et al. (2015) found that grazing pressure has doubled in Amboseli National Park since 1982, concomitant with a long-term fall in biomass yield per unit of rainfall. According to some estimates, in Eastern Kajiado between 1977-2011, cattle, donkey, sheep and goat populations have declined in conjunction with a decrease in wildlife abundance (Ogutu et al. 2014). A notable exception to this decline in wildlife in Amboseli has been the elephant population, which has increased by 115% between 1977 and 2011 (ibid.), though as has already been mentioned, this elephant concentration appears to have come with a significant loss in woodland and bushland vegetation and large mammal biodiversity (Western and Maitumo 2004). Rangeland fragmentation and habitat loss are closely linked to the decline in pasture productivity and wildlife and livestock abundance and diversity in Amboseli.

Most researchers seem to trace the beginning of this fragmentation to the start of the colonial period (Western and Manzanillo-Nightingale 2004; Worden 2007: 22), and this is discussed more fully in Chapter 8. Suffice to say, due in part to the restriction of access to wetlands and grazing areas following the creation of national parks, and also to the fact that communal lands had increasingly been adjudicated, privatised, and commodified into smaller and smaller holdings throughout the 20th century, anxiety over land alienation was widespread among pastoralists and others in the Amboseli area (Campbell 1991; Fratkin 1994). Within this context, the Kenyan government and international development agencies advocated for the formation of group ranches in Kajiado, in a belief this would reduce overstocking, and increase investment in pastoral rangelands (Grandin 1991; Rutten 1992). The group ranch idea was accepted by many Maasai as a means to ensure some guaranteed access to land. Land expropriation continues to be a major concern in Amboseli (Western and Manzanillo-Nightingale 2004), and today most pastoralists support subdivision (Ntiati 2002). As a result, the vast majority of group ranches in Amboseli have subdivided into individual land parcels managed at the household level, and the remainder consider the process to be inevitable (BurnSilver and Mwangi 2007; Southgate and Hulme 2000: 86-87).

Within group ranches, both subdivided and intact, permanent settlements are increasingly situated near water provision points, schools, healthcare centres, roads, shops etc. promoting sedentarisation around key resources, with this process being far more common on subdivided ranches (Western et al. 2009). The negative effects of sedentarisation and subdivision are evident in a comparative study between a subdivided and unsubdivided group ranch in Amboseli, which found that despite livestock densities being equal, pasture was diminished and the capacity for grass to regenerate after drought was more limited on the subdivided ranch (Groom and Western 2013). Sedentarisation and subdivision are said to pose the most significant threat to wildlife and rangeland productivity in all of Kenya (Western et al. 2009), undermining the pastoral production sector and conservation efforts in Amboseli.

Both sedentarisation and rangeland fragmentation have impacted the practicality of so-called 'traditional economic choices' in Amboseli (BurnSilver et al. 2008: 236). The human population has been increasing in Amboseli, outpacing livestock growth significantly, so that per capita livestock holdings have fallen to half of that suggested to be needed for 'subsistence' (Western 1994). Engaging in economic diversification and intensification are both responses that pastoralists in the landscape are pursuing in response to the complex challenges they face (BurnSilver et al. 2008; BurnSilver 2016). In an effort to intensify livestock production, Zebu cattle are being cross-bred with Boran and Sahiwal breeds that are known for higher milk and meat yields and sell for better prices, but they are less mobile, and have greater forage, water, and veterinary requirements, meaning this strategy is not entirely risk free (BurnSilver et al. 2005). There also appears to be a steady decrease in the ratio of cattle to small stock (Western and Manzanillo-Nightingale 2004: 9), a herd composition transition that is probably influenced by the fact that small stock are less expensive, reproduce faster, have lower water and pasture requirements, and tend to be herded shorter distances compared to cattle.

While livestock continue to be an important investment (McPeak and Little 2005), households in Amboseli that are more diversified have larger gross incomes, whether engaging in agriculture, milk sales, business, or wage employment (BurnSilver et al. 2008: 241). Importantly, livelihood diversification is practiced by both wealthy and poor pastoralists in Amboseli, but it is those with the largest herds who stand to earn the largest net gains from pursuing activities alternative to animal husbandry (BurnSilver 2016). Those with plentiful stock have the ability to get loans, sell animals, and diversify without decimating their herds, which allows wealthier households to buffer against leaving the pastoral sector altogether (Borgerhoff Mulder and Sellen 1994; Borgerhoff Mulder et al. 2010). In Amboseli, households with fewer livestock holdings are more directly reliant on cultivation however, as they derive a greater percentage of their gross income from agriculture (Homewood et al. 2009). It thus can be argued that livelihood diversification is both a choice for wealthier pastoralists, assisting them in maintaining large herds, and a necessity for poorer households who have minimal stock holdings (ibid.). On the other hand, as economic incentives promote the expansion of farms in the landscape, rangeland fragmentation processes are compounded, threatening to undermine the pastoral economy as a whole.

Estimates suggest that agricultural land use in Amboseli has grown by 300% from 1977-2000, with an especially aggressive period of expansion coinciding with an intense drought in the early 1980s when herds were depleted and people took to farming to re-establish their wealth (Campbell et al. 2003). Agricultural growth on the slopes of Mt. Kilimanjaro and the wetlands in the basin has been facilitated with high intensity irrigation, practiced by both Maasai and non-Maasai people. As two Maasai academics have phrased it, since the creation of group ranches 'unfortunately the exclusion principle of Maasai-only use has not been adequately upheld and outsiders consistently encroach and overuse the communally owned private

resources' (Ole Seno and Tome 2013: 68). Wildlife and livestock herders both face more restricted access to water and forage in these dry season grazing zones as they are excised for farming (Worden et al. 2003). This issue is exacerbated by the offtake of water for irrigation in upstream areas, further diminishing water and pasture availability in the lowlands (Western and Manzanillo-Nightingale 2004: 4). The density of settlements around agricultural zones, even at comparatively low levels, is said to have resulted in an environment 'inherently antagonistic' and 'hostile' to wildlife, prohibiting the 'synergist effects of a strictly livestock/wild system' (Worden et al. 2003: 13). Conservationists in Amboseli are thus heavily invested in managing how people use land within the ecosystem, favouring pastoral modes of production over agricultural.

In Amboseli, direct payments for ecosystem services are used to encourage local people to 'adopt practices that secure ecosystem conservation and restoration' (Wunder 2005). For example, the creation of the Kimana Wildlife Sanctuary and ecotourism destination has served to prohibit cultivation in the Kimana wetlands area, and while this initiative has been somewhat turbulent (Southgate 2006), in theory it will deliver employment and cash benefits to local Maasai. Consolation payments are also made to livestock owners when they lose their animals to wildlife predation in order to reduce retaliatory killings and to buffer pastoralists from financial loss (MacLennan et al. 2009; Okello et al. 2016). While wildlife-farmer conflict is a common occurrence (Kioko et al. 2008), payments are made far less frequently to farmers when crops are damaged by wildlife.⁸ The idea is that Maasai people in Amboseli can either use their land for farming or livestock herding, and conservationists must embolden those opting for the latter (Bulte et al. 2008: 399). To be fair, conservation organisations in Amboseli have financed the construction of fences around farmland and regularly deploy rangers to prevent elephants from raiding crops, though this is done to alleviate human-wildlife conflict rather than in the interest of promoting agriculture. Conservation organisations are also seeking to prevent land fragmentation in Amboseli by incentivising owners to reconsolidate their individual land parcels to operate as joint conservancies/grazing reserves, or by distributing money from leases, camps, donations, and disbursements to group ranches that remain intact around Amboseli National Park (KWS 2008).

Financial incentives for local people to tolerate or participate in wildlife conservation appear to be working in Amboseli, though there are also criticisms, a major one being the equitable distribution of these benefits (Groom and Harris 2008). Research suggests that those who receive the most income from wildlife based activities in Amboseli are, perhaps as intended, those who own livestock and do not farm, but even among this group benefits are far from evenly spread (BurnSilver 2009). It remains to be seen how patterns of land use will continue to change in coming years, though ecologists seem to agree that pastoral systems in Amboseli have recently undergone radical transformation, and from an environmental perspective, it has been for the worst. Yet the narrative of land use history in Amboseli is rather generalised, and as it continues to inform policies aiming to maintain and rehabilitate this ecosystem, it is worth examining in more detail.

2.5. Therein lies the rub

It is far from uncommon for conservationists to make nostalgic claims about an imagined past (Alagona et al. 2012), and among ecologists in Amboseli there is a tendency to discuss the period prior to the colonial encounter in rather specific ways. The narrative is that Maasai in Amboseli practiced 'traditional subsistence' (Western 1982: 205), though in the 20th century

⁸ Email correspondence with Nelson Ng'ida, March 18 2018.

entered a ‘subsistence-cum-market economy’ where livestock sales and grain consumption both became more prevalent (Western and Manzanillo-Nightingale 2004: 26). In contrast to times of old, agricultural markets and consumer goods are said to now be of increasing importance in Amboseli (BurnSilver et al. 2008: 231). Campbell (1999: 323) suggests that farming only began on the northern slopes of Mt. Kilimanjaro in the 1930s, and has since extended down into the rangelands along riverine and wetland areas. Western and Manzanillo-Nightingale (2004: 5) sum the dominant perspective up best when they imply that during the 20th century Maasai pastoralists in Amboseli faced a ‘transition from a relatively closed and socially homogenous subsistence society to an open, diversified economy’.

While I do not contest the evidence that farms are more ubiquitous in this landscape now than ever before, and that the East African economy experienced radical restructuring during the 20th century, among the volume of literature generated by ecologists and conservationists concerning Amboseli, there is scant mention of the role agriculture and exchange with non-pastoral producers may have played in people’s lives in the pre-colonial period. There is also little consideration for how Maasai people may have interacted with other ethnic groups present in East Africa at the turn of the 20th century beyond livestock raiding pursuits (although see Kangwana and Browne-Núñez 2011; Browne-Núñez 2011). Instead, I have detected a pervasive tendency to ignore how pastoral production prior to the colonial period may have been oriented to intersect with agriculturalists, commodity traders, and other specialist producers. While there is recognition of the complexities of pastoral livelihood diversification in Amboseli today (e.g. BurnSilver 2009, 2016; Western 2009), there seems to be an assumption that prior to the 20th century, there were only Maasai pastoralists in Amboseli, and they only ever produced livestock for household consumption, or to trade with other pastoralists. Like narratives of overgrazing and pastoral irrationality that arose in the colonial era, the idea that livestock herders in Amboseli traditionally operated in an isolated and socially homogenous subsistence society is a handy but misleading simplification.

As will be explored in this thesis, the picture of ‘baseline’ anthropogenic conditions presented by many ecologists and conservationists working in Amboseli fails to fully engage with the body of research that historians, palaeoecologists, archaeologists and anthropologists have amassed on East Africa. I am aware that promoting the longevity and sustainability of pastoral livelihoods (rather than agricultural) has been necessary to counteract the damaging and enduring legacies of policies and rhetoric that stem from the colonial era. I also sympathise with those who may be consciously or unconsciously motivated to embrace a history of Amboseli that advocates for pastoral livelihoods and land rights, as both have historically been compromised by the state and certain actors in the conservation community. However, within this thesis I have sought to explore the understated complexity of pastoral modes of production in Amboseli prior to and during the colonial period. In doing so, I have found that the trajectory of pastoralism within Amboseli has been predicated by events, people, and processes that lie beyond the boundaries of the ecosystem, and any limited conceptualisation of pastoral subsistence.

2.6. Conclusions

In this chapter I have discussed how pastoralists negotiate the Amboseli landscape by being able to regularly divide, disperse, and reunite their herds, and by managing their compositions in relation to the individual water, grazing, browsing and overall health requirements of their animals. Pastoralism in Amboseli is recognised to be a complex but also highly strategic occupation, and those who wish to practice it successfully must have an adequate depth of knowledge and experience. I have also reviewed how livestock herders and their direct and

indirect approaches to rangeland management are finally being accepted as capable of exerting a significant influence on the ecology of Amboseli, often for the benefit of wildlife and people alike. As such, ecologists are expending considerable effort to understand and promote traditional pastoral ecosystem dynamics that enhance biodiversity in this landscape. I am concerned however that traditional pastoral livelihood dynamics in Amboseli have been somewhat misconstrued. A major premise of this thesis is that we must resist the assumption that prior to the colonial period and throughout the course of its lengthy history in East Africa, pastoralism existed as an isolated and static pursuit. Rather, pastoralists in Amboseli have made decisions regarding their production strategies in relation to complex and dynamic socio-economic, political, and environmental factors that operate in configurations extending far beyond the recognised borders of the ecosystem. It is also important to recognise that the heterogeneity and biodiversity that is characteristic of Amboseli cannot be understood as having emerged in a landscape devoid of agriculture. The historic adaptability of pastoral livelihoods in Amboseli is rooted in the inherent flexibility of pastoralists to respond to these changing circumstances rather than in their capacity to remain untouched by the outside world.

3 Methods

People in Amboseli are well aware of the ways that their history as traditional pastoralists is perceived, and actively participate in performing heritage for various audiences. For instance, in Amboseli, tourists going on safari in the National Park are encouraged to include in their itinerary a ‘traditional cultural *boma*’ experience where they can meet Maasai individuals dressed in *shukas* (draped cloth garments), witness singing and dancing, and purchase crafts. In this way, Maasai pastoralists with their culture that is promoted as having ‘remained largely unchanged in the midst of western influence’ are presented as the face of conservation in Amboseli (KWS 2008:9). Of course the ‘authenticity’ of such encounters is contested (e.g. KWS 2008:87) in discussions that are revealing of the assumptions that are made surrounding what Amboseli is and how it should be presented, by whom and for whom (see Lane 2015). But alongside this representation of Amboseli culture and heritage, there are many ways in which Amboseli’s inhabitants tell their own history, and these moments of remembering diversify, complicate, and reveal very different perspectives on Amboseli’s past from that produced for tourist audiences.

This thesis accepts that pastoral pasts in Amboseli manifest in a multiplicity of forms and constructs, only some which can be accessed through more standard archaeological source materials and methods. Similar to other historical archaeological/ecological endeavours, I have taken a ‘promiscuous’ approach to engaging with palaeoenvironmental, ecological, linguistic, archival, ethnographic and material lines of evidence (Voss 2007) to make sense of the heterogeneous pasts of pastoralism in this landscape. This chapter first describes the methods used to survey, excavate, and analyse the archaeological finds encountered during my time in Amboseli. I also explain how I have drawn on local knowledge sources and archival documents to better implement, contextualise, and interpret my research and results.

3.1. Survey design

A challenge confronting many archaeologists is when to record or not to record a scatter of artifacts as a site. Artifacts do not exclusively cluster in neat spatially bounded units, but rather are distributed across the landscape in varying densities. The archaeologist must decide where these artifact densities represent viable sites, what these ‘sites’ represent, and what to make of the so-called background noise. Distinguishing sites from the ‘background noise’ is dependent on knowledge of the overall variability in the density of artifacts for the area under examination, and the research aims of the archaeologist. As such there are often considerable discrepancies in the total area and density of materials that are designated as sites (if these designations are made explicit in archaeological reports at all). For instance, the vast majority of the archaeological materials encountered in Amboseli would have been classified as light density artifact scatters by researchers working in the Lemek-Mara region in the 1980s (e.g. Pilgram et al. 1990: 38) and would therefore have gone unrecorded. Rather than overlooking the light density artifact scatters in Amboseli which comprise most of the archaeological material in the landscape, it was decided to collect everything. This approach was made

possible by recent advances in GPS technology and GIS software making it easier than ever before to accurately map and analyse the spatial distribution of artifacts.

The near complete collection and analysis of artifacts in the landscape was done in accordance with the aim of this research project – to investigate pastoral land use and livelihoods in Amboseli through time. The frequent and often long-distance movement of pastoral people has been central to the resilience of this livelihood, and is both greatly influential to and influenced by the landscapes they inhabit. Although studies that exclusively focus on identifying dense and discrete assemblages are clearly important, such an approach fails to address how highly mobile pastoral people may have contributed to the formation of an archaeological landscape in its entirety.

Prior to embarking for the field, historical aerial photographs (originally produced by the Royal Air Force and acquired from the Bodleian Library, University of Oxford) and satellite imagery (Google Earth) were consulted to build an understanding of the vegetative cover and general topography of the Amboseli region to help in deciding what areas would be suitable for my own study. These remote sensing techniques were particularly helpful in detecting places favoured for 20th century pastoral settlement, which are broadly presumed to have been places that were similarly attractive to earlier pastoralists (Robertshaw 1990: 295; Marshall 1990: 880; Lane 2013: 119). The study area I selected is in the south of Olgulului/Ololarashi group ranch (Fig. 3.1).

Fig. 3.1 Amboseli study area

World Imagery provided by Esri, DigitalGlobe, GeoEye, i-cubed, USDA FSA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo, and the GIS User Community.

In a purely logistical sense, this area was well suited for archaeological survey work as Olgulului/Ololarashi group ranch has not been subdivided, nor is it part of the National Park, meaning that arranging permission to access this land for research purposes was relatively

simple. Additionally, the furthest western extent of the study area was only an hour and a half drive away from the nearest town (Kimana), which had suitable facilities for our base camp. Finally, a significant portion of Olgulului/Ololarashi's southern extent is comprised of wildlife migration corridors and grazing reserves, meaning the landscape is comparatively unperturbed by agricultural, urban, and tourist infrastructure, though it boasts a number of pastoral households.

The area was also deemed attractive as it encompasses an ecotone between the agriculturally fertile foothills of Mt. Kilimanjaro and the wetlands of Enkong'u Narok and Longinyie in Amboseli National Park. The bio-geophysical diversity of this ecotone offers its inhabitants access to a wide range of resources, and for this reason it was hoped it would also feature a rich variety of archaeological sites and artifact types. Finally, the chosen study location immediately abuts the area surveyed by Robert Foley (1981a), and thus offered the opportunity to draw comparisons between his work and the results of my own research with regards to depositional contexts and artifact distributions in Amboseli.

Overall we managed to survey nearly 10% of the 135 km² study area. It was not possible to carry out a full coverage survey at a satisfactory level of intensity due to time constraints. Some survey tracts were instead positioned strategically to cover places that local research assistants identified as 'old' and culturally significant. However, so as not to exclusively survey areas that potentially only reflect more contemporary pastoral patterns of movement and landscape cognition, most of the survey tracts were positioned to encompass a range of soil, vegetation, and elevation zones. When not surveying areas flagged as interesting by local research assistants, some attempt was made to position our tracts along a north-south and east-west orientation. Yet, working so near to the park and often in animal migration corridors the task of following straight transects was significantly complicated by the dangers presented by wildlife.⁹ Acting on the advice of my local Maasai research assistants, we endeavoured to remain in reasonable proximity (not in excess of 700 m) to our vehicle at all times, meaning that survey tracts often detoured towards terrain that the Land Cruiser could successfully navigate. As is often the case, the representativeness of the survey could have been improved upon. The end result does however reflect a compromise between the logistical challenges of moving around the landscape in a safe and timely manner, incorporating areas of local pastoral historical significance, and covering a range of bio-geophysical locales.

The survey was carried out between February and March of 2015 with a team of four to six surveyors. Surveyors were spaced approximately 15-20 m apart, and this degree of survey intensity makes it unlikely that sites larger than 15 m across were missed. During the survey all artifacts were collected, bagged and labelled with a waypoint generated by a Garmin handheld GPS device. Artifacts less than 5 m apart were frequently assigned the same waypoint. The survey team members invariably included myself, a representative from the National Museums of Kenya (Cecilia Ngugi or Christopher Kirwa), a qualified Kenyan archaeologist (Victor Iminjili or Joyce Waithira), and one or more local research assistants (Sinabule, Raphael Musere, and/or John Lembakuli) who were given training in artifact recognition and proved extremely adept.

Broadly conceived, the survey was conducted to identify and characterise the presence of temporally and otherwise diagnostic material culture in the study area. An additional goal was to explore patterns in the distribution of artifacts in relation to each other, to landscape features of relevance, and to mid-20th century Maasai settlement locations. Key issues considered were whether or not there is evidence to suggest that artifact distributions have been significantly influenced by taphonomic factors and observer biases, or if they are

⁹ Elephants in 2016 alone killed upwards of 11 people in Amboseli.

representative of broad patterns in land use indicative of change or continuity through time. The methods by which this analysis was carried out are described in detail in Chapter 4. Finally, the survey was implemented in order to identify sites viable for further excavations.

3.2. Identifying pastoral sites in Amboseli

The survey provided an overview of the distribution of artifacts across the landscape, allowing for a degree of insight into how pastoralists and others have lived in Amboseli in broad spatial terms. The excavation of settlement sites delivered another level of precision to this understanding. The methods used to select archaeological sites for further excavation included surveying for artifacts and architectural remains (as described above) and looking for old enclosure sediment formations using satellite imagery and historic aerial photographs. Additionally, some sites were selected for excavations on the basis of their being recognised as pastoral settlements of more and less certain antiquity and significance by local research assistants and interviewees. Vegetation surveys were also conducted at the sites excavated to contribute to an understanding of the vegetation that characterises pastoral glades of varying ages and occupation histories in Amboseli.

The identification of archaeological sites occupied by pastoralists comes with a number of challenges however. For one, highly mobile herders are assumed to be unlikely to own, and subsequently deposit into the archaeological record, tremendous amounts of material possessions (Cribb 1991; Gifford 1978). For another, the ethnographic record in East Africa is rich with examples of the biodegradable construction traditions of herders - people who craft temporary domestic spaces from resources they carry with them from place to place, or obtain from their immediate surroundings (Prussin 1995). Few architectural or artefactual remains are thus expected to be detectable at pastoral sites.

From an archaeological perspective, important hallmarks of pastoral sites are the remaining traces of dung and urine that were deposited by livestock. As animals are secured overnight in enclosures at pastoral settlements, their bodily excretions transform the very ground beneath them. Further contributing to the formation of anthropogenic soils are the homes of some pastoral people like the Maasai, constructed from dung plastered wattle-frames. As a result of these inputs, the soil chemistry of abandoned settlements is markedly distinct from background deposits, featuring higher concentrations of nitrogen, phosphorus, magnesium, calcium, carbon, and sodium (Boles and Lane 2016; Reid and Ellis 1995: 984; Stelfox 1986; Turner 1998a,b). Vegetation associated with these pastoral sites can be quite distinctive from surrounding areas, with high-quality forage thriving in the growing conditions created at pastoral settlements (Veblen 2013). As mobile grazing animals (including livestock) are drawn to these palatable fodder hotspots even more deposits of nutrient rich dung accumulate; a cycle manifests, and in its repetition, pastoral glades are created (Augustine and McNaughton 2003; Muchiru et al. 2008, 2009; Veblen 2012; Young et al. 1995). An additional pathway by which glades may be renewed and maintained is if areas are repeatedly occupied by pastoral people.

Archaeologists can look for a number of indicators when identifying degraded livestock enclosure sediments. These include peaks in grass phytoliths, microlaminated sediment structure (assuming bioturbation is minimal), authigenic phosphate minerals, dung spherulites, certain stable nitrogen isotopic compositions, lipid biomarkers, and even dung-associated mites (Boles and Lane 2016; Evershed et al. 1997; Macphail et al. 2004; Schelvis 1992; Shahack-Gross et al. 2003, 2008). Geochemical glade signatures are detectable in archaeological deposits of considerable antiquity, including at the Pastoral Neolithic site of

Suganya, south-western Kenya, radiocarbon dated to c.2000 BP (Shahack-Gross et al. 2008). Sediment samples were collected during excavations and at the time of writing, are undergoing phytolith analyses at the National Museums of Kenya by Rahab Kinyanjui. Unfortunately it was beyond the scale of this research project to pursue the full suite of methods for pastoral site identification developed by Shahack-Gross et al. (2003). As none of the sites in Amboseli were excavated in their entirety, the potential remains to conduct further sediment sampling.

While microscale analysis of sediments can undeniably aid in the recognition of pastoral sites, satellite imagery can also offer quick and considerable insight in this regard. Rings or roughly circular arrangements of fine pale sediment featuring anomalous vegetation patterns are characteristic of pastoral glades in parts of East Africa (Boles 2017; Causey 2008). These features can persist in the landscape for centuries, as is apparent at the site of Maili Sita in Laikipia (Boles 2017: 209). High resolution panchromatic and multispectral World View 2 satellite imagery (provided courtesy of a DigitalGlobe Foundation imagery grant) has helped in detecting patterns indicative of anthropogenic activity in the vegetation and sediment at sites excavated in Amboseli. In addition, digital images were obtained with a DJI Phantom quadcopter and processed using Agisoft PhotoScan software to create models of the excavation areas. In one instance, (Kirinkai), the digital images enabled the detection of the formation of what appears to be the anthropogenic soils of a glade that available satellite imagery failed to reveal.

Given that the vegetation that thrives on pastoral glades has been found to be unique compared to background species compositions, vegetation surveys were also conducted at the Amboseli sites (Tables 1-10, Appendix 6). Surveys were guided by the expertise of Mathias Muindi, Department of Botany, National Museums of Kenya, and John Lembakuli, a local Maasai research assistant with considerable knowledge of plants in Amboseli. It was possible to identify some species in the field, while in other instances, samples were taken to the East African Herbarium at the NMK to identify in consultation with their botanical collection. Surveys were conducted in June of 2017, anticipating that vegetation cover would be peaking as the rainy season drew to a close. As it turned out, Amboseli was suffering through a drought at this time, with implications for the species compositions observed at the sites.

The vegetation surveys were implemented in order to provide a general description of the vegetation structure (trees, shrubs/other, grasses), species abundance, and also the biodiversity present at each site. Percentages were estimated as the area of land covered by each vegetation type/plant species of the total area of green biomass. These estimates were used to categorise each species presence as major (Ma = >50%), moderate (Mo = 20-49%), minor (Mi = 5-19%) or minimal (Min = <5%). John Lembakuli provided additional insights on which species are widely valued as edible, medicinal, and/or fodder plants by local pastoralists, in order to build a profile on the functional attributes of glade vegetation in Amboseli. Observations were made on the distribution of species across the sites, and patterns are discussed in the excavation report section of this thesis. At the sites of Ilnyangusi Manyatta, Kirinkai, and Irrpurai it was not at all obvious where anthropogenic deposits began and ended. In these instances, the 'site' was designated as an approximate area up to 50 m extending radially in all directions from our excavation units.

Note that even using this range of analytical techniques, it was not always possible to know if the sites excavated were in fact occupied by pastoralists, or when pastoral occupations first commenced, as is discussed further in Chapter 5. The aim of excavations was to offer basic descriptions and dates for the material remains of a range of Late Iron Age and colonial period pastoral settlements in the study area that can be used to draw broader observations about livelihoods, settlement and land use in Amboseli over the last millennium. Admittedly,

the interpretations that can be made from such small scale test pits have their limitations. There is much scope to expand the excavations started in 2015, and an important contribution of this research has been to document the archaeological potential of these sites rather than to fully exploit it.

3.3. Excavation design

Test pits and some larger exploratory excavation units were dug at 10 sites. Excavations were carried out in two phases. During phase one in the month of April of 2015 around six 50 x 50 cm test pits were excavated at each site in order to assess the state of preservation, and the depth, abundance, and range of archaeological deposits. During phase two in July of 2015 larger 1x1 m connecting units were excavated at select sites (Empaash, CB, Lemomo Hill, and Ilnyangusi Manyatta). A second round of excavations also took place at Irrpurrai, but rather than expanding a single unit, we continued to sink 50 x 50 cm test pits. The decision to return to some sites and not others was in truth predominantly influenced by the richness of artifact deposits. Similarly, areas with diverse and abundant quantities of archaeological material were targeted for excavation within any given site.

Units were often established in areas where bone fragments were present, as I had hoped to carry out isotopic analysis of the faunal remains to better understand past patterns of mobility. Unfortunately the bone material encountered during excavations was scarce and poorly preserved, rendering this line of inquiry untenable. Regardless, highly visible surface clusters of artifacts and bone overwhelmingly occurred where vegetation cover is limited. Therefore areas targeted for excavation were no doubt biased towards where artifacts were either eroding out of their original deposits, or resting on deflated surfaces. To at least partially address this bias, test pits were also excavated within raised vegetated or earthen mounds located in proximity to scatters of surface finds, hypothesising that there would be a greater probability of encountering *in situ* deposits here.

Excavation of only the ‘richest’ areas of sites may be criticised as this sampling strategy could potentially miss actual activity or occupation areas and over represent rubbish or secondary refuse deposits. However, given the hit and miss nature of deposits at pastoral sites, the limited time and resources available to carry out this research, and the fact that the primary goal of excavations was to maximise the recovery of materials reflective of dietary and economic behaviour, this sampling strategy seemed justified.

During actual excavations, arbitrary 5-10 cm levels were followed when no stratigraphy was visible, or a natural level was thicker than 5 cm. In most instances transitions between layers were highly diffuse, and thus were only distinguished in stratigraphic profiles. Generally, excavations in units continued until we had dug 10 cm of artifact sterile sediment. All sediment was sieved through 1 cm mesh screens. As is standard, finds were bagged and labelled according to type and provenience. The location of individual excavation units was mapped using a Leica dGPS, though the position of finds and features were not digitally recorded but rather sketched, photographed and/or noted in corresponding context sheets.

Note-taking at all sites followed a standardised context sheet form. Notes for each level included the date excavated, provenience, sediment and soil descriptions (texture, Munsell colour, and inclusion size, type, and density), photo descriptions, archaeological materials collected, and any other relevant information. Each context sheet featured measured plan drawings for every level along with starting and ending depths for all four corners of the unit. Photographs were taken at the opening and closing of each level, and also of any artifact clusters or features encountered during excavations. At the close of each excavation the

stratigraphy of all four 50 x 50 cm unit walls was roughly sketched. At the sites where larger, contiguous excavation units were dug (Empaash, CB, Lemomo Hill, and Ilnyangusi Manyatta), more detailed profile drawings were made using graph paper on a scale ranging from 1:5-1:10, depending on the context, and photographs were taken. Representative illustrations of unit profiles are presented in this thesis. All units were backfilled.

In no particular order, the excavation team included a representative from the National Museums of Kenya (Cecilia Ngugi or Christopher Kirwa), a Kenyan archaeologist (Victor Iminjili, Joyce Waithira, or James Munene), a graduate attaché from the British Institute of Eastern Africa (Stephen Armstrong) and one or more local research assistants (Sinabule, Raphael Musere, Alice Musere, Samuel Ntimama, and/or John Lembakuli).

3.4. Artifact analysis

Collecting and recording information pertaining to material culture running the gamut from everyday things to extraordinary objects could be considered the *raison d'être* of archaeology. The following section details the methods of analysis used to examine and describe the ceramics, lithics, 'special finds', zooarchaeological remains, and archaeobotanical remains recovered while surveying and excavating in Amboseli.

Note that the amount of information obtained during ceramic and lithic analysis was often in excess of the immediate aims of this research project. This level of detail was recorded to build robust datasets that will allow different questions to be asked of the data in the future. To facilitate ongoing analysis, supplementary data pertaining to the attributes and location of the lithics, ceramics, and special finds encountered while surveying and excavating has been made available to download at DiVA¹⁰, Uppsala University's online academic archive.

3.4.1. Ceramic analysis

Ceramic sherds were analysed in the National Museums of Kenya (NMK). Sherds were washed using water and a soft-bristle brush. All ceramics were categorised as either rims, handles, necks, bases, or non-diagnostic body sherds. The maximum thickness and weight of each sherd was recorded, and maximum dimensions were also taken for all rims. A small area on a broken edge of each sherd was drilled using a Dremel 4000 drill fitted with a 1 mm diamond-coated burr. This was done in order to be able to see the inclusions, which were classified according to size and percentage (after Mathew et al. 1991), and degree of sorting (after Barraclough 1992). Where I felt confident, inclusion type was noted (i.e. mica, quartz, volcanic stone). Sherd colours were recorded using a Munsell Colour Guide. A ceramic profile gauge was used to extrapolate the total rim diameter of each rim sherd that was large enough to be measured. Form and body characteristics were approximated where possible by looking at rim form and rim diameter estimates. In order to approximate the minimum number of vessels represented in the ceramic assemblage, colour, decoration, and thickness of each sherd was taken into account in addition to the uniformity, size and quantity of inclusions, as well as of course, the location from which each sherd was recovered. Estimations of minimum number of vessels tended on the conservative side, lumping rather than splitting. All decorated and diagnostic sherds, as well as a representative sample of undecorated sherds, were photographed. The profiles of all rims and decorated sherds were drawn using graph paper, and inked in Adobe Photoshop.

¹⁰ URN: [urn:nbn:se:uu:diva-355266](http://nbn:se:uu:diva-355266); OAI: oai:DiVA.org:uu-355266DiVA; id: diva2:1228237

3.4.2. Lithic analysis

Lithic analysis was also done at the National Museums of Kenya. Preliminary sorting was undertaken by James Munene, with a more intensive programme of discrete variable data collection completed by Emily Hallinan. At the most basic level, lithics were distinguished as flakes, cores, or tools. Various quantitative measurements and qualitative attribute descriptions were generated for each lithic artifact (Table 1, Appendix 1), after Goldstein (2017), Slater (2016) and Wilshaw (2012). Definitions for tool types follow that developed by Ambrose (1980, 1998) and Nelson (1973, 1980) for East African lithic assemblages, so this data may be compared across the region (Table 2, Appendix 1). Additional comments were made as necessary, describing for instance whether or not flakes were blades (parallel laterals and/or lamellar or prismatic flake scar patterns), core rejuvenators or core trimming elements etc. All lithics were photographed, and representative examples of various lithic artifact types are displayed in Appendix 1 for reference.

Note that obsidian lithic artifacts were classified according to colour, in combination with a ranking of obsidian quality to gain a rudimentary understanding of where obsidian artifacts were sourced (essentially - locally or not). Colour is however an imprecise means by which to differentiate obsidian source groups, and there is thus some doubt as to the accuracy of these classifications. To better assess the range of sources from which stone tool users in Amboseli were accessing their obsidian, samples of various obsidian raw material types have been exported to the Max Planck Institute for X-ray fluorescence (XRF) analysis and results of this analysis are pending.

3.4.3. Special finds

A number of other finds were also collected during the survey and excavations, including ostrich eggshell (OES), cowry shells, and grinding-stone implements. These were encountered rarely enough that we simply retained all specimens. Metal artifacts, on the other hand, were only collected while surveying when they looked sufficiently 'old', which was a somewhat arbitrary distinction but based on the presence of corrosion and weathering. Additionally, not all beads encountered while surveying were collected. I relied on the experience of local research assistants to estimate which beads could predate the last 50 years, and which were more obviously modern, and only the former were retained. All special finds were brought to the NMK where they were given a succinct qualitative description as well as measured, weighed, and photographed. Select examples of special finds are depicted in Appendix 3. None of the special finds were treated (i.e. washed) and all are bagged separately in the event that trace residue or other forms of analysis may one day be carried out on them.

3.4.4. Zooarchaeological analysis

All faunal remains were collected during excavations of the Amboseli sites, though bones on site surfaces, having highly uncertain proveniences, were not. Bone was wrapped in aluminium foil to help prevent post-excavation fragmentation, as the Amboseli faunal remains are friable. Faunal remains were minimally prepared for analysis, other than being lightly brushed in the field, as washing and drying threatened to further undermine their structural integrity.

Oliver Boles conducted analysis of the faunal remains using comparative specimens in the National Museums of Kenya. All bones (identifiable elements and non-identifiable fragments) were counted and weighed. Identifiable bones were bagged separately from unidentifiable fragments. The number of identified specimens (NISP) counts - the number of bone fragments

that can be identified to skeletal element, type, or taxon - are presented in this thesis. The minimum number of individuals (MNI) is also included where appropriate. MNI gives the lowest possible number of individual animals of a given taxon or size class identified in an assemblage, based on the representation of particular elements. For example, the presence of two complete *Bos* left-femurs implies the presence of two individuals, but one left- and one right-femur could represent either one or two individuals, and thus is only counted as one.

Where appropriate, bones in the Bovidae family that were either too fragmentary or of little specific diagnostic value were assigned to one of four size categories following Brain (1981). Bovid 1 (up to 20 kg) includes most neotragini and cephalophini such as dik dik and duiker, but also oribi (*Ourebia ourebi*). Bovid 2 (20-100 kg) includes sheep and goat, Thomson's gazelle (*Eudorcas thomsoni*), impala (*Aepyceros melampus*) etc. Larger animals such as hartebeest (*Alcelaphus buselaphus*), wildebeest (*Connochaetes taurinus*) and possibly some small domestic cattle (*Bos taurus*) fall under Bovid 3 (100-400 kg). Finally, Bovid 4 (>400 kg) includes cattle, buffalo (*Syncerus caffer*), and eland (*Taurotragus oryx*).

During analysis, any alterations in the form of cut marks (Blumenschine 1988, 1995), tooth marks (Shipman 1983), rodent gnawing and burning (Shipman et al. 1984) were noted. When possible, tooth wear stages (TWS) were described, following Grigson's (1982) criteria when discussing cattle, and Grant (1982) for ovicaprids. Limb bone shafts and axial elements with epiphyseal fusion areas were also recorded as fused or unfused.

3.4.5. Archaeobotanical analysis

Macrobotanical sampling and analysis was conducted at select sites in Amboseli, informed by published protocols (Pearsall 2000). Charred plant material identified during excavations was handled using a trowel, wrapped in aluminium foil, and bagged separately from charred plant material found during sieving. Select samples of charred plant remains visible during excavations were used for radiocarbon dating, and with the exception of one sample (Ua-57156), all radiocarbon dates are from material recovered *in situ*. Wood charcoal that was hand-collected during excavations was also weighed to give an idea of changing charcoal densities in each stratigraphic layer. Only the weights of the charred plant material found during excavations are listed in the site find tables in Chapter 5.

Point sediment samples averaging 3 litres were further collected from units and layers where burnt charred plant material was noted to be present, and also from contexts of particular interest (i.e. artifact dense deposits). The primary goal of the macrobotanical analysis was to determine whether or not domesticated crop remains were present at any of the sites excavated. I did not intend for the results of the sample analysis to undergo statistical analysis, with sampling undertaken on more of a 'presence/absence' basis, and to assess the potential for archaeobotanical research at these sites. A total of 610 litres of sediment was floated, and all light fractions were analysed in their entirety.

The flotation machine at the British Institute of Eastern Africa was used to process samples, and all flotation was done by Sheline Lugonzo. A 1 mm mesh was used to collect the heavy fraction, and the light fraction was collected in chiffon cloth. Fresh water was used and equipment was cleaned between samples. Seeds less than 0.5 mm were routinely identified from the flotation samples, suggesting the recovery rate of small charred material was generally good. I personally sorted all heavy fractions, and added any additional charred vegetal material to the light fractions.

Light fractions were exported to the University of York (UK) for analysis. All light fractions were weighed, separated through nested sieves (4 mm, 1 mm, 500 µm, 250 µm), and examined under 3-40x magnification. Sample components (charcoal, bone, enamel, uncharred material, seeds etc.) larger than 1 mm were separated and weighed; the remaining size fractions were scanned for seeds, parenchyma, tubers, fruit/nut shells, and faunal remains only. The label unidentified charred plant remains was given to material that did not appear to fit in any known category, but may be further identified and could prove of interest in future research. Parenchyma refers to any charred material with a porous or bubbly texture that resembles what typically remains when seed endosperms or underground storage organs are burned (Hather 2000). Tuber fragments were also recovered from a number of sites, and these may prove to be identifiable to a taxonomic level when modern analogue materials are analysed from the region. Michèle Wollstonecroft did assist in identifying one tuber fragment from the Ilnyangusi Manyatta site as Cyperaceae. The remaining specimens were simply classified as tubers based on the presence of rhizome detachment scars and central vascular fibers. Scanning electron microscopic analysis (Fig. 6, Appendix 7) was used to confirm the validity of this tuber classification rubric on select specimens.

Reference collections for seed identification included published and online sources (e.g. Beijerinck 1976; Fuller 2006), eastern and southern African crop specimens collected by Jimmy Jonsson (Uppsala University) and the extensive reference collections at the Institute of Archaeology, University College London. Seed reference material for Kenya and adjacent countries is unfortunately extremely restricted though. Due to time constraints and the limitations of the seed reference material, small non-domesticated grasses and other seeds and legumes were overwhelmingly assigned probable family or genus identifications. See Appendix 7 for illustrations and photomicrographs of the categories of identifiable plant remains discussed within this thesis.

Sediment samples for phytolith analysis were also collected to test for the presence of vegetative crops such as banana (*Musa* sp.), and maize (*Zea mays*), and to examine differences in the abundance of phytoliths throughout stratigraphic layers which may be indicative of degraded dung deposits. At the time of writing, the samples are still undergoing analysis by Dr Rahab Kinyingi, at the National Museums of Kenya.

3.5. Archival sources and historical texts

As is apparent in Chapter 8, historical texts compiled by 19th and 20th century European travellers, missionaries and government officials were accessed to shed light on the socio-ecological landscape of Amboseli as it was perceived, and in the colonial period, also governed. As such lines of evidence were produced under a colonial gaze, drawing on these texts requires constant dissection and contextualisation. They undeniably added different temporalities and levels of detail to my insights on Amboseli than would have been possible had I relied exclusively on oral traditions and archaeological source materials, however.

Due to language barriers, I draw most heavily on English source materials. Many 19th and early 20th century texts written about the Kilimanjaro area are in German, and I thank Nik Petek for graciously assisting me in the translation of certain passages. Documents pertaining to Amboseli's 20th century colonial history were accessed at the Kenya National Archives (KNA) during a research visit to Nairobi in 2016. I am grateful to Richard Ambani for his help in tracking down these files. The documents housed at the KNA that were of most relevance to this study were monthly and annual provincial reports, revealing among other

things how the British colonial administration organised itself, enforced (or failed to enforce) law and order, and how it perceived different ethnic and economic groups living in the wider Amboseli area.

3.6. Engaging local knowledge

Local knowledge and perspectives have been part of this research project in manifold ways. Every day interactions with local research assistants as we surveyed and excavated sites in Amboseli were particularly productive with regards to interpreting and understanding material remains and features in the landscape itself. In addition, I also partook in a number of more formal participatory mapping exercises and interviews with local Maasai people (Fig. 3.2). These interviews and mapping exercises were largely focused around discussing the artifacts collected and sites excavated during archaeological fieldwork in Amboseli in 2015. Insights generated during these interviews and exercises are featured especially in Chapter 8, as much of these discussions related to the colonial period, though throughout this thesis I make reference to these exchanges.¹¹

Examining networks of engagement in the research process is important. Most of the locally based research assistants involved in this project (Raphael and Alice Musere, John Lembakuli, Sinbune, Nelson Ng'ida, Moses Waema, Ernest Lenkoina, and Samuel and Peter Ntimama) are members of Olgulului/Ololarashi group ranch, and the majority male. The hiring bias reflects my own assumption that being male and a group ranch member would facilitate ease of access to inhabitants of Olgulului/Ololarashi, but also is a product of the recommendations of Daniel Lesinko Kanchori, chief of Amboseli location, whom I thank for connecting me with many of the people I worked with in Amboseli. These research assistants had a critical role as intermediaries facilitating my relationships with other people in Amboseli acting as English – KiMaasai translators.¹² Furthermore, I was introduced to the people I interviewed in Amboseli based in part on referrals from other interviewees, but predominantly through the personal contacts of my research assistants. Following this continual trail of referrals had advantages and disadvantages, though the involvement of participants and research assistants in creating an ever expanding network of contacts does have a certain collaborative appeal.

Local research assistants hired to work in this project were an integral part of my fieldwork as they were involved in every day of surveys and excavations. Interpretations of the significance of various sites, artifacts, features, and interactions were continuously discussed with local research assistants and indeed with all collaborating project members. Many important insights that have contributed to this thesis were achieved through such 'informal' conversations and observations that were recorded in my daily field diary. Additionally, while working on writing and researching my thesis away from Amboseli I remained in contact with a few key individuals who provided further assistance clarifying certain points and discussing ideas more generally.

¹¹ Note that verbal consent was obtained from each interviewee and research assistant to 1) participate in interviews and discussions and to 2) have the contents of these discussions and their identifying information be published within this thesis.

¹² The Maasai language has not been fully canonised, and thus I have used transliterations provided by the Maasai research assistants I have worked with when recording KiMaasai place names and formal names.

Fig. 3.2 Interviews and participatory mapping exercises in Amboseli

i) touring the Iinyangusi Manyatta site with Remando Oloshikoki; ii) interviewing Peneti; iii) map-drawing exercise with Nipakore and Parmari Tilei; iv) touring Empaash with Kitoe Lemomo; v) interviewing Eunice Shoke vi) interviewing Mboikai Lembakuli

Beyond these informal exchanges and discussions, a total of 17 interviews were conducted during participatory mapping exercises with local research assistants and other community members in 2015 and 2016. These exercises took on a number of different forms. On some occasions I provided individuals or groups of people with poster paper and markers and asked them to draw maps of Amboseli and note down important landscape features (springs, wild plant food distributions, settlements, markets, borders, rivers, boreholes etc.) replete with place names. These map-drawing exercises were photographed and audio-recorded. This was useful early on for me as I was getting my bearings in the study area and learning about how local people broadly classified the landscape and the resources within it. However, I quickly found that a much more revealing and productive approach was to actually travel to landscape features of significance (e.g. wells, rivers, salt deposits, old settlements, archaeological sites) with local people, using the opportunity to take photographs, acquire GPS coordinates, and of

course, ask questions. The discussions that unfolded during these excursions were audio-recorded and transcribed. In these ways, landscape features and historical sites became physical conduits for memories and narratives, allowing me to incorporate local ‘oral geographies’ (Hall et al. 2008) into this research.

In addition, 42 interviews were conducted with people in Amboseli during fieldwork in 2015 and 2016. Most of the individuals interviewed were members of Olgulului/Ololarashi group ranch, and all identified as Kisongo Maasai. As my research has a specific focus on the colonial period, I actively sought out people who were alive during those years. Men and women were interviewed in approximately equal numbers. Some interviews were conducted as group discussions, involving up to 5 people. Interview times ranged from 30 minutes to 3 hours. The audio from each of these interviews was digitally recorded, and I transcribed all of the discussions in English. The interviews are best described as being semi-structured (Bernard 2011: 212) as they followed a pre-determined format but still allowed for flexibility, and I encouraged interviewees to steer our discussions in different directions as this often led to new insights.

Typically in the beginning of each of these interviews, after explaining my research and seeking verbal confirmation of consent to participate, I would follow a set line of inquiry, asking people their names, how old they were, and where they had lived over the course of their lives. Interviews were occasionally conducted with an emphasis on certain events such as the initial Maasai settlement of Amboseli in the 1800s, or with a focus on themes such as wild plant foods, and the identities of Iloogolala and Dorobo people. Many discussions were concerned with clarifying issues and questions as they emerged during the course of my fieldwork. By far the majority of interviews were orientated around objects of material culture that were collected while surveying and excavating in Amboseli however. Asking people what they believed these artifacts were, and how they were made, used, and acquired served to frame our discussions around matters of change and continuity in the consumption and trade of everyday things.

One drawback to this approach was that it biased our conversations towards objects that can be identified in the archaeological record. That being said, as artifacts such as pots, beads, metal jewellery, and grinding-stones encompass the so-called ‘materialities of everyday life’ (Schmidt and Walz 2007: 142) they run the risk of being rendered invisible in their mundanity. For this reason, I doubt that many of these objects would have been commonly discussed during interviews if I had point blank asked people: what were the things you use and owned, where do they come from, and how has this changed through time? Therefore, I consider my approach to have been highly productive as it is so often the things that are camouflaged in their mundanity that are the most powerfully determinant of our behaviour, expectations, and norms (Lemonnier 2012; Miller 2005: 5). Using artifacts as tools for provoking local memories and insights had its drawbacks, but it also had real advantages for understanding aspects of daily life, especially quotidian relations of trade and exchange, and how these relate to pastoral livelihoods more generally.

In addition, artifacts recovered while surveying and excavating in Amboseli have an added temporal dimension capable of eliciting discussion pertaining to life before the 1900s, though of course it is my responsibility to refrain from evoking a reductive sense of timelessness as I make reference to these exchanges throughout this thesis. Indeed all discussions of objects used in the past in Amboseli took place in contemporary times, and were in every way demonstrative of how history is animate and continuously remade in the present as opposed to dead and unchanging. It is important to keep this mind in Chapter 5 where I have included

suggested interpretations of artifacts that predate the 20th century offered by local Maasai. As the people I interviewed in Amboseli also recognised, we cannot assume that the function and significance of various artifact types has remained stable. These interpretations are instead offered in Chapter 5 in an attempt to include the voices of local Maasai people in my archaeological process.

Finally, it should be noted that I relied heavily on the use of the Maasai age-generation system in order to construct a rough chronology of the remembered past in Amboseli. Among the Maasai in eastern Africa, named generations of groups of male initiates are given a common name as they graduate from boyhood to junior warriors. A new age-set is initiated every 10-15 years. The Maasai age-set chronology consulted in writing this thesis was that devised by Fosbrooke (1956), as it is recognised to be the most reliable (Anderson 2016: 54). Additionally, I referred to Rutten's (1992: 134) age-set chronology for the period post-dating the 1940s.

3.7. Conclusions

In this chapter I have detailed the methods used to survey my study area in Amboseli, as well as those used to identify and excavate a number of archaeological sites. The means by which the artefactual remains collected were analysed are also discussed. Finally, I have described the manner in which I have engaged with local knowledge sources (interviews and participatory mapping exercises), and provided a brief outline of the range of archival and historical source materials consulted throughout the course of this research project.

It would be remiss to not acknowledge that there are many ways in which this research could be expanded. For instance, my research area was limited to the southern extent of Olgulului/Ololarashi group ranch in Amboseli, and the people and landscapes that I interacted with here cannot be said to be representative of the wider region. There are numerous other group ranches, farmlands, and urban centres that feature only peripherally in this thesis, if at all. The methods used to explore pastoral pasts in Amboseli could also be diversified, incorporating geoarchaeological analysis for example. The approach I have taken to writing a history of pastoralism in Amboseli is but one of many possibilities, and this should be remembered in the following chapters as the results of my endeavours are disclosed.

4 Surveying in the Amboseli landscape

In Amboseli, surface finds need not be overlooked in favour of the temporal resolution of excavated sites, when a more balanced approach is possible. Any attempt to interpret patterns in the distribution of surface finds must, however, first take into account the depositional environment from which they came. This chapter begins with a summary of the results of previous archaeological survey work in Amboseli, and explains how this current research articulates with Robert Foley's pioneering study in off-site archaeology in the Amboseli basin. An overview of the 2015 survey finds is also presented, detailing the range and abundance of artifact types, and providing cursory interpretations of some of the more diagnostic objects. The second half of this chapter is devoted to evaluating the significance of survey find distributions, particularly in relation to mid-20th century Maasai settlement densities. The extent to which taphonomic processes and observer bias have impacted the distributions is examined, and trends in continuity of land use between mid-20th century Maasai and earlier ceramic/stone-tool using people in Amboseli are discussed, drawing on evidence from remote sensing techniques and the insights of local Maasai individuals.

4.1. Previous survey research in Amboseli

In the 1970s, Amboseli was the locus of early experimental research in off-site archaeology by Robert Foley. Foley (1981a,b) championed the idea that important information is to be found in analysing the distribution and density of continuous off-site artifact scatters. Through a survey program designed to sample what is today essentially Amboseli National Park, Foley produced a series of contour maps indicating the distribution of lithic artifacts across the landscape (Fig. 4.1). As Foley (1981a: 176) himself noted though, the sediments on the periphery of his study area are the least likely to contain accurate records of Holocene artifact discard rates because they are aggrading, or otherwise less suitable for the retention of artifacts. This may mean that the low density of artifacts on the edges of the study area and comparatively high density of artifacts towards the interior are not entirely reflective of actual use and discard patterns.

For comparison, Foley also created models of predicted land use and artifact density distributions for Maasai, Pastoral Neolithic, and hunter-gatherer groups (Fig. 4.1). As the wetlands of Amboseli have an exceptionally high concentration of mammalian biomass, Foley (1981a: 105) suggested that hunter-gatherer land use would be predominantly conditioned by hunting strategies. Largely modelling hunter-gatherer mobility from Hadza groups in Tanzania (Foley 1981a: 104), he suggested that hunter-gatherers would have concentrated near to the wetlands and woodlands of the central basin.

His model for the distribution of Maasai artifact density was based on the work of Western (1973) and Western and Dunne (1979), detailing preferred pastoral settlement zones in Amboseli in the mid-20th century. Foley (1981a: 112) hypothesised that PN and Maasai pastoralists would have had very similar land use needs, with the main difference being that the first domestic stock in eastern Africa were less drought tolerant than later breeds, and thus would have had to reside in closer proximity to the wetlands.

Fig. 4.1 Predicted and actual artifact distribution models in Amboseli National Park

Data from Foley 1981a, Figs. 6.2-6.4 and Fig. 7.4

World Imagery provided by Esri, DigitalGlobe, GeoEye, i-cubed, USDA FSA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo, and the GIS User Community.

While Foley (1981a: 96) acknowledged that agriculture is likely to have been an important mode of production in the Kilimanjaro and Chyulu areas for millennia, and that people in the Amboseli basin would have been in contact with these groups, he did not consider it likely that farming would have been extensive in the basin itself in the absence of irrigation. Foley did not observe any evidence for irrigation during his survey, and thus did not consider an agricultural model for land use appropriate.

As the observed distribution of artifacts in Amboseli did not fit the proposed pattern for pastoral land use, Foley (1981a: 191) concluded that contemporary pastoral strategies may have 'evolved within and out of the Late Holocene hunter-gatherers' and that there was a 'continuity of subsistence and adaptation, with the gradual increase of pastoral components'. This would suggest that early stone-tool using livestock herders in Amboseli had markedly different settlement strategies than the Maasai, and that patterns of land use exemplified by the Maasai in Amboseli are likely to be relatively recent.

Foley's work remains a seminal text for those engaging with off-site archaeological approaches (e.g. Binford 1980; Hallinan and Parkington 2017; Rossignol 1992), though it has been less widely cited by archaeologists studying the PN in East Africa. Among the latter, assumptions in Foley's model regarding the degree of standardisation of pastoral practices

through time have been criticised (Collett 1982). Adding to this, mid-20th century Maasai settlement distributions (after which Foley based his model) were being influenced by conservation and central government authorities even before the creation of the National Park, and do not necessarily represent the areas that are the most ‘naturally’ suited to pastoral habitation. For instance, by constructing watering points in peripheral locales and through more direct attempts to control grazing patterns, pressure has been applied on herders to shift livestock concentrations away from the central basin since the late 1950s (Kangwana and Browne-Núñez 2011: 32-33; Lindsay 1989: 154). Conceivably, prior to colonial era interventions, Maasai pastoralists were routinely settled closer to the wetlands in the National Park, overlapping more with Foley’s proposed hunter-gatherer distribution.

Regardless of the accuracy of his models, Foley is among a short list of people who have systematically attempted to understand how pastoral communities generate archaeological landscapes in East Africa (see also Boles 2017; Causey 2008). This chapter is inspired by his research, and carries on the tradition of off-site archaeology in Amboseli with the intention of refining methodological approaches for disentangling taphonomic processes and observer bias from actual artifact discard patterns so that trends in the distribution of artifacts in East African landscapes may be better understood.

4.2. Overview of survey area and finds

Fig. 4.2 2015 survey area and tracts

World Imagery provided by Esri, DigitalGlobe, GeoEye, i-cubed, USDA FSA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo, and the GIS User Community.

As a team of four to six surveyors spaced approximately 15-20 m apart, we were able to walk in tracts spanning some 100 m across, surveying an estimated total area of 9.73 km² (Fig. 4.2). The average number of finds per 100 m² was 0.02. In comparison, Foley (1981a: 119) found an impressive mean artifact density of 0.13 per 100 m². The lower rate of recovery in 2015 is

likely linked in part to discrepancies in the intensity of the surveys: in accordance with the aims of these different research projects the 2015 survey was conducted over an area some 38 times larger than Foley's, in a considerably shorter period of time. However, Foley (1981a: 166-169) found that artifact densities across his survey area were spatially variable, with the highest counts occurring on the 'pink tuff' soil type, which essentially immediately surrounds the wetlands of the central basin. Foley recorded far lower artifact densities on the 'lava soils' to the south of his study area, an area that overlaps with the 2015 survey tracts. Therefore, to a certain extent, differences in artifact recovery rates probably also reflect actual distributions. The following section provides a brief overview of the quantity, character, and distribution of archaeological remains encountered during surveys in Amboseli, noting differences and similarities between the 2015 finds and Foley's earlier work in the central basin.

4.2.1. Ceramics

A total of 735 ceramic sherds were collected during the 2015 survey in Amboseli. A basic kernel density map of the ceramic finds is presented in Fig. 4.21. Ceramic sherds from an approximate total of 235 sherds from unique vessels were collected during the survey. Due to the diminutive size of the rim sherds it was only possible to identify 8 vessels from the surface collections; these include 2 jars with everted rims, 1 bowl with a slightly everted rim, 1 bowl with a slightly inverted rim, and 4 bowls with straight rims (Fig. 1, Appendix 2).

The vast majority of the sherds collected (94%) have no decoration. Decorative elements present on the Amboseli 2015 survey sherds include twisted cord rouletting, grooves, striations, bands of triangular and circular impressions, incised lines, applied decoration, and punctates (see Fig. 2, and Figs. 5-14, Appendix 2). Foley (1981a: 160) did not describe the 100 ceramic sherds he identified in Amboseli in great detail as pottery did not form the central concern of his sampling program, but he did deposit a sample of his assemblage at the National Museums of Kenya. The diagnostic ceramic sherds from Foley's collection are depicted in Fig. 3, Appendix 2. There is minimal overlap between the decorations seen on the ceramics from Foley's collection and the 2015 survey finds – the grooves on Fig. 3 xiv and xv sherds (Appendix 2) are some of the only familiar attributes, and one sherd (Fig. 3x, Appendix 2) also has rouletting. Foley did not provide much information on the provenience of these sherds, only noting which of his survey locations contained pottery, though not the number of sherds found in each spot. It is therefore not possible to compare trends in the spatial distribution of ceramics across the study areas.

A few general statements can be made from looking at the surface collection of ceramics from Amboseli. There were no sherds recovered in 2015 that stand out as Pastoral Neolithic, with the possible exception of one extremely thin rim (Fig. 2xi, Appendix 2). There are some thin incised sherds in both of the Amboseli collections, but this is insufficient evidence to infer the presence of Akira ware, a late Pastoral Neolithic (PN) ceramic ware, as Foley (1981a: 180) had suggested. Foley did find a combed stamped sherd that might be Narosura (Fig. 3iii, Appendix 2), and one with herringbone decoration that could be classified as Ileret (Fig. 3i, Appendix 2), which could suggest a PN presence in Amboseli (see Chapter 6). There were no ceramics in either the 2015 survey collection or Foley's assemblage that clearly resemble the ceramics affiliated with the Pastoral Neolithic Elmenteitan tradition (again refer to Chapter 6), characterised by mica tempered minimally decorated vessels, red-to-black in coloration with lugs/spouts (Ambrose 1984; Bower et al. 1977; Collett and Robertshaw 1983; Wandibba 1980). The vast majority of the ceramics would seem to date to the Iron Age and on. As is discussed more fully in Chapter 7, some sherds are tentatively affiliated with specific Iron Age wares, though this has its complications.

4.2.2. Lithics

A basic kernel density map of the 2015 lithics finds is presented in Fig. 4.20. The majority of the lithics collected during the 2015 survey appear to be made from locally sourced materials, with the exception of some of the obsidian artifacts (Fig. 4.3). The fine grained green-grey basalt lithics were likely made from the volcanic rocks of Mt. Kilimanjaro. Unworked quartz nodules were frequently encountered. I did, however, personally observe that quartz nodules are very common on the Precambrian sediments roughly 10 km to the north of the study area, and it is possible that quartz may have been transported south from there. Chert is also reported to be naturally occurring in the Amboseli basin (Behrensmeyer and Boaz 1981). It is interesting to note the discrepancies in the recovery of lava/basalt, obsidian, and quartz artifacts identified in the different study areas in Amboseli. As Foley discovered, obsidian artifacts are more common towards the southern extent of the central Amboseli basin compared to quartz and lava (Fig. 4.4), likely accounting for the low recovery of quartz and lava in the 2015 study area.

The obsidian lithics collected in 2015 can be further categorised by colour and raw material quality (Fig 4.5). To my knowledge, geological surveys have yet to document a major obsidian outcrop on Kilimanjaro (Fosbrooke and Sassoon 1965), but nodules (approximately 5-10 cm in diameter) of coarse opaque obsidian were encountered on the sediments overlying the Kilimanjaro volcanics to the south of our survey area. There were also a number of lithics made from higher quality green, grey, and 'coffee' coloured obsidians found during the 2015 survey in Amboseli. The green obsidian is likely from the upper Eburru and Masai Gorge areas (Merrick and Brown 1984). The coffee coloured obsidian, visually identified with the assistance of Professor Stanley Ambrose, is suggested to be from the Gicheru Diatomite Quarry on the eastern side of the Kedong Valley (Petrological Group 14 of Merrick and Brown 1984). Sources for high quality grey obsidian are numerous in the Central Rift Valley, though none have been documented in the Amboseli or Kilimanjaro areas. In addition to the grey, green, coffee, and opaque obsidians, 15% of the obsidian lithic artifacts had indeterminate colouring, ranging from brown to green to grey, or were too dense to evaluate, and are thus referred to as indeterminate obsidian. It should be noted that the higher quality non-local obsidian may be somewhat overrepresented in the assemblage. As the higher quality obsidian was presumed to be sourced from outside the area, there was a lowered threshold for qualification as an artifact in comparison to the local opaque obsidian, quartz, chert, and basalt.

Likely in relation to the difficulty of procuring non-local grey and green obsidian, non-local obsidian cores appear to have been more intensively reduced in comparison to the other raw materials. This can be quantitatively assessed, as the percentage of surface cortex on flakes and remnant cores is an indicator of core reduction stage (Dibble et al. 2005; Lin et al. 2010). Fig. 4.6 shows that artifacts made of obsidian were the least likely to have cortex, and of all the obsidian artifacts, the opaque obsidian cores and flakes were the most likely to have cortex. The intensity of core reduction is also reflected in the proportion of bipolar to non-bipolar cores, with the data showing that the obsidian raw material sources were the most extensively flaked in a bipolar fashion (Fig. 4.7). Nearly all of the obsidian cores were bipolar, regardless of their quality. Yet, the making of cores on flakes can also be a way of extending the utility of a scarce material, and the higher rate of core on flake cores among the grey and green obsidian lithics in comparison to those of opaque obsidian suggests people were conserving these raw materials to a greater degree (Fig. 4.7). In sum, non-local high quality grey and green obsidian was highly conserved in Amboseli.

As we might expect, the obsidian artifacts were found to be the least patinated of the chipped stone lithics and the opaque obsidian lithics were also more patinated than the green, grey,

and coffee coloured obsidian implements (Fig 4.8). The relative proportion of lithics with post-depositional damage serves as another rough indicator of the amount of time that these artifacts have been exposed to taphonomic processes. As we might expect, the basalt artifacts—which based on form appear to predate the LSA—have the highest percentage of post-depositional damage (Fig. 4.9). We can also see that the opaque obsidian artifacts have a higher rate of post-depositional damage in comparison to the lithics made from coffee, grey, and green obsidian. It seems reasonable to infer that for the most part the appearance of green, grey, and coffee coloured obsidian in Amboseli post-dates the use of local lithic materials. There is, however, no reason to conclude that locally available obsidian, quartz and chert sources were not used contemporaneously and even more recently than the imported obsidian.

Fig. 4.3 Lithic assemblage composition by raw material

Fig. 4.4 Distribution of lithics by raw material in Foley's survey area

From Foley 1981a, Fig. 7.7 World Imagery provided by Esri, DigitalGlobe, GeoEye, i-cubed, USDA FSA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo, and the GIS User Community.

Fig. 4.5 Obsidian lithics categorised by colour and raw material quality

Obsidian quality ranges from 1 (high) to 4 (low). Information on the qualitative obsidian quality ranking system used for this analysis is in Table 1 Appendix 1.

Fig. 4.6 Percentage of total lithic assemblage with cortex

Fig. 4.7 Percentage of core types indicative of raw material conservation

Fig. 4.8 Percentage of total lithic assemblage with patination

Fig. 4.9 Percentage of total lithic assemblage with post-depositional damage

We may further deduce that the grey, green and ‘coffee’ coloured obsidian was utilised for a shorter period of time in Amboseli in comparison to the local lithic sources. For one, the study area is located some 350 km away from the presumed upper Eburru source of the green obsidian, and the large scale movement of obsidian from this area probably did not occur until the ceramic Late Stone Age/Pastoral Neolithic (Merrick and Brown 1984). The lithic assemblages of pre-pastoral hunter-gatherers overwhelmingly indicate utilisation of local raw materials, and minimal involvement in long distance networks of exchange (Frahm et al. 2017). The antiquity and sources of the grey obsidian are less well understood, but based on chemical sourcing of high-quality obsidian from the nearest PN sites to Amboseli (Maua Farm and Wasendo Glade) some of the grey obsidian found in Amboseli could originate from the Naivasha area (Merrick and Brown 1984; Mturi 1986).

Unfortunately, apart from the lithics from the Iron Age sites excavated for this thesis, there has never been a systematic quantitative assessment of Late Stone Age (LSA) lithic industries in the Amboseli area, making it difficult to determine whether the lithics collected during the 2015 survey resemble a particular tradition such as Savanna Pastoral Neolithic (SPN) or Elmenteitan (see Chapter 6 for a discussion of these terms). A major limitation to direct comparisons between the Amboseli lithics and assemblages from elsewhere is that there were diverse local adaptations of LSA lithic traditions, especially in places beyond the Central Rift, where access to high-quality obsidian sources was constrained (Goldstein 2017: 24). However, based on the information available for the lithics and ceramics, it seems unlikely that there was a pronounced Elmenteitan presence in Amboseli.

Generally, Elmenteitan blades are large and frequently exhibit dorsal-proximal faceting, though the crescents associated with these assemblages are smaller, being less than 20 mm (Ambrose 1984; Frahm et al. 2017). In contrast, SPN toolkits (which also date to the Pastoral Neolithic) in the Central Rift are similar to other LSA industries but contains blades shorter than 100 mm, with ground platforms, and larger crescents (Ambrose 1984, 2002; Goldstein 2014; Wilshaw 2012). There are only four complete blades in the Amboseli lithic assemblage, but none exceed 60 mm, with the average size being 37 mm. Furthermore, none of the nine complete crescents found during surveys in Amboseli fall within the typical Elmenteitan size range, but conform more to SPN standards in the Central Rift Valley (Table 4.1), although it is not possible to know if they are Pastoral Neolithic in age.

It does then seem unusual to have such a high percentage of green obsidian artifacts in the Amboseli assemblage so far south-east of the known range of Elmenteitan sites, which is thought to be confined to the western side of the Great Rift Valley (Ambrose 1980). Assuming that Elmenteitan lithics were not being produced in Amboseli, the abundance of green obsidian in the landscape may be explained in a number of ways.

Table 4.1 Comparing average crescent lengths in mm

Amboseli lithics					Comparative sites			
	Green obsid.	Grey obsid.	Opaque obsid.	Total	Elmenteitan (WL)*	Urewe (WL)	Narosura	Elmenteitan obsidian quarry
Mean	24.36	22.55	19.38	22.03	18.6	17.23	22.5	16.47
Min	22.06	20.34	15.51	15.51	11.26	no data	15	no data
Max	26.65	24.76	22.47	26.65	33.35	no data	33	no data
SD	2.30	2.21	2.89	3.02	4.24	no data	no data	0.99
N	2	2	3	9	47	8	135	4
Source					(Seitsonen 2004)		(Odner 1972)	(Goldstein 2017:163)

* No measurements are known for crescents in the Elmenteitan levels at Wadh Lang'o (WL) so average geometric microlith length is listed instead.

It is possible that 1) the green obsidian arrived in Amboseli before the Pastoral Neolithic, as earlier LSA lithic assemblages bear no evidence for preferred obsidian sources (Ambrose 2012). Yet, as already stated, Amboseli is situated a considerable distance from Mt. Eburru, and the long-distance movement of significant quantities of obsidian does not appear to have occurred prior to the PN. It is also possible that 2) the green obsidian is not from Mt. Eburru but rather originated from a yet unknown source. We can also consider that 3) the green obsidian was brought to Amboseli during the ceramic LSA and PN by lithic producers whose material traditions do not conform simplistically to SPN or Elmenteitan labels. This is not unheard of – for instance the supposedly SPN lithic assemblage of the later Pastoral Neolithic site of Maringishu is dominated by green obsidian from the upper Eburru and Masai Gorge areas, while obsidian from southern Naivasha area sources occur only minimally (Merrick and Brown 1984: 148). Closer to Amboseli, the GvJm 47 occurrence at Lukenya Hill, identified as a PN site with unknown ceramic wares, is also dominated by upper Eburru area obsidian (Merrick and Brown 1984: 147). Interestingly, coffee coloured obsidian sourced from the Kedong area also appears in minute quantities at the Pastoral Neolithic site of GvJm 47, and as this obsidian source does not seem to have been widely used elsewhere during the PN (Merrick and Brown 1984), it could suggest some sort of connection between the Lukenya Hill area and Amboseli. Green obsidian from the Mt. Eburru area may have even come to Amboseli by means of exchange with Elmenteitan lithic manufacturers, or those who were provisioning Elmenteitan lithic manufacturers with obsidian during the PN, possibilities also discussed with regards to Kansyore sites in the Lake Victoria area (Frahm et al. 2017). Finally, 4) the green obsidian may have been transported into Amboseli during the last stages of the PN and into the Iron Age, when the strict adherence to grey obsidian in SPN sites and green obsidian in Elmenteitan sites is no longer seen (Siiriäinen 2009: 186). Some of the non-local obsidian may have even been recycled from older archaeological contexts into the Iron Age. Given the available evidence, explanations 3) and 4) seem most parsimonious, with elements of both probably occurring in Amboseli.

As this section underscores, there are large gaps in our understanding of LSA lithic traditions in and around Amboseli. From looking at the Amboseli lithic assemblage in its entirety, we may still draw a few basic conclusions. For one, the vast majority of the lithics with the exception of the basalt implements are LSA, and it would appear that during the Late Stone Age obsidian was the preferred raw material for flaking in Amboseli. Furthermore, the green, grey, and coffee coloured obsidian are unlikely to be locally sourced. The green obsidian was, for the most part, probably moving into Amboseli during and after ceramic LSA/Pastoral Neolithic periods. Also, Elmenteitan style lithics and ceramics do not feature prominently in Amboseli, though this does not preclude the possibility of inhabitants of Amboseli being in contact with Elmenteitan obsidian exchange or distribution networks.

4.2.3. Special finds

A number of other finds were also encountered during the 2015 survey (Fig. 4.10). These include 4 glass beads, 4 cowrie-shell fragments (Fig. 4, Appendix 3), and 7 grinding-stones (Fig. 2, Appendix 3). The beads and cowrie shells are very likely from the Iron Age or more contemporary times, though the grinding-stones may date to any period. A total of 10 metal implements judged to be of some antiquity (i.e. not modern) were also recovered (Fig. 5, Appendix 3). In addition, two lithic ‘manuports’ were found, one being a smoothed chert stone, possibly once used as a pendant, and the other being a rounded pebble, tentatively identified as feldspar (Fig. 3, Appendix 3). The feldspar pebble also appears to have an indentation, and may have been an attempt at a stone bead that was abandoned upon the stone fracturing.

Fig. 4.10 Distribution of special finds collected during the survey

Another surface find worthy of mention is a fragment of a stone bowl manufactured from porous local basalt (Fig. 1, Appendix 3). The stone bowl was not technically found during surveys, but on a visit to Olgulului in 2017. The stone bowl was clearly from a disturbed context, situated among a series of 1-2 m deep earthen trenches, each stretching east-west for 200 m in a sequence extending 1.8 km. These trenches were constructed in the last few decades by an NGO to collect surface water that previously flowed into the National Park,

and they have disturbed a considerable amount of sediment. While the exact origin of the stone bowl fragment is unknown, it does still attest to a Pastoral Neolithic presence in the Amboseli area.

Finally, five possible stone cairns were encountered during surveys (Fig. 4.11). Three of these cairns were situated within c.15 m of each other, while at the other two sites they occurred alone. All appear to be simple rather than kerbed or ringed in construction, though some seem to be eroding or have perhaps been disturbed. None of these cairns were located adjacent to or within scatters of artifacts that could be designated as sites, nor were any artifacts observed in the stone heaps. However, I was told by research assistants and interviewees that when similar stone heaps were excavated in Amboseli by curious locals, some were found to contain human remains (see also Lewis 2015: 47). While European explorer accounts indicate that some prominent Maasai men such as diviners (*laibons*) were buried in graves marked by stone heaps (Merker 1910: 202) no Maasai people in Amboseli that I spoke with recall having any such tradition of interring their dead beneath rock cairns. Instead, a common narrative in Amboseli is that these cairns contain the remains of colonial government agents.¹³ Lacking the expertise of a human osteoarchaeologist during fieldwork, and in recognition of the sensitive nature of disturbing human remains, no attempt was made to excavate these features.¹

Fig.4.11 Stone cairns in Amboseli

¹³ E.g. interview with Olemwanda in Olgulului/Ololarashi G.R., August 24 2015; Interview with Kurrambe in Olgulului/Ololarashi G.R., September 16 2015.

4.2.4. Artifact clusters

Artifacts have been further categorised into 120 ‘artifact clusters’ (Appendix 4) Clusters were distinguished using the following criteria: anywhere with ≥ 2 unique sherds (i.e. equal to or more than the remains of 2 vessels), or anywhere with ≥ 3 flakes, cores, or tools, separated by less than 200 m. The decision to use 200 m as the maximum extent for each cluster was based on the observed maximum extent of artifacts on the surface of sites in the Lemek-Mara area (Pilgram et al. 1990: 41), which was 220 m. Two exceptions were made: clusters 79 (maximum extent = 300 m) and 107 (maximum extent = 351 m), where the artifacts were spaced in larger continuous scatters. While clearly the classification of these clusters is somewhat arbitrary, and they cannot all be considered discrete sites, this categorisation scheme at least provides the reader a sense of where artifacts were found, and how they were situated in relation to each other. More detailed information on the distribution of finds encountered during surveys in Amboseli is accessible for download at DiVA, Uppsala University’s online academic archive.¹⁴

4.3. Decoding the landscape: spatial temporal analysis of survey finds

Rather than exclusively using sites as the unit of analysis, the archaeological record on the surface of this landscape is regarded as a continuous expanse of individual artifacts, varying in density (Foley 1981a; Hallinan and Parkington 2017). In this section patterns in the distribution of artifacts grouped under broad categories (ceramics, lithics, lithic type and raw material) are examined. Leaving aside taphonomic processes and observer bias, the lithic artifacts may be understood as an averaged representation of landscape use during the LSA/PN/Iron Age, while the ceramic artifacts are a more averaged indication of Iron Age and contemporary Maasai land use. As with most archaeological endeavours, there is no certainty to this enterprise. Disregarding taphonomic factors and observer bias, artifact locations are only representative of the places where material culture was lost or discarded, and does not prove that other areas in the landscape were uninhabited. There is also the issue that lithics and ceramics have unique functional roles, and variations in their distribution may be more indicative of where these artifacts tended to be used rather than exemplifying different approaches to navigating landscapes by temporally separate groups. Off-site archaeological approaches are always a trade-off, affording an understanding of landscape use at a greater spatial resolution than the mapping of individual sites, at the expense of lowered temporal resolution (Foley 1981a: 197).

The goal of this analysis is twofold. Firstly, I seek to understand how representative artifact distributions are of actual land use patterns in the study area. This is especially relevant with regards to interpreting the apparent paucity of Pastoral Neolithic artifacts and sites in Amboseli, and the comparatively stronger Iron Age signature. Secondly, this analysis seeks to assess the degree of difference and similarity between the distribution of mid-20th century Maasai pastoral settlements and artifacts collected during the 2015 survey. Earlier work in Amboseli National Park concluded that the location of lithic artifacts and Maasai intensive land use areas had little overlap (Foley 1981a: 184). In the following section I revisit the issue with reference to a different area of Amboseli, seeking to shed light on questions of just how ‘modern’ mid-20th century Maasai and their patterns of landscape use really were. Do trends in the location of mid-20th century Maasai settlements depart radically from the observed distribution of archaeological materials in Amboseli, or is there more similarity than Foley's

¹⁴ URN: urn:nbn:se:uu:diva-355266; OAI: oai:DiVA.org:uu-355266DiVA; id: diva2:1228237

(1981a) research would perhaps suggest? Finally, how may we best account for this similarity where it does occur?

It is important to keep in mind throughout the remainder of this chapter that the map generated of mid-20th century Maasai settlements does not represent *the* definitive traditional Maasai land use pattern. Maasai land use patterns in Amboseli have been subject to change due to factors that do not solely relate to the availability of water and pasture. For example, during the 1950s boreholes were being installed in Amboseli, and settlement zones were gradually retracting into smaller and fewer designated areas (Worden 2007). By the 1970s, Amboseli's non-subdivided group ranches like Olgulului/Ololarashi were beginning to embrace a system that encouraged a fixed use of areas for permanent wet season settlement (*emparnat*) and temporary dry season settlement (*enkaron*) (Worden 2007: 34). This system is known to have been a departure from a more continuous use of less permanent settlements over a larger geographic area (Western 1973; Western and Dunne 1973; Worden 2007). Even prior to the construction of boreholes and colonial grazing scheme interventions, the history of Maasai occupation of Amboseli has long been dynamic (see Chapter 8). The following analysis is only comparing an averaged decadal signature of Maasai land use, representative of a specific moment in time.

A further caveat that needs to be addressed at the beginning of this section is that our understanding of local-scale environmental change in Amboseli during the Holocene is not especially refined. While we may assume that much of the study area was submerged under Lake Amboseli during the Late Pleistocene (c.100,000-20,000 BP), and palynological evidence has established that the wetlands persisted throughout the later Holocene with phased expansions and retractions (Githumbi et al. 2018a,b; Rucina 2010), the lack of detailed palaeolimnological data for Lake Amboseli makes it difficult to factor in the extent of rangeland transformation through time on this flood prone landscape. However, both palaeoenvironmental and archaeological records are fragmentary by nature, and will never allow for total certainty in the reconstruction of past human behaviour. This chapter endeavours to work within the limitations of the data, adjusting research questions and interpretations as appropriate.

4.3.1. Mapping mid-20th century Maasai settlement distributions

In order to approximate mid-20th century pastoral Maasai settlement distributions, aerial historical photographs (originally produced by the Royal Air Force and acquired from the Bodleian Library, University of Oxford) from January 22 1961, and February 13th 1950 were consulted. The photographs were first digitised and then georeferenced in ArcGIS. Unfortunately, the photographs do not depict the southernmost and westernmost extent of the study region, though these blind spots only account for a small percentage of the total area surveyed and thus do not detract significantly from the data.

Two other issues were identified that could potentially negate how representative these photographs are of mid-20th century pastoral land use areas. As all of the images were captured during the dry season, they only depict dry season settlement distributions. In addition, 1961 was an unusual year as a major drought was occurring in Kajiado. To overcome these limitations, both abandoned and occupied pastoral settlements were plotted in ArcGIS. Only abandoned settlements that appeared in photographs in 1961 and not in 1950 were counted however, as glades visible across this time period could potentially predate Maasai landscape occupation. The resulting data set (Fig. 4.12) provides a more averaged pastoral settlement distribution signature in the study area between 1950 and 1961.

Fig. 4.12 An averaged distribution of pastoral settlements c.1950-1961

World Imagery provided by Esri, DigitalGlobe, GeoEye, i-cubed, USDA FSA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo, and the GIS User Community.

4.3.2. Statistical analysis

Patterns in the distribution of data have been investigated primarily through goodness of fit tests using a χ^2 statistic. A goodness of fit test is used to compare an observed sample distribution with an expected probability distribution. To carry out these tests, the survey area was first divided into either distance intervals (e.g. x number of meters from a pastoral settlement¹⁵); into two nominal variables (e.g. volcanic and lake-bed geological zones); or in accordance with other categories (areas with high and low CTI/NDVI values¹⁶). The percentage of land of the total area surveyed was then determined for each category. The observed sample distribution is the actual number of occurrences in each category. The expected distribution is the number of cases there would be in each category if the sample data were distributed evenly in accordance with the percentage of the total area surveyed in each category. If the number of expected occurrences was similar to the number of observed occurrences then the test was found not-significant. A result of no significance indicates that the frequency distribution is the same across the groups, or that the sample is not large enough to detect significant differences. On the other hand, if there were much higher or lower observed counts than expected counts, the null hypothesis was rejected, and a significant χ^2 result was produced. The lower the p value in relation to the significance level (0.05), the less likely the distribution is entirely random. The results of all tests are found in Appendix 5.

¹⁵ Distance intervals were calculated using the ArcGIS Multiple Ring Buffer tool, which creates buffers at specified distances around features.

¹⁶ To group landscape data into these 'other' categories, the Jenks optimisation method or Natural Breaks method in ArcGIS was used. The Natural Breaks method uses an algorithm to break data into classes that group similar values, and that maximise the differences between classes (see also de Smith et al. 2007: 101).

Within this chapter the percent that observed and expected counts deviated in the various tests has been expressed graphically in order to help the reader visualise significant trends.

Percent deviation was calculated as:

$$\text{percent deviation} = \frac{(\text{Obs}-\text{Exp})}{\text{Exp}} \times 100$$

A Kendall rank correlation coefficient test (Kendall's tau test) was used to measure the ordinal association between two measured quantities, and the software used to perform this test was accessed at Wessa (2018). The Kendall's tau test measures the strength and direction of association that exists between two variables. The results are reported as a correlation coefficient between +1 and -1, which is compared to a *p* value. If the Kendall's tau correlation coefficient is greater than the *p* value (disregarding the direction of association), the result is concluded to be significant.

Note that the sample of quartz and chert lithics found during the 2015 survey was judged to be too low to be statistically representative and are not analysed individually in the following sections, but are featured in the total lithic, flake, and core counts. Additionally, the basalt lithic artifacts judged to predate the time period of interest (LSA) have been excluded from the total counts of lithics, flakes, cores and tools. Finally, ceramic sherds that are assumed to belong to the same vessel have been excluded from the analysis, unless otherwise indicated, so as not to overestimate artifact counts in locations where sherds have been fragmented into many pieces. Analysis was however carried out on total ceramic sherd counts, and the results are listed in Appendix 5 for reference and comparison.

4.4. Taphonomic considerations and observer bias

Taphonomic processes and observer bias during surveys can create patterns reflecting the surfaces on which artifacts are frequently removed or re-deposited, or where artifacts are most readily identified by archaeologists, rather than the actual ways that people have interacted with their landscapes. Overall, deposits in the survey area appear to be aggrading, meaning there is concern that the artifacts encountered may have either derived from elsewhere, or are comparatively recent in age. Four tests were designed to identify, understand, and where possible, correct for post-depositional processes and observer bias.

4.4.1. Vegetation cover

The visibility of artifacts is generally acknowledged to be impacted where dense bush or tree cover predominates. To evaluate whether or not artifacts were more commonly identified in areas with more open ground and less so from more vegetated locations, a Normalised Differential Vegetation Index was created using the NDVI function in ArcGIS (Fig. 4.13). NDVI values range between -1 and +1, and allow for a standardised way to measure vegetation cover in a landscape. The NDVI used for this study was calculated from multispectral WorldView2 satellite imagery (resolution of 1.84 m), acquired February 2, 2011. The NDVI values were classified in ArcGIS using the Jenks optimisation method into three groups representing the most vegetated (NDVI values = 0.208-0.998), moderately vegetated (0.13-0.208), and least vegetated areas (-0.998-0.130). A test of proportions using a Chi² statistic was performed to determine if the observed number of artifacts associated with each NDVI value was equal to the expected, or if there were significant differences, and the results appear in Fig. 4.17 and Table 1, Appendix 5.

Fig. 4.13 NDVI values across the study area

This test reveals that although the survey was conducted during the dry season when vegetation cover was limited, artifacts were still predominantly identified in more open areas. As the vegetation cover in the survey area is prone to fluctuation on a seasonal, annual, and decadal scale (Western 2006), it is assumed that the distribution of contemporary vegetation in the survey area did not impact on the land use strategies of people in the past. Rather, the relationship between NDVI values and artifact densities is more convincingly explained by observer bias. On average there were 77% more artifacts observed than expected on areas with NDVI values between -0.998-0.130, and 66% fewer artifacts on areas with NDVI values between 0.208-0.998. To correct for this difference, in future tests when calculating the expected number of artifacts in each landscape category (e.g. the expected number of artifacts in the total area surveyed on volcanic sediments, and the total area surveyed on lake bed sediments) an additional 77% was added to the total area in each category with a corresponding NDVI value of -0.998-0.130, and 66% deducted from the total area in each category with values ranging from 0.208-0.998.

4.4.2. Geology

Amboseli is a Pleistocene lake bed, and is renowned for its loose dusty soils. The sediments overlying the volcanic geology of Mt. Kilimanjaro stand in contrast to the fluvial facies of the lake bed, the former being both rockier and more consolidated. Loose soil and dust, particularly abundant in between the rainy seasons, has the potential to camouflage artifacts in Amboseli. Foley (1981a: 163-165) also hypothesised that in certain areas of Amboseli loose dusty sediment may be causing the vertical displacement or obfuscation of artifacts, though tests to establish this proved inconclusive. However, in addition to post-depositional factors and recovery bias leading to a lack of artifacts on the lake bed deposits, there may also be a preference for occupation of the volcanic sediments. Maasai in Amboseli have reported that when building their homes, locations with finely-textured soils are avoided because of the excessive quantities of dust raised by livestock and wind (Western and Dunne 1979: 90). This may explain why significantly fewer mid-20th century pastoral settlements than expected were situated on the lake bed (Table 2, Appendix 5).

Fig. 4.14 Geological map of Amboseli

Digitised from Williams (1972)

A simple evaluation was designed to determine whether there were more artifacts than expected on the consolidated volcanic sediments and fewer on the lake bed using a geological map of Amboseli. The map was digitised into ArcGIS (Fig. 4.14) and a goodness of fit test using a χ^2 statistic was performed to compare observed and expected values across these two geological zones.

The test revealed that there are significantly more ceramics and opaque obsidian flakes on the volcanic sediments than expected (Fig. 4.18 and Table 2, Appendix 5). There is no obvious reason why only some artifacts would be less readily identifiable on lake bed sediments, and thus the associations are assumed to be unrelated to observer bias.

Considering that some of the ceramic sherds collected are likely contemporaneous with 20th century Maasai settlements, it is no surprise that they also appear in higher counts than expected on the volcanic sediments. The reason why this pattern exists for the locally sourced obsidian flakes is more complex. As the local obsidian lithics are thought to comprise some of the oldest artifacts in the survey assemblage, conceivably they have been most subject to burial and displacement on the lake bed. While there do not appear to be more opaque obsidian cores and tools on the volcanic sediments, this may be only because the sample size is too small, and does not provide enough evidence to show a significant difference between observed and expected counts. We may then consider that higher opaque obsidian flake densities on the volcanic sediments reflect a preference for settlement away from the dusty lake bed, implying that opaque obsidian was the raw material of choice for people whose patterns of landscape use overlap most with mid-20th century Maasai. Finally, we may consider that the test has detected actual use and discard patterns indicating that local obsidian was obtained and flaked in proximity to the volcanic rocks of Kilimanjaro, where nodules of this raw material are more commonly found.

This test is no doubt failing to detect more subtle variations in the topography of the survey area however. To further evaluate how geomorphological factors may be impacting the

distribution of artifacts in the landscape, two tests were designed to investigate the influence of hydrological processes.

4.4.3. Hydrological processes

During the rainy season, the river beds running south to north from Mt. Kilimanjaro flow with water and sediments derived from the mountain towards low relief areas in the central basin. During these periods of intense rainfall, it is probable that artifacts have been redeposited across the landscape and/or buried beneath accumulating sediments due to fluvial/pluvial processes. To evaluate whether the location of artifacts in the landscape is heavily determined by modern hydrological processes, a Compound Topographic Index (CTI) map was created (see also Reeves et al. 2016 for a comparable study in Turkana). Acting under the assumption that topography drives the flow of water in a landscape, the index predicts the accumulation of flow in topological low spots. CTI values have been shown to be significantly correlated with soil water content, horizon depth and silt percentage, and can be used to model aspects of hydrological systems (Moore et al. 1993). Areas with high CTI values indicate large water catchments, such as gentle slopes and depressions, whereas areas with low CTI values represent small water catchments, such as ridges and crests. Therefore, high CTI values are a better indicator of aggrading environments, and low CTI values are more representative of erosion zones.

CTI values were calculated in ArcGIS for the survey area using a TanDEM-X digital elevation model (acquired from the German Aerospace Centre, Microwaves and Radar Institute), with a relative accuracy of 2 m, and a raster resolution of 12 m. Elevation anomalies that may have interfered with the calculations were first removed from the DEM. The filled DEM was then used to calculate slope (β) and flow accumulation (As) using a D-infinity algorithm (Tarboton 1997).

The formula used to calculate CTI was modelled after Gessler et al. (1995) and can be shown as:

$$CTI = \ln\left(\frac{As}{\tan \beta}\right)$$

The model resulting from this procedure is pictured in Fig. 4.15.

First a Kendall's rank correlation test was performed to evaluate if artifact weight and CTI values had an ordinal association, which would suggest that the location of artifacts in the landscape is heavily determined by hydrological processes. A weak but significant negative relationship was identified for green obsidian artifact weights and CTI values, but otherwise these tests failed to demonstrate significant correlations (Fig. 4.16, and Table 3, Appendix 5). This suggests that fluvial processes are unlikely to be displacing significant quantities of artifacts in the survey area to the extent that size sorting is taking place.

To examine whether there were significant differences in the observed vs expected number of artifacts in areas assumed to be aggrading and eroding, an additional test was performed. CTI values were first classified into 32 categories in ArcGIS using the Jenks optimisation method. Moderate variations among CTI values within the basin are circumspect because the accumulation values in this flat area are large. As is common with landscape analysis involving CTI values (e.g. Yang et al. 2005), thresholds were established in order to reduce the 'noise' within the model. The 5% of the area surveyed with the lowest CTI values (0-4.901) are assumed to be erosion zones, and the 15% of the area surveyed with the highest CTI values (9.45-23.25) are assumed to be aggrading zones. A goodness of fit test using a

Chi² statistic was conducted to determine if there were significant differences between the expected and observed number of artifacts situated in places with the highest and the lowest CTI values.

Fig. 4.15 CTI model of survey area

Fig. 4.16 Kendall's Tau test results for green obsidian

This test indicated that there are significant differences in the observed vs expected number of green obsidian artifacts and flakes in areas with the highest CTI values (Fig. 4.19 and Table 4, Appendix 5). These results suggest that some lithic artifacts are being buried or displaced in areas where sediments are aggrading. Ideally, the CTI map would be ground-truthed, however, as there are currently no better data available, it is assumed that the distribution of artifacts in the landscape has been influenced to some extent by modern hydrological processes.

Fig. 4.17 Percent deviation between observed and expected counts across NDI/1 value categories

Fig. 4.18 Percent deviation between observed and expected counts across geological zones

Fig. 4.19 Percent deviation between observed and expected counts across CTI value categories

Note the * indicates the relationship is **not significant**

4.4.4. Accounting for taphonomic factors and observer bias

In sum, observer bias and taphonomic factors do appear to be influencing the distribution of artifacts across the study area. First, artifact location was highly correlated with NDVI values, indicating that vegetation cover limited the visibility of artifacts during the survey. To correct for this, when calculating expected artifact counts in the tests of proportions performed in this chapter, in places with dense vegetation the number of artifacts expected has been reduced, and in places devoid of vegetation, the number of artifacts expected has been increased. The NDVI correction ensures that significant differences between observed and expected artifact values are not being erroneously influenced by differences in the visibility of artifacts in barren and bushy places.

Secondly, notable differences in observed vs expected artifact recovery rates across the two major geological zones in the survey area were limited to opaque local obsidian flakes and ceramics. The higher than expected counts of ceramics on the volcanic sediments mirrors the distribution of mid-20th century Maasai settlements, and likely reflects similarities in land use areas (though taphonomic processes cannot be entirely ruled out). Lower than expected counts of opaque obsidian on the lake bed do not appear to be the result of observer bias, and are thus attributable to taphonomic processes and/or actual use and discard patterns.

Finally, associations between hydrological processes and artifact distributions were examined. A weak negative relationship was found between compound topographic index values and the weight of green obsidian artifacts using a Kendall's rank correlation test. However, the observed number of flakes and green obsidian artifacts recovered in areas with high CTI values differs significantly from expected counts. As anticipated, in some areas surveyed, low lithic artifact densities seem to be best explained by processes of sediment aggradation rather than actual artifact discard patterns. In the following analysis, trends in the distribution of lithic artifacts in particular should be evaluated with this in mind.

Based on the available information, we cannot conclude that all of the artifacts collected during the survey have been redeposited from elsewhere, nor that all areas with low artifact densities are entirely the result of taphonomic processes. However, patterns in the spatial distribution of some artifacts appear to have been significantly influenced by post-depositional factors. Additional or alternative processes and biases may still be operating on the data but effort has been made to acknowledge and compensate for some of these issues in interpreting artifact distributions across the survey area.

4.5. Inferring pastoral landscape use from survey data

This section first examines if there is significant overlap in the distribution of artifacts and mid-20th century pastoral settlements, and then seeks to understand why. In Amboseli the availability of forage and water resources has been said to be the primary determinant of the spatial and temporal movement of livestock (Coughenour 1991; Western 1973; Western and Dunne 1979; Western and Finch 1986). While this statement is somewhat reductive, pasture and water are undeniably important to grazing animals, and the following analysis utilises what is known about the placement of these resources in the landscape to test how influential they may have been to people in the past. Finally, I lay aside the remote sensing techniques that feature so prominently in this chapter to more fully consider how artifact dense places are actually experienced by Maasai pastoralists.

4.5.1. Proximity to pastoral settlements

Fig. 4.20 displays kernel density maps for ceramics, lithics and pastoral settlements, illustrating areas of overlap. Note that the kernel density maps were created in ArcGIS, that the default search radius was used (a spatial variant of Silverman's 1986 Rule of Thumb) in calculating the expected counts, and the classification method used was Natural Jenks.

Fig. 4.20 Kernel density maps displaying expected counts per square meter of ceramics, lithics and pastoral settlements

**Fig. 4.20 should be interpreted as a rough approximation of artifact and settlement densities based on known distributions, and is not a particularly reliable depiction of artifact densities outside of the areas surveyed.*

World Imagery provided by Esri, DigitalGlobe, GeoEye, i-cubed, USDA FSA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo, and the GIS User Community.

Additionally, a simple test was designed to evaluate whether or not the overlap between the location of artifacts in the landscape and mid-20th century Maasai settlements was significant. The observed vs expected number of artifacts at three distance intervals from pastoral settlements was compared using a Chi² statistic, and the results are listed in Table 5, Appendix 5, and Fig. 4.23. The test quite conclusively reveals that there are significantly more artifacts within 0-500 m of a 20th century pastoral settlement than there are at distances greater than 1 km from a settlement. Such a trend does little to illuminate where or why spatial patterns overlap, but there are definite similarities in the distribution of pastoral settlements and areas where lithic and ceramic artifacts have been recovered that can be further examined.

4.5.2. Proximity to stream channels

Survey reports from multiple locales in eastern Africa have noted that archaeological sites tend to be situated in proximity to stream channels rather than interfluvial zones (e.g. Pilgram et al. 1990: 39; Wright 2007: 32). This may be because on the open plains sites are less visible as there are fewer eroded or deflated exposures, but it may also be because people are drawn to riverine environments. A number of seasonal stream channels are present in the study area. Some of these are up to 4 m deep in the southern extent of the survey area, flowing into more ephemeral water courses approaching the National Park (Fig. 4.21).

Fig. 4.21 Major streams in the study area

World Imagery provided by Esri, DigitalGlobe, GeoEye, i-cubed, USDA FSA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo, and the GIS User Community.

After the rains, when the stream beds are saturated and the grass on the surrounding plains is green, people have been known to dig shallow wells in the river channels. Some of these wells are just used for a few weeks at a time, while others are more sustaining. Larger structures that are several meters deep and require considerable labour investments to build and maintain are also situated in riverine areas where the water table is elevated. These wells allow livestock and wildlife to disperse away from heavily grazed dry season pastures near more permanent water sources, mitigating overgrazing. In addition, the stream channels of Olgulului/Ololarashi are densely vegetated, attracting local people in need of firewood, and

medicinal and wild edible plants. They are also popular locations for meat-feasts (*il-puli*), and can be considered the foci for a great deal of social and ceremonial activity in the landscape. There are significantly more pastoral settlements than expected within 500 m of the river beds in the study area (Fig. 4.24 and Table 6, Appendix 5), underscoring their relevance to Maasai people in Amboseli. The importance of these streams to contemporary pastoralists in Amboseli is often overshadowed by the wetlands of the central basin, which is particularly unfortunate considering their waters are increasingly being diverted upstream for agricultural developments, and their structural integrity is being compromised by unregulated sand mining (Rutten 2005).

To determine if these riverine environments may have held a similar draw for people in the past, a test was designed to examine whether there were significant differences in observed vs expected artifact counts at distance intervals of 0-500 m, 500 m-1 km, and > 1km from the stream beds in the study area. Note that higher than expected artifact concentrations within the river and in close proximity to anticipated overflow areas (100 m to either side of each stream channel) are suspect, as artifacts in this area may be derived from alluvial erosion and re-deposition. The results of this test are listed in Table 6, Appendix 5, and Fig. 4.24.

There are significantly more ceramic artifacts than expected within 0-500 m and 500 m-1 km of the streams than beyond this point, a pattern that overlaps with the pastoral settlement distribution. There are slightly more opaque obsidian lithics than expected within 100 m of the rivers, suggesting their deposition or exposure here could be partly the result of fluvial processes. All of the obsidian lithics have a positive percent deviation trend between 200-500 m, though there are only significantly more opaque obsidian artifacts within 500 m of rivers. Finally, there is no significant difference between observed and expected values for flakes or cores, but there is for tools. There are significantly more lithic tools within 500 m of stream beds, and this trend appears to be largely driven by scrapers. The test provides some evidence to suggest that lithic tool and ceramic using people have preferentially occupied riverine environments in the study area.

4.5.3. Proximity to wetlands

The wetlands within the central basin are another obvious point of attraction in the landscape for wildlife and livestock offering water and pasture year round. The wetlands of Longinyie and Enkong'u Narok are observed to have great influence on the spatial distribution of pastoral settlements in the wider landscape, though the creation of the National Park has modified this relationship (Western and Dunne 1979; Western and Finch 1986; Worden 2007). Prior to this, however, during the dry season, Maasai in Amboseli are reported to have situated their settlements within 3 km and 8 to 12 km of the wetlands (Western and Finch 1986: 81). Herders located 8-12 km away brought their cattle to the wetlands on alternate days, making a trade-off between the long trek to water and the ability to access more distant, sparsely grazed pastures (Western and Finch 1986: 81). To determine if artifacts are more abundant in proximity to the wetlands, or at distances compatible with mid-20th century Maasai grazing orbits, a goodness of fit test using a Chi² statistic was performed.

Distance intervals of 1 km from the nearest major wetlands in the central Amboseli basin were calculated in ArcGIS (Fig. 4.22). The distribution of pastoral settlements detected in mid-20th century historical aerial photos suggest a slightly different pattern in the study area than that noted by Western and Finch (1986), with significantly more pastoral settlements than expected situated at 4-5 and 9-10 km from Longinyie, Enkong'u Narok and Ormakau wetlands, and significantly less than expected at a distance of 6-7 km (Fig. 4.25 and Table 7, Appendix 5). It should be noted however that the total area of land surveyed within 0-1 km of

the wetlands and between 10-12 km from the wetlands is comparatively small, and is therefore less representative of actual artifact and pastoral settlement densities. Surveying too close to the wetlands was problematic as we did not want to inadvertently enter the National Park. Additionally, beyond 10 km of the wetlands the terrain becomes increasingly rocky with dense vegetation cover. This area is unsuitable for driving, and due to the abundance of elephants in the area, deemed unsafe to navigate on foot.

Fig. 4.22 Distance intervals from wetlands

World Imagery provided by Esri, DigitalGlobe, GeoEye, i-cubed, USDA FSA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo, and the GIS User Community.

As there are other factors influencing the distribution of artifacts and settlements in the landscape other than proximity to the wetlands (rivers, major topographic features, post-depositional processes, grazing scheme interventions etc.) interpreting positive and negative percent deviations is complex. Overall, the strongest relationship between wetland proximity and artifact type appears to be for the non-local (green especially) obsidian flakes and cores at 1-2 km from the wetlands. A common trend is a consistent paucity of artifacts and settlements at a distance of 6-7 km from the wetlands. One suggestion for why there is a ‘dip’ in activity here is because this is mid-way between the lower slopes of Mt. Kilimanjaro and the wetlands of the central basin. While initially it would seem the area is ideally situated to access major sources of water and pasture to the north and south, this does not take into account seasonal fluctuations in forage biomass. The wetlands are most populated by wildlife and livestock during the dry season, when there is little available water or pasture elsewhere (Western 1973, 1975). The lower slopes of Kilimanjaro are frequented most during the wet season, when pasture has been exhausted in proximity to the wetlands, and surface water and high quality forage become more heterogeneous in their distributions (Western and Finch 1986, Worden 2007). If people situated themselves equidistant from these areas year round, they may have had to consistently travel long distances to access seasonally productive grazing lands and or hunting/foraging grounds. We should also consider that both the wetlands and lower slopes of Kilimanjaro have agricultural potential, and this too may have exerted a draw. More evidence is required to substantiate this hypothesis though, and to determine whether this trend reflects actual use and discard patterns or is more a product of the depositional environment.

Fig. 4.23 Percent deviation between observed and expected counts at distance intervals from pastoral settlements

Fig. 4.24 Percent deviation between observed and expected counts at distance intervals from streams

Fig. 4.25 Percent deviation between observed and expected counts at distance intervals from wetlands

Note the * indicates the relationship is **not significant**

4.5.4. When things attract things

Statistical analysis of the spatial distribution of artifacts in the study area has demonstrated that there is significant overlap between areas frequented by stone tool and ceramic using people in Amboseli and mid-20th century Maasai settlement locales. This overlap may be partially explained by a shared attraction to riverine environments, and a seemingly long-term aversion to an area 6-7 km from the central wetlands and lower slopes of Mt. Kilimanjaro, though we can't discount the influence of taphonomic processes. A final point explored in this section is that in this landscape settlement begets settlement.

As discussed in Chapter 2, the microbiomes of abandoned pastoral settlements are nutrient-rich hot spots, featuring high-quality forage. Repeated grazing of these areas helps them to maintain an open, closely cropped, vegetation structure which can persist for centuries (Boles and Lane 2016). In Amboseli some of these glades are highly visible, and are easily identified by pastoralists who have considerable knowledge of this landscape. To the Maasai, glades are known as *emurua*, and they are often repeatedly resettled, barring the death of a person at these sites. Western and Dunne (1979: 95) discussed this phenomenon of *emurua* re-occupation in Amboseli attributing it to there being a finite number of 'premium' locations that have just the right environmental parameters for optimal human and livestock welfare (Western and Dunne 1979: 95). In conversation with pastoralists in Amboseli, it became apparent, however, that glade resettlement may be less a factor of limited space as it is the attributes of the *emurua* themselves.

It was explained to me that large *emurua* are auspicious places to live: *'There is a belief that the places are holy, they are marked by the ancestors, and are blessed places for human settlement. The size of the enclosure for livestock means there is a high chance for the expansion of livestock. It is the belief that the size of the emurua will lead to the expansion and increase of richness, and more cow and children.'*¹⁷ Clearly there is an association between large *emurua* and livestock health. There may also be value ascribed to the antiquity of *emurua* as *'we believe that if you find obsidian in an emurua, you have maybe found something important. An emurua with obsidian is a good cattle liking place.'*¹⁸ Knowing how attuned the average herder is to the availability of pasture in the landscapes they reside in, it seems of no great interpretive leap to suggest that Maasai people in Amboseli refer to large and old *emurua* as good places to bring livestock because they are aware that these areas have above average forage. As discussed in Chapter 2, archaeologists and ecologists are increasingly becoming cognisant of the fact that pastoralists do not passively roam landscapes in search of water and pasture, but play an active part in transforming savanna ecosystems to better suit livestock. Thus we must further consider that re-occupation of *emurua* is done to both benefit from, and maintain, these landscape features. Yet in framing this re-occupation of *emurua* as something that is motivated exclusively by environmental considerations, I think I risk projecting how I am want to perceive these glades onto how all Maasai pastoralists do.

Among Maasai people in Amboseli, and indeed among communities the world over, there are always specific socially constructed practices for navigating landscapes (Lane 2016b: 205; Tilley 1994). Highly mobile pastoralists in many parts of eastern Africa do not recognise territories with clear boundaries delineating where they must move, and by extension, who they are (Cormack 2016; Wood 2009: 239). While Maasai people certainly do associate geographical places with clan-based sections (*iloshon*), the boundaries surrounding even these areas are fluid and permeable (Spencer 2003). This is not to say that land and space do not matter – but what are more important than the boundaries surrounding an arbitrary territory

¹⁷ Email correspondence with Nelson Ng'ida, February 26 2018.

¹⁸ Interview with Olekumbua in Kimana, April 21 2015.

are the ‘critical centres’ (Wood 2009: 239) or ‘tenured points’ (Turner 1999: 108) such as wells, springs, sacred landscape features like Mt. Kilimanjaro, and ancestral settlements. It is these centres or points that pastoralists may use to ‘locate, orient and identify’ (Wood 2009: 239) themselves throughout their mobile lives.

Creating, recognising, and re-occupying *emurua* may all then be considered part of a practice of pastoral ‘place-making’ in Amboseli (Casey 1993). On participatory mapping exercises in Amboseli, I witnessed that these *emurua* are used as mnemonic devices of sorts. As the families who lived in each one are named, and age-sets associated with that particular period of occupation are recounted, these uniquely local and place-based memories and identities become part of the landscape. *Emurua* are nodes from which pastoral histories emanate and mobility strategies are constructed, as well as being places of value for livestock health. From this perspective, reoccupation of *emurua* highlights both the degree of ecological mutualism that is characteristic of East African pastoralists and the landscapes they live in, and also a certain continuity with regards to principles for structuring space. It is futile to attempt to disentangle the ‘natural’ and ‘cultural’ justifications for the practice of re-occupying *emurua* in Amboseli, though in examining their intersections we can begin to more fully interpret overlap in the distribution of artifacts and pastoral settlements.

It would be wrong however to assert that for all of time all pastoralists in Amboseli have re-occupied glades, nor may we anticipate that the significance of re-occupying settlements has been immutable. Indeed as Lane (2016b: 216) has discussed in relation to pastoral sites that have been the focus of long-term human activity, certain aspects of their materiality may emphasise change and reconfiguration above that of permanence.

In Amboseli the meaning of critical pastoral landscape centres, I would argue, was subject to change during the colonial period as the creation of nation-states and ethnically exclusive African Reserves generated new frameworks and demands for performing identity and connection to land (Hughes 2000, 2006; Waller 1993). The directness of these interventions were underscored to me in an exchange between Olokida Makau and a British colonial officer shortly before Kenya’s independence:

We are being told by my friend ‘Today I want to ask you one question: what is the one most important sweet in the world?’ And people say ‘Milk, meat, sugar?’ And the British said ‘No. It is only two things which are sweet. One is soil.’ And he takes a soil something like this (scooping a palm full of dirt off the ground and holding it in his hand) and says ‘Can you taste this one?’ The old fathers said ‘No, it’s not sweet!’ To that the British said ‘Not sweet like the sugar, but I mean the soil is very very nice and very important to your life so please you can have your own land and never never never sell it.’ And then he said ‘There are only two things which are sweet in this world, just soil and a portion of food you eat.’¹⁹

The emphatic warnings of this unknown colonial agent would prove relevant, as in Maasailand throughout the 20th century, access to land became an increasingly pressing issue (see Chapter 8). What is important though for this discussion is that the means by which people in Amboseli ensured their right to land was by literally being registered as Maasai. Lacking a litmus test to determine the credentials of non-Maasai, the arbitrariness of colonial law exacerbated positions on Maasai identity and land tenure (Waller 1993). Knowing this history, I was able to understand why when I had asked people about their connection to old wells in Amboseli, the research assistants I was working with related to me that some

¹⁹ Interview with Olokida Makau in Endonet, September 13 2015.

interviewees had been nervous about my inquiries, and had wondered if I was a lawyer who was investigating land claims in the area. Historical narratives about wells might seem an indirect way to go about authenticating land ownership but on second glance, these wells serve as one of the few material signifiers of a deep Maasai ancestry and right to existence in Amboseli. An awareness of this concern further helps in comprehending why the stone cairns with human burials in Amboseli may be attributed to colonialists. As Maasai people in Amboseli recall having no tradition of interring their dead in this way, perhaps a more suitable explanation for their existence is that they are recent foreign elements in the landscape as opposed to belonging to a group of people that ‘predate’ the Maasai, and are also ideologically and ancestrally dissimilar. We may further consider that the significance of re-occupying *emurua* in the 20th century may have more to do with communicating a pastoral identity and ancestry, and therefore with asserting ones right to ownership and access to territory, than it did in a more distant past. That is not to say that local concepts of geography and identity were replaced by the state’s, but in subtle ways, Maasai people have integrated the state’s geography and perceptions of ethnicity with their own.

In sum, it is not possible to fully understand how people use space in a landscape through remote sensing techniques alone. For one, had I not learned the significance of *emurua* to Maasai people in Amboseli, I would never have made the connection that some of the overlap in the distribution of ceramic and lithic artifacts and mid-20th century pastoral settlements can be explained by the fact that people actively seek to re-occupy what I would consider archaeological sites. It remains a challenge to quantify just how much of the overlap between the location of artifacts and Maasai settlements can be explained by the practice of re-occupying *emurua* as not all glades are easily recognisable from satellite imagery. Yet another important point is that pastoral mobility is unlikely to ever be entirely the product of biophysical considerations devoid of anthropogenic factors, as landscapes are what result from political realities, cultural values, histories, and conscious and unconscious acts of resource management that are unique to particular times and people.

4.6. Conclusions

In this chapter I have presented the results of the 2015 archaeological survey in my study area in Amboseli, and have endeavoured to understand how the distribution of artifacts across this landscape came to be. First it was critical to examine how taphonomic and observer bias may be impacting artifact densities through space, and where possible, control for them. Towards this end, expected artifact counts were adjusted for highly vegetated areas, as it was significantly more challenging to survey these places. Hydrological processes were also identified as playing an influential role in the distribution of lithics, evidently obscuring artifacts under aggrading deposits. One factor further complicating this endeavour is a lack of certainty with regards to how the landscape has changed through time. I have however demonstrated that there is a rather good fit between the distribution of ceramics and mid-20th century Maasai land use areas – as the ceramics are an averaged representation of Iron Age and more recent Maasai land use areas, this is not surprising. Notable patterns include there being significantly more settlements, opaque obsidian and ceramic artifacts on volcanic compared to lake bed sediments. Moreover, there are significantly more ceramic and opaque obsidian artifacts and pastoral settlements within 500 m of rivers. A generally positive to negative percent deviation trend for all lithic artifacts suggests the rivers have been areas of attraction in the landscape for centuries, possibly millennia. Differences in the observed vs expected counts of artifacts and settlements at distance intervals from the wetlands are more complex, but there is some indication that an area 6-7 km from the wetlands is used less

intensively than other locations. I suggest this may be in part explained by the fact that this area is equidistant to the wetlands of the central basin and the lower slopes of Mt. Kilimanjaro. It is important to also factor in that people occupy and re-occupy areas in Amboseli for reasons that cannot be easily detected through quantifiable means. Pastoral people have processes through which they create and continually rework the landscapes they live in, imbuing and re-imbuing places and features with soil enhancing nutrients, in addition to their own histories and identities.

This study concurs with observations by Robert Foley (1981a) that the ‘lava soils’ to the south of Amboseli National Park are aggrading, and that low lithic artifact densities in this area are not entirely reflective of land use patterns, but rather attributed to the burial or displacement of artifacts. We may further question, as Foley himself did, whether or not the relative abundance of lithics on the ‘pink tuff’ in the central basin actually indicates that this area was occupied more intensively compared to the surrounding land.

As to whether or not mid-20th century Maasai settlement distributions are significantly different from LSA hunter-gatherers or PN herders – the jury is still out. There is some overlap in spots occupied by mid-20th century Maasai and places where high densities of lithic deposits were found in the 2015 study area, but the opposite pattern would appear to be true around Amboseli National Park where Foley did his survey. The distribution of lithics across both study areas, however, may have been subject to taphonomic processes, calling into question their interpretive potential *vis-à-vis* understanding PN and earlier LSA land use. Lithics in particular appear to be subject to burial or displacement in areas in the landscape where sediment is accumulating. In light of this, the paucity of diagnostic PN artifacts encountered while surveying in 2015 may perhaps be attributed to aggrading sediments covering earlier archaeological material, accounting for the fact that the only diagnostic PN artifact recovered (the stone bowl fragment) came from disturbed deposits. We may further consider that much of the material encountered in the 2015 survey is reflective of Iron Age and more contemporary landscape use. I would not, however, avoid off-site archaeological approaches for fear that the data fails to perfectly reflect actual land use patterns. In doing this analysis, I have learned more about the depositional conditions in Amboseli and am able to better interpret the existing archaeological evidence, and thus the history of pastoral land use in this landscape.

5 Excavating in the Amboseli landscape

This chapter presents the results of excavations at ten different sites (Fig. 5.1), each affording a greater degree of understanding of settlement, livelihood, and land use in Amboseli stretching back c.1000 years ago and into the colonial period.

Fig. 5.1 Sites excavated in Amboseli

1) Kirinkai (HdJn7); 2) Ilnyangusi Manyatta (HcJn1); 3) Lemomo Hill (HdJn4); 4) Ilmaarba (HdKn1); 5) Ololopoli (HdJn5); 6) Osoit (HcJn5); 7) RB (HdJn3); 8) Irrpurai (HcJn4); 9) Empaash (HcJn3); 10) CB (HdJn6). World Imagery provided by Esri, DigitalGlobe, GeoEye, i-cubed, USDA FSA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo, and the GIS User Community.

A defining characteristic of many of the sites inhabited by pastoralists in Amboseli is that they are returned to again and again. As new sites are built over old, the archaeological record may come to resemble a ‘palimpsest’ of overlapping occupations, varying in size and state of preservation. Yet, as all archaeological sites are fragmented representations of the past, ongoing in their formation, this fragmentation should not be seen as a limitation preventing us from understanding, rather it must be embraced as a reality of the data we work with (Lucas 2010: 357; Witmore 2014: 213). In this study, pastoral palimpsests therefore are not side-lined as contaminated or compromised sites, particularly because these are more often than not areas recognised by local Maasai pastoralists as being of significance to their own history. Rather, this research project endeavoured to understand how and why these sites have come to form, in large part by documenting the array of material culture present on their surfaces, and the nature of their stratified deposits, but also by incorporating information from local pastoralists pertaining to their significance and antiquity. Detailed reports are important for interpreting pastoral settlements, where the aging and often repeated accumulation of

enclosure sediments makes for an incredibly dynamic archaeological record, one that is not so much in ruin as it is in reformation. The heavy description of depositional contexts in this chapter forms a basis from which larger more integrated conclusions about settlement, land use and livelihoods in Amboseli over the last millennium may be drawn.

That being said, there are still many questions left to be answered, especially as it was not always clear which sites and depositional layers can be conclusively attributed to pastoral settlement episodes. To highlight the range of forms that pastoral sites may take on, this chapter begins with a discussion of the layout and uses of pastoral settlements in Amboseli typical of the 20th century. It is important to acknowledge that archaeological sites inhabited by pastoralists in Amboseli did not conform to any one standardised type in the recent past, nor should we anticipate this to have been the case in earlier times. Additionally, we should be open to the possibility that some of the sites encountered in Amboseli were inhabited by people who may have engaged in livelihood pursuits that do not strongly resemble pastoralism as practiced by contemporary Maasai.

5.1. Ethnographic insights on pastoral site types in the Amboseli context

In Amboseli today, the most common pastoral settlement type is the *enkang* (*enkangiti*, pl.), depicted in Fig. 5.2ii, the size of which are determined by the number of people and livestock they house, but tending to be between 50-80 m in diameter, inhabited by anywhere between 10-100 people (Århem 1985; Jacobs 1965; Mbae 1990). The typical settlement layout is described as a central cattle enclosure ringed by a thorn bush fence. Within this are placed smaller livestock enclosures for calves, sheep and goats. Each adult male will have their own gate in the outer fence perimeter with the house of his first wife built to the right of this, and houses of subsequent wives built to either side (Mbae 1990: 280). Individual houses are some 6 x 3 m, and are constructed of wooden posts plastered with cow dung mixed with soil and ash (Mbae 1990: 280). Cooking of meat during ceremonial occasions can occur in the central cattle enclosure (Mbae 1990: 282), but for the most part, cooking hearths are situated within the house. Domestic areas are cleaned regularly with the refuse being deposited along the interior of the settlement perimeter fence (Mbae 1990: 281). The dung of juvenile livestock that accumulates within houses is also habitually removed and deposited with live hearth embers at secondary rubbish dumps situated between 3-5 meters from the settlement (Mbae 1990: 281).

Enkangiti may be inhabited seasonally, as until recently was observed to be the case with the Maasai in Amboseli (Worden 2007). In Amboseli, the average number of moves per household per year in the mid-20th century was between six and eight (Western and Dunne 1979). As such, new *enkangiti* were not built each time a family relocates; rather settlements were repeatedly returned to and may be in use for a number of six to eight week periods over the course of 8 years (Western and Dunne 1979: 96). After a decade or so of intensive use, settlements are abandoned as health problems may arise due to the accumulation of dung, which can be several meters deep (Muchiru et al. 2009; Western and Dunne 1979: 95-96). Settlements may also be suddenly abandoned in the event of an outbreak of disease, a death, or an accidental fire. New settlements are frequently built within a few hundred meters of the old ones, resulting in the development of a dense patchwork of pastoral glades, or in areas where trees are absent, patches of nutrient rich soil (Western and Dunne 1979: 95). If resources in the area become heavily depleted, or disease losses become too high, settlement zones are abandoned for a longer period (some 20-25 years) after which the cycle begins again (Western and Dunne 1979: 95). Settlements can be, but are not always, burnt upon abandonment.

Apart from *enkangiti*, less permanent settlement types are remembered to have been common in Amboseli. Temporary camps known as *ronjo*, illustrated in Fig. 5.2iii, differ from the typical *enkang* in that they are smaller, and houses are built from woven mats, hides, and grass secured over wooden frames (Århem 1985: 11). These satellite settlements allow pastoralists even more flexibility in their mobility orbits.

In addition to these more quotidian settlements, there is the *manyatta*, depicted in Fig. 5.2i. A *manyatta* is a settlement type that serves as a focus for the ceremonial life of the *il-moran*, the warrior Maasai. *Manyat* (pl.) are larger than other Maasai settlement types (approximately 100 m across). Århem (1985) describes two types of *manyat* that are still used by the Kisongo Maasai today, including the young warrior village, and the *olngesherr* ceremony *manyatta*. At the warrior village (*manyatta il-moran*) houses and small stock are located around the perimeter, while cattle are kept in a single central enclosure. Warrior villages are occupied for a period of c.5-10 years and only warriors, their mothers, and their young sisters are permitted to reside in these spaces. The *olngesherr* ceremony *manyatta* is built when senior warriors are promoted to junior elders. Instead of a central cattle enclosure, there is a ceremonial ground formed from a preparation of cattle dung, urine, milk, and honey beer (ibid.). The *olngesherr* ceremony *manyatta* is only occupied for a matter of days as opposed to years.

Fig. 5.2 Common pastoral Maasai settlement types in Amboseli

i) warrior village (*Manyata il-moran*; ii) residential settlement (*enkang*) iii) temporary camp (*ronjo*). h = house, g = gate; c = cattle enclosure; ss = small stock enclosure. All are based on settlements encountered in Olgulului/Ololarashi in 2015, though sketch design is after Boles 2017:71.

Another settlement type that Maasai pastoralists frequently inhabit is the meat-feasting camp or *ol-pul* (pl. *il-puli*). In conversation with local people, meat feasting was described as a pleasurable ritual wherein groups of Maasai men gather together in a secluded location to eat copious amounts of meat and consume broth infused with medicinal plants (*motori*). *Il-puli* can be inhabited for a matter of days or weeks, depending on the number of participants and the amount of livestock brought to slaughter.²⁰ The layout of a meat feasting camp is variable (Mbae 1990), but will typically include a hearth, a butchering area, a space where animals are tied or penned as they await slaughter, and an informal sleeping quarters. Popular locations for camps include river banks and rock shelters, and sites are often repeatedly returned to.²¹

²⁰ E.g. participatory mapping exercise with Ntsipa Tinayo in Olgulului/Ololarashi G.R., August 27 2015; Discussion with Raphael Musere in Olgulului/Ololarashi G.R., field notes March 17 2015.

²¹ Discussion with Sinabule in Olgulului/Ololarashi G.R., field notes, March 17 2015.

Settlement layouts may also fluctuate through time. For example, the average Maasai *enkang* in Amboseli is growing increasingly smaller, especially as members of subdivided group ranches are splitting their households in order to maintain a presence in irrigated agricultural areas and drier rangelands (Worden 2007: 42). If we look beyond the Maasai in Amboseli to pastoralists like the Samburu or Rendille, an even greater variety of pastoral site types are seen (Boles 2017: 73-78). The archaeological record in East Africa provides further examples of pastoral site types with no direct contemporary equivalents, such as Maili Sita in Laikipia (Boles and Lane 2016) or the Sirikwa ‘holes’ of western Kenya (Sutton 1973). It is therefore important that archaeologists do not limit their exploration of pastoral history by only excavating a narrow range of site types that parallel ethnographic examples. In selecting areas for excavations for a combination of reasons, including the density and range of surface finds, evidence for architectural features, and the insights of local pastoral people, I have attempted to investigate a more diverse array of archaeological sites that may be informative of more diverse approaches to livelihood and land use in Amboseli.

5.2. Excavated sites

Sites were targeted for excavations in Amboseli on the basis of various indicators. During our survey, concentrations of material culture collected on the surface of Irrpurai, Kirinkai, Ilmaarba and Ololopoli primarily signalled the archaeological potential of these sites. Local knowledge revealed that others such as Inyangusi Manyatta, Lemomo Hill, CB and Empaash were occupied by Maasai pastoralists, and excavations in these areas were conducted to learn more about these historic glades. Inyangusi Manyatta and Lemomo Hill were both more remarkable sites in Amboseli as they are steeped in ceremonial significance according to local traditions, while CB and Empaash were known to be more quotidian settlements, representative of daily life during the colonial period. Finally, the circular clearings of RB and Osoit situated on a lava field to the west of the study area were first recognised from satellite imagery, and survey results revealed a high density of finds and clear formations at these localities which is why they were prioritised for further investigation. These were not the only clusters of artifacts, glade formations or historic settlements encountered during fieldwork. These particular sites were selected for excavations however, as I believed they had the most potential to be representative of a broad range of Late Iron Age to colonial occupation periods. The remainder of this chapter details the results of these excavations.

5.2.1 Kirinkai (HdJn7)

Equidistant between the rivers Ilmaarba and Irgum, on the volcanic rock geological zone of Kilimanjaro is the Iron Age site of Kirinkai. This stretch of land is rather densely settled by pastoralists today, and aerial historical photographs indicate this region was similarly popular for habitation in the mid-20th century, with there being a settlement located just 200 m to the west of Kirinkai in 1961. Neither contemporary satellite nor historical aerial imagery clearly indicate the formation of anthropogenic soils at Kirinkai, though a total of sixteen ceramic sherds and nine flaked lithics were collected from the surface of the site while surveying, suggesting archaeological potential (Fig. 5.3, and artifact cluster 113). Aerial photographs taken in 2015 further show that the sediment upon which most of the artifacts were recovered is paler and less red than the surrounding soils, faintly suggesting there may very well have been an accumulation of dung, urine, and ash in this area (Fig. 5.4). The vegetation growing in this area comprised dense stands of *Acacia tortilis* and *A. mellifera* encircling patchy growths of *Balanites glabra*, *Sericocomopsis palida*, *Sporobolus spicatus* and *Cenchrus ciliaris* (Table 1, Appendix 6).

Fig. 5.3 Distribution of surface finds at Kirinkai

Worldview-2 satellite image (acquired February 02 2011)

Fig. 5.4 Aerial view of units excavated at Kirinkai

Aerial photographs acquired in July 2015

Six 50 x 50 cm test pits were excavated at Kirinkai in May 2015. Units 1, 2 and 4 were located on slightly raised earthen mounds and Units 3, 5 and 6 were positioned in proximity to a scatter of charcoal and burnt earth eroding from the surface of the site. The stratigraphy of the site is summarised in Table 5.1 and the finds recovered from these test pits are listed in Table 5.2.

Layer A, a sun baked compact brown silty clay loam, extended between 0-5 cm DBS (depth below surface), containing 5-10% volcanic pebble and gravel inclusions, and charcoal, bone and burnt earth in Units 3, 5 and 6. Layer B was distinguished as a lighter brown unconsolidated silty clay loam, nearly devoid of rocky inclusions, extending for a maximum depth of between 10 and 50 cm DBS. Charcoal, bone, and two flakes of local obsidian were recovered in Layer B, and were found to decrease in abundance throughout the profile. A few small chunks (3-5 cm) of burnt sediment were seen in Layer B across test pits 1, 2, 4, and 5 with larger concentrations in 3 and 6. Finally, Layer C, devoid of artifacts, was characterised by a return to compact silty clay loam with increased volcanic and pebble inclusions, and the appearance of a few large grey calcareous nodules. A moderate number of dung beetle brood balls were seen during excavations, and these could be linked to the micro-mixing of sediments in the upper layers of the site.

Table 5.1 Layer descriptions for Kirinkai units

Layer	Description	Range of depths below surface (cm) in units					
		1	2	3	4	5	6
A	Compact brown silty clay loam; 5-10% volcanic pebble and gravel inclusions, charcoal, bone, and burnt earth eroding out in some areas.	0-5	0-3	0-5	0-5	0-5	0-5
B	Light brown loose silty clay loam; ashy deposits appear with clumps of burnt earth, charcoal and bone continue but decrease throughout layer. Dung brood beetle balls present and vegetal roots also in this layer. Volcanic pebble and gravel inclusions decrease to 0-5%.	5-25	3-25	5-50	5-10	5-30	5-45
C	Brown compact silty clay loam; increase in volcanic pebbles, gravel and cobbles to 15-20%, large calcareous nodules present, no artifacts.	25-35	25-35	50-60	10-30	30-40	50-55

Table 5.2 Finds by layer and unit at Kirinkai

Unit	Layer	Wood charcoal	Lithic	Indeterminate bone fragment		Indeterminate tooth fragment	
				count	weight (g)	count	weight (g)
1	A	0.541		40	9.6	80	11.6
	B	0.666					
2	A	0.193					
	B	0.342		15	2.6		
3	A	0.398					
	B	78.457	1	1	0.2		
4	A	2.606		3	6.3		
	B	0.014					
5	A	0.697		3	1		
	B	0.185	1				
6	A	4.29					
	B	19.419		1	0.1		
TOTAL		107.808	2	63	19.8	80	11.6

Units 3 and 6 contained evidence for *in situ* burning, and may thus be the remains of a hearth feature. The stratigraphy of Units 3 and 6 are depicted in Fig. 5.5. On the surface of Unit 6,

and to a lesser extent, Unit 3, a large lump of burnt earth was found to be eroding out of a shallow Layer A. Unconsolidated patches of burnt earth appeared across both Units 3 and 6, underlain with a very loose light grey ashy horizon (Fig. 5.6). The few unidentifiable bone fragments recovered in Units 3 and 6 were also noted to have been burnt. Charred wood from the burning feature (Unit 3 Layer B, collected at 28 cm DBS) was radiocarbon dated to 822 ± 27 BP, (1216-1282 CE, 2 sigma range).

Fig. 5.5 Kirinkai, Units 3 and 6 stratigraphic profile

Fig. 5.6 Kirinkai, Units 3 and 6 burnt feature

The top two photographs show the burnt earth features which were pedestalled, and the bottom two photographs depict the pockets of ashy deposits underlying the burnt earth. The scale bar (10 cm intervals) is situated on the northern wall of the units.

A minimum of one ceramic vessel type is represented by the sixteen sherds collected from the surface of the site. All sherds can be described as medium thick (averaging 11 mm), reddish brown in colour, and with 5-10% moderately well-sorted sand inclusions ranging in size between 0.5-2 mm. Decorative elements include 'pleating', and also parallel horizontal grooves (Fig. 5, Appendix 2).

Two locally sourced obsidian flakes were found during excavations of Units 3 and 5. An additional six flakes were collected from the surface of the site, as well as a backed blade and an *outil écaillé*. Lithic raw materials on the surface of the site appear to be rather mixed, including non-local and local obsidian as well as chert. An example of the rarely encountered coffee coloured obsidian was present on the surface of Kirinkai.

Table 5.3 Lithic artifacts recovered from Kirinkai

Context	Type	Raw material	Comments
surface	backed blade	obsidian (green)	informal shape
surface	<i>outil écaillé</i>	obsidian (coffee)	core on flake
surface	flake	obsidian (opaque)	
surface	flake	obsidian (green)	
surface	flake	obsidian (grey)	
surface	flake	chert	
surface	flake	obsidian (indet.)	
surface	flake	obsidian (coffee)	
Unit 3 Layer B	flake	obsidian (opaque)	
Unit 5 Layer B	flake	obsidian (opaque)	

Faunal remains from Kirinkai identifiable to taxonomic group are presented in Table 5.4. The remains of one *Bos* and at least one size class 2 Bovid were found in Layer A. These could substantiate an interpretation of Kirinkai as being a pastoral settlement.

Table 5.4 Identifiable faunal remains from Kirinkai units

Unit	Layer	Taxon	Element	Side	Portion	Other	Weight (g)
1	A	<i>Bos</i>	m1/m2	L		fusion at ph1—first phalanx, heavily cemented	22.0
1	A	<i>Bos</i>	m1/m2			very degraded	7.0
2	B	Bovid (2)	metapodial		distal shaft	unfused	0.7
TOTAL							29.7

Flotation samples were taken during the excavation of Unit 6, totalling 11.6 litres of sediment (Table 1, Appendix 7). A few fragments of burnt bone, including some enamel, were found in Layer B deposits with large quantities of wood charcoal. Two or three charred termite droppings (frass) were also noted in the flotation samples from Layer B, but given the amount of wood charcoal in this context this is not unexpected, and does not signal there was a great deal of termite activity in Unit 6. There were 31 carbonised wild grass seeds also recovered from this feature, in addition to 10 other small non-domesticated seeds identified to the family level. The concentration of grass seeds in Unit 6 at Kirinkai is unrivalled by any other site yet excavated in Amboseli, indicating this was an area where more than wood charcoal was being burned.

Radiocarbon dates from a wood charcoal fragment found in Layer B at Kirinkai indicate that this site was occupied during the 13th century CE. Aerial photographs acquired in 2015 suggest the sediment on the surface of the site is distinct from the surrounding area, and may have been modified from concentrated deposits of manure, dung, and ash, though this signature is apparently too subtle to be perceived in satellite imagery. Cattle remains that do not appear modern (heavily degraded/cemented) further suggest a pastoral orientation. Future archaeological work at Kirinkai would benefit immensely from geochemical, phytolith, isotope, and micromorphological analysis aimed at detecting anthropogenic inputs characteristic of pastoral sites.

5.2.2 Ilnyangusi Manyatta (HcJn1)

The Ilnyangusi Manyatta site is situated on a small floodplain of a lower branch of the Kitenden River, within the lake basin. The south-western extent of this flood zone is currently bisected by a road. As the name suggests, a warrior village manyatta for the Ilnyangusi age-set of the Laitayok clan was located at HcJn1 in the 1940s. Neither historical aerial photographs, contemporary aerial photographs (Fig. 5.7) nor satellite imagery (Fig. 5.8) give any indication of a pastoral glade formation, suggesting that the build-up of anthropogenic deposits was not that extensive. There is also the possibility that the light coloured alluvial background sediments make it difficult to distinguish any anthropogenic soils. Touring the site with Remando Oloshikoki, who lived at the manyatta for a brief time as a young girl, we were however shown the exact location of the Ilnyangusi settlement (Fig. 5.8).²² The area is totally devoid of trees, with the dominant species growing on the site being *Dactyloctenium aegyptium* grass (Table 2, Appendix 6).

Fig. 5.7 Aerial view of units excavated at the Ilnyangusi Manyatta site

Aerial photographs acquired in July 2015

²² Participatory mapping exercise with Remando Oloshikoki in Olgulului/Ololarashi G.R., August 25 2015.

Fig. 5.8 Distribution of surface finds at the Ilnyangusi Manyatta site

Worldview-2 satellite image (acquired February 02 2011)

Surveying this flat bare surface revealed three somewhat arbitrarily delineated artifact clusters which have been labelled as 80, 84, and 46 (see Appendix 4). The central cluster, referred to as 84, is what is taken to represent the surface of HcJn1, though the nearby cluster 46 could also be interpreted as being of the same surface assemblage. Also note that the distribution of surface finds suggests a gap in the central area of the flood plain, but this area was not surveyed as extensively as the north-eastern and south-western limits. There may very well be a more or less continuous scatter of artifacts across this surface.

Finds recovered while surveying HcJn1 include six potsherds, eleven flaked lithics, two cowry shell fragments, and a sandstone grinding-stone fragment. I anticipated that we would encounter deposits dating to the 20th century, though the abundance of stone tools on the surface of the site gave some indication that there may be older archaeological horizons at

HcJn1. Test pits were excavated here in May and July of 2015, with seven 50 x 50 cm units and six 1 x 1 m units being dug (Fig. 5.7). As the site featured little topographic relief, Units 1, 2, 3, and 5 were located on top of surface scatters of bone, and Units 4, 6, and a-g were situated together to explore a cluster of eroding wood charcoal.

The stratigraphy at the Ilnyangusi Manyatta site is summarised in Table 5.5, with finds from each layer and unit presented in Table 5.6. The East section of Unit 4 is depicted in Fig. 5.9, and the East section of Unit a is shown in Fig. 5.11. Layer A was a loose thin silty clay loam with very sparse grassy vegetation, not extending more than 5 cm DBS. Layer B consisted of an unconsolidated silty clay loam with 10-15% volcanic pebble and gravel inclusions, and quite an abundance of dung beetle brood balls and tunnels. In Units 4, 6, and a-g, Layer B extended between 5 and 65 cm DBS. Finds tended to be concentrated in Layer B in the first 10-35 cm DBS. In some units, Layer B transitioned into the rockier Layer C, which also contained a few dark grey pumice stones. Layer C was not reached in all units however, due to time constraints. Rather, we elected to cease excavating after digging through 10 cm of deposits devoid of finds. Layer B in Units 4 and 6 was exceptional in that it featured a charcoal rich ashy lens between 20-35 cm DBS (Fig. 5.9). Layer D, found only to the south and somewhat upslope of the other test pits in Units 2 and 3, was encountered between 25-55 cm DBS, and marked by a rapid transition to a culturally sterile, cobble abundant, loose brown silty clay loam.

Despite predictions that the deposits at HcJn1 would predominantly date to the 20th century, wood charcoal from the concentration in Unit 4 Layer B (at 24 cm DBS) was radiocarbon dated to 1145 ± 30 BP, (887-1031 CE, 2 sigma range). The ostrich eggshell bead (found in Unit 6 Layer B between 60-65 cm DBS) was also radiocarbon dated to 697 ± 58 BP, (1266-1411 CE, 2 sigma range). The later date for the ostrich eggshell (OES) bead is potentially explained by the recrystallisation or precipitation of additional secondary calcium carbonate (Walker 2005). It is also possible that the OES bead is from more recent deposits that were vertically displaced through bioturbation, and could suggest at least two Iron Age occupations of the site. Finally, the early charcoal date could also be explained by old wood. For now, we may conclude that the archaeological material from the Layer B deposits in the excavation units appear to date to the Middle-Late Iron Age. The Layer A horizon probably dates to the 20th century, though there has been some stratigraphic mixing of deposits across layers.

Table 5.5 Layer descriptions for Ilnyangusi Manyatta units

Layer	Description	Range of depths below surface (cm) in units												
		1	2	3	4	5	6	a	b	c	d	e	f	g
A	Brown loose silty clay loam topsoil; some roots/organic matter, pottery, lithics and bone recovered. 5-10% pebble and gravel inclusions.	0-5	0-5	0-5	0-5	0-5	0-5	0-5	0-5	0-5	0-5	0-5	0-5	0-5
B	Brown very loose silty clay loam; wood charcoal, bone, pottery and lithics present, and decrease throughout layer. Rocky inclusions increase to 10-15%. Extensive tunnelling and dung beetle brood balls.	5-40	5-25	5-30	5-65	5-30	5-65	5-55	5-55	5-50	5-55	5-65	5-60	5-25
C	Brown loose silty clay loam; rocky inclusions at 15-30%, cobbles abundant, no finds. The occasional pumice stone collected.				65-85		65-80	60-65				65-70		
D	Brown loose silty clay loam; rocky inclusions at 30-40%, cobbles abundant, no finds.		25-30	30-55										

Table 5.6 Finds by layer and unit at Ilnyangusi Manyatta

Unit	Layer	Wood charcoal (g)	Pottery	Lithic	Ostrich eggshell	Bead	'Bao' stone	Indeterminate bone fragment		Indeterminate tooth fragment	
								count	weight (g)	count	weight (g)
1	A							2	0.1	3	0.2
	B	0.04		1				10	0.9		
2	A		1	1							
	B	0.03						15	1.6		
3	A							1	0.1	1	0.1
	B		1					10	2.6		
4	A	0.03						3	0.5		
	B	102.82	1					14	3.4		
5	A							4	0.7	1	0.4
	B									2	0.2
6	A									2	1.3
	B	65.30	1		1			73	43.9		
a	A	0.01		1				1	<0.1		
	B	1.7	2	1	1			61	23.4		
b	A										
	B	0.72		4	1			28	56.5		
c	A	0.02		1							
	B	1.26		4				26	4.7		
d	A					1		1	0.1	1	0.3
	B	3.82		5	1			37	26.4		
e	A	0.11		1						1	0.1
	B	2.06		1			1	84	34.0		
f	A	0.01		1				1	0.2		
	B	4.33		2	1			61	35.4	5	2.0
g	A	0.02		1							
	B	0.06						80	39.7	1	<0.1
TOTAL		182.01	6	25	5	1	1	512	274.2	17	4.6

Fig. 5.9 Ilnyangusi Manyatta site, Unit 4 stratigraphic profile

Fig. 5.10 Photograph of the East section of Unit 4, Ilnyangusi Manyatta

scale = 50 cm

Fig. 5.11 Photograph of the East section of Unit a, Ilnyangusi Manyatta

Notice that layers are diffuse and mixing of deposits is occurring due to dung beetle activity.

There is a minimum of one vessel type represented by the pottery sherds found while surveying and excavating HcJn1. In Units 2, 3, 4, and 6 a total of six sherds of a reddish-brown medium thick (averaging 9 mm thick) type were collected, all having well-sorted 5-10% volcanic and quartzite inclusions ranging in size from 0.5-2 mm. Another six sherds were collected from the surface of the site, all of a similar reddish-brown medium thick type. One of the sherds identified during our survey had decoration featuring parallel grooves with vertical hatching (Fig. 6i, Appendix 2).

The animal taxa represented in the Ilnyangusi Manyatta excavation units probably include ovicaprids and cattle, although species specific identifications were not possible. Some indeterminate bone fragments in Units f and b were found to be charred. The results of faunal analysis are presented in Tables 5.7 and 5.8. A minimum of one Bovid 2, and one Bovid 4 individuals are represented in the faunal assemblage from the site, as well as a rodent. Enamel hypoplasia, a deformation caused by stress when enamel is being formed (Balasse et al. 2009), was found on one of the Bovid (size class 2) tooth specimens in Unit 6 Layer B. This hypoplasia may suggest the animal was alive during a period of environmental stress, such as a drought. Four fragments of ostrich eggshell were also collected in the midden deposits at site HcJn1 in addition to one broken ostrich eggshell bead found in Unit 6 (Figure 4ix, Appendix 3). Unworked fragments of ostrich eggshell suggest the bead may have been manufactured on site.

Table 5.7 Identifiable faunal remains from Ilnyangusi Manyatta units

Unit	Layer	Taxon	Element	Side	Portion	Other	Weight (g)
1	B	Bovid (4)	enamel				0.1
4	C	rodent	incisor				<0.1
		rodent	femur	L			0.1
5	B	Bovid (2)	enamel			10 fragments	2.2
		Bovid (2)	rib				1.4
6	B	Bovid (2)	rib				1.5
		Bovid (2)	enamel			clear hypoplasia	0.1
	A	Bovid (2)	long bone		shaft		2
d	B	Bovid (2)	humerus	L	distal acondyle	UF	1.8
		Bovid (2)	caudal				1.1
TOTAL							10.3

Table 5.8 Identifiable species from Ilnyangusi Manyatta units

Taxonomic group	NISP	MNI
BOVIDAE		
Bovid (4)	1	1
Bovid (2)	14	1
RODENTIA		
indeterminate	2	1
TOTAL	17	3

Lithics collected while surveying at the Ilnyangusi Manyatta site include seven flakes, two percoirs, and one informal tool with a notch, all made of obsidian (Table 5.9). Lithics recovered during excavations include seventeen flakes, four cores, and two backed pieces. The lithics recovered during the survey and while excavating were made of both non-local and local obsidian, as well as quartz.

Table 5.9 Lithic artifacts recovered from Ilnyangusi Manyatta

Context	Type	Raw material	Comments
surface	percoir	obsidian (opaque)	
surface	percoir	obsidian (grey)	retouched blade with two notches and two percoirs
surface	notched informal tool	obsidian (opaque)	
surface	bec	obsidian (grey)	
surface	flake	obsidian (opaque)	
surface	flake	obsidian (opaque)	
surface	flake	obsidian (grey)	
surface	flake	obsidian (grey)	bladelet
surface	flake	obsidian (grey)	
surface	flake	obsidian (green)	core trimming flake
Unit 1 Layer B	flake	obsidian (opaque)	
Unit 2 Layer A	backed bladelet	obsidian (indet.)	
Unit a Layer A	bipolar core	obsidian (indet.)	
Unit a Layer B	flake	obsidian (opaque)	
Unit b Layer B	flake	obsidian (indet.)	
Unit b Layer B	flake	obsidian (indet.)	
Unit b Layer B	flake	obsidian (indet.)	
Unit c Layer A	flake	quartz	
Unit c Layer B	flake	obsidian (indet.)	
Unit c Layer B	flake	obsidian (green)	
Unit c Layer B	flake	obsidian (green)	
Unit c Layer B	backed piece	obsidian (green)	
Unit d Layer B	flake	obsidian (green)	
Unit d Layer B	flake	obsidian (green)	
Unit d Layer B	flake	obsidian (green)	
Unit d Layer B	flake	obsidian (green)	
Unit d Layer B	<i>outil écaillé</i>	obsidian (green)	
Unit e Layer A	flake	quartz	
Unit e Layer B	bipolar core	quartz	
Unit f Layer A	flake	obsidian (grey)	
Unit f Layer B	<i>outil écaillé</i>	obsidian (green)	core on flake
Unit f Layer B	flake	obsidian (opaque)	
Unit g Layer A	flake	obsidian (indet.)	

Flotation samples were taken during the excavation of Units 4, 6, a d, and f, totalling 108 litres of sediment (Table 2, Appendix 7). Seed counts were relatively impoverished in Layer A deposits, with most charred plant material being found in Layer B around 10-35 cm DBS, where we also recovered the majority of finds during excavations. A few fragments of burnt bone were found in Layer B of Unit a. The most represented family in the Ilnyangusi Manyatta samples from Layer B is Cyperaceae (n=54), followed by Poaceae (n=39).

While sedges grow in a diverse range of environments, many are associated with wetlands. In light of this, the relative abundance of Cyperaceae remains, not to mention the recovery of Orizoid and what is tentatively identified as Juncaceae species, may be interpreted in several

ways. We can consider that many of the seeds in the samples are derived from seed rain, reflecting the background vegetation at this site, presumably during its Iron Age occupation. The sedge and wild rice remains may then suggest the site was situated in a mesic habitat. Given that we don't see a sharp break in the stratigraphy of the site where alluvial sediments have washed over the older archaeological material, it seems that people were living on a flood plain that was already in existence at the turn of the first millennium CE. This could mean that this area has long been a riverine environment, and probably a resource rich place, possibly contributing to the density of archaeological finds in this zone.

We can also consider that these seeds do not reflect the background vegetation at the site, and are more representative of human activity. Some seeds may have originated from intentionally or unintentionally burnt dung (e.g. Hastorf and Wright 1998; Miller and Tristine 1984). Dung is of course a ubiquitous feature of pastoral settlements, and may have been charred accidentally, or even have been used for fuel. If these seeds largely derive from dung, the presence of hydrophilic species could indicate that animals were grazing in and near aquatic environments, such as the wetlands of the central basin, or a nearby river. Not all of the sedge remains appear to derive from dung however, as a number of tuber fragments were identified in the flotation samples, including a *Cyperus* tuber, and these have been found to rarely survive ruminant digestion (Reddy 1998; Valamoti 2013; Wallace and Charles 2013). There is the further possibility that some of the sedge remains were brought to the site by people as food, or medicine, or for construction purposes. The tubers of *Cyperus rotundus* for instance (or *Eling'onom* in KiMaasai) are edible, and consumed in Amboseli today. Further excavations at HcJn1, and examination of flotation samples from a multitude of contexts at this site, promise to shed more light on the potential ways plants were incorporated into the archaeological record here.

Other finds found on the surface of the site include a grinding-stone fragment made of sandstone (Fig. 2vii, Appendix 3). In conversation with local people this was thought to have been used to sharpen metal implements.²³ In addition, a smoothed spherical basalt stone (1.3 cm in diameter) was found in Unit e Layer B (Fig. 3iii, Appendix 3). Local research assistants and interview participants identified this pebble to be a stone used for playing the game Bao.²⁴ Two cowry shell fragments were also collected while surveying (Fig. 4x-xi, Appendix 3). The cowry shells could perhaps have been transported to site during the Middle-Late Iron Age but, erring on the side of caution, they are assumed to relate to the 1940s occupation period. Finally, a white bead was collected in Unit d Layer A (Fig. 4i, Appendix 3). Based on morphological attributes, this bead is suggested to be similar to some of the earliest European beads found in East Africa, dating to around the 17th century (Marilee Wood, pers. comm. February 2018). It may have been curated by inhabitants of the Ilnyangusi Manyatta until the 1940s when it was lost or discarded, or may even relate to a different but as yet undated occupation period.

Excavations of HcJn1, the Ilnyangusi Manyatta site, suggest it was inhabited both in the 1940s and around the Middle-Late Iron Age, though there may very well have been other occupation episodes. Of course we cannot ignore the fact that the site is situated in a flood prone area, and that deposits have been subject to bioturbation, all complicating straightforward interpretations of the stratigraphic layers. However, the density of cultural material in Units 4, 6, and a-g suggest Layer B in the main excavation area is of significance, possibly representing a rubbish disposal zone. The consistency of sediment in Layers A and B could

²³ E.g. discussion with Raphael Musere and Sinabule in Olgulului/Ololarashi G.R., field notes, February 14 2015; Interview with Olokida Makau in Endonet September 13 2015.

²⁴ E.g. interview with Kuyiatio in Kimana August 22 2015; Interview with Eunice Shoke in Olgulului/Ololarashi G.R., August 6 2016.

further suggest the continuous presence of enclosure sediments throughout the archaeological horizons, though diffuse layers and deposits are quite typical of many of the sites excavated in Amboseli in 2015. The recovery of faunal remains from ovicaprid and cattle sized animals in Layer B deposits could reinforce an interpretation of an early orientation towards livestock herding at the site, but again there are doubts as to the actual species present, and the age of these faunal remains.

5.2.3. Lemomo Hill (HdJn4)

Lemomo is a volcanic vent reaching approximately 100 m in elevation up from the basin deposits, affording panoramic views of Amboseli and the Tanzanian border. On the southern face of the hill is a gently sloping plateau where it is recognised that Kisongo Maasai have a long history of settlement. During interviews it was suggested that the first Maasai to live at Lemomo occupied it when the Ilmeirishan age-set were warriors (c.1806-1826), and that the hill has been inhabited since this time.²⁵ The recently abandoned (c.10 years old) settlement, visible in Fig. 5.12, attests to this locations ongoing appeal.

Lemomo is a landscape feature that is clearly imbued with a degree of ritual significance for those living in its surrounds. In conversation with Ngedo Punuka it was recalled that historically, during periods of prolonged drought, sheep were brought to the top of the hill for sacrificial rituals to *Enkai*, to encourage the return of the rains.²⁶ During excavations in 2015 we also encountered some local priests who were meeting at Lemomo to discuss spiritual matters and hold a prayer service.

As of 2014 a wildlife conservation ranger station complete with airstrip has been situated at Lemomo, financed by the Big Life Foundation. Clearing and raking during the creation of the airstrip likely dislodged some artifacts and has impacted the surface distribution of finds. However, as it was decided to build the airstrip only on the southernmost extent of the plateau, and as the surface of the strip was graded by hand,²⁷ disturbance to the stratigraphy of the site appears to have been minimal.

Satellite imagery acquired in February 2011 (prior to the construction of the airstrip) indicates a pale ‘scar’ on this occupation surface stretching some 300 m across, dominated by grassy and shrubby vegetation with trees growing on the perimeter (Fig. 5.12 and Table 3, Appendix 6). Lemomo Hill would appear to be the most biodiverse site yet surveyed in Amboseli in terms of plant species. The pale scar feature on which this biodiversity concentrates is a pastoral glade formation, the result of accumulating deposits of ash and manure modifying the soil chemistry and vegetation of the site. It is not possible to visually identify any clear settlement layouts, likely because the area has been repeatedly occupied, blurring the lines between enclosures. Like the Ilnyangusi Manyatta site, Lemomo Hill is clearly of palimpsest formation. While surveying, twenty-seven potsherds, seven flaked lithics, a gneiss grinding-stone fragment, a cowry shell, and a segment of copper coil were collected from across the glade feature (artifact cluster 73). It was decided to excavate a total of four preliminary 50 x 50 cm test pits here in March 2015, and an additional seven 1 x 1 m units in July of that same year (Fig. 5.13). As the topography of the plateau is notably homogenous, excavation units were established where artifact scatters were visible.

²⁵ Interview with Olokida Makau in Endonet September 13 2015; Interview with Kitoe Lemomo in Olgulului/Ololarashi G.R., August 26 2015.

²⁶ Interview with Ngedo Punuka and Morengara in Kimana August 26 2015.

²⁷ Email correspondence with Craig Millar (Field Co-ordinator for Big Life Foundation), November 12 2016.

Fig. 5.12 Distribution of surface finds at Lemomo Hill

Worldview-2 satellite image (acquired February 02 2011)

Fig. 5.13 Aerial view of units excavated at Lemomo Hill

Aerial photographs acquired in July 2015

The profiles of the western wall of Units c and d are presented in Figs. 5.14-5.15, respectively. Tables 5.10-5.11 summarise the depositional layers and finds at the site. Layer A, ranging between 0-10 cm DBS, was found to consist of a light brown moderately compact topsoil wherein most finds (including wood charcoal, bone, lithics, pottery, and fragments of ostrich eggshell) were recovered. Layer A clearly contains anthropogenic soils that resemble livestock enclosure sediment (Fig. 5.14). Layer B, extending to a depth of 25-50 cm DBS consisted of a silty loam with mottled dark reddish brown/ brown sediment. Being somewhat rockier than Layer A (featuring volcanic cobbles), tunnelling and insect bioturbation were also clearly evidenced in Layer B. Artifacts such as charcoal, bone, pottery, lithics, and OES fragments continued to be collected in Layer B. In Layer C, sediments transitioned to a brown loose silty loam which extended between 25-70 cm DBS, and was distinguished from Layer B due to an increase in rocky inclusions, a decrease in tunnelling and dung beetle brood balls, and by the appearance of powdery calcareous inclusions. Wood charcoal and bone were also present in Layer C in some units, but in decreasing quantities. Layer D, finally, was a more homogenous and compact brown silty clay loam with a desiccated and almost grittier texture extending between 40-75 cm DBS. Powdery calcareous inclusions were also present in Layer D, and in Unit 1 and Unit d, some wood charcoal continued to be collected.

Typically, we did not close a unit until a minimum of 10 cm had been excavated without returning any finds. At Lemomo however, in Units 1, 2, 4, 5, d, and f we continued to collect traces of wood charcoal in the deepest deposits reached. Unfortunately, due to time constraints we were unable to proceed further in these units and it remains to be seen how far the (albeit minute) charcoal deposits extend in these spots.

Fig. 5.14 Photograph of the West section of Unit c, Lemomo Hill

Note the clear contrast in sediment colour across Layers A, B, and C. scale = 50 cm

Fig. 5.15 Lemomo Hill, Unit d stratigraphic profile

Two dates were obtained from the excavated material at Lemomo Hill. An ostrich eggshell bead blank from Unit 4 Layer B (found at 13 cm DBS) was dated to 526 ± 58 BP, (1318-1615 CE, 2 sigma range). A piece of wood charcoal from Unit d Layer D (found at 71 cm DBS) returned a date of 620 ± 58 BP, (1314-1420 CE, 2 sigma range). As these dates are very close, and may indeed overlap, they could suggest that much of the trace archaeological material found in Layers C and D have been vertically displaced from higher in the stratigraphic profile. The charcoal from Unit d in Layer D very probably originates from dense deposits encountered in Layer B.

Table 5.10 Layer descriptions for Lemomo Hill units

Layer	Description	Range of depths below surface (cm) in units											
		1	2	3	4	5	a	b	c	d	e	f	
A	Light brown moderately compact silty clay loam topsoil; roots/organic matter, pottery, lithics, OES, wood charcoal and bone recovered. 10-15% volcanic pebble and gravel inclusions.	0-10	0-10	0-10	0-10	0-10	0-10	0-10	0-10	0-10	0-10	0-10	
B	Mottled dark reddish brown/brown loose silty loam; wood charcoal, bone, pottery, lithics and OES present. Volcanic pebbles and gravel at 10-15%, with an additional 5% volcanic cobbles. Some tunnelling and dung beetle brood balls.	10-30	10-25	10-50	10-30	10-30	10-25	10-20	10-25	10-30	10-30	10-30	
C	Brown loose silty loam; wood charcoal, and bone present in decreasing quantities. Volcanic pebbles and gravel at 25-30%, with an additional 10% volcanic cobbles. Some tunnelling and dung beetle brood balls. Pronounced powdery calcareous inclusions appear.	30-40	25-50	50-70	30-40	30-50	25-35	20-35	25-30	30-65	30-35	30-45	
D	Brown moderately compact silty clay loam with a somewhat crusty feel; rocky inclusions at 25-30%, and powdery calcareous inclusions continue. Traces of wood charcoal present in some units.	40-72	50-70		40-60					65-75			

Table 5.11 Finds by layer and unit at Lemomo Hill

Unit	Layer	Wood charcoal (g)	Pottery	Lithic	Ostrich eggshell	Indeterminate bone fragment		Indeterminate tooth fragment	
						count	weight (g)	count	weight (g)
1	A		4		2	2	<0.1		
	B		1						
	D	.104							
2	A		1			32	6.1		
	B	1.915	1			2	0.2		
	C	0.024				1	<0.1		
3	A				1	4	1.1		
	B	0.008							
4	A					2	1.5		
	B	0.017	1		1	2	1		
	C	0.056				1	<0.1		
5	A	0.419		2		9	2.0	2	1.0
	B	2.407				8	2.7		
	C	0.997				2	0.9		
a	A					6	1.3		
	B			1		2	0.6		
b	A	0.056				8	1.1	1	<0.1
	B	0.093							
c	A	0.11	1			8	1.8		
	B	1.6							
d	A	0.706				4	2.4		
	B	6.139			1	7	0.7		
	C	1.596							
	D	0.225							
e	A	0.036	1	1		11	8.9	2	0.4
	B	0.586							
f	A	0.229							
	B	0.157				1	0.6		
	C	0.011							
TOTAL		17.491	10	4	5	112	32.9	5	1.4

I estimate that there are a minimum of three vessel types represented by the pottery sherds collected while surveying and excavating at Lemomo Hill (see Fig. 7, Appendix 2). In Units 1, 2, 4, c, and e nine sherds were found of a thin (average thickness being 7 mm) reddish-brown type with well-sorted 5% inclusions ranging in size between 0.5-2 mm. An additional nine sherds of similar description were also collected while surveying, one of which has twisted-cord roulette decoration on the lip (Fig. 7i, Appendix 2). This sherd with twisted-cord roulette decoration on the lip appears to be from a bowl with a slightly inverted rim (Fig. 1iii, Appendix 2). A single sherd of a distinctly thicker (9.5 mm thick) brown type with 10% moderately sorted inclusions ranging in size from 0.5-2 mm was found in Unit 2 Layer A, and a further seventeen sherds of this type were collected during our survey. Two of the thicker coarser brown sherds were decorated with ‘checked’ grooves (Fig. 7iii-iv, Appendix 2). Finally, a dark-red thin (7.5 mm thick) sherd with 5% very well-sorted quartzite inclusions

ranging in size from 0.5-2 mm was also collected from the surface of the site. This dark-red thin sherd features twisted-cord roulette decoration (Fig. 7ii, Appendix 2).

Flaked lithics collected from the surface of the site include one *outil écaillé*, and six flakes made of grey, opaque, and coffee coloured obsidian, as well as quartz (Table 5.12). The only lithics recovered during excavations were four flakes. It is interesting to note that the rarely encountered coffee coloured obsidian again appears in association with Iron Age deposits, as this colour of obsidian also occurs at the site of Kirinkai.

Table 5.12 Lithic artifacts recovered from Lemomo Hill

Context	Type	Raw material	Comments
surface	scraper	quartz	notched scraper
surface	flake	obsidian (opaque)	
surface	flake	obsidian (green)	blade
surface	flake	obsidian (green)	
surface	flake	obsidian (green)	
Unit 2 Layer A	flake	obsidian (indet.)	
Unit 4 Layer B	flake	obsidian (opaque)	bipolar
Unit 6 Layer B	flake	obsidian (opaque)	

Faunal remains were fragmented and friable, though taxa represented in Layer A include one *Bos*, and one Bovid (2) and one Bovid (4) size class animals. These bovid remains are likely to be sheep/goat and cow, but wild ungulates may also be present. An overview of the faunal components is presented in Tables 5.13 and 5.14. Note that nearly all of the faunal remains were found in the first 10 cm DBS, and may very well be modern.

Table 5.13 Identifiable faunal remains from Lemomo Hill units

Unit	Layer	Taxon	Element	Side	Portion	Weight (g)
l	A	Bovid (2)	enamel			0.1
b	A	Bovid (4)	enamel			5
		Bos	m1/2			3.4
c	A	Rodentia	maxilla	L		0.1
e	A	Bovid (2)	rib			2
f	A	Bovid (2)	tibia	L	medial shaft	5.3
TOTAL						15.9

Table 5.14 Identifiable species from Lemomo Hill units

Taxonomic group	NISP	MNI
BOVIDAE		
Bovid (4)	1	1
Bovid (2)	7	1
RODENTIA		
indeterminate	1	1
TOTAL	9	3

Other notable finds from excavations include two ostrich eggshell bead blanks recovered in Unit 1 Layer A, and Unit 4 Layer B. Unworked fragments of ostrich eggshell were also recovered in a number of deposits, suggesting the beads were manufactured on site. A drawn brownish-red glass bead (Indian red) was found on the surface of the site (Fig. 4ii; Appendix 3). This particular style of bead is frequently seen in pre-European Late Iron Age

archaeological contexts (e.g. Helm 2000; Soper 1976), providing further evidence that people in Amboseli were articulated with trade networks oriented towards the coast c.500 years ago (see Chapter 7). A fragment of a cowry shell again suggests coastal connections (Fig. 4x, Appendix 3), but as these shells are still used in Amboseli today for decorating calabashes and for personal adornment, they could have been brought to site at any time.²⁸ A small copper coil fragment was also found on the surface of the site, and judging from its corroded state it is not modern (Fig. 5vii, Appendix 3). Copper alloy artefacts, including coils, are commonly found on coastal littoral sites from around the 15th century (Helm 2000: 193-194; Walz 2010). Herbert (1984) contends that copper was widely used as a currency in both precolonial and colonial era sub-Saharan Africa however, and is thus not exclusively associated with coastal trade networks. Unfortunately, it is unclear exactly how old the copper coil found on the surface of HdJn4 is, so erring on the side of caution, it is not assumed to be associated with the Iron Age occupation of Lemomo Hill. Finally, a fragmented grinding-stone that appears to have once been a handstone (rather than a base) was found on the surface of the site (Fig. 2v; Appendix 3). In conversation with local people this was suggested to have been used for grinding ochre, or for sharpening metal implements.²⁹

Flotation samples were taken from Units 3, 5, a, c, d, and e totalling 112 litres of sediment. The Lemomo Hill samples were not particularly rich in carbonised seeds, and even a charcoal dense deposit in Unit d, Layer B was found to contain primarily just charred wood. The Poaceae:Cyperaceae ratio (8:4) suggests a dominance of grassy species over sedges at the site. One relevant observation from the flotation samples is that there was a large amount of insect remains in all deposits across the site. In Layer C deposits in particular insect remains account for approximately half of the weight of the entire light fraction. The abundance and ubiquity of insect remains clearly indicate that bioturbation caused has impacted the stratigraphy of the excavation units sampled.

It is difficult to untangle the material evidence pertaining to the Iron Age occupation of Lemomo Hill from its more contemporary occupation phases. Oral traditions of local people indicate that the site has been a focus for settlement and ceremonial activity since the earliest known age-set, which one could say equates to the beginning of time for the Maasai (see Anderson 2016 and Chapter 8). The long history of settlement at Lemomo Hill is clear from the anthropogenic sediment visible in satellite imagery, which reveals a diffuse occupation horizon stretching some 300 m. Despite my prediction that most of the excavated deposits would date to the 19th-20th centuries, material from Layer B was radiocarbon dated to around the 15th century. Given the prominence of Lemomo Hill as a landscape feature, we should perhaps consider that occupations of the site have been relatively continuous as opposed to having occurred as a single ‘pre-Maasai’ and ‘Maasai’ phase. The absence of faunal remains identifiable to the species or taxonomic level in Layer B makes it difficult to know whether livestock were present at this site during the Late Iron Age though. It is possible that the formation of the glade may have only been initiated after the suggested *terminus post quem* of c.600-700 years ago. On the other hand, the manner in which surface finds probably predating the 19th-20th centuries (lithics, glass bead) appear to cluster on this glade formation rather than being randomly distributed across the hill suggest to me some incarnation of the glade formation may have been present during the Late Iron Age. This interpretation is further supported by the recovery of lithics in Layer A, where deposits resemble livestock enclosure sediment, suggesting the glade and the lithic artifacts could be contemporaneous. Though these lithics appear in modest quantities, this is in line with other Late Iron Age sites in

²⁸ E.g. interview with Kuyiatio in Kimana August 22 2015; Interview with Remando Oloshikoki in Olgulului/Ololarashi G.R., August 25 2015.

²⁹ Discussion with Raphael Musere and Sinabule in Olgulului/Ololarashi G.R., field notes, February 14 2015.

Amboseli. That being said, there is also evidence for bioturbation at this site, which weakens this argument. Once again, further work is required to conclusively identify a Late Iron Age pastoral presence at Lemomo Hill.

5.2.4. Ilmaarba (HdJn1)

HdJn1 is situated on volcanic rather than lake bed sediments just over a kilometre away from the Kamwanga and Ilmaarba rivers. Satellite imagery indicates a roughly circular clearing, some 150 m across, though it is not possible to ascertain whether or not this is a pastoral glade from visual inspection alone. Clumps of shrubs and grasses (mainly *Lycium europaeum*, *Maerua* sp. and *Sporobolus virginicus*) as well as a few *Balanites glabra* and some young *Acacia tortilis* were observed to be growing within the circular feature (Table 4, Appendix 6). While surveying at the Ilmaarba site (artifact cluster 103) six flaked lithics and forty-six potsherds were collected (Fig. 5.16). The potsherds were almost entirely found in two clusters, one being situated near Unit 2, and the other being found to the north-west (marked as 'PC' in Fig. 5.16). None of the local Maasai research assistants that I worked with in Amboseli recall there having been a settlement located here, suggesting the site predates the 20th and probably 19th centuries. It was decided to excavate a total of four 50 x 50 cm test pits here in May of 2015 (Fig. 5.17).

Fig. 5.16 Distribution of surface finds at Ilmaarba

Worldview-2 satellite image (acquired February 02 2011)

Fig. 5.17 Aerial view of units excavated at Ilmaarba

Aerial photographs acquired in July 2015

Unit 1 was dug into a slight earthen mound, Unit 2 was set up in the centre of a pottery cluster, and Units 3 and 4 were placed on raised vegetated areas. Excavations on the elevated spots at the site were undertaken as these areas were hypothesised to be more resistant to erosion, which seems to be an acute problem at Ilmaarba.

Table 5.15 summarises the stratigraphy at Ilmaarba, and the profile of the north wall of Unit 4 is depicted in Fig. 5.18. Finds were almost entirely concentrated in the first 10 cm of the excavation units (Table 5.16). On the surface of the test pits was a thin layer of somewhat compact topsoil (0-5 cm DBS) (Layer A). Beneath this, between 10-15 cm DBS, we encountered the loose brown silty clay loam of Layer B. Layer B appeared to be rather extensively disturbed by agents of bioturbation, including dung beetles, and the roots of several *Hydnora abyssinica* plants.³⁰ A small amount of wood charcoal, bone and a single potsherd were found in Layer B though I suspect these finds were not recovered *in situ* as this layer has clearly been mixed by root and insect activity. Layer C, between 10-40 cm DBS was found to be devoid of artifacts and characterised by loose sediment, dung beetle brood balls, and extensive tunnelling. Layer D, only seen in Unit 2, was indistinguishable from Layer C except for the presence of a few calcareous nodules. The basalt pebble and gravel inclusions in the stratigraphy of this site were consistently between 0-5%.

³⁰ *Hydnora abyssinica* is an edible parasitic subterranean rhizome-like plant that local Maasai people call *erikunyi*. The roots are black and easily mistaken for charcoal but for the distinctive warty periderm.

Table 5.15 Layer descriptions for Ilmaarba units

Layer	Description	Range of depths below surface (cm)			
		1	2	3	4
A	Brown moderately packed silty clay loam topsoil; roots/organic matter, pottery, wood charcoal.	0-5	0-5	0-5	0-5
B	Brown loose silty clay loam; a few roots, decrease in artefact density though pottery and wood charcoal still present, evidence of tunnelling appearing, and <i>Hydnora abyssinica</i> in Units 1, 2, and 3.	5-35	5-30	5-15	5-10
C	Brown loose silty clay loam; with dung beetle brood balls and tunnelling, no artifacts.	35-40	30-35	15-30	10-20
D	Brown loose silty clay loam; with dung beetle brood balls and tunnelling, a few calcareous nodules and no artifacts.		35-40		

Table 5.16 Finds by layer and unit at Ilmaarba

Unit	Layer	Wood charcoal (g)*	Pottery	Indeterminate bone fragment	
				count	weight (g)
1	A	.005		1	<0.1
2	A		48		
	B	.194	3	1	.01
4	A	.012	1		
	B	.006			
TOTAL		0.226	52	2	.01

Fig. 5.18 Ilmaarba, Unit 4 stratigraphic profile

One radiocarbon date was obtained from HdJn1, from a piece of wood charcoal found in Unit 4 Layer A. This was dated to 556 ± 31 BP, or 1395-1448 CE, 2 sigma range. Based on this date, the site appears to have been inhabited at the turn of the 15th century.

An estimated minimum of two ceramic types were identified from the surface and excavation finds. As previously stated, there were forty-six potsherds collected from the surface of the site, all averaging just over 10 mm in thickness, ranging in colour from reddish brown to dark brown and having 5-10% well-sorted inclusions, 0.5-2 mm in size. Two decorated sherds were collected while surveying, each bearing punctate impressions (Fig. 8iii, Appendix 2). In Unit 2 an additional fifty-one potsherds, all of the same reddish brown type were found. Six of the sherds from Unit 2 also have punctate decorations. Finally, a single sherd found in Layer A of Unit 4 was unique in relation to the other sherds recovered, being yellowish-red in colour with what is tentatively identified as cord roulette decoration (Fig. 8v, Appendix 2). The fabric of the sherd from Unit 4 is otherwise similar to other sherds from the site (5-10% well-sorted inclusions between 0.5-2 mm in size). The sherds from Ilmaarba are small and highly fragmented, and no refits were possible.

In our survey of HdJn1, a notched tool, an end scraper, a bipolar core, and three flakes were collected from the surface of the site (Table 5.17). No lithics were found in the excavation units, though admittedly the volume of sediment excavated at Ilmaarba was not exceptionally great. Given the apparent age of HdJn1, I would anticipate that the people occupying this site probably did use stone tools, and the lithics found on the surface of Ilmaarba can thus be assumed to be contemporaneous with the excavated deposits.

Table 5.17 Lithic artifacts recovered from Ilmaarba

Context	Type	Raw material	Comments
surface	notched informal tool	chert	
surface	scraper	obsidian (green)	convergent pointed end scraper
surface	bipolar core	obsidian (indet.)	core on flake
surface	flake	obsidian (indet.)	
surface	flake	obsidian (indet.)	
surface	flake	obsidian (indet.)	

Flotation samples were not taken at Ilmaarba, as we did not encounter any charcoal rich deposits. The limited extent of excavations at Ilmaarba, a site which seems to have been inhabited 600 years ago, reflects the degree of deflation/erosion. As archaeological deposits seemed to only extend for 10 cm, we elected to invest little time exploring further.

5.2.5. Ololopoli (HdJn5)

Ololopoli is in the Ilmaarba area, where an outcrop of volcanic rock transitions into the basin sediments of the former lake bed. The nearest source of water is the Kamwanga River, some 2 km away. The site is situated equidistant between two volcanic mounds each c.350 meters to the north and south, making the location of Ololopoli easily navigable. Satellite imagery shows that HdJn5 comprises a faint circular clearing, approximately 200 m in diameter with a dense patch of vegetation in the centre dominated by *Acacia tortilis*, *Balanites glabra*, and *Lycium europaeum* (Table 5, Appendix 6). The site is ringed by pale sediment which may very well be anthropogenically formed, and vegetation here is dominated by *Cenchrus ciliaris*. Geochemical analysis would no doubt more fully illuminate the layout of HdJn5, but based on visual examination, there is a pastoral glade here (Fig. 5.19). None of the local Maasai research assistants that I worked with in Amboseli recall there having been a settlement located at Ololopoli, suggesting the site predates the 20th, and probably the 19th centuries.

Surveying in the area resulted in the collection of sixty potsherds, predominantly in the north-east quadrant of the site, as well as five flaked lithics, and an iron ring (artifact cluster 71). A total of six 50 x 50 cm test pits were excavated at Ololopoli, in March of 2015, all focused on the area with the highest concentration of artifacts identified during the survey (Fig. 5.20). Unit 1 was located on a slight earthen mound, Units 2 and 3 were set in the centre of a cluster of pot sherds, Units 4 and 6 were located on a comparatively larger earthen mound, and Unit 5 was situated on top of a concentration of bone and charcoal fragments. A unique aspect of Ololopoli is that much of the surface of the site is covered by compact laminar calcrete into which cultural material was ‘cemented’ (Fig. 5.21). The formation of calcrete on the surface of the HdJn5 may be helping to minimise the erosion or deflation of archaeological horizons.

Table 5.18 summarises the stratigraphy at Ololopoli, and the profile of the north wall of Unit 3 is depicted in Figure 5.22. Finds were noted to have concentrated in the first 30 cm of the test pits (Table 5.19).

Fig. 5.19 Distribution of surface finds at Ololopoli

Worldview-2 satellite image (acquired February 02 2011)

Fig. 5.20 Aerial view of units excavated at Ololopoli

Aerial photographs acquired in July 2015

Table 5.18 Layer descriptions for Ololopoli units

Layer	Description	Range of depths below surface (cm) in units					
		1	2	3	4	5	6
A	Brown highly compact laminar calcrete; little roots/organic matter present, pottery, wood charcoal, bone, lithics and iron, artifacts 'cemented' into sediment.	0-10	0-5	0-5	0-5	0-5	0-5
B	Brown silty clay loam moderately compact-compact; wood charcoal, bone, pottery and lithics present.	10-20	5-20	5-30	5-25	5-25	5-15
C	Dark brown loose silty clay loam; increase in pebbles and gravel inclusions from 0-5% to 10%. Some dung beetle brood balls, tunnelling not extensive, no artifacts.	20-40	20-30	30-40	25-35	25-45	15-35
D	Dark brown loose silty clay loam; continuous increase in pebbles and gravel, and cobbles appearing, rocky inclusions at 10-15%. Scattered powdery calcareous inclusions, no artifacts.			40-70			

Table 5.19 Finds by layer and unit at Ololopoli

Unit	Layer	Wood charcoal (g)	Pottery	Lithic	Iron blade	Indeterminate bone fragment	
						count	weight (g)
1	A	.093					
	B	.109					
2	A	.015	44	1		15	2.1
	B					1	<0.1
3	A	.147	34			1	0.9
	B	1.598	1			3	3.4
4	A				1		
	B	.003		1		1	0.2
5	A	.155				16	4.8
	B	.042					
6	A	2.185				26	7.2
	B	.103		1			
TOTAL		4.303	79	3	1	63	18.6

Layer A is comprised of a calcrete formation which was noted to have extended for a maximum of 10 cm, but averaging less than 5 cm DBS. Layer B is a less compact brown silty clay loam containing wood charcoal, bone, pottery and lithics. Layer C is found beneath, containing a darker brown loose silty clay loam, and an increase in basalt pebble and gravel inclusions, though devoid of material culture. Layer D, found only in Unit 3 sees a continuous increase in pebble and gravel inclusions with a few cobbles appearing. Layer D also contains scattered powdery calcareous inclusions.

In Unit 3, Layer B featured a loose greyish brown ashy lens, predominantly along the southern half of the test pit, between 26-33 cm DBS (Fig. 5.22). This ashy feature was located directly beneath the highest concentrations of wood charcoal found in Unit 3 suggesting there may have been an in situ burning event here, perhaps representing part of a hearth feature. Alternatively, this feature could have resulted from a secondary deposit of burnt material and could thus also be the remains of something more along the lines of a rubbish heap.

The stratigraphy of the units excavated at Ololopoli represent a typical calcrete profile with the degree of induration decreasing downward, and powdery calcrete occurring in the lower levels (Chen et al. 2002). It is unknown if the source of the dissolved carbonate resulting in the formation of calcrete on this site is from anthropogenic deposits (i.e. dung, ash, bone), or if it originates from an alternative source.

Fig. 5.21 Photograph of surface of Unit 3, Ololopoli

Note the 'cementing' of pot sherds in Layer A. The scale bar (50 cm) is situated to the south of Unit 3.

Fig. 5.22 Ololopoli, Unit 3 stratigraphic profile

The ceramic assemblage collected while surveying and excavating at HdJn5 represents a minimum of three vessel types. In Units 2 and 3 a total of seventy-nine sherds were retrieved, all of a dark reddish-brown colour, averaging 10 mm in thickness, and having 10% moderately well-sorted volcanic rock inclusions ranging between 0.5-3 mm in size. Two of these seventy-nine sherds were rims with near identical profiles, the largest of which is depicted in Fig. 9vii, Appendix 2. Some refits were possible, and all of the sherds from excavations appear to be very similar, possibly coming from a single vessel.

The pottery sherds found on the surface of the site are more diverse, representing at least an additional two vessel types. Of the sixty potsherds recovered while surveying, fifty-six are of the same dark reddish-brown type seen in Units 2 and 3. Two of these dark reddish-brown sherds have applied decoration (Fig. 9v, Appendix 2). There were also five rim sherds in the surface collection. Four of these rims were found in proximity to Units 2 and 3 and have the same profile shape as the rims excavated from these test pits. One of the dark reddish-brown rim sherds found on the surface of the site (near the iron ring) has a different profile, and thus

is taken to represent a unique vessel (Fig. 9vi, Appendix 2). Five distinct sherds of a yellowish-red type with 5% well-sorted inclusions ranging in size between 0.5-1mm were also found near Units 2 and 3. These yellowish-red sherds are very thin (averaging 60.5 mm thick), and two have twisted cord roulette decoration (Fig. 9iii-iv, Appendix 2). Finally, there were two yellowish-red handle fragments (Fig. 9i-ii, Appendix 2).

The lithics recovered from excavations at Olopololi include three obsidian flakes, all found in Layers A and B. From the surface of the site an additional four flakes of local and non-local obsidian were collected, as well as a quartz scraper (Table 5.20).

Table 5.20 Lithic artifacts recovered from Olopololi

Context	Type	Raw material	Comments
surface	scraper	quartz	notched scraper
surface	flake	obsidian (opaque)	
surface	flake	obsidian (green)	blade
surface	flake	obsidian (green)	
surface	flake	obsidian (green)	
Unit 2 Layer A	flake	obsidian (indet.)	
Unit 4 Layer B	flake	obsidian (opaque)	bipolar
Unit 6 Layer B	flake	obsidian (opaque)	

As mentioned, a ring made of iron, identified in conversation with local people as an earlobe pendant, was found on the surface of the site (Fig. 5ii, Appendix 3).³¹ In addition, an iron blade was found in Unit 4 Layer A (Fig. 5ix, Appendix 3). During interviews in Amboseli, this iron implement was consistently identified as an *olmurunya*. This is a special blade with largely ceremonial function. *Olmurunya* were most widely reported to have been used during female circumcision, and also to shave heads during age-set graduations.³² Of course the function and significance of these iron implements are not taken to have been constant over time, but these interpretations are included here to provoke insight nonetheless.

The faint but distinctive glade formation at Olopololi suggests this site is a pastoral settlement, inhabited c.400-500 years ago. HdJn5 has quite good archaeological potential as the formation of calcrete on its surface seems to be protecting the cultural deposits. Although there was no indication of iron working (slag, tuyeres), the presence of metal implements and roulette decorated ceramics indicate this site is rather typical of the Pastoral/Late Iron Age.

5.2.6. Osoit (HcJn5)

On a plateau in a lava field to the west of the study area lies the site of Osoit. The layout of the site is immediately recognisable, as the lava boulder and cobbles that strewn the surface of this field have been cleared away and arranged in a circular feature with a diameter of 65 m (Fig. 5.23). Within this feature, additional stone circles have been created, no doubt once used as livestock enclosures. The sediment on the surface of Osoit is paler than the surrounding area, suggesting enrichment from manure, urine, and ash. The vegetation on the site is dominated by *Cynodon dactylon* and a number of shrubby fodder plants (*Cyathula polyecephala*, *Sericocomopsis pallido*, *S. hildebrandtii*) (see Table 6, Appendix 6).

³¹ E.g. interview with Nooretet Kapusia in Olgulului/Ololarashi G.R., August 28 2015; Interview with Kuyiato in Kimana August 22 2015.

³² E.g. interview with Olemwanda Olgulului/Ololarashi G.R., August 24 2015; Interview with Kitoie Lemomo in Olgulului/Ololarashi G.R., August 26 2015.

Fig. 5.23 Distribution of surface finds at Osoit

Worldview-2 satellite image (acquired February 02 2011)

Fig. 5.24 Aerial view of units excavated at Osoit

Aerial photographs acquired in July 2015

Osoit is just one such feature on this lava field, which is dotted with circular clearings easily identifiable from above. While in Amboseli, I was told these clearings are very old, and that they have existed here since the earliest securely dated Maasai age-set, Ilmeirishan.³³ Aerial historical photographs indicate that these clearings were regularly occupied in the mid-20th century. Within the last decade however, the area has become a locally managed grazing and wildlife preserve, part of the ‘Kitenden corridor’, and thus people no longer build *enkangiti* here.

While surveying, a total of 19 flaked lithics and a single potsherd were collected from the surface of the site (artifact cluster 105). This was one of the highest density lithic scatters encountered during fieldwork. We also noticed a few fragments of broken glass and rusted tin, indicating Osoit is yet another site where contemporary and non-contemporary material culture, and in all likelihood, archaeological horizons, have intermixed.

Six 50 x 50 cm test pits were excavated here in May 2015 (Fig. 5.24). Units 1, 2, 5, and 6 were located within what local Maasai research assistants suggested were small stock enclosures, while Units 3 and 4 were located in what was hypothesised to have been a central cattle enclosure. The stratigraphy of the site is summarised in Table 5.21, finds by layer and unit are described in Table 5.21, and the West section of Unit 5 is depicted in Fig. 5.21.

Table 5.21 Layer descriptions for Osoit units

Layer	Description	Range of depths below surface (cm) in units					
		1	2	3	4	5	6
A	Loose brown topsoil; largely devoid of vegetation, 15-20% volcanic pebbles, gravel and cobbles, lithics present.	0-5	0-5	0-5	0-5	0-5	0-5
B	Loose brown silty clay loam; 30-40% volcanic cobbles, pebbles and gravel. Lithics present and one bone fragment. A few dung brood beetle balls.	5-10	5-10	5-20	5-10	5-35	5-30
C	Loose brown silty clay loam; 40-50% boulders, cobbles, gravel, and pebbles, with calcareous nodules and powdery calcareous residue on underside of rocky inclusions. No artifacts.	10-20	10-30	20-50	10-30	35-50	30-45

Table 5.22 Finds by layer and unit at Osoit

Unit	Layer	Lithic	Indeterminate bone fragment	
			count	weight (g)
1	A	1		
	B			
2	A	3		
	B			
3	A	2		
	B	1		
4	A	1		
	B	1		
5	A	3		
	B	3	1	1.1
6	A	2		
	B	1		
TOTAL		19	1	1.1

³³ Discussion with Sandy Legeny in Olgulului/Ololarashi G.R., field notes, February 23 2015.

Fig. 5.25 Osoit, Unit 5 stratigraphic profile

Layer A was described as a loose brown topsoil largely devoid of vegetation containing smaller rocky inclusions of volcanic origin. In comparison to other sites excavated in Amboseli, a large number of flaked lithics were recovered from Layer A. This loose brown topsoil was found to extend between 0-5 cm DBS in the units excavated. Underlying this we encountered the transitional Layer B which extended to a maximum depth of 35 cm DBS. Like Layer A, Layer B was comprised of loose brown silty clay loam. Lithics continued to be recovered in Layer B, in addition to a solitary bone fragment which was found in Unit 5, though no other finds were collected. Finally, Layer C appeared to be culturally sterile, and was distinguished by the presence of calcareous nodules, and basalt boulders. Agents of bioturbation (e.g. termites, dung beetles, vegetation) do not appear to have impacted the stratigraphy of the site to a significant degree.

Excavations of the test pits were, however, impeded by volcanic cobbles and boulders that increased in abundance and size throughout the layers. In Units 1, 2, and 4 the deposits quickly became dominated by large rocks that were impossible to remove without expanding the area under excavation, and unfortunately, due to time constraints, this was not possible.

No charcoal was recovered from Osoit. As mentioned, faunal remains were restricted to one unidentified bone fragment. Like most of the faunal remains encountered in Amboseli, the bone fragment from HcJn5 was friable, and while it was sent to Ångström Laboratory for radiocarbon dating, the sample was found to be too degraded.

The solitary potsherd found on the surface of the site was unlike any other encountered while surveying. This rim sherd has a tapered lip featuring carination, along which short vertical lines have been incised (Fig. 10, Appendix 2). No additional ceramic artifacts were encountered during excavations.

The material culture recovered during excavations from Osoit was thus almost entirely restricted to obsidian lithics (Table 5.23). From the surface of the site two backed blades, a crescent (length = 24 mm), a side scraper, four bipolar cores, and eleven flakes were collected, all made from obsidian from local and non-local sources. During excavations a further seventeen flakes and one bipolar core were found in Layers A and B, also made from local and non-local obsidian. Unlike at every other site excavated in Amboseli with evidence for stone tool use, there was no quartz or chert seen at Osoit. The concentration of lithic artifacts at Osoit also exceeds that encountered at any other Iron Age site in Amboseli.

Table 5.23 *Lithic artifacts recovered from Osoit*

Context	Type	Raw material	Comments
surface	backed blade	obsidian (grey)	
surface	backed blade	obsidian (grey)	
surface	crescent	obsidian (indet.)	
surface	scraper	obsidian (opaque)	side scraper
surface	bipolar core	obsidian (indet.)	
surface	bipolar core	obsidian (opaque)	core on flake
surface	bipolar core	obsidian (opaque)	core on flake
surface	bipolar core	obsidian (opaque)	core on flake
surface	core rejuvenation flake	obsidian (grey)	
surface	flake	obsidian (grey)	
surface	flake	obsidian (grey)	
surface	flake	obsidian (grey)	
surface	flake	obsidian (indet.)	
surface	flake	obsidian (opaque)	
surface	flake	obsidian (opaque)	
surface	flake	obsidian (opaque)	
surface	flake	obsidian (opaque.)	
surface	flake	obsidian (opaque)	
surface	flake	obsidian (opaque)	
Unit 1 Layer A	flake	obsidian (opaque)	
Unit 2 Layer A	flake	obsidian (opaque)	
Unit 2 Layer A	flake	obsidian (green)	
Unit 2 Layer A	flake	obsidian (opaque)	
Unit 3 Layer A	flake	obsidian (opaque)	
Unit 3 Layer A	flake	obsidian (opaque)	
Unit 3 Layer B	flake	obsidian (green)	
Unit 4 Layer A	flake	obsidian (indet.)	
Unit 4 Layer B	bipolar core	obsidian (green)	core on flake
Unit 5 Layer A	flake	obsidian (green)	
Unit 5 Layer A	flake	obsidian (indet.)	
Unit 5 Layer A	flake	obsidian (opaque)	
Unit 5 Layer B	flake	obsidian (green)	
Unit 5 Layer B	core rejuvenation flake	obsidian (opaque)	
Unit 5 Layer B	flake	obsidian (green)	
Unit 6 Layer A	flake	obsidian (opaque)	
Unit 6 Layer A	flake	obsidian (indet.)	
Unit 6 Layer B	flake	obsidian (green)	bladelet

The date of the occupation sequence at Osoit has yet to be determined. The stone circle formations that currently feature on the interior surface of HcJn5 may or may not be coeval with the lithic artifacts as it is apparent that the site has been occupied and modified by pastoral people within the last century. However, both the concentration of lithics on the surface of the site and the relatively large number found during excavations suggest another occupation of the site that almost certainly predates the last hundred years. The lithics encountered at Osoit are distinct from other known Iron Age assemblages in Amboseli in that they are entirely made from obsidian, which could possibly signify that the stone tools at Osoit date to an earlier period. The solitary ceramic sherd found at Osoit is also unlike any other yet seen in Amboseli. No artifacts diagnostic of the Pastoral Neolithic were recovered

on the lava field while surveying, suggesting some of the older stone clearings in this area may have been constructed during, but not before, the Iron Age. Further work is required to elucidate the timeline by which Osoit was constructed and inhabited. Excavations at HcJn5 raise the intriguing possibility that some of the clearings on this lava field in Amboseli pre-date the Late Iron Age. Alternatively, if the rather anomalous artifacts recovered at the site of Osoit do date to the Late Iron Age, it would attest to a considerable heterogeneity of material culture types in this landscape.

5.2.7. RB (HdJn3)

Similar to Osoit, RB is another site that was cleared on the lava fields in the west of the survey area. Satellite imagery shows a pale circular glade formation here (Fig. 5.26), stretching some 80 m across, with patches of *Sporobolus spicata* grass growing in its interior. The vegetation surrounding this site included the odd *Acacia mellifera* and *Azima tetracantha* plant with *Hypoestes* sp., *Sericocomopsis pallida*, and *Pavonia patens* constituting the remaining species diversity (Table 7, Appendix 6). While surveying, fourteen potsherds and six flaked lithics (artifact cluster 76) were collected from this clearing.

Seven 50 x 50 cm test pits were excavated at RB, and all but Unit 5 were positioned within the circular clearing (Fig. 5.27). Unit 5 was placed on top of a patch of reddish dark brown silty loam, high in organic content and devoid of rocky inclusions. Excavated to a depth of 45 cm DBS, the stratigraphy of Unit 5 was unique to the other deposits, as it was found to be a decomposing tree trunk, devoid of archaeological material. Descriptions of the stratigraphy from all test pits (excluding Unit 5) are presented in Table 5.24, and finds from these units are listed in Table 5.25. The profiles of Units 4 and 6 are depicted in Fig. 5.28.

Fig. 5.26 Distribution of surface finds at RB

Worldview-2 satellite image (acquired February 02 2011)

Fig. 5.27 Aerial view of units excavated at RB

Aerial photographs acquired in July 2015

Layer A was a loose light brown topsoil containing bone fragments, wood charcoal and lithics extending between 0-5 cm DBS. Layer B was a more compact mottled reddish brown/brown silty loam featuring an increase in volcanic rock inclusions. Wood charcoal, bone and lithics were also collected in Layer B. A loose brown silty clay loam comprised Layer C which again saw an increase in rocky inclusions and the appearance of boulders. Additionally, few calcareous nodules were encountered in Layer C. With the exception of a charcoal concentration in Layer C of Units 4 and 6, most finds were located in the first 0-30 cm, as was common at other sites. Bioturbation did not appear to be impacting the stratigraphy of the site to a significant degree.

Table 5.24 Layer descriptions for RB units

Layer	Description	Range of depths below surface (cm) in units					
		1	2	3	4	6	7
A	Loose light brown silty loam; 15-20% volcanic pebbles, gravel and cobbles, lithics and charcoal present.	0-5	0-5	0-5	0-5	0-5	0-5
B	Mottled reddish brown/brown, moderately compact, silty loam; 20-30% volcanic cobbles, pebbles and gravel. Lithic, bone and charcoal present. A few dung brood beetle balls.	5-30	5-30	5-30	5-30	5-30	5-35
C	Loose brown silty clay loam; 30-40% boulders, cobbles, gravel, and pebbles, large wood charcoal deposit in Units 4 and 6. A few calcareous nodules noted.	30-40	30-50	30-40	30-75	30-75	35-60

Table 5.25 Finds by layer and unit at RB

Unit	Layer	Wood charcoal	Lithic	Indeterminate bone fragment		Indeterminate tooth fragment	
				count	weight (g)	count	weight (g)
1	A		1				
2	B	0.157		2	<0.1		
3	B	0.009		1	2.5		
4	A	1.035	1	12	6.2		
	B	0.251		7	2.2		
	C	13.067					
5	Decomp. tree						
6	A			7	0.8	3	1.3
	B	2.095	2	8	2.0		
	C	18.679					
7	A			2	0.1		
	B	0.73	2	1	0.1		
TOTAL		36.023	6	41	13.9	3	1.3

Fig. 5.28 RB, Units 6 and 4 stratigraphic profile

Two notable concentrations of charred material were encountered during excavations in Units 4 and 6, from which three radiocarbon dates were obtained. In the first 15 cm DBS of Layers A-B, slightly more charred faunal and floral remains were noted to occur compared to other units at the site, and several large chunks of charcoal were also found at 35-50 cm DBS (Layer C). A fragment of fruit/nut shell found in a flotation sample taken from Unit 6, Layer A (0-5 cm DBS) was radiocarbon dated to 127 ± 29 BP (1692-1950 CE, 2 sigma), with a 79.2% probability it dates to after 1805 AD. A considerably older date was obtained from a piece of wood charcoal from Unit 4 Layer C, found at 47 cm DBS (7010 ± 37 BP, or 5978-5742 BCE, 2 sigma). As I suspected that the wood charcoal sampled in Layer C may have been contaminated with old carbonates, an additional sample was run from Unit 6 Layer C at 38 cm DBS, yet this too returned at date from c.8000 BP (7048 ± 36 BP, or 5990-5783 BCE, 2 sigma). While it is not entirely impossible that the *terminus post quem* for pastoral occupation at RB is 8000 years ago, it is highly improbable given what is known about the spread of pastoralism in sub-Saharan Africa (see Chapter 6). Layer A appears to contain deposits dating from anywhere in between the 17th through to mid-20th centuries, but Layer C

dates to a time that almost certainly precedes the arrival of pastoralists in Amboseli, and is thus unlikely to be associated with the circular stone clearing. Considering that no other artifacts were encountered at this depth, it is difficult to say whether or not the wood charcoal in Layer C is even anthropogenic in origin or if it was produced perhaps as the result of a wild fire.

Ceramics were only recovered from the surface of the site, and represent a minimum of one vessel type. All fourteen sherds were of a yellowish-red colour, of medium thickness (averaging 12 mm) with well-sorted 10% inclusions ranging in size from 0.5-2 mm. Eight of these sherds are decorated with horizontal grooves, and one is a rim sherd with a bevelled lip (Fig.11, Appendix 2). No potsherds were found during excavations.

No faunal remains were identified to the taxonomic level at HdJn3, though some bone fragments in all units were noted to be charred.

A backed bladelet and five flakes made of local and non-local obsidian as well as chert were found on the surface of the site. An additional five obsidian flakes were encountered in Layers A and B (Table 5.26). The somewhat nominal presence of lithics at the RB site could suggest a Late Iron Age occupation period.

Table 5.26 Lithic artifacts recovered from RB

Context	Type	Raw material	Comments
surface	backed blade	obsidian (green)	bladelet
surface	flake	obsidian (opaque)	
surface	flake	obsidian (opaque)	
surface	flake	obsidian (indet.)	
surface	flake	chert	
surface	flake	chert	
Unit 1 Layer A	flake	obsidian (opaque)	
Unit 4 Layer A	flake	obsidian (green)	
Unit 6 Layer B	flake	obsidian (grey)	
Unit 6 Layer B	flake	obsidian (grey)	
Unit 7 Layer B	flake	obsidian (green)	
Unit 7 Layer B	flake	obsidian (green)	

Flotation samples were taken from Unit 6 (totalling 27 litres) and as is typical of most of the Amboseli sites, there was a preponderance of grassy taxa identified. Charred plant remains appear to be concentrated in Layer A, with intermediate quantities in Layer B, and large amounts again seen in Layer C around 40-50 cm DBS. Nearly all (96%) of the seeds from Unit 6 were recovered in Layers A and B, with only wood charcoal appearing in Layer C, highlighting a distinction between these deposits. See Table 4, Appendix 7 for full results.

The site of RB is similar to Osoit in that both are located on the volcanic field to the west of the study area, both are clearly distinguishable pastoral glades with more permanent architectural features (ringed by stone), and both appear to have been occupied during a time when people manufactured flaked stone tools, and judging from the radiocarbon date, also probably more recently. Unlike at Osoit, the lithics and ceramics at RB are more typical of known Late Iron Age assemblages in Amboseli. Based on the evidence, I tentatively suggest RB was occupied post 1805 CE, with at least one other habitation occurring in the Late Iron Age. The apparent absence of any recognised PN pottery types in this volcanic field in conjunction with the density of lithic artifacts associated with some of the glade formations suggest to me that the construction of stone rings here began sometime in the Iron Age though admittedly, radiocarbon dates have thus far been unable to corroborate this hypothesis.

5.2.8. Irrpurai (HcJn4)

The site of Irrpurai is located in the basin sediments of the lake bed, just one kilometre north-east of the Ilnyangusi manyatta site. The word *irrpurai* translates as a patch of ground mainly devoid of vegetation, and HcJn4 is exactly that. While surveying, a diversity of artifact types were found to be strewn across the surface of the site. This collection of surface finds has been demarcated as artifact cluster 79. A total of forty-eight pot sherds, eleven flaked-lithics, two iron projectile points, a glass bead, a grinding-stone fragment, and a smoothed chert ‘manuport’ were identified, a scatter of finds extending approximately 300 m (Fig. 5.29). The sparse vegetation cover at the site was dominated by *Cynodon dactylon* grass, and shrubby forage plants (*Sericocomopsis hildebrandtii* and *Maerua decumbens*) (see Table 5, Appendix 7). There is no clear glade formation at HcJn4, though the concentration of material culture in this area indicated it had archaeological potential.

A total of eighteen 50 x 50 cm test pits were excavated at Irrpurai, in March and July of 2015 (Fig. 5.30). Units 1, 4, 5, 6, 8, 13, 17, and 18 were located on slightly raised, more vegetated areas. Units 2, 10, 14, and 16 were located on slightly raised bare earth mounds. The remaining test pits were situated on deposits of eroding charcoal (Unit 12), bone (Units 7, 9, 11, and 15) and pottery (Unit 3).

Fig. 5.29 Distribution of surface finds at Irrpurai

Worldview-2 satellite image (acquired February 02 2011)

Fig. 5.30 Aerial view of units excavated at Irrpurai

Aerial photographs acquired in July 2015

The general stratigraphy of the test pits from this site is summarised in Table 5.27, and the stratigraphy of Units 1, 8 and 12 are depicted in Fig. 5.31. During excavations, finds were recovered in Layers A and B, or the first 35 cm DBS (Table 5.28). Layer A consisted of a compact brown silty clay loam extending for a maximum of 20 cm DBS. Layer B was described as a slightly looser dark brown silty clay loam that felt somewhat velvety in texture. Containing decreasing quantities of wood charcoal, pottery, and bone, Layer B reached a depth of 35 cm below the surface of the site. In Layer B of Units 8, 14, 17 and especially in Unit 2, clumps of burnt earth (2-3 cm) were found. Noted agents of bioturbation appearing in Layer B include dung beetles and scorpions. Layer C, devoid of artifacts, was characterised by a less compact brown silty clay loam, with volcanic pebble and gravel inclusions increasing from the 0-5% in previous layers to 5-10%.

Two radiocarbon dates were obtained from deposits at HcJn4. One fragment of wood charcoal found in a concentration in Unit 12 Layer A (3 cm DBS) returned a date of 201 ± 27 BP (1659 CE-present day, 2 sigma). Another fragment of wood charcoal from Unit 8 Layer B (16 cm DBS), directly below the remains of a *Bos* molar, was dated to 237 ± 29 BP (1643-1805 CE, 2 sigma). Considering that no one I spoke with in Amboseli could recall there ever having been a settlement at Irrpurai³⁴, I am inclined to believe that deposits in Layers A and B at this site date to the 19th century at the latest.

³⁴ Participatory mapping exercise with Remando Oloshikoki in Olgulului/Ololarashi G.R., August 25 2015; Discussion with Sinabule and Raphael Musere in Olgulului/Ololarashi G.R., field notes, March 24 2015; Discussion with John Lembakuli and Samuel Ntimama in Olgulului/Ololarashi G.R., field notes, July 19 2015.

Table 5.27 Layer description for Irrpurai units

Layer	Description																
A	Brown compact silty clay loam; variable roots and organic matter containing wood charcoal, pottery, and faunal remains.																
B	Dark brown moderately compact silty clay loam; sediment is finely textured, few roots, tunnelling and some dung beetle brood balls appear, wood charcoal, pottery and faunal remains present, burnt sediment in some units.																
C	Dark brown loose silty clay loam; slight increase in basalt pebble and gravel inclusions, no artifacts.																
Layer	Range of depths below surface (cm) in units																
	1	2	3	4	5	6	7	8	9	11	12	13	14	15	16	17	18
A	0-5	0-5	0-5	0-5	0-5	0-20	0-10	0-15	0-5	0-5	0-5	0-5	0-5	0-5	0-5	0-5	0-5
B	5-20	5-30	5-25	5-25	5-20	2-30	10-30	15-30	5-25	5-30	5-30	5-35	5-15	5-15	5-20	5-15	5-20
C	20-30	30-50	25-30	25-30				30-45	25-35	30-40	30-35	35-45			20-30		

Table 5.28 Finds by layer and unit at Irrpurai

Unit	Layer	Wood charcoal (g)	Pottery	Indeterminate bone fragment		Indeterminate tooth fragment	
				count	weight (g)	count	weight (g)
1	A		5	9	15		
	B		2				
2	A		13				
	B	0.139	28				
3	A		8				
	B			2	0.4		
4	A/B		1	26	28.2		
5	B			1	0.3		
7	A	0.223	1	22	9.5		
	B	0.012					
8	A	0.268		19	10.5	2	2.6
	B	0.169	1	2	2.8		
9	A	0.819		30	5		
	B	.169		2	0.5		
10	Animal burrow 0-25 cm	.001		37	2.1		
11	A/B	0.223		31	9		
12	A	35.2		3	0.6		
	B	1.8	1	1	0.3		
13	A	0.619		5	22.7		
	B	0.739					
14	A	.001					
15	A			19	4.7		
16	A	.003					
	B	.179					
17	A			5	1		
	B	0.034					
18	A			43	34.1		
TOTAL		40.598	60	274.7	124	2	2.6

Fig. 5.31 Irrpurai, Units 1, 8, and 12 stratigraphic profiles

There are a minimum of two vessel types represented in the pottery from excavations at HcJn4. Units 1, 4, and 8 contained nine sherds of a reddish-brown medium thick (averaging 8.5 mm thick) type with well-sorted 5-10% volcanic and quartzite inclusions ranging in size from 0.5-2mm. One rim sherd of this description found in Unit 1 is from a bowl (Fig. 1v, Appendix 2) that has circular punctate decoration just below the lip (Fig. 12iv, Appendix 2). In Units 2, 3, 7, and 12 fifty-two sherds of a brown thick (averaging 15 mm) type were found, including one rim, and a base (Fig. 12.v,viii, Appendix 2). These thick brown sherds had poorly sorted abundant volcanic and quartz inclusions (20%), ranging in size from 0.5-3 mm. Blackening was noted on the exterior of 25% and on the interior of 44% of these thick coarse brown plainware sherds. The coarse brown plainware sherds were also notably friable and easily fragmented during washing. Such grotty thick potsherds with coarse temper would have been used for some kind of heavy duty cooking, or perhaps even salt evaporation (see below).

A minimum of three additional vessel types at site HcJn4 are distinguishable from the surface pottery. Two non-diagnostic sherds found in proximity to Unit 2 are of the coarse brown type. The remaining forty-six sherds are of the reddish-brown medium thick (averaging 9 mm) type with well-sorted 5-10% volcanic and quartzite inclusions, ranging in size from 0.5-2mm. Five reddish-brown rim sherds were collected, three of which have distinct profiles (Fig. 12 ii,iii,vii, Appendix 2). Decorations on these surface sherds include horizontal striations (Fig. 12i, Appendix 2), notching on the lip (Fig. 12iii, Appendix 2), and bands of circular impressions (Fig. 12vi, Appendix 2).

Despite rather extensive test-pitting, no lithics were found in excavated deposits at HcJn4. The lithics on the surface of the site may very well have been redeposited here from elsewhere, after the site was abandoned c.350-200 years ago (Table 5.29). Another possibility is that these lithics may be associated with an older occupation in an area of the site that has yet to be excavated.

Like most other sites excavated in Amboseli the faunal remains were highly friable and fragmented. The only element confidently identified to species was the molar of a *Bos* sp. (M1/M2, tooth ware stage = ½, weight = 22.3 g) found in Layer B of Unit 8. The *Bos* molar was found just below some cranial bone fragments, suggesting we may have encountered the remains of a cattle cranium.

As previously mentioned, two iron projectile points, a glass bead, a smoothed chert pebble, and a grinding-stone fragment were identified on the surface of the site. The glass bead is drawn and turquoise in colour (Fig. 4v, Appendix 3). Beads of this colour and translucency were known to have been manufactured in India and Europe, and if the bead is from India, it probably dates to the 17th century (Marilee Wood, pers. comm. February 2018). Considering

the radiocarbon dates from the site, it is equally possible that the bead originated in either Asia or Europe. During interviews the smoothed chert pebble (Fig. 3ii, Appendix 3) was suggested to be an *olena* pendant worn by children to protect them against the ‘evil eye’ or *erta gonjek*.³⁵ The grinding-stone fragment (Fig. 2ii, Appendix 3) is made of sandstone and was identified by local Maasai whom I interviewed to have possibly been a stone used for sharpening metal implements. Two iron projectile points of different styles were recovered, one being triangular with tangs with the other being leaf-shaped (Fig. 5xii-xiii, Appendix 3). In discussion with local Maasai informants, these were both suggested to have been manufactured by Akamba people, and less commonly, Chagga people, but used widely in the Amboseli area by hunters or by those engaged in violent inter-personal conflict.³⁶

Table 5.29 Lithic artifacts recovered from Irrpurai

Context	Type	Raw material	Comments
surface	curved backed blade	obsidian (opaque)	
surface	scraper	obsidian (grey)	thumbnail scraper
surface	scraper	obsidian (opaque)	disc scraper
surface	core	quartz	multiplatform
surface	flake	obsidian (grey)	
surface	flake	obsidian (green)	
surface	flake	obsidian (indet.)	
surface	flake	obsidian (green)	
surface	flake	obsidian (grey)	
surface	flake	obsidian (opaque)	
surface	flake	obsidian (grey)	

Flotation samples were taken from a number of contexts at the site, totalling 85 litres of sediment (Table 5, Appendix 7). Most samples contained moderate quantities of wood charcoal with the exception of Unit 12 Layer A, which was rich in burnt wood. There were few charred seeds recovered from the flotation samples overall.

However, three grains of finger millet (*Eleusine coracana*) were found in Unit 12 Layer B (Fig. 1, Appendix 7), with an additional possible finger millet grain found in Unit 13 Layer B, though this specimen is too distorted and fragmented to identify with confidence. Finger millet has distinctive sub-globose grains with quasi-angular edges, a short embryo on the dorsal surface, and a pusticulate pericarp surface (Fuller 2003; Hilu and De Wet 1976). The wild progenitor form of finger millet, *E. africana* also occurs within the wider Amboseli area, and thus criteria from Hilu et al. (1979), Hilu and De Wet (1976) Phillips (1972), and Kennedy-O’Byrne (1957), as summarised in Giblin and Fuller (2011), were consulted to ensure the Amboseli samples are indeed *E. coracana*. Overall, *E. africana* is distinguished from *E. coracana* by its more rigid surface pattern and elongated seed form (ibid.). The length and width measurements of the Amboseli samples are well within the range of domesticated finger millet (Fig. 5.32). Based on these morphological attributes, the *Eleusine coracana* grains identified at Irrpurai can be labelled domesticated.

³⁵ E.g. interview with Toret in Olgulului/Ololarashi G.R., September 12 2015; Interview with Ronkoyieni in Olgulului/Ololarashi G.R., September 11 2015.

³⁶ E.g. interview with Nooretet Kapusia in Olgulului/Ololarashi G.R., August 28 2015; Interview with Kaputiti ene Kasaine in Kimana, August 22 2015; Interview with Mboikai Lembakuli in Olgulului/Ololarashi G.R., September 14 2015.

Fig. 5.32 Plot showing length and width measurements from Amboseli *E. coracana* samples

The ranges for modern domesticated finger millet (*E. coracana*) were taken from measurements made by Giblin and Fuller (2011 Fig. 7) and are shown for comparative purposes. The compiled range of reported measurements of *E. africana* (Giblin and Fuller 2011 Fig. 7) is also depicted.

Assuming the absence of grain processing by-products (e.g. straw, glumes, rachis, and ‘weedy seeds’) is unrelated to preservation conditions, it may be the case that sieving and winnowing of this grain was done away from cooking fires, meaning that grain processing by-products were unlikely to be charred, preserved, and recovered in the archaeological record. More likely, this was a crop that was threshed, winnowed, and probably grown elsewhere. The later hypothesis seems more plausible, as due to a lack of water, the site of Irrpurai is unsuited to finger millet cultivation.

An additional unusual discovery at HcJn4 was that a number of the parenchyma and wood charcoal fragments from Unit 2 were impregnated with salt (Fig. 5.33). This phenomenon, known as salt defibration, occurs when wood is exposed to water containing dissolved sodium chloride; as the moisture evaporates from the wood, salt crystals form in the cells. The coarse ceramic sherds (briquetage?) in addition to the salt impregnated charred plant remains and lumps of burnt earth all found in Unit 2 tentatively suggest that small-scale salt production was occurring at this site. Conceivably salt was being obtained by reducing saline water in ceramic evaporating vessels heated over fire. Another possible explanation for this coarse ceramic ware and salt impregnated parenchyma could be that people were cooking food in briny water. The later explanation may indeed be more plausible as there might not have been a need to further refine salt sourced from Amboseli. Salt crystals (*emunyan*) can be easily collected around the central basin of Amboseli especially during the dry season when crusts form on surface deposits due to high evaporation rates. Today the salt deposits around the Amboseli basin are collected and brought to markets on Kilimanjaro. The people I spoke with during interviews did not recall a tradition of salt refining happening in Amboseli; instead, salty sediments are added to boiling water when cooking maize in order to soften the grain, or salt is fed directly to livestock.³⁷

³⁷ E.g. interview with Tatia Ene Lopenyet in Kimana G.R., April 20 2015; Interview with Kalai Mukaie in Olgulului/Ololarashi G.R., August 23 2015.

Fig. 5.33 Salt impregnated parenchyma, Unit 2 Layer B

Radiocarbon dates suggest the site was occupied c.1650-1800 CE. Irrpurai is an exceptional site in Amboseli, distinguished by the sheer quantity and variety of artifacts across its expansive surface. The presence of domesticated cereal and what may be evidence for salt processing/consumption are also both unique aspects of HcJn4. The *Bos* sp. remains may hint at a livestock herding orientation, though the site is currently undergoing deflation and erosion, making it difficult to determine whether or not this was once a pastoral settlement or an altogether different type of activity area.

5.2.9. Empaash (HcJn3)

Empaash is a region adjacent to Amboseli National Park, south of Enkong'u Narok and Longinyie wetlands, where water and pasture are available year round. The proximity of Empaash to the wetlands in the central basin makes it particularly hospitable to pastoralists during the dry season. I first became aware of HcJn3, a site hereafter referred to as Empaash, while surveying, as we collected five pot sherds, a broken cowry shell and a grinding-stone fragment from across its surface (artifact cluster 58). Satellite imagery further revealed a pastoral glade formation here, with pale sediments suggestive of significant dung deposits in a sort of 'Q' shape, extending some 100 m east-west, and 200 m north-south (Fig. 5.34). The scant vegetation cover at the site is dominated by the shrubby fodder species *Sericocomopsis pallida* and *Maerua decumbens* interspersed with *Eragrostis superba*, *E. ciliaris*, *Sporobolus* sp. and *Cynodon* sp. grass (Table 9, Appendix 6).

One of the local research assistants on the survey and excavation team, John Lembakuli, informed me that he suspected this site had been a dry season settlement occupied during colonial times. This was re-iterated during a visit to the site with Kitoie Olemomo who had resided at HcJn3 for a short period when he was a warrior in the 1950s. Olemomo recalled he had lived in an informal camp at Empaash, remaining only for a matter of days before travelling on to Lengasim (north of the National Park). Olemomo explained he was told that the site was established when the Ilterito were first becoming warriors (in the latter half of the 1920s) and that there had been an *enkang* here, inhabited during the dry season.³⁸ The pastoral glade that exists at HcJn3 today may then be thought of as an accumulation of repeat occupation episodes spanning the early 20th century.

³⁸ Participatory mapping exercise with Kitoie Lemomo in Olgulului/Ololarashi G.R., August 26 2015.

Fig. 5.34 Distribution of surface finds at Empaash

Worldview-2 satellite image (acquired February 02 2011)

Fig. 5.35 Aerial view of units excavated at Empaash

Aerial photographs acquired in July 2015

A total of six 50 x 50 cm test pits, and six 1 x 1 m units were excavated at HcJn3, overwhelmingly towards the north-eastern extent of the site (Fig. 5.35). Initial test pits were excavated in May of 2015, and more targeted excavations were done in June of the same year. Two 50 x 50 cm test pits (Units 1 and 3) and six 1 x 1 m units (Units a-f) were concentrated on what is believed to be a refuse disposal area. Unit 5 was set on top of a smaller accumulation of bone fragments lying to the south. Other 50 x 50 cm test pits were dug adjacent to or directly on slightly raised earthen mounds hypothesised to be more resistant to erosion. Table 5.30 summarises the stratigraphy at Empaash, and the profiles of Units a and f are presented in Fig. 5.36. As is shown in Table 5.31, most of the finds were concentrated in the first 10 cm of the excavation units.

Table 5.30 Layer descriptions for Empaash

Layer	Description	Range of depths below surface (cm) in units											
		1	2	3	4	5	6	a	b	c	d	e	f
A	Brown loose silty clay loam topsoil; roots/organic matter, pottery, charcoal, iron present, bone abundant. 15-20% pebble and gravel inclusions.	0-10	0-10	0-5	0-10	0-5	0-5	0-5	0-5	0-5	0-10	0-5	0-5
B	Brown loosely packed silty clay loam; a few roots, sharp decrease in artifact density some tunnelling and dung beetle brood balls present. Pebbles and gravel decrease to 5-10%.	5-30	10-20	5-35	10-20	5-15	5-20	5-20	5-30	5-20	10-25	5-15	5-30
C	Brown moderately packed silty clay loam with calcareous nodules; no artifacts some tunnelling and dung beetle brood balls present. Pebbles and gravel inclusions further decrease to 0-5%.		20-35	35-50	20-30	15-20	20-25	25-30	30-40		25-50	15-25	30-40

Table 5.31 Finds by layer and unit at Empaash

Unit	Layer	Wood charcoal (g)	Pottery	Bead	Iron implement	Indeterminate bone fragment		Indeterminate tooth fragment	
						count	weight (g)	count	weight (g)
1	A	1.793	1			151	129.3	8	5.5
	B	0.023				3	1.5		
2	A	0.304				2	7.1	1	<0.1
	B	0.034				4	1.1		
3	A	1.152	2			139	231.3	10	1.4
	B	0.047				91	11.7		
4	A	0.151	1			11	1.7		
	B	0.043				2	0.3		
5	A					1	<0.1		
	B	0.028							
6	A				1	4	1.1	2	0.3
	B	0.035							
a	A	0.119				183	38.3		
	B	0.164				5	0.6		
b	A	2.427	2			74	36.1		
	B	2.222	2			6	1.2		
c	A	0.567				20	2.8	3	0.5
	B	0.271				7	0.5		
d	A	1.777	2			123	19.1	2	0.9
	B					17	4.1		
e	A	0.887	2			4	0.1		
	B	0.06		1					
f	A	1.256	1			83	54.5		
	B	0.053	1			3	0.2	0.1	1
TOTAL		13.413	14	1	1	933	542.6	26.1	9.65

Fig. 5.36 Empaash, Units f and a stratigraphic profile

Fig. 5.37 Photograph of North section of Unit a, Empaash

scale bar = 50 cm

In general, the surface of the site is a thin layer of topsoil between 0-10 cm DBS with scattered patches of shrubby vegetation in which concentrations of bone, pottery, and charcoal can be observed to be eroding from (Layer A). Layer B extends down another 5-30 cm, and is distinguished by a decrease in rocky inclusions and artifacts. Appearing between 15-35 cm, Layer C is devoid of cultural material, and differentiated from Layer B by the higher degree of sediment compaction and decrease in rocky inclusions. In addition, a few calcareous nodules were recovered from units that extended into Layer C. Dung beetle brood balls and tunneling were observed to varying degrees in all units. Overall, the transitions between layers are quite diffuse, as is noticeable in the North section of Unit a, which is quite typical of the units excavated (Fig. 5.37).

Curious as to whether we might be able to detect a pre-20th century occupation of the site, one fragment of wood charcoal from Unit d Layer A was radiocarbon dated, returning a result of 127 ± 29 BP (1692-1950 CE, 2 sigma). This date neither rules out nor substantiates an earlier occupation of Empaash, but the exceptional preservation of bone at the site in addition to the information relayed to me by Olemomo suggests the deposits we excavated are from the 20th century.

The pottery from excavations appears to be from two vessel types. There is at least one brown medium thick type (thickness averaging 11 mm) having 10% moderately sorted inclusions ranging in size from 0.5-3 mm. This is represented by six sherds with grooved decoration (Fig. 13iii-iv, Appendix 2) and five non-decorated pieces. Three sherds also belong to a thinner (thickness averaging 9 mm) yellowish-red coil-manufactured type with approximately 5% well-sorted inclusions ranging in size from 0.5-2 mm. Of the five sherds found during the survey, two are of the yellowish-red type, including a rim, and two are of the coarser thicker brown type. Finally, a thin (7.5 mm thick) dark reddish-brown sherd with a lug found on the surface represents a third vessel type at the site (Fig. 13i, Appendix 2). The sherd with the lug has well-sorted inclusions of approximately 5%, ranging in size from 0.5-2mm.

Certain contexts in the refuse disposal area at Empaash were sampled for macrobotanical remains. The results are presented in Table 6, Appendix 7. Unlike the other sites excavated in Amboseli, the faunal remains outweighed the floral in the flotation samples at Empaash, which I take as a clear sign that these deposits are comparatively recent. Like most of the other flotation samples analysed from deposits in Amboseli, small grass seeds appear to dominate the identifiable elements of the assemblage. A single wild rice grain found in Unit f Layer A hints at the presence of hydrophilic plants on site. This wild rice was probably once growing in the standing waters or flood prone banks of the wetlands in the National Park. We can consider that some of these small weedy seeds may be the remains of burnt dung, transported to site by animals that were grazing in and around the nearby wetlands.

Faunal remains are comparatively abundant at Empaash, and a number were identifiable to the species level. Taxa represented include ovicaprid, cattle, and warthog. An overview of the faunal components is presented in Tables 5.32 and 5.33. The high level of preservation of faunal remains and the absence of flaked lithic artifacts in excavated or surface deposits at the site signify its age is more recent compared to the sites described above.

Table 5.32 Identifiable faunal remains from Empaash units

Unit	Layer	Taxon	Element	Side	Portion	Other	Weight (g)
1	A	<i>Ovis/Capra</i>	humerus	R	distal end		4.4
	B	<i>Ovis/Capra</i>	tibia	L	distal end		3.1
2	A	Bovid (2)	rib		central		0.8
3		Bovid (2)	innominate	L	acetabulum/ilium		0.8
		Bovid (2)	rib		3 frags 50%		1.7
	A	Bovid (2)	m1/2	L			1.3
a		Bovid (2)	m1/2	R		TWS 5	1
	B	Achatinidae	shell				0.5
b		Rodent	innominate	L			0.1
		Bovid (2)	tibia	L	shaft		10.9
d	A	Bovid (2)	tibia	R	shaft		14.2
		<i>Bos</i>	m1/2		one column		1.9
	B	Achatinidae	shell				0.6
e		Achatinidae	shell				0.4
		<i>Phacochoerus africanus</i>	p1	R			2.9
f	A	<i>Bos</i>	m1/2		one column		4.3
	B	Bovid (4)	tibia		distal end		2.5
TOTAL							51.4

Table 5.33 Identifiable species from Empaash units

Taxonomic group	NISP	MNI
BOVIDAE		
<i>Bos</i>	2	1
<i>Ovis/Capra</i>	2	1
Bovid (2)	7	
Bovid (4)	1	
SUIDAE		
<i>Phacochoerus africanus</i>	1	1
RODENTIA		
indeterminate	1	1
MOLLUSCA		
Achatinidae	3	3
TOTAL	17	7

An iron rod that tapers to a point at both ends was found in Unit 6 (Fig. 5viii, Appendix 3). During interviews with local people it was suggested that this was likely hafted and used either by young boys as a practice arrow, or by women, as an awl.³⁹ A fragmented basalt grinding-stone was also found on the surface of the site (Fig. 2i, Appendix 3). This appears to be a lower immobile grinding-stone, as opposed to a handstone. In conversation with local people this was thought to have been used for a number of grinding and pounding tasks, though most commonly for producing maize flour.⁴⁰ A small bead of a colour and translucency known as ‘oyster white’ was also collected during excavations (Fig. 4vi, Appendix 3). Maasai people that I spoke with felt this was a rather quotidian bead that was worn in the early half of the 1900s, and was likely acquired from a duka (shop) in Loitokitok.⁴¹ Marilee Wood (pers. comm. February 2018) has also confirmed that this type of bead is of European origin, having been popular in East Africa in the 19th and 20th centuries.

While Olemomo was unsure of the layout of the various settlements that were once present at the site of Empaash, I would hazard to guess that our main excavation area (Units 1, 3, and a-d) was placed atop a rubbish disposal zone located towards the exterior of the *enkang*.

5.2.10 CB (HdJn6)

CB is a colonial-era *enkang* settlement site located 150 m away from the Ilmaarba River. The site was identified while surveying as we collected forty-four potsherds and a rusted iron fragment from its surface (artifact cluster 65 and Fig. 5.38). Further details about the use of HdJn6 were revealed during a visit to the site with Kurrambe who lived here as a child. Seven initial 50 x 50 cm test pits were dug at CB in May of 2015, and an additional seven 1 x 1 m excavation units were established in July (Fig. 5.39). Kurrambe recalled that the site was occupied in the 1940s during the wet season ‘*because in those times there were good rains*’, and standing water was available in the adjacent stream bed. Kurrambe was able to recall where the cattle enclosure was positioned, allowing for us to estimate where the centre of the site was situated.⁴²

³⁹ E.g. interview with Ronkoyieni in Olgulului/Ololarashi G.R., September 11 2015; Interview with Kurrambe in Olgulului/Ololarashi G.R., August 25 2015.

⁴⁰ E.g. interview with Remando Oloshikoki in Olgulului/Ololarashi G.R., August 25, 2015; Interview with Ngedo Punuka in Kimana, August 26 2015.

⁴¹ E.g. interview with Mboikai Lembakuli in Olgulului/Ololarashi G.R., September 14 2015; Interview with Seleni Kolay in Kimana, August 5 2016.

⁴² Interview with Kurrambe in Olgulului/Ololarashi G.R., August 25 2015.

Fig. 5.38 Distribution of surface finds at CB

Worldview-2 satellite image (acquired February 02 2011)

Fig. 5.39 Aerial view of units excavated at CB

Aerial photographs acquired in July 2015

Despite the recent age of occupation, looking at available satellite imagery there is no clear indication of anthropogenic soils or glade formation at CB (Fig. 5.38). Vegetation at the site is a rather even mix of trees, shrubby plants and grasses, (Table 10, Appendix 6), though there would appear to be a concentration of *Cenchrus ciliaris* growing atop the central cattle enclosure.

Units 1-3, and 5-7 were located to the south of the cattle enclosure, where we approximated houses once stood. Unit 4 was excavated into the cattle enclosure itself. As Units 5 and 7 had a relative abundance of bone, pottery, and burnt sediment, Units a-f were excavated to determine the extent of these deposits. Tables 5.34 and 5.35 summarise the stratigraphy and finds at CB, and the profiles of the West walls of Units d, f, c, and g are presented in Fig. 5.40. The West section of Unit d is also depicted in Fig. 5.41.

One fragment of wood charcoal from Unit b Layer C was radiocarbon dated to 171 ± 29 BP (1671 CE - present day, 2 sigma). Again, I was interested to know if there may have been an earlier period of occupation at the site that exceeded Kurrambe's memory. Both the radiocarbon date and the well-preserved deposits at the site suggest this is probably not the case.

Table 5.34 Layer descriptions for CB units

Layer	Description	Range of depths below surface (cm) in units													
		1	2	3	4	5	6	7	a	b	c	d	e	f	g
A	Brown silty loam; where surface has no vegetation sediment is compact, but sediment is a loose topsoil where surface has grassy vegetation growing. 10-15% basalt pebble and gravel inclusions. Bone, charcoal and pottery eroding out.	0-5	0-5	0-5	0-5	0-5	0-5	0-5	0-5	0-5	0-5	0-5	0-5	0-5	0-5
B	Brown loose clay loam; 5-10% basalt pebble and gravel inclusions. Some dung beetle brood balls and tunnelling. Bone, pottery, and charcoal continue. Burnt sediment appearing.	5-25	5-20	5-15	5-35	5-15	5-20	5-15	5-10	5-15	5-15	5-10	5-15	5-10	5-10
C	Faintly mottled reddish brown/brown very loose silty loam; 10-15% basalt pebble and gravel inclusions, burnt sediments, charcoal, bone, pottery continue. Some dung beetle brood balls and tunnelling.		20-40	15-45		15-75		15-85	10-70	15-70	15-70	10-65	15-60	10-70	10-70
D	Brown loose silty clay loam; 15-20% basalt pebble and gravel inclusions. Pumice stone present. Traces of burnt sediment in some units.	25-60	40-60	45-75			20-45	85-95	70-80	70-90	70-100	65-80	60-80	70-95	70-85

Table 5.35 Finds by layer and unit at CB

Unit	Layer	Wood charcoal	Pottery	Bead	Grinding-stone	Burnt sediment (g)	Indeterminate bone fragment	
							count	weight (g)
1	A	2.001		1			30	4.1
2	A		1				10	13.2
	B						2	0.5
3	A	0.026	2				20	11.2
	B	0.037					7	1.1
	C	0.125				14.0		
4	B	0.062						
5	A						1	<0.1
	B					1.6	7	6.1
	C	2.194	1			51.0	45	22.5
6	A	0.13					20	6.9
	B	1.716						
7	A					0.4	1	0.2
	B					4.8	1	0.5
	C	0.36	1			467.5	18	7.3
	D					1.9		
a	A					22.0	3	0.9
	B					2.9	24	2.3
	C	0.194	1			36.4	32	12.0
b	A					2.4	2	0.1
	B	0.005	1			1.1	16	7.4
	C	1.422				60.2	10	7.6
	D					1.4		
c	A					2.3		
	B					13.5	20	8.0
	C	0.357	3		1	230.6	66	38.8
d	A	0.089				3.2	2	1.3
	B	1.529	1			6.2	53	12.6
	C	0.484				30.5	14	29.8
e	A						6	0.5
	B					1.3	5	1.1
	C	0.191				4.5	11	3.4
f	A					1.5	1	0.3
	B	0.134				7.0	4	3.1
	C		3			148.1	19	18.1
g	A					1.1		
	B					80.2	12	6.8
	C	1.222	1			496.3	55	56.6
TOTAL		12.278	15	1	1	1693.9	517	284.3

Fig. 5.40 CB, Units d, f, c, and g stratigraphic profile

Fig. 5.41 Photograph of the West section of Unit d

scale = 50 cm

Fig. 5.42 Burnt sediment encountered in CB

Burnt sediment collected in Unit g Layer B

Vitrified dung in a former settlement
that ignited in Olgulului/Ololarashi G.R.

Layer A extended between 0-5 cm DBS, consisting of brown silty loam, loose in areas where vegetation was growing and compact on eroded surfaces. Layer B, between 5-35 cm DBS was a brown loose silty loam with fewer pebble and gravel inclusions than Layer A. Pottery, charcoal and bone fragments continue in Layer B and clumps of burnt sediment appear. In Layer C, between 15-85 cm DBS the soil is loosely compacted and takes on a faintly mottled reddish-brown/brown colour, with a slight increase in pebble and gravel inclusions. Pottery, charcoal, and bone fragments continued to be recovered in Layer C, and concentrations of burnt sediment are highest here. Layer D is a slightly more compact brown silty clay loam with increased basalt pebble and gravel inclusions. Traces of burnt sediment were found in Layer D in Unit 7 and Unit b, but otherwise Layer D is devoid of archaeological finds. The burnt sediment found in these units had a laminar quality and strongly resembled what is seen at pastoral settlements in Amboseli after they have been razed by fire (Fig. 5.42). The abundance of finds, and the density of burnt sediment in particular recovered from Units 5-7 and a-g, suggest these deposits are unique from other units. This area may be the remains of a house or livestock enclosure that was burnt upon abandonment.

The pottery sherds collected during excavations and while surveying at CB are judged to be representative of a minimum of three vessels. The fifteen sherds found in the excavation units were all of a relatively thin (average thickness is 9.5 mm) coil-manufactured yellowish-red type with 10% well-sorted inclusions ranging in size between 0.5-2 mm. A globular jar with circular punctate decoration on the neck was reconstructed from sherds of this general type found in Unit 5 Layer C (Fig. 14iv, Appendix 2). Refits were also possible with sherds from Unit d Layer B and Unit c layer C, suggesting that Layers B and C were deposited in quick succession, or that there has been large-scale post-depositional mixing of artifacts here. An additional forty-four potsherds were found on the surface of CB. Four of the sherds recovered in the survey are similar to the yellowish-red type encountered during excavations, and had an average thickness of 8 mm. Of these was one yellowish-red type rim which would appear to be from a bowl (Fig. 1i, Appendix 2, and Fig. 14ii, Appendix 2). The remaining forty sherds were of a brown thicker (average thickness being 12 mm) plainware, with 10-15% moderately well-sorted volcanic inclusions ranging in size between 0.5-2mm, featuring one rim (Fig. 14iii, Appendix 2). During interviews I was told that pots (*olmoti*) resembling the one recovered from Unit 5 Layer C have a great many uses. They are valued for making soups and rendering fat from meat, and for cooking bananas, maize, beans, and potatoes. Ceramic pots of a larger size are also important for brewing alcohol. Broken pot sherds can even be used for grinding tobacco leaves.⁴³

The only flaked lithic artifact encountered at HdJn6 was a single green obsidian flake fragment found on the surface. This flake may very well have been re-deposited here from elsewhere, though Maasai people in Amboseli do occasionally collect obsidian and chert (both referred to as *olena*). These stones are wrapped in a piece of goat skin and kept with children as amulets or charms, used to protect them from the 'evil eye' or *erta gonjek*.⁴⁴ It is not possible to know if this particular flake fragment was used as an *olena* though.

Some of the comparatively abundant faunal remains were identified to the species level, and both wild and domesticated animals are present at CB. The taxa represented include sheep/goat, cow, hare, zebra, and a species of gazelle, tentatively identified as *Eudorcas thomsoni* (Thompson's gazelle). An overview of the faunal components is presented in Tables 5.36 and 5.37. A number of bone fragments were found to have been burnt.

⁴³ E.g. interview with Peneti in Olgulului/Ololarashi G.R., September 14 2015. Interview with Eunice Shoke in Kimana, August 6 2015; Interview with Tatia Ene Lopenyet in Kimana, April 20 2015.

⁴⁴ E.g. interview with Kitoe Lemomo in Olgulului/Ololarashi G.R., August 26 2015; Interview with Kalai Mukaie in Olgulului/Ololarashi G.R., August 23 2015.

Table 5.36 Identifiable faunal remains from CB

Unit	Layer	Taxon	Element	Side	Portion	Other	Weight (g)
3	B	<i>Bos</i>	axis				14.4
5	C	<i>Bos</i>	humerus		proximal end		21.1
5	C	Bovid (2)	ph1/2			unfused	1.7
5	C	Bovid (2)	humerus		distal end. half of epiphysis	fused	3.1
5	C	Achatinidae	shell				0.7
6	A	Bovid (2)	tooth			5 fragments	3.8
7	C	<i>Bos</i>	ulna	L			8
7	C	Achatinidae	shell				0.3
7	C	Achatinidae	shell				0.8
b	B	<i>Lepus microtis</i>	tibia	L	mesial end		0.4
b	C	Bovid (2)	rib		central section		0.6
b	C	Bovid (2)	rib		central section		0.6
c	C	Bovid (2)	humerus	L	distal shaft	unfused	4.7
c	C	Bovid (2)	ph1/2		proximal epiphysis	unfused	0.8
c	C	Bovid (2)	vertebra		central column		2.4
c	C	Bovid (2)	tibia	L	shaft		17.1
c	C	Bovid (2)	LV				12.1
c	C	Bovid (2)	TV				1.9
c	C	<i>Lepus microtis</i>	humerus	R	shaft		2.3
c	C	rodent	mandible	R			0.3
c	C	Achatinidae	shell				1.0
d	A	rodent	femur	L			0.3
d	B	<i>Equus quagga</i>	tooth				3.6
d	C	Bovid (4)			metapodial	4 fragments	28.2
d	C	<i>Equus quagga</i>	tooth		part of upper molar		3.6
d	C	<i>Equus quagga</i>	tooth				3.8
d	C	<i>Bos</i>	metapodial				93.3
d	C	<i>Ovis/Capra</i>	humerus	R	epiphysis		6.1
d	C	rodent	humerus	R			0.3
d	C	<i>Ovis/Capra</i>	ph1				0.6
d	C	rodent	mandible				0.18
d	C	rodent	innominate	L			0.1
d	C	rodent	TV				0.1
d	C	rodent	tibia	R			0.2
f	A	Bovid (4)	long bone				6.1
f	A	<i>Bos</i>	femur	R	distal shaft		35.3
f	C	Bovid (2)	TV		partial		2.9
g	A	Bovid (2)	long bone				4.7
g	B	<i>Ovis/Capra</i>	scapula	R			5.6
g	C	<i>Eudorcas</i> sp.	humerus		distal epiphysis	fused	3.1
g	C	Bovid (2)	humerus	R	distal shaft		3.3
g	C	Bovid (2)	metapodial		single distal epiphysis		1.8
TOTAL							298.48

Table 5.37 Identifiable species from CB

Taxonomic group	NISP	MNI
BOVIDAE		
<i>Bos</i>	5	1
<i>Ovis/Capra</i>	3	1
<i>Eudorcas</i> sp.	1	1
Bovid (2)	15	
Bovid (4)	2	
EQUIDAE		
<i>Equus quagga</i>	3	1
LEPORIDAE		
<i>Lepus microtis</i>	2	1
RODENTIA		
indeterminate	7	2
MOLLUSCA		
Achatinidae	4	4
TOTAL	42	11

Other finds from CB include an iron bead, found in Unit 1 Layer A (Fig. 5iii, Appendix 3). In conversation with local Maasai, this bead was identified to have been worn during circumcision ceremonies (in which case it would be referred to as *olmoru*), or worn around the ankle of a child (and then referred to as *orgusoi*).⁴⁵ In addition, a flat iron fragment, suggested to have once possibly been a blade, was found on the surface of the site (Fig. 5v, Appendix 3).⁴⁶ A basalt grinding-stone was also found in Unit c, clearly featuring ochre staining across all of its surfaces (Fig. 2viii, Appendix 3). Ochre is used as a pigment to anoint Maasai bodies and objects (e.g. shields), and can be acquired through trade or collected from sources on Kilimanjaro as close by as Loitokitok, or as far away as Monduli in Tanzania.⁴⁷

Deposits at the CB site were rather extensively sampled for macrobotanical remains, with a total of 193 liters of sediment floated (Table 7, Appendix 7). The preservation of floral remains, or perhaps the conditions under which they were carbonised, has resulted in the vast majority of seeds being highly fragmented and distorted, rendering them unidentifiable. There are large quantities of parenchyma in these deposits, and it seems likely that some of these fragments are what remains of the seeds at this site.

Although Kurrambe was unaware of whether or not the site of CB was burnt upon abandonment, the abundance of burnt sediment (probably vitrified animal dung), and the state of the floral remains suggest to me this may have very well been the case.

5.3. Summarising site chronology

Radiocarbon dating was the primary means by which archaeological sites were dated, in addition to consulting local landscape histories. All radiocarbon samples were submitted to

⁴⁵ E.g. interview with Kurrambe in Olgulului/Ololarashi G.R., August 25 2015; Interview with Nooretet Kapusia in Olgulului/Ololarashi G.R., August 28 2015; Interview with Leah in Olgulului/Ololarashi G.R., August 27 2015.

⁴⁶ Interview with Kuyiatio in Kimana, August 22 2015; Interview with Kinene in Olgulului/Ololarashi G.R., September 12 2015.

⁴⁷ Interview with Nooretet Kapusia in Olgulului/Ololarashi G.R., August 28 2015; Interview with Olokida Makau in Endonet, September 13 2015.

Ångström Laboratory, at Uppsala University, and resulting dates were calibrated using OxCal v4.3.2 (Bronk Ramsey 2017) and SHCal13 atmospheric curve (Hogg et al. 2013). It is acknowledged that a dependency on individual radiocarbon dates from many of the sites excavated is not wholly reliable. Additionally, not all dates are associated with hearths or burnt structures, with some being derived from isolated charred plant material remains, increasing the potential for factors such as bioturbation to complicate interpretations of site stratigraphy and age. While recognising a need for caution, radiocarbon dates from these sites, with the exception of RB, do largely confirm a relative sequence already established from the material culture and local oral histories.

Fig. 5.43 Radiocarbon dates from Amboseli sites

Table 5.38 Radiocarbon dates from Amboseli sites

Lab number	Site	Context	Material dated	$\delta^{13}\text{C}\%$ V-PDB	^{14}C age BP	Calibrated date
Ua-56618	Kirinkai (HdJn7)	Unit 3 Layer B	Wood charcoal	-24.7	822 $\pm$ 27	1216-1282 CE
Ua-57237	Iinyangusi Manyatta (HcJn1)	Unit 4 Layer B	Wood charcoal	-23.6	1145 $\pm$ 30	887-1031 CE
Ua-56623	Iinyangusi Manyatta (HcJn1)	Unit 6 Layer B	Ostrich eggshell	-5.0	697 $\pm$ 58	1266-1411 CE
Ua-54545	Lemomo Hill (HdJn4)	Unit d Layer D	Wood charcoal	-25	620 $\pm$ 28	1314-1420 CE
Ua-56622	Lemomo Hill (HdJn4)	Unit 4 Layer B	Ostrich eggshell	-6.1	526 $\pm$ 58	1318-1615 CE
Ua-57341	Ilmaarba (HdJn1)	Unit 4 Layer A	Wood charcoal	-24.9	556 $\pm$ 31	1395-1448 CE
Ua-56619	Olopoli (HdJn5)	Unit 4 Layer A	Wood charcoal	-24.3	476 $\pm$ 27	1422-1496 CE
Ua-54546	Olopoli (HdJn5)	Unit 3 Layer B	Wood charcoal	-24.6	373 $\pm$ 29	1464-1634 CE
Ua-54548	RB (HdJn3)	Unit 4 Layer C	Wood charcoal	-24.2	7010 $\pm$ 37	5978-5742 BCE
Ua-57156	RB (HdJn3)	Unit 6 Layer A	Charred fruit/nut fragment	-25.9	127 $\pm$ 29	1692-1950 CE
Ua-54547	Irrpurai (HcJn4)	Unit 8 Layer B	Wood charcoal	-26.3	237 $\pm$ 29	1643-1805 CE
Ua-56621	Irrpurai (HcJn4)	Unit 12 Layer A	Wood charcoal	-24.1	201 $\pm$ 27	1659 CE-present
Ua-57153	Empaash (HcJn3)	Unit d Layer A	Wood charcoal	-27.8	127 $\pm$ 29	1692-1950 CE
Ua-57155	CB (HdJn6)	Unit b Layer C	Wood charcoal	-25	171 $\pm$ 29	1671 CE-present

Broadly speaking, all of the sites excavated appear to have occupation horizons that date to the last millennium (Fig. 5.43 and Table 5.38). The Ilnyangusi Manyatta site may be the oldest, with an occupation spanning into the Middle Iron Age, but the two dates from the site offer ambiguous support for this hypothesis. Kirinkai and the Ilnyangusi Manyatta site may thus be roughly contemporaneous, or Kirinkai, with its 13th century date, may be older. The Ilnyangusi Manyatta also has a known occupation horizon dating to the 1940s. Radiocarbon dates from Lemomo Hill, Ilmaarba and Ololopoli all overlap to some extent in the early second millennium, though Lemomo Hill was also occupied in the 19th and 20th centuries. Age determinations for RB and Osoit, the two stone circle sites, are vexing. The material culture encountered at RB and Osoit is not wholly contemporary. Unfortunately, remains from Osoit could not be radiocarbon dated. The dates from RB are equally ambiguous, indicating an occupation anytime during the last 7000 years. Irrpurai appears to have been occupied between the 17th and 18th centuries. Empaash and CB both date to the early 20th century.

5.4. Conclusions

The results of these excavations are in many ways preliminary, and there is much scope to dig deeper. The archaeological record in Amboseli is of course compromised by issues of preservation. There are, for example, a number of taphonomic processes resulting in the destruction of bones in Amboseli, including mineralogical and chemical alternations, as well as physical weathering (Behrensmeyer 1993; Trueman et al. 2004). It is an inescapable fact that there is a limit to the type and quantity of data that could be recovered and interpreted given the resources and time available, and the very nature of the archaeological deposits. Described above are more deeply stratified multi-occupation sites and shallower, more ephemeral sites, and both entailed certain challenges. Multi-occupation sites had deposits that were mixed, confusing the strata and associated data. More ephemeral sites were subject to the redistribution and loss of deposits by taphonomic factors rendering it difficult to conduct spatio-temporal investigations. Finally, only a small number of sondages could be dug at all of these sites, in particular limiting the opportunity for horizontal spatial analysis.

One of the most significant challenges faced in interpreting the sites described above is determining whether or not they were indeed occupied by pastoral people, and when. Satellite imagery suggests Ilmaarba and Ololopoli are situated in clearings that resemble pastoral glades, and are thus more convincingly labelled pastoral settlements. There is tentative support for an anthropogenic glade formation at the site of Kirinkai, and the remains of cattle further suggest a pastoral orientation. Both the Ilnyangusi Manyatta site and Lemomo Hill have ovicaprid and cattle sized faunal remains, and sediments characteristic of pastoral glades, but these sites were also known to have been occupied in the 20th century, and due to the level of bioturbation, it is challenging to determine the antiquity of pastoral settlement. Osoit and RB, situated in lava rock fields that were cleared to create circular enclosures, are more easily identifiable as pastoral sites, though there are uncertainties with regards to their age. Irrpurai has no clear enclosure sediment deposits, though cattle remains were recovered here, indicating a livestock herding orientation. The occupation histories of Empaash and CB were informed by local people, and thus there is a greater level of confidence associated with their identification as pastoral sites.

Vegetation surveys were also undertaken to aid in detecting patterns in the appearance of certain species that typically thrive in pastoral enclosure sediments. During our 2017 survey, a great deal of intra-regional variability was found to exist across the species growing at the

sites excavated, which is unsurprising as all of the sites are situated in unique environmental contexts and have different occupation histories. Overall, the most ubiquitous species encountered at the sites were *Acacia tortilis*, *Balanites glabra*, *Solanum campylacanthum*, *Lycium europaeum*, and *Sericocomopsis hildebrandtii*. The grasses present at the Amboseli sites were far more variable, but the most ubiquitous Poaceae species would appear to be *Cenchrus ciliaris*, followed by *Cynodon dactylon*, *Dactyloctenium aegyptium* and *Eragrostis ciliaris*. Due to lack of rain while undertaking these vegetation surveys, I believe our results underrepresent the diversity of grasses at the Amboseli sites, and overrepresented drought resistant species. Plants previously observed to colonise pastoral glades occupied in the 20th century in Amboseli include *Cynodon plectostachyus* (manyatta grass), *Acacia tortilis*, *A. mellifera*, *Amaranthus graecizans*, *Tribulus terrestris*, *Pavonia patens*, and *Commelina pedunculosa* (Muchiru et al. 2009), so there is certainly some overlap with what was recorded at the archaeological sites excavated for this research. It is further interesting to note that *Cenchrus ciliaris*, a common grass at the Amboseli sites, has been labelled an ‘ecological indicator’ of Iron Age middens in eastern Botswana (Denbow 1979). It would prove valuable to repeat these surveys in the future under more ameliorate growing conditions.

I do not anticipate that we will ever be able to find a single ‘glade species’, anthropogenic soil formation pattern, or material marker unequivocally associated with all pastoral archaeological sites in Amboseli however. For one, herders inhabit a range of environmental zones with their own soils, vegetation, fauna, microclimates, among other variables, and enclosure sediments respond differently to the passage of time in accordance with these factors. While conducting geochemical analysis of numerous 20th century pastoral settlements in Amboseli, Shahack-Gross et al. (2003) found that no one technique is sufficient in itself to detect enclosure sediments, and that signatures present at some sites are not present at others. This is partly because the site types occupied by pastoral people are quite diverse, and the imprints they leave behind are equally varied. Even with the suite of analytical techniques employed during excavations and in later laboratory based analyses, it was not always possible to definitively state that the people who inhabited the sites excavated, during all of their occupation periods, were in fact pastoralists. Moreover, the complex and fluid dynamics of pastoral identities means there will always be uncertainties regarding whether or not people who lived at the archaeological sites that we encounter today even considered themselves – or were labelled by their contemporaries – pastoralists.

It is critical to not discount the possibility that the people who occupied some of the sites described above (Kirinkai, Ilnyangusi Manyatta, Lemomo Hill, Ilmaarba) pursued hunting and gathering livelihoods. Evidence for the consumption of domesticated cereal grain and livestock at the site of Irrpurai indicates that diets and modes of production were mixed in this landscape at least from around the 17th/18th centuries. Granted, with the exception of a few grains of finger millet, the remains of domesticated cereals, pulses, or fruits are not featured in the samples floated from the other Amboseli sites. There are some sites (CB and Empaash) where residents were known to have been consuming domesticated cereals (maize), and it would thus appear that in some cases crop remains have yet to be recovered from the Amboseli samples because these foods were prepared, consumed and disposed of in a manner that limits their ability to preserve in the archaeological record (see also Young 1999; Young and Thompson 1999). Conversely, people occupying some of the sites excavated in Amboseli may have chosen to not, or perhaps to only minimally incorporate cultivated cereals and legumes into their culinary traditions. Far larger sediment samples are likely required to begin to build an understanding of the importance of cultivated plant foods to pastoral people in Amboseli. Alternative approaches must also be embraced, for example, phytolith and starch

grain analysis, since these are the only means by which we can directly trace the role of important species such as bananas in early East African economies.

As these excavations were so exploratory in nature, they have in many ways raised more questions than they have answered. The sites described above were however the sites identified as being the most promising while surveying, capable of yielding stratified archaeological deposits from as wide a range of time periods possible. I argue that this excavation strategy, of dividing time and resources over a large number of sites rather than focusing exclusively on one or two areas, was justifiable as the goal was to identify and explore a diversity of site types of varying ages. Additionally, while excavating sites that have deposits of less than stellar preservation and artifact density is generally eschewed by archaeologists, there is something to be said for embracing the more ephemeral traces and in acknowledging that the challenges they present make any insights gleaned all the more important, as these are the site types that are so typically overlooked, but also so typical of Iron Age pastoral archaeological remains in eastern Africa. In exclusively focusing on large deeply stratified archaeological deposits that are easily identifiable as pastoral settlements, we actually run the risk of limiting our understandings of pastoral land use and activity in the past.

6 The emergence of pastoralism in Amboseli

In this chapter I review the available evidence for life in Amboseli at the inception of herding, and during the Pastoral Neolithic when specialised pastoralism first emerged. Owing to the paucity of relevant archaeological material from the study area, the trajectory of pastoralism as disclosed here draws more heavily on regional archaeological occurrences (see Fig. 6.1) rather than evidence found within Amboseli itself. As such, the story that unfolds is by necessity sweeping, and can for the most part only speculate as to how early herders in Amboseli may have been unique or similar to those living elsewhere in East Africa. Throughout this chapter, as in the entirety of this thesis, it is critical to acknowledge both the strengths and limitations of the archaeological record in reconstructing such a history.

Further complicating attempts to fit an extrapolated region-wide history of pastoralism into Amboseli is that as a livelihood, livestock herding has emerged, declined, reproduced and transformed in numerous and dynamic ways across a myriad of landscapes during the span of millennia. That being said, the vast majority of pastoralists in eastern Africa appear to have been engaging very early on in relations of trade and exchange with other herding and hunter-gatherer groups and over the course of time, as pastoralism became an increasingly entrenched livelihood these exchange relationships became more expansive. Archaeologists have been able to trace these networks by sourcing stone tools made of obsidian, finding that this high-quality lithic material was being moved from the Central Rift Valley to some of East Africa's furthest rangeland environments, very probably including Amboseli. It seems highly likely that the protracted emergence of specialised pastoralism in East Africa even at times hinged on the ability of herders to either diversify their livelihoods, or to seek support and refuge among other pastoral and hunter-gatherer-fisher people. Due to the excellent preservation of stone tools, archaeologists can more easily hypothesise that the exchange of obsidian facilitated the growth and maintenance of alliances among pastoralists and others during the Pastoral Neolithic that would have made this sort of livelihood diversification and transformation feasible. Toward the end of this chapter, however, I discuss how evidence for plant management and cultivation during the Pastoral Neolithic has been under-examined. The possibility that cultivated or intensely managed plant products were exchanged during the Pastoral Neolithic, and that such activity could have at times featured significantly in the emergence of specialised pastoralism cannot be entirely dismissed.

6.1. Pastoral origins

The origins of African pastoralism lie far to the north of Amboseli. As such, I will begin at the close of the dry Terminal Pleistocene when the African Humid Period commenced with a northward shift of the Inter-Tropical Convergence Zone (ITCZ), bringing a period of increased moisture to what is now the Sahara desert. Humid conditions during this time led to an expansion of lakes, riverine networks, and well-watered savannas across previously arid land (Drake et al. 2011; Kuper and Kröpelin 2006; Leblanc et al 2006). For the next three thousand years the Sahara experienced climatic variability, oscillating between arid and wetter conditions, though consistently becoming drier until finally around 5500 years ago, when much of northern Africa entered a period of extreme aridity as the ITCZ established its

modern range (Gifford-Gonzalez 2017a: 397). It was during the early Holocene that African pastoralism emerged, with herding spreading into East Africa at the start of the mid-Holocene.

6.1. From whence they came

The earliest uncontested evidence for morphologically domesticated bovid remains in western Egyptian and eastern Saharan sites dates to the mid-eighth millennium BP (Chenal-Vélardé 1998; Linseele 2004; MacDonald and Macdonald 2000). There is ongoing debate as to whether African cattle derive from an independent domestication event on the continent (Bradley 2003; Edwards et al. 2004; Gautier 2001; Grigson 1991; Wendorf and Schild 1984), or if African cattle lineages can be traced to gene flow between Eurasian and African wild/domesticated cattle (Linseele 2013; Pérez-Pardal et al. 2010; Stock and Gifford-Gonzalez 2013). Early experimentation with penning wild goats (*Ammotragus lervia*) was already underway by the ninth millennium BP in Libya, though these animals were not morphologically domesticated (di Lernia 2001). *Bos* remains at the site of Bir Kiseiba in the eastern Sahara, along with what may have been a well, tentatively suggest intensive cattle management commencing at 10,000 BP (Close 1990; Wendorf et al. 1987). Despite these indications that people in Africa were engaging in animal husbandry before domesticated cattle appear in the archaeological record, current evidence is leaning towards a south-west Asian origin for African cattle. Either way, African pastoralist lifeways are undeniably of distinct independent invention (Linseele 2010).

Africa's first livestock keepers were diversified, engaging in hunting and fishing, and consuming wild grains and shellfish (Gautier 1987; Gifford-Gonzalez 2005). While evidence for domesticated livestock predates that for morphologically domesticated cereals, there are clear indications that people were systematically gathering, processing, and storing wild cereals in the early Holocene (e.g. di Lernia 2001; Haaland 1995; Kuper and Riemer 2013; Wasylikowa and Dahlberg 1999; Wasylikowa et al. 1995; Wendorf and Schild 2001) suggesting cultivation without domestication may have been quite widespread (Mercuri et al. 2018). These first cattle keepers existed contemporaneously with hunter-gatherers (McDonald 2008), and north-eastern Africa at this time is characterised as a heterogeneous and dynamic mosaic of livelihood practices (Marshall and Weissbrod 2011). Within this mosaic cattle based dairy pastoralism originated very shortly after the arrival of domesticated cattle. Numerous rock art sites in south-western Libya attest to the significance of among early pastoralists, though these sites are notoriously difficult to date (Le Quellec 2011). Spectrographic analysis of lipid residues from ceramics in Takarkori rock shelter (south-west Libya) has managed to indicate milking taking place between 5800-7200 BP (Dunne et al. 2012), with selection for lactase persistence soon thereafter (Dunne et al. 2012; Tishkoff et al. 2007). Another major change occurring after cattle arrived was the absorption of sheep and goats (both domesticated in the Near East) into African herds (Hassan 2000; Linseele and Van Neer 2008).

Mobility would have been extremely important to early pastoralists where pasture quantity and quality varied temporally and spatially, and we can imagine this was very much the situation during the mid-Holocene when grasslands became more arid and precipitation became increasingly unpredictable. As the African Humid Period came to a close and parts of the eastern and central Sahara experienced desertification, people in the mid-Holocene appear to have become increasingly mobile (Barich 2002; Hassan 2000; di Lernia 2002). There may be a link between heightened mobility in the mid-Holocene and domestication of the donkey in the sixth millennium BP (Rossel et al. 2008), as donkeys are important animals for transportation among some contemporary pastoral groups (Marshall and Weissbrod 2011). Pastoral people were certainly moving south into areas beyond the natural distribution of wild

cattle during the mid-Holocene. At this time, East Africa was emerging from the early Holocene warm and humid optimum, and was thus experiencing a period of increased aridity. As lake levels fell and rainfall decreased c. 5000 BP, open grassy savannas were expanding and equatorial forests were retreating to riparian margins (Marchant and Hooghiemstra 2004; Thompson et al. 2002; Vincens et al. 1999). Whereas during the warm and wetter early Holocene the southward movement of people and livestock may have been inhibited by forests harbouring cattle diseases such as trypanosomiasis (Gifford-Gonzalez 1998, 2000, 2017b), now, climate and vegetation changes were resulting in the opening up of grasslands and pasture further south.

6.1.1. East Africa's first stock keepers

The trajectory of early pastoralists from the Sahara into East Africa is not well understood due to limited archaeological data from areas such as Sudan, northern Uganda, and Chad. Currently, ceremonial pillar and domestic sites in the Turkana Basin of north-western Kenya dating to around 5000-4500 BP contain the earliest evidence for pastoralism in eastern Africa (Barthelme 1985; Hildebrand et al. 2011; Hildebrand and Grillo 2012; Marshall et al. 1984, 2011; Nelson 1995). The first appearance of livestock is characterised as a low-density, low-scale occupation, East Africa's 'Northern Exploratory Phase' of pastoralism (Marshall et al. 2011). Linguistic, genetic, and archaeological evidence all suggest that a physical movement of human populations explains the southward expansion of cattle, sheep, goats, and donkeys into sub-Saharan Africa, though other trajectories of herder expansion such as livestock and knowledge exchange with hunter-gatherer groups cannot be entirely dismissed (Lane 2013). In fact, recent comparative analysis of dental metric and non-metric traits from Late Stone Age (LSA) hunter-gatherer, Turkana pillar, and Pastoral Neolithic sites in eastern Africa suggest that the arrival of livestock did not entail a population replacement, but was more likely a case of small-scale population movements with gene flow occurring between incoming groups and those they encountered (Sawchuk 2017). aDNA studies promise to further refine our understandings of human migrations across the region through time, but considering the remarkable genetic diversity of contemporary East African populations, such endeavors will be far from straightforward (Campbell and Tishkoff 2008). For now, it is clear that transitions to pastoralism in East Africa were neither immediate, nor comprehensive, and may be best characterised by shifting frontiers of social interaction and exchange between stock keepers, foragers, and later cultivators.

The earliest herders around Lake Turkana had a mixed economy of mobile pastoralism, hunting and fishing (Lane 2013; Marshall et al. 1984, 2011; Stewart 1989), although some reliance on plant foods cannot be ruled out. These early pastoralists were the first to engage in a system of obsidian exchange comparable to later Pastoral Neolithic networks (Ndiema et al. 2010). Prior to the arrival of livestock, the lithic assemblages of pre-pastoral hunter-gatherers overwhelmingly contain evidence for utilisation of local raw materials, and minimal involvement in long distance networks of exchange (Frahm et al. 2017). Moreover, the monumental pillar sites created by early herders indicate unprecedented forms of social interaction incorporating repeated visits to ceremonial places (Hildebrand et al. 2011) and cattle iconography (Grillo and Hildebrand 2013; Nelson 1995). Long distance obsidian exchange networks and monumental mortuary sites were restricted to Turkana until the later Pastoral Neolithic. However, early herders in Turkana also appear to have created a new ceramic style known as Nderit ware, and the use of this ceramic type soon spread south (Grillo and Hildebrand 2013). Another pottery type that seems to emerge from the Lake Turkana area during the mid-Holocene Dry Phase is Ileret ware (Nelson 1995), a tradition that

may be derivative or coeval with Nderit (Grillo and Hildebrand 2013), and also appears outside of northern Kenya.

Beyond Lake Turkana, Nderit and Ileret pottery is found in south-central Kenya and northern Tanzania by the early fourth millennium BP in association with wild fauna and after 4000 BP, a few rare caprines, indicating nominal domesticate use among hunter-gatherer groups (Gifford-Gonzales 2000; Marean 1992). Cattle seem to move south at an even later date, though admittedly, their regional origins are less clear (Gifford-Gonzalez 1998, 2005; Marshall 2000). Traces of Nderit ceramics begin to appear at sites in the Central Rift such as Enkapune ya Muto (5270-5370 cal. BP) (Ambrose 1998) marking the incursion of early pastoral influences. Other possible early dates for Nderit pottery are found on the Serengeti Plains (Bower and Gogan-Porter 1981), Tsavo (Wright 2007; Wright et al. 2007), and the Tanzanian coast (Chami and Kwekason 2003). Marginal quantities of sheep and goat are also identified in the Lake Victoria Basin at Usenge 3, Gogo Falls, and Wadh Lang'o dating to c. 3500 BP, (Karega-Munene 2002; Lane et al. 2007; Prendergast 2008) though Nderit/Ileret ware is absent.

One piece of herringbone decorated pottery collected from Amboseli while surveying was deposited by Foley at the National Museums of Kenya. This sherd bears a resemblance to Ileret ware (Fig. 3i, Appendix 2). Ceramics identified as 'Ileret-like' were similarly recovered in Northern Tanzania at the sites of Mumba (4890±70-1780±80 uncal. BP), Nasera (4720±105-5400±150 uncal. BP), and Jangwani 1 (not dated) by Mehlman (1989). The 'Ileret' sherd from Amboseli very tentatively suggests Amboseli was within the sphere of interaction of fourth millennium BP stock keepers. However, both Ileret and Nderit wares persist into the later Pastoral Neolithic, albeit more commonly in the Lake Turkana area (Robertshaw and Collett 1983; Wandibba 1980). Furthermore, the presence of this ceramic type is equivocal evidence for the existence of livestock in Amboseli.

Still, it is conceivable that early stock keepers were drawn to the wetlands of Amboseli during the mid-Holocene Arid phase. Analysis of pollen cores suggests that while the local ecosystem was drier than today, the permanent water availability of the wetlands served to attract herbivores in relatively dense concentrations (Githumbi et al. 2018a). Conversely, during the mid-Holocene Dry Phase, foragers dabbling in stock keeping in Amboseli may have preferentially occupied higher elevation zones, such as on nearby Mt. Kilimanjaro, a strategy suggested to have been favoured in the Central Rift (Ambrose and Sikes 1991). Faunal assemblages from hunter-gatherer sites in the Central Rift show people were hunting forest/savanna game, though honey was also likely an important food (Ambrose 1984; Kusimba 2013: 465; Marean 1992). On the shores of Lake Turkana and Lake Victoria however, early stock keeping people incorporated both wild terrestrial mammals in their diets and exploited lacustrine resources, including fish and shellfish (Dale and Ashley 2010; Lane et al. 2006, 2007; Prendergast and Lane 2010; Prendergast and Beyin 2017). Essentially if Northern Exploratory Phase stock keepers were present in Amboseli, it is possible that hunting and scavenging of terrestrial fauna, fishing, gathering and perhaps 'low-level' cultivation (*sensu* Smith 2001) all contributed to their livelihoods. More intensive surveys and excavations focused on elucidating the history of mid-Holocene hunter-gatherers/stock keepers are required to clarify these issues, as currently there are no known archaeological sites dating to this period in Amboseli.

6.1.2. Life at the 'moving frontier'

Despite the paucity of data in Amboseli, we can surmise that early stock keepers expanding along what Lane (2004) has called the 'moving frontier' of food production in East Africa

were faced with challenges that later more established herding populations were not. This may explain why the emergence of specialised pastoralism seems to have occurred more than a thousand years after livestock first appear in the archaeological record. For one, disease barriers had to be negotiated. Pastoralists encountering other population groups and environments for the first time may have been exposed to new pathogens, though episodes of disease transmission among humans in East Africa prior to the 19th century have been almost entirely unstudied. Livestock too encountered several novel vectors such as trypanosomiasis and wildebeest-derived malignant catarrhal fever (Gifford-Gonzalez 2017b). Cattle would have been among the most susceptible to these epizootic obstacles, which may explain why evidence for ovicaprines occurs in the archaeological record before that for larger stock. The selective breeding of drought tolerant and disease-resistant livestock over the course of millennia affords a considerable advantage to contemporary herders (Gifford-Gonzalez 2000). Furthermore, for the last c. 4000 years people have been directly and indirectly modifying landscapes in East Africa to facilitate pastoral habitation using techniques such as burning, glade formation, and well building (see Chapter 2). In the absence of sustained landscape domestication efforts we can imagine that herders would have found some ecosystems less hospitable than others (Lane 2016a). In addition, knowledge of local ecosystems would have been extremely valuable, as pastoral livelihoods demand an understanding of the temporal and spatial availability of resources and risk factors. Marshall and colleagues (2011: 56) suggest that a lack of such local knowledge may have impeded the expansion of early herders into new areas.

Importantly, people living along the moving frontier would have had to navigate new cultural configurations, forging risk mitigating alliances and relationships of exchange (Gifford-Gonzalez 1998). Relationships between and within populations almost certainly encompassed more aggressive aspects, such as theft and raiding (Marshall et al. 2011), though there is minimal evidence for interpersonal violence during this period (Lane 2013; Sawchuk 2017:128). Instead, hunter-forager-fisher groups persist in East Africa throughout the Northern Exploratory Phase and into the later Pastoral Neolithic (and beyond) suggesting people were not displaced by pastoral communities, but rather integrated with them to varying degrees, a process that was facilitated by regular contact and exchange (Lane 2004, 2013; Mabulla 2007; Marshall et al. 2011; Marshall 2000; Marshall and Hildebrand 2002; Robertshaw and Collett 1983). Considering the longevity of hunter-gatherer occupation in East Africa, and the level to which stock-keepers likely integrated themselves with these communities, it seems plausible that the processes by which livestock came to be widely herded were influenced by hunter-gather groups just as much as any incoming ‘migrants’. In this light, deeply entrenched pre-existing hunter-gatherer preferences for food, labour organisation, ideas of ownership, concepts of time and space and so forth, may have been resistant to accommodating ways of doing and being that are more characteristic of people who practice animal husbandry (Marshall 2000; Wright 2013: 65). We can thus imagine it would have required time for hunter-gatherer and pastoral livelihoods to become sufficiently entangled and entwined, and for their mutual success to become dependent on regular interactions and exchanges, at which point the conditions were created for more specialised forms of pastoralism to expand through the landscape. Whatever the case, the archaeological record indicates there is a considerable chronological gap between the first appearance of livestock and when the remains of domestic taxa come to constitute larger proportions of faunal assemblages, signalling a significant shift in livelihood strategies.

Fig. 6.1 Pastoral Neolithic sites mentioned in this chapter

1) Ileret; 2) Hyrax Hill; 3) Njoro River Cave; 4) Prolonged Drift; 5) Masai Gorge Rockshelter; 6) Enkapune ya Muto; 7) Crescent Island Causeway; 8) Usenge 3; 9) Wadh Lang'o; 10) Gogo Falls; 11/12) Lemek sites and Sugunya; 13) Narosura; 14/15) Lukenya Hill sites GvJm 47 and GvJm 53; 16) Tsavo sites (Kahinju and Mwituu); 17) Naseria; 18) Mumba; 19) Jangwani 1; 20) Luxmanda; 21) Maua Farm

6.2. The emergence of specialised pastoralism

From roughly around 3000 years ago what Marshall and colleagues (2011) have called the ‘Southern Settlement Phase’ of the Pastoral Neolithic was underway. Major developments around this time include an increase in the ubiquity and abundance of livestock remains at occupation sites, and the appearance of at least two archaeological traditions: first the Savanna Pastoral Neolithic (SPN) and then the Elmenteitan, differentiated by unique ceramic and lithic artifact types, as discussed below. During the Pastoral Neolithic, traits also found among contemporary herders emerge in the archaeological record, including signs of economic specialisation, herding strategies incorporating seasonal mobility, and a proliferation of long distance networks of exchange. Pastoral Neolithic herders are not directly analogous to modern pastoral groups however, as for instance the former seem to have occupied sites with exceptionally rich artefactual records (Grillo et al. 2018). There are a number of theories as to why the Pastoral Neolithic occurred as it did, and we should expect a multitude of causal factors to have contributed to livelihood change during this time.

6.2.1. Savanna Pastoral Neolithic

Savanna Pastoral Neolithic (SPN) is a catch-all term encompassing a diversity of archaeological sites in East Africa associated with the emergence of pastoralism after 3400 BP. The first SPN sites appear in the southern highlands of Kenya though they are widely distributed: the Loita-Mara plains are their minimum western extent (Gifford-Gonzalez 1998), and Tsavo their minimum distribution to the east (Wright 2007). SPN sites appear to not appear to stretch much farther north than Lake Baringo, but their southern extent is increasingly being expanded by archaeological survey. In north-central Tanzania, for example, the site of Luxmanda on the Mbulu Plateau has SPN occupation sequences dating to as early as 3000 BP (Grillo et al. 2018; Prendergast et al. 2013).

Ambrose (1984) has suggested that SPN lithic industries exhibit broad continuity with LSA traditions, alluding to an idea that it was the long entrenched hunter-gatherer communities of the Central Rift Valley whom, upon adjusting their technological traditions as they adopted livestock herding, became the makers of SPN lithics. Complicating this interpretation is that SPN material signifiers in the Central Rift are frequently found together with Eburran phase V lithics (a LSA lithic tradition typically associated with hunter-gatherer modes of production) (Ambrose 1998; Onyango-Abuge 1977). As hunter-gatherer and SPN sites have been found to have been contemporaneous and situated in close proximity, the evidence is more suggestive of interaction between long established hunter-gatherer and pastoral groups rather than the one simply becoming the other.

SPN sites are characterised by the presence of cattle, sheep, and goat, featuring wild taxon in varying ratios (Marshall 1990). Sparse remains of donkey were also recovered from the site of Narosura (Gramly 1974). Stable isotope analysis of human skeletal remains from SPN sites have been interpreted by Ambrose and DeNiro (1986) to reflect a meat and milk based diet with minimal plant food consumption. There is no direct evidence for agricultural products contributing significantly to SPN diets, but due to the lack of systematic archaeobotanical sampling and analysis, the use of plant resources during the PN is little understood. Settlement sites tend to be large, located in open habitats at high-altitudes that share similar ecological parameters with those favoured by contemporary Maasai (Lane 2013).

Stone bowls, ground-stone axes and grinding-stones regularly feature at both Elmenteitan and SPN sites, though there are discernible differences in flaked lithic assemblages and ceramic wares. Ceramic traditions associated with SPN sites include Narosura, Akira, Maringishu, and more regularly in Turkana, Nderit and Ileret wares (Robertshaw and Collett 1983, Wandibba

1980). As already stated, SPN flaked lithic assemblages are morphologically comparable to LSA lithics, though a great deal of diversity exists within SPN sites, and distinct traditions are lumped together under the SPN banner (Ambrose 2001). In Tanzania, for example, the sites of Mumba, Nasera, and Luxmanda (which contain SPN ceramics and livestock remains) have quite unique lithic assemblages compared to those seen in the Central Rift Valley (Goldstein 2017:24; Grillo et al. 2018). SPN lithic assemblages in the Central Rift Valley tend to be dominated by grey obsidian obtained from source groups in the south and south-west Lake Naivasha Basin (Merrick and Brown 1984). This grey coloured high-quality obsidian was quarried from the Central Rift and very likely moved through regional networks of exchange reaching impressive distances. Users of SPN material culture at the site of Luxmanda for instance had access to obsidian sources in the Lake Naivasha area, though unlike in the Central Rift, the lithic assemblage at this site is not dominated by grey obsidian (Grillo et al. 2018).

A range of obsidian types were encountered during the survey in Amboseli in 2015, and some were very likely brought to Amboseli through Pastoral Neolithic obsidian distribution networks (see Chapter 4). However, it is not possible to know with great certainty which if any of these lithic finds are regional variants of SPN, Elmenteitan, or earlier LSA lithic industries as there has yet to be a systematic quantitative assessment of stone tools from deposits predating the Iron Age in Amboseli.

In addition to the tentative evidence that people in Amboseli participated in long distance obsidian distribution networks during the PN, stable isotope analysis of livestock remains hints that stock were being herded or exchanged in and out of Amboseli at this time. At the SPN site of GvJm 53 in Lukenya Hill, analysis of strontium ($^{87}\text{Sr}/^{86}\text{Sr}$) isotopes suggests cattle and caprines were being moved to regions characterised by young volcanics, which Janzen (2015:352) hypothesised may have been the Tertiary volcanics of the Central Rift or the Plio-Pleistocene basalts of Amboseli. Janzen (ibid. 354) considered the presence of green obsidian from Mt. Eburru at the Lukenya Hill PN site of GvJm 47 to indicate that people in this area had some connection to the Central Rift, and thus thought it more likely that livestock were moving in and out from that direction. However, our recent survey in Amboseli found that green obsidian is rather common in this landscape as well, and that rarely reported ‘coffee’ coloured obsidian appears both in Amboseli and at GvJm 47 (see Chapter 4). Furthermore, stable isotope analysis at a number of sites in the Central Rift Valley suggests that the exchange of livestock between far-flung pastoral groups may have been rather uncommon during the PN (Janzen 2015), which could negate Janzen’s hypothesis that the livestock at GvJm 47 were ever herded in the Central Rift. This evidence is highly circumstantial, but it does warrant further inquiry into possible PN links between Amboseli and Lukenya Hill.

Apart from the lithics and the isotopic analysis of livestock at GvJm 53, evidence for SPN occupation of Amboseli is currently entirely based on survey finds, including a stone bowl fragment (Fig. 1, Appendix 3), and pottery bearing affinity to Ileret (Fig. 3i, Appendix 2) and Narosura (Fig. 3iii) wares. Weissbrod (2010:45) has also mentioned encountering a single sherd of Narosura ware during time spent in Eselenkei group ranch. In the absence of any data from an excavated PN site in Amboseli, it is unfortunately difficult to determine the cultural provenience of the few sherds encountered during surveys, let alone describe changing pastoral production strategies, trade relationships, and distribution networks.

6.2.2. Elmenteitan

Elmenteitan sites appear in the archaeological record after 3000 years BP, where they co-exist within the Central Rift Valley and south-western highlands of Kenya for another two millennia alongside makers of SPN material culture. Elmenteitan sites concentrate in the Naivasha-Nakuru area, and through the Lemek-Mara area of southern Kenya, with their northern distribution not exceeding the Laikipia Plateau, and their furthest western extent being the Lake Victoria basin (Lane 2013). Elmenteitan sites are not known to exist as far south-east as Amboseli, and surveys failed to identify any clear indication of Elmenteitan occupation, but this PN ‘group’ is discussed here as it is nonetheless linked to the emergence of specialised pastoralism in East Africa.

Elmenteitan assemblages appear overlying Eburran lithics at sites such as Masai Gorge Rockshelter and Enkapune Ya Muto, suggesting a chronological and perhaps phylogenetic relationship between the makers of Elmenteitan stone tools and those producing Eburran phase V implements (Ambrose 1985, 1998). However, at other sites (e.g. Crescent Island Causeway and Hyrax Hill) Eburran phase V and Elmenteitan occupations are contemporaneous (Ambrose 1984). Moreover, the site of Prolonged Drift is recognised to have both Narosura and Elmenteitan style ceramics, Eburran phase V and Elmenteitan lithics, and a high proportion of wild to domestic faunal remains (Ambrose 1984, Gifford et al. 1980). The archaeological record at Prolonged Drift could suggest that this site was occupied by hunter-gatherers who interacted with makers of both SPN and Elmenteitan artifacts, was used relatively coevally by these different groups, or that some combination of these was occurring. Whether or not the former interpretations are at all correct, hunter-gatherer livelihoods clearly continued to be embraced through the rise of specialised herding and into the modern era, with sustained interaction occurring between pastoralists and foragers.

Many Elmenteitan sites have a large number of mature animals in their faunal assemblages, typical of pastoral diets with a high reliance on dairy products (Marshall 1990). Additionally, Elmenteitan faunal assemblages from sites in Kenya’s south-western highlands overwhelmingly contain domestic cattle, sheep, and goats in comparison to wild animals (Marshall 1990). Elmenteitan sites near Lake Victoria, on the other hand, have considerably more wild taxa (Lane et al. 2006; Robertshaw 1991). Evidence for intensive hunting of wild animals as well as fishing and shellfish collection at sites such as Gogo Falls and Wadh Lang’o were once thought to indicate that the livestock herders residing in this supposedly heavily wooded environment had been driven to diversify their livelihoods to a greater extent compared to other Elmenteitan pastoralists living to the east (Marshall and Stewart 1994). However, recent stable isotope analysis of fauna from Gogo Falls indicates that the landscape was more open than previously thought, and that the zoonotic risk posed by tsetse fly appears to have been rather overstated (Chritz et al. 2015). The pursuit of more diversified livelihoods around Lake Victoria at this time could thus very well have been motivated by factors entirely unrelated to ecological constraints. Whatever the case, this diversification is certainly demonstrative of the variability of livelihood practices pursued by individuals whom archaeologists lump together using such categories as Elmenteitan.

Like SPN sites, it has been noted that the distribution of Elmenteitan sites in south-western Kenya is closely related to the spatial patterning of contemporary Maasai settlements in the landscape (Marshall 1990: 880; Robertshaw 1990: 295). In contrast to SPN settlements, the majority of Elmenteitan sites in the Central Rift are rockshelters and caves, located at high altitudinal zones near savanna/forest ecotones (Ambrose 1984, 1985). It is only outside the Central Rift that we find large scale open air settlement sites with Elmenteitan material culture (Goldstein 2017: 37). Robertshaw (1988: 64) has noted a tendency for higher caprines to cattle ratios at rockshelter sites, possibly indicating that small-stock were herded in more

diverse and peripheral zones compared to cattle. This interpretation is supported by stable isotope analysis on faunal remains from Masai Gorge and Enkapune Ya Muto that suggest cattle were not being herded seasonally between altitudinal zones, but that caprines were feeding in both low and middle elevation areas (Balasse and Ambrose 2005). Goldstein (2017: 37) has questioned this explanation however, pointing out that high altitude rockshelters and caves are not ideal locations for any class of livestock to be herded in and around, that many of these Elmenteitan sites exhibit evidence for ceremonial behavior, and that there are few open air Elmenteitan sites in the Central Rift Valley where these high-altitude rockshelters and caves are seemingly clustered. Instead, the makers of Elmenteitan traditions may have been coming to rockshelters in the Central Rift for reasons grounded in more social rather than subsistence considerations (*ibid.*). Again we are reminded that environmentally deterministic interpretations of herder behaviour must not overshadow the socio-economic aspects of life in the Pastoral Neolithic.

Outside the Central Rift where open air higher elevation Elmenteitan sites proliferate, settlement sizes have a remarkable range, spanning anywhere between 10 and 230 m (Lane 2013: 121). Differences in site sizes may be related to occupation longevity, as the accumulation of dung at smaller sites is considerably less than at larger ones (*ibid.*). Sites such as Suganya, for example, have dense accumulations of dung (Shahack-Gross et al. 2008; Simons 2005), which may indicate sustained periods of occupation, or what Bower (1991: 70) has called ‘tethered nomadism’ wherein people oscillated between distributing their herds more widely across the landscape and returning to a larger main settlement. Drawing on patterns of contemporary pastoral site occupation and size in Amboseli (Western and Dunne 1979), larger Elmenteitan sites may have been occupied when resources such as water or pasture were more densely concentrated (e.g. during the dry season), and smaller sites may have been occupied when resources were more evenly distributed across the landscape (e.g. during the wet season), or perhaps vice-versa. However, artifact densities at Elmenteitan sites do not necessarily correlate with site size, which may negate the occupation longevity theory in some instances (Robertshaw et al. 1990: 41-43). Robertshaw (1990: 293-299) has instead suggested that differences in Elmenteitan site sizes may instead be related to herder wealth or status, or perhaps even degree of livelihood diversification, with smaller sites being associated with herders who also pursued cultivation.

Interestingly, stable isotope analysis of human skeletal remains at sites in the Central Rift has demonstrated that plant food consumption was of greater significance to Elmenteitan groups in comparison to SPN (Ambrose and DeNiro 1968). Makers of Elmenteitan material culture at the sites sampled are hypothesised to have had diets high in C₄ plants, mixed with cattle and caprine pastoral products (Ambrose and DeNiro 1986). Unfortunately, direct evidence for plant use is still lacking in East Africa until the end of the Pastoral Neolithic.

In common with SPN sites, stone bowls and grinding-stones feature in Elmenteitan archaeological assemblages, perhaps most spectacularly at Njoro River Cave (Leakey and Leakey 1950). Unlike at SPN sites, Elmenteitan burials exhibit a preference for cremation over inhumation (Lane 2013: 124). The makers of Elmenteitan material culture also appear to have removed the central incisors of the lower jaw, while other PN cultures did not (Lane 2013: 124).

Elmenteitan sites are further distinguished by the style of ceramics recovered in archaeological deposits. Once referred to as Remnant ware, Elmenteitan ceramics are commonly described as undecorated mica-tempered pots, frequently featuring lugs and spouts (Nelson 1980; Wandibba 1980). The Elmenteitan lithic industry is also highly diagnostic, featuring squat crescents and long blades with coarsely abraded striking platforms (Ambrose 2002). Elmenteitan blades were manufactured using the punch technique on prepared cores

(ibid.). The Elmenteitan lithic industry was manufactured almost entirely from Mt. Eburru's green obsidian sources (Merrick and Brown 1984), though there may be a few departures from this trend. At Njoro River Cave for example, while some 80% of the artifacts are made from green obsidian, grey obsidian crescents are common (Leakey and Leakey 1950), though it has been noted that archaeological deposits in the cave were disturbed (Merrick and Monaghan 1984). Both Elmenteitan and SPN people living outside the Central Rift were somehow obtaining their obsidian from sources located hundreds of kilometres away, most likely through networks of trade or exchange (see Goldstein 2017).

6.2.3. Reconsidering the role of cultivation in the emergence of specialised pastoralism

Archaeologists have long debated the reasons why the 'trickle' (Bower 1991: 74) of livestock into eastern Africa finally shifted towards the end of the fourth millennium BP to a marked increase in the ratio of domesticates to wild fauna at some PN sites. Was it just that it took some one thousand years for the challenges discussed in section 6.13 to be overcome, or is this change perhaps better explained by catalysing factors?

One idea put forward is that there was an in-migration of pastoralists c. 4000 years ago. Turning to the linguistic evidence, it appears that click language speakers came to be outnumbered by Southern Cushitic speaking people arriving in East Africa via southern Ethiopia, and Southern Nilotic language speakers who once resided in South Sudan (Ehret 1998). Some scholars have proposed that these Southern Nilotic speakers may have been the Elmenteitan people, and that SPN herders spoke proto-Southern Cushitic languages (Ambrose 1982; Ehret 1998). While this idea offers a tidy explanation, the evidence suggests a significantly more complex reality. Hetzron (1980) has for instance argued that the Southern Cushitic language group may actually be a younger sub-branch of eastern Cushitic, and that the longevity of Southern Cushitic speakers in East Africa may not be as considerable as once thought. More importantly, there is no reason to assume that the archaeological SPN and Elmenteitan 'cultures' correspond in any direct sense to actual language or ethnic groups (Bower 1991; Lane 2004; Marshall 2000; Robertshaw and Collett 1983). As it stands, the hypothesis that Elmenteitan people spoke Southern Nilotic languages and that SPN makers conversed in proto-Cushitic languages is far from widely accepted. Finally, as already discussed, dental metric and non-metric analysis is more indicative of continuity among Late Stone Age Holocene hunter-gatherers, SPN, Elmenteitan, and early Northern Exploratory Phase herders (Sawchuk 2017), and thus does not support a hypothesis of large scale demographic change occurring during the PN.

If we look to the palaeoenvironmental record, it is evident that arid conditions prevailed in eastern Africa until c. 3000 BP (Garcin et al. 2012; Richardson and Dussinger 1986; Thompson et al. 2002) at which time we also see a proliferation in domestic fauna at archaeological sites in eastern Africa. We can therefore speculate that this return to increased moisture availability may have facilitated the expansion of livestock herds throughout the region. Gradual oscillations between drier or wetter climatic conditions over the course of centuries are in most cases far less relevant to people than the seasonal availability and predictability of water, however.

In seeking to understand the climatic context in which the spread of specialised pastoralism first occurred, we must also consider how patterned movements of the ITCZ may have brought a more predictable and higher volume bimodal rainfall regime to Kenya and Tanzania c. 3000 years ago (Bower 1991: 70; Marshall 1990, 1994: 34). This supposed major change in precipitation has been suggested to have been of particular importance, promoting reduced mobility and year-long dairying (Marshall 1990, 1994: 34). Still, despite the overall trend

towards greater water availability, rainfall patterns were highly variable on the yearly, decadal, and centennial scale (Thompson et al. 2002), with a marked increase in the frequency and intensity of ENSO events after 3000 BP (Riedinger et al. 2002). Thus while pastoralists can generally be understood to have been living in more well-watered landscapes c. 3000 BP, they still had to negotiate uncertainty in the availability of water and pasture.

Marshall et al. (2011) have put forth the intriguing argument that during the Southern Settlement Phase it was the very intensity of climatic variability in combination with higher rainfall levels that helped to stimulate the emergence of innovative and resilient pastoral adaptations in East Africa. During the mid-Holocene arid phase stock keepers were supposedly tethered to permanent water sources (Wright 2007), and as the climate was not as variable, the regional distribution of resources may have also been less heterogeneous. As water availability increased after c. 3000 BP, herders may have been able to move more freely within landscapes characterised by spatio-temporally diverse terrain and vegetation (Marshall et al. 2011).⁴⁸

Marshall and colleagues further hypothesise that population densities were greater in southern East Africa during the Southern Settlement Phase as opposed to the Turkana area during the Northern Exploratory Phase, allowing later pastoralists to engage more fully in risk-reducing co-operative social practices. Such practices are suggested to have included trade and gift giving between diverse pastoral and hunter-gatherer groups (Gifford-Gonzalez 1998, 2000; Marshall and Hildebrand 2002; Marshall et al. 2011). It is difficult to measure human population densities during the Pastoral Neolithic, though archaeological evidence points to an increase in livestock numbers, and historic and ethnographic records further indicate that generally speaking, the more livestock a household owns, the more extensive their networks of exchange (Bollig 1998; de Vries et al. 2006). The social safety nets built and reinforced by herders through distribution networks may have been important for gaining access to healthy breeding stocks, for the rebuilding of herds after population crashes (Marshall et al. 2011), and hunter-gatherer communities probably offered 'specialisation sanctuaries' for stockless people who had to transition out of pastoralism. Stable isotope analysis of faunal remains from PN sites provides stronger evidence for the existence of extensive livestock distribution outside of the Central Rift Valley than within (Janzen 2015), though obsidian from the Central Rift was clearly being moved throughout much of eastern Africa (see Goldstein 2017). The antecedents of such behaviour can perhaps be traced to the monumental stone pillar sites of Turkana, where people may have met to exchange resources such as obsidian, beads, and shells, many of which were sourced from far beyond the lake, but also to disseminate knowledge pertaining to water and pasture availability, the breeding of domestic stock, and to discuss social and political relations with hunter-gatherers (Marshall et al. 2011: 57). Finally, during the Southern Settlement Phase supposedly higher population densities and greater rates of group identity differentiation may have created the conditions for inter-group competition, raiding, and violence, which may have both created and mitigated risks for herders, although Marshall et al. (2011) admit there is but negligible evidence for this violence in the archaeological record.

I am inspired by the model put forth by Marshall and colleagues (2011), and find it to be a well thought out overview of the mechanisms by which animal husbandry could have developed during the Pastoral Neolithic, but there is still room to push their ideas further. In particular, I find the assumption that cultivation did not influence herder activity during the

⁴⁸ This is of course a macro-scale evaluation of changes occurring in the Pastoral Neolithic, and the archaeological record of East Africa provides exceptions. In Tsavo, for example, stock-keepers appear to have continued to be tethered to riparian environments through the PN and into the Iron Age (Wright 2007).

Pastoral Neolithic (Marshall et al. 2011: 49,56) to be problematic. The development of herding during the Pastoral Neolithic was initially thought to coincide with a broader shift to cultivation – evidence of which was supposedly confirmed by the appearance of various grinding-stone implements (Leakey and Leakey 1950; Odner 1972; Onyango-Abuje 1977; Robertshaw and Collett 1983). This narrative has since been substantially revised, and recognising that agriculture is not a prerequisite for pastoralism, it is now accepted that there was a long pastoral phase prior to the widespread appearance of agriculture in East Africa (Marshall and Hildebrand 2002). That being said, deficiencies in archaeobotanical analysis must surely caution against assuming that all forms of cultivation were universally absent during the Pastoral Neolithic. Until recently, a select few archaeological projects in sub-Saharan Africa employed methods for recovering archaeobotanical materials, and thus while the current state of the archaeobotanical record makes it impossible to prove, I argue that it is highly unlikely that all forms of cultivation were entirely avoided during the PN.

Within the wider region, the first incidents of farming are typically attributed to the eastward and southerly expansion of Bantu-language speakers from west-Central Africa, appearing in eastern Africa around 2000 years ago, accompanied by iron-working and certain diagnostic ceramic wares (see Chapter 7). I contend this date is best considered a *terminus ante quem* for cultivation practices in East Africa.

Of interest with regards to Amboseli is the possibility that banana (*Musa* sp.) and taro (*Colocasia esculenta*) were being moved through to the tropical forests of Africa's interior at an early date, as the high diversity of plantain cultivars found in African rainforest and highland habitats suggest the cultivation of bananas on Mt. Kilimanjaro anytime after 3500 BP, though by 1000 BP at the latest (Blench 2009; De Langhe et al. 1995, De Langhe 2007). Some researchers have attested that Asian domesticates such as chicken (*Gallus gallus domesticus*) and banana were being farmed in East Africa prior to the arrival of Bantu-speakers (Chami 2001; Lejju et al. 2005, 2006; Mbida et al. 2000, 2001, 2004, 2006), though lines of evidence supporting these claims have yet to gain widespread acceptance (Neumann and Hildebrand 2009; Shipton et al. 2016; Sinclair 2007). Within the African continent however there are a number of centers of domestication where indigenous cultivars originated. The timing and geographic scale over which many African crops entered relationships of domestication with African farmers remains poorly understood.

Attesting to this fact is the evidence for African domesticates such as pearl millet (*Pennisetum glaucum*), finger millet (*Eleusine coracana*), sorghum (*Sorghum bicolor*), cowpea (*Vigna unguiculata*), and hyacinth bean (*Lablab purpureus*) all having been transferred from African savannas into dry-cropping regions of India by at least 4000 BP (Fuller 2003; Fuller and Boivin 2009; Fuller et al. 2011). While cowpea was cultivated in South Asia 4000 years ago (Fuller 2003), the earliest evidence from eastern Africa is only from around 2000 BP (Giblin and Fuller 2011). The strongest evidence for cowpea domestication comes from West Africa (D'Andrea et al. 2007; Fuller 2003), though its wild progenitor is present throughout most of sub-Saharan Africa, meaning it could have also been domesticated further east.

Astonishingly, the earliest accepted date for the presence of finger millet (a crop indigenous to Africa) in India is a full thousand years older than any thus far found in the archaeological record for the entirety of Africa (ibid.), again demonstrating a need for more archaeobotanical research to be carried out on the continent. Intriguingly, a single grain of wild finger millet (*Eleusine africana*) was found in the lowest excavated levels at the site of Gogo Falls (occupied as early as 3500 BP), and while this seed is of uncertain antiquity, it very tentatively suggests wild finger millet was being collected and consumed during the PN (Lange 1991; Wetterstrom 1991). Currently, the earliest evidence for domesticated finger millet comes from Ethiopia c. 2000 BP (D'Andrea 2008), though based on the range of its

wild progenitor, it may have first been cultivated anywhere between the uplands of Ethiopia and the Great Lakes region of eastern Africa (Fuller 2003; Fuller and Hildebrand 2013). Certainly, none of this proves crops like finger millet and cowpea were cultivated in southern Kenya during the Southern Settlement Phase of the Pastoral Neolithic, but irrefutably, there are gaping holes in East Africa's archaeobotanical record, and thus we cannot interpret an absence of evidence as evidence of absence.

More importantly, identifying cultivation exclusively from the presence of domesticates is inappropriate in many African contexts (Lane and Shoemaker 2017), as species are known to exhibit only subtle genetic and morphological change, if at all, despite having been managed for millennia (D'Andrea et al 2006; Hildebrand 2003a,b; Kahlheber and Neumann 2007). We must consider the presence of what Smith (2001) has termed 'low-level food production', wherein plants are cultivated or intensively managed in ways that do not lead to morphological domestication (see also Zeder et al. 2006 and Zeder 2015). The herder-*Acacia tortilis* relationship is one example of low-level food production that is highly characteristic of pastoralists in East Africa today (see section 2.2.1 of this thesis). As it is inappropriate to apply direct ethnographic analogies to the Pastoral Neolithic, more work is required to understand if *A. tortilis* cultivation may have facilitated foddering and allowed herders to mitigate stock loss risks during this time, or indeed how other forms of cultivation may have significantly influenced PN herders.

For now, we can only speculate as to how cultivation impacted the trajectory of pastoralism prior to c. 2000 BP, drawing on ethnographic analogy to generate testable hypotheses but not to 'telescope' into the past (Kusimba 2013: 467). We can for instance consider that at some points in time the cultivation of edible taxon eased the dietary requirements people sought from their livestock, allowing people to lower the off-take of milk, meat, and blood from their animals resulting in more resources being available for herd expansion. Any plant product with an ascribed value, for instance calabashes,⁴⁹ could have also been substituted for animal products during trade accomplishing a similar goal. It is conceivable that some forms of cultivation became more expansive in response to the presence of specialised pastoralists, perhaps as stockless people desired to trade plant products in return for milk, meat, and to acquire livestock to transition into pastoralism themselves. We can also consider there may have been communities of stockless pastoralists who turned to cultivation upon losing their herds, being unwilling to forgo all forms of food production (see Chapter 8 for a discussion of similar dynamics at work in the 19th century in Amboseli). Such lines of inquiry are especially relevant in landscapes like Amboseli where the arid lowland plains of the central basin quickly transition to the fertile slopes of Mt. Kilimanjaro, which is today one of East Africa's most intensively cultivated highland zones.

As Crowther and colleagues (2017: 7) have noted, the presence of so-called 'complex forager' populations and behaviours during the Pastoral Neolithic have not been adequately confirmed but the possibility merits further consideration as cases of intensive 'wild' resource management are increasingly being recognised where archaeologists had previously assumed they did not exist (e.g. Denham et al. 2003; Groesbeck et al. 2014; Lepofsky and Armstrong in press; Lyons and Ritchie 2017). I am by no means suggesting that agriculture need be a central aspect in the functioning of specialised pastoralism (for a critique of such an idea see Makarewicz 2013 or Marshall and Hildebrand 2002), only that considering the spatio-temporal scale at which the Pastoral Neolithic unfolded, the possibility for diverse human-plant interactions - including those involving management typical of low-level food production - cannot easily be dismissed.

⁴⁹ Evidence for the use of calabash gourds can be found at the PN Hyrax Hill site (Sutton 1998: 79).

6.3. Conclusions

In this chapter I have discussed the evidence for the emergence of pastoralism in Amboseli, and East Africa more generally. A number of *fossiles directeurs* (stone bowl fragment, possible Ileret and Narosura ware ceramics, and non-local obsidian) from unstratified deposits could suggest there was a Pastoral Neolithic presence in Amboseli. I have also reviewed evidence from stable isotope analysis that very tentatively indicate a link between people in the Lukenya Hill area and the Amboseli landscape. Surveys and excavations have yet to conclusively identify pastoralist sites that predate the first millennium CE in Amboseli though. This could mean that pastoralist incursions into Amboseli were comparatively minimal during the Pastoral Neolithic, but considering the depositional environment surveyed in 2015 (aggrading) there is considerable scope to further refine our understandings of early livestock herding activity here. I recommend future surveys in Amboseli target higher-elevation areas that are more resistant to aggradation and other taphonomic processes that have the potential to obscure evidence for Pastoral Neolithic occupation.

As archaeologists are want to do, within this chapter substantial thought is devoted to the so-called emergence of food production in East Africa which is suggested to have begun with the origins of specialised pastoralism. I reiterate that generations and generations of stock-keepers and herders lived through the Pastoral Neolithic, which took place in and around the Rift Valley, a region encompassing bewildering diversity in terms of vegetation, wildlife, topography, geology, and hydrology. As such we cannot expect any one homogenising meta-narrative to fully explain the multiple trajectories along which animal husbandry developed.

Some factors that may have been particularly influential with regards to this development include migration, disease, protracted processes of anthropogenic landscape modification/domestication, exchange and distribution networks, rising population densities, local knowledge accumulation, cultural values, and finally climate change (both long term directional trends and short term variability).

Ameliorations and deteriorations in rangeland conditions and fluctuations in the spatio-temporal availability of the resources that herders rely upon must be taken into account when discussing the emergence of specialised pastoralism in East African landscapes. Savanna ecosystem dynamics can of course be influenced by climate change, and thus palaeoecological records are often consulted by archaeologists seeking to better understand the development of specialised pastoralism, but, as I have cautioned, the primacy of environmental factors remains questionable.⁵⁰

It is clear, however, that the rise of specialised pastoralism on a macro-scale took place in a diversified socio-economic context featuring hunting and gathering, fishing, stock-keeping, and I would hazard to guess some degree of cultivation. Deliberations are still ongoing with regards to whether or not sites containing both wild and domestic zooarchaeological remains are indicative of pastoralists engaging in hunting, herders exchanging with hunting-gathering groups, or hunter-gatherers transitioning into pastoralism, though their existence points to livelihood strategies that embraced fluidity rather rigidity (Lane 2004: 249-250). Furthermore, individuals who were invested to varying extents in hunting, gathering and herding appear to have been participating in relations of exchange spanning extensive geographical areas. Shifts in the economic focus of different groups did not progress along any sort of linear trajectory, however, and far more work is required to elucidate the history of the first herders in

⁵⁰ This is perhaps best attested to by stable isotope analysis of fauna from Gogo Falls, western Kenya where Chritz et al. (2015) have provided evidence suggesting that climatically conditioned vegetation patterns between 4500 and 3000 BP were not a barrier to the southward movement of cattle from the Lake Turkana basin.

Amboseli. Yet judging from region wide evidence, transitions to pastoralism did not entail a full-scale replacement of hunting and gathering practices and populations, and thus it seems that interaction with people who were not engaged in livestock herding was influential in the early development of this livelihood strategy.

7 Amboseli through the Iron Age

In this chapter I will explore how the Pastoral Neolithic ends, and three Iron Age phases proceed it in East Africa. The divisions and terminology followed here have been critiqued (Ashley 2005: 34; Kiriama 1993; Stahl 2004b: 146), and they are indeed problematic as they imply that with the start of the Iron Age there were all encompassing socio-economic changes occurring that can be easily temporally demarcated. Rather, the transitions between these phases are chronologically and spatially diffuse, and did not follow a strict linear trajectory. While these terms are admittedly flawed, they are still widely used in the archaeological community, and thus for this discussion to be compared to the literature preceding it, this chapter is separated into reviews of the Early Iron Age/final Pastoral Neolithic (~0-300 CE), the Middle/Early Pastoral Iron Age (~300-1000 CE), and the Late (Pastoral) Iron Age (~1000-1800 CE) in Amboseli.

Belying the idea that changes in material culture types and broad chronological divisions represent profound disruptions and new demographic incursions is a theme that features throughout this chapter: that of the ‘mosaic’ quality of East African social, environmental and economic landscapes (Kusimba and Kusimba 2005; Stahl 2004b). As has been argued for nearby Tsavo (Kusimba and Kusimba 2005; Kusimba and Walz 2018; Wright 2005), the Iron Age archaeological record of Amboseli similarly attests to the presence of multiple groups practicing diverse livelihoods and patterns of settlement that were linked through broader networks of interaction. Rather than conceiving of Amboseli as being inhabited by distinct ethnic-linguistic groups that can be indelibly associated with certain livelihood practices, time periods, and archaeological cultures we can instead draw on the work of Amselle (1998) and Kopytoff (1987) to recognise the potential for fluidity, hybridisation and syncretism, and envision how identities and economic pursuits were open to continuous reconfiguration. That is not to say that boundaries were non-existent between socio-economic groups, but rather that these boundaries are better conceptualised as having been mediated through interaction rather than isolation (Barth 1969; Kusimba and Walz 2018: 10). Finally, we can also see how livelihoods in Amboseli were coming to be shaped by ‘global entanglements’ (Stahl 2004b) as the material residues of Swahili coastal trade activities feature in Late Iron Age sites.

7.1. The Iron Age transition

The first millennium CE marks the start of the Iron Age in East Africa, and the end of the Pastoral Neolithic, though there was by no means a sudden transition from pastoral to agro-pastoral livelihoods in Amboseli. Rather, a dynamic mosaic of farmers, foragers, herders, hunters, and craft specialists emerged in the centuries following the end of the PN. Although archaeological evidence for this period is rather sparse in comparison to the data we have for the Late Iron Age, it is still worth reviewing as it contextualises developments occurring in the last millennium.

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7.1.1. Early Iron Age

The Iron Age is distinguished by a few key archaeological markers (knowledge of iron working, certain ceramic wares, and the presence of agriculture), evidence of which are first dated to c.2000 years ago in East Africa. As the suite of Iron Age material signifiers seems to appear in the archaeological record in eastern Africa at roughly the same time that linguistic and genetic evidence suggest Bantu-language speaking populations were starting to be present, the so-called Bantu expansion has long been held as the mechanism by which agriculture and iron working dispersed through the region (e.g. Bellwood and Renfrew 2002; Robertshaw 2013). An eastern stream of Bantu-language speakers, who can be traced to a proto-Bantu ‘homeland’ in Cameroon, seem to have moved into the Great Lakes/southern Sudan region c.2500 years ago (Lane 2015b). Current linguistic and archaeological evidence suggests that prior to coming into this area, Bantu-language speaking groups were farming yams, oil-palm, and likely cowpea, and when they arrived here they encountered sorghum and pearl millet, before eventually coming to inhabit most of East Africa after 2000 BP (Crowther et al. 2017; Lane 2015b; Schoenbrun 1993, 1998). For better or for worse, archaeological understanding of this time period largely hinges on the appearance of Urewe and Kwale ware.

To the west of Lake Victoria, Urewe ware pottery seems to be closely associated with knowledge of iron-working, with sites dating from c.2500 BP, and in Uganda and western Kenya from c. 1800-1200 BP (Ashley 2010; Lane et al. 2006; Reid 1994; Van Grunderbeek 1988). Bevelled rim Kwale ware is more diagnostic of Early Iron Age sites in eastern Kenya and Tanzania. Kwale ware is suggested to have ‘evolved’ from Urewe ware pottery (Collett 1985; Helm 2000: 53; Soper 1971). Kwale ware appears to date from the 1st century to the mid-first millennium CE (Fawcett and LaViolette 1990; Schmidt 1988). The less well-defined Lelesu ware, appearing c.1800 BP, may be analogous to Kwale in north-central Tanzania (Soper 1982; Sutton 1968). Sites with Kwale and its variants are widely distributed, appearing in the Central Rift as far north as central Kenya (Soper 1979), along the Tana River (Kiriamia et al. 1996), on Mt. Kilimanjaro (Odner 1971a; Mturi 1986), the Taita Hills (Collett 1985), the Usambara Mountains (Schmidt 1988) and through the central coastal region and off-shore islands of Tanzania (Chami and Mapunda 1998; Fawcett and LaViolette 1990; Helm 2000; Soper 1967a). In Amboseli, two sherds with bevelled rims were recovered while surveying in 2015, (Fig. 2i, Appendix 2) and while this is a characteristic feature of Kwale and the later Maore ware (as described below), it is unclear if these sherds represent an Early Iron Age presence in Amboseli. The bevelling seen on the sherds collected in Amboseli is less sharply defined in comparison to other known Kwale and Maore wares, suggesting the Amboseli rims are possibly only distantly related, if at all. It is also conceivable that the rocked zig-zag decoration seen on a sherd Foley recovered in the Amboseli basin (Fig. 3xiii, Appendix 2) could be Kwale ware, but this embellishment is seen on sherds throughout the Iron Age, and is thus inconclusive.

Archaeologists are still working out the significance of Kwale ware and how closely linked this ceramic type may be to farming, iron-working and Bantu-language speakers in different regions of East Africa. If we accept that Kwale ceramics in some (though certainly not all) contexts could be a proxy indicator for farming activity, it is interesting to note the distribution of Kwale ware on the southern *and* northern slopes of Mt. Kilimanjaro, even appearing at the site of ‘Farm No. 8 Ol Molog’ (Odner 1971a), which is just 10 km from the area surveyed in 2015. It would not be surprising if Kilimanjaro was an early centre for cultivation in East Africa, as the mountain is most renowned for being a farming landscape, a so-called ‘island of intensive agriculture’ (Widgren 2000; Widgren and Sutton 2004). Furthermore, palaeoenvironmental records suggest that highland environmental zones and

other drought refugia may have been of particular importance to Early Iron Age cultivators in East Africa.

In the Central Rift, the earliest stages of the Iron Age are associated with signs of increasing aridity (Taylor et al. 2005). Environmental conditions in Amboseli appear to have followed a similar trajectory, with the Namelok pollen record showing a desiccation phase occurring from ~2400-1700 years BP (Githumbi et al. 2018a; Rucina et al. 2010). Bacterial cell-wall lipids also show a period of reduced rainfall between 2000-1800 years BP at Lake Challa (Buckles et al. 2016). In light of these signs of aridity, it is interesting to note that Phillipson (1977: 143) associates Kwale ware with higher elevation sites, along the forest margins of foothills and escarpments where we would expect early farmers to have been drawn. Kwale ware on Kilimanjaro also appears to concentrate on the southern side of the mountain, conceivably because the north-western areas receive less rainfall and were thus more regularly frequented by pastoralists at this time (Stump and Tagseth 2009); however these areas have also been less extensively surveyed. The proposition that the appearance of Kwale ware in areas with high agricultural potential is indicative of these places being settled by Early Iron Age farmers merits some consideration. Using Kwale pottery as indirect evidence for farming is however, highly problematic.

Pots do not necessarily reflect population movements, sociocultural identities or economic practices (Ashley 2013; Pikirayi 2007). In fact, current archaeological evidence does not support Kwale ware, iron working and farming being that closely associated in East Africa. For one, while surveys of Kilimanjaro identified a number of sites featuring Kwale ware, evidence of iron working appears to have been lacking (Mturi 1986; Odner 1971a). Furthermore, around Lake Victoria zooarchaeological and archaeobotanical data indicate a certain amount of continuity between Kansyore, Elmenteitan, and Urewe periods (Dale and Ashley 2010; Lane et al. 2007; Lange 1991; Wetterstrom 1991), failing to suggest a dietary revolution was underway with the arrival of Urewe ware and iron-working. At sites in northern and central Tanzania with Lelesu ceramics but no evidence of iron working, faunal assemblages indicate a reliance on wild resources (Mehlman 1989; Prendergast 2008), and Crowther et al. (2017) suggest Lelesu pots could have been a trade good used by some combination of foragers and SPN herders. Finally on the coast, intensive archaeobotanical and zooarchaeological sampling at Early Iron Age sites found that while Kwale ware and iron working were present at this time, there is no evidence for changing culinary traditions (Crowther et al. 2017). In fact, the earliest dated appearance of any domesticated crop in East Africa comes from Rwanda where Giblin and Fuller (2011) found c.1600 year old sorghum, pearl millet and cowpea, and other than a few undated reports of pearl millet and sorghum in southern Tanzania (Pawlowicz 2011), there is no other archaeobotanical evidence for agriculture during the Early Iron Age. Unfortunately, as systemic sampling for archaeobotanical remains has been so rare, this absence of evidence neither supports nor negates a Bantu-language/Kwale pot farming dispersal model (Crowther et al. 2017). Regardless, the idea that the Bantu migration was the driving force behind which iron working and agriculture emerged in East Africa has been critiqued (e.g. de Maret 2013; Karega-Munene 2002; Kusimba and Kusimba 2005; Lwanga-Lunyiigo 1976; Vansina 1995), with the very notion that migrations are a *de facto* explanation for culture change being linked to enduring and problematic colonial era rhetoric (Chami 1994: 32; Kwekason 2013).

Rather than using a migration and population displacement model, we may instead envision a moving frontier along which Iron Age material signifiers and Bantu-languages entered or otherwise arose within East Africa, and deduce that transitions were introduced, maintained, abandoned, and reproduced through various agents and mechanisms (Lane 2004). This explanation seems more parsimonious with the actual evidence as archaeological and

linguistic assessments indicate a highly variable tempo and scale by which different Iron Age elements took hold (Crowther et al. 2017; de Maret 2013; Grollemund et al. 2015; Lane et al. 2007; Prendergast 2008). It is also important to note that agriculture and cultivation practices may have not been entirely novel livelihood strategies in the Iron Age (see Chapter 6). There are still many unanswered questions with regards to how such moving frontiers may have been experienced by pastoral people in Amboseli and elsewhere in East Africa. As de Maret (2005: 423-424) has remarked, we may actually know less today about the Iron Age in East Africa than archaeologists may have thought 30 years ago, as we have welcomed the realisation that society cannot be collapsed into simple linguistic, ceramic, or even economic groupings, but is far more varied and diverse.

7.1.2. Pastoral Neolithic final phase

In comparison to the moving frontier that ushered in the transition to pastoralism during the PN, in the Kenyan interior the cultural-historical sequence of pastoral sites after c. 2000 years ago is poorly understood. Generally, what archaeologists recognise as Pastoral Neolithic sites persist into the first millennium CE, though there are some indications of livelihood change. In the Central Rift Valley from between 1900 to 1300 BP, Bower (1991) identifies a transition away from specialised pastoralism and toward more highly mobile settlement strategies and a greater reliance on wild foods. At the site of Wadh Lang'o near Lake Victoria there is similarly an increase in the diversity of wild fauna found in Iron Age levels (Prendergast 2008: 145). Settlements in south-western Kenya also appear to become smaller in comparison to earlier Elmenteitan sites (Robertshaw et al. 1990). There is no indication that pastoral diets or mobility patterns changed substantially on the Galana River in Tsavo during the second millennium BP, however, (Wright 2005) highlighting the potential diversity of pastoral adaptations in the final phase of the PN.

Though in some respects Iron Age lithic industries show continuity with PN assemblages (Bower 1991; Causey 2010; Lane et al. 2007; Posnansky 1967), the networks through which obsidian was being distributed throughout the region appear to break down following the Pastoral Neolithic. With the Iron Age comes a cessation of the strict adherence to green obsidian in Elmenteitan sites, and quartz-dominated assemblages that feature marginal quantities of chert and also grey obsidian emerge in the Lemek area (Siiriäinen et al. 2009: 186). This obsidian may have been recycled from older archaeological contexts (Robertshaw 1990: 298). Perhaps due to issues pertaining to raw material acquisition, obsidian pieces decrease in both size and count in comparison to earlier Elmenteitan and SPN assemblages, and lithic assemblages become both smaller and more informal overall (Bower and Nelson 1978; Lane et al. 2007; Siiriäinen 1990; Siiriäinen et al. 2009).

Bower (1991) has also suggested that new ceramic types (Akira and Maringishu ware) may be a product of the 'final phase' of the SPN. The cultural provenience of Akira ware is not well established (Ashley and Grillo 2015: 464), though radiocarbon dates from the type site (GuJi 2) range between 1255 ± 140 BP to 1695 ± 140 BP (Bower et al. 1977), spanning the Pastoral Neolithic – Iron Age time period. Foley described the few potsherds encountered during his survey of Amboseli National Park to be a local variant of Akira ware (Foley 1981a: 180), and possibly there is one thin incised line sherd recovered while surveying in 2015 that could be said to resemble this ceramic type (Fig. 2xi, Appendix 2), but in the absence of sherds from dated stratified deposits, it is difficult to say whether or not pastoralists inhabited Amboseli at the close of the PN. Elsewhere, the association between Akira ware and SPN sites containing predominantly wild faunal assemblages has led to the suggestion that Akira pottery was manufactured by hunter-gatherer groups, and its wide distribution perhaps indicates its value

as a trade good (Robertshaw 1990). Conceivably, wild resource use at SPN sites in the first millennium CE could likewise be a product of exchange with specialised hunter-gatherers rather than a dual hunting-herding economy (ibid.). Either way, the decline of PN obsidian exchange networks and what in some locales may have been a partial withdrawal from more specialised pastoral modes of production appears to broadly coincide with an expanding reliance on iron working and agriculture and the spread of Bantu-language speakers in the wider region. Again, there is still much more work to do to determine the tempo and scale at which changes occurred, and if and how these transformations were related.

7.1.3. Middle/Early Pastoral Iron Age

The Pastoral Neolithic could be said to terminate from around the latter half of the mid-first millennium, coeval with the start of the Middle Iron Age, and the Pastoral Iron Age (PIA). After the period of extreme aridity at the start of the first millennium CE, the landscape subsequently became greener and wetter. In Amboseli, pollen cores indicate that from ~2000 to ~400 years BP around Esambu, between ~2000 to ~900 years BP at Enkongu, and after ~1700 to ~1200 years BP at Namelok there was increased moisture and fire activity, along with an expansion of shrubby and woodland taxa reflecting higher pollen diversity overall (Githumbi et al. 2018a; Rucina et al. 2010). Afromontane taxa from adjacent highlands also increase from ~2000 to ~400 years BP (Githumbi et al. 2018a,b). Other palaeoecological studies in Tsavo (Gillson 2004) and Lake Challa (Rucina 2011) similarly show an increase in moist tree taxa, suggesting humid climatic conditions in the mid-first millennium. The general trend throughout eastern Africa is that slightly wetter conditions prevailed after c.1800 BP (Marchant et al. 2018: 339). Following this period of amelioration, from c.1200-800 BP regional environmental records indicate lake level low stands and a prolonged dry phase contemporaneous with the Medieval Warm Period (Alin and Cohen 2003; Öberg et al. 2013; Ryner et al. 2008). Boles (2017: 43) has raised the possibility that arid conditions presented a challenge to PN herders and encouraged diversification towards iron-facilitated farming and hunting, but as is often the case, it is not clear from the archaeological evidence and palaeoenvironmental proxy records that these changes were tightly synchronised.

It is interesting to note that Zebu cattle (*Bos indicus*, domesticated in South Asia) and/or Sanga cattle were probably present in East Africa by the mid-first millennium CE (Gifford-Gonzalez and Hanotte 2011). The arrival of Sanga breeds in Amboseli may have prompted significant transformations in pastoral economies as indicine/taurine hybrids are especially resistant to heat, ticks, and forage and water deprivation (Porter and Mason 2002). Herd sizes may have even increased or expanded into previously marginal environments as Zebu cattle became a fixture in the highly seasonal rangelands of East Africa.

Unfortunately, few sites can be securely dated to the start of the Pastoral Iron Age in East Africa. Important exceptions include the ‘main site’ at Deloraine which contains evidence for iron working and livestock herding c.1400 BP (Ambrose et al. 1984), and at Enkapune ya Muto c.1300 BP (Ambrose 1998). A single grain of finger millet was also recovered from Deloraine, along with a number of grinding-stone tools, suggesting to Ambrose and colleagues (1984) an agro-pastoral occupation. The Deloraine ceramic assemblage may reflect a transition from the remnants of an Elmenteitan tradition to the PIA (Ambrose et al. 1984; Sutton 1993a: 123). Other than this, evidence for farming or iron-working at pastoral sites in the Kenyan interior has yet to be documented until the second millennium CE.

Material from the Ilnyangusi Manyatta site does date to a period ranging from 887-1411 CE, and thus may cautiously be considered representative of the early Pastoral Iron Age in Amboseli. Like most of its contemporaries, there is no evidence for iron working or cereal

consumption at this site. Instead, Layer B deposits at the Ilnyangusi Manyatta site tentatively suggest people here were oriented towards pastoralism and stone tool technology during the Middle-Late Iron Age/early PIA. Ceramics from excavated deposits were rather non-descript and thus do not lend themselves to being lumped with any known archaeological ware. It is unclear what the ratio of wild to domesticated fauna was at the site, but the presence of enamel hypoplasia on a size class 2 Bovid (e.g. ovicaprid, gazelle, or impala) from Layer B deposits could indicate that animals in the area were experiencing stress, possibly due to drought. The site is also situated close to the Kitenden River, suggesting these pastoralists may have been tethering their mobility to water sources, as is seen in the Tsavo area (Wright 2007). Considering that occupation of the Ilnyangusi Manyatta site may overlap with the arid Medieval Warm Period, people were perhaps drawn to this riverine environment and the nearby wetlands of the central basin as they offered water and grazing.

An additional line of evidence pertaining to a Middle Iron Age occupation period in Amboseli could possibly be a sherd bearing some stylistic resemblance to Maore ware. While use of Urewe pottery (and so-called MIA ceramics) persists to the end of the first millennium CE in the Great Lakes area (Ashley 2005; Lane et al. 2007), and Kwale is supplanted by Early Tana tradition ceramics on the coast, between these regions after the Early Iron Age, use of Kwale ware pottery seems to gradually transition to Maore ware. Around 1500-1000 years BP in the Pangani basin (Walz 2010), the hills of North and South Pare (Odner 1971b; Soper 1967b), Taita (Collett 1985), and the southern slopes of Kilimanjaro (Odner 1971a), Maore ware appears (sometimes together with Kwale ware), persisting until around 1500 CE (Soper 1976; Walz 2010). Just east of the South Pare hills (Soper 1967b), and in the Usambara area Maore pottery is found together with beads made from marine shells that were probably acquired from coastal communities around the 10th century CE (Walz 2010). In the Usambara Hills Walz (2010: 208) suggests that Maore ware may have even been a trade good manufactured in the Pare mountains or somewhere further west. One sherd recovered by Foley during his survey in Amboseli is decorated with rocked zig-zag impressions (Fig. 3xiii, Appendix 2), and two sherds found in 2015 had bevelled rims (Fig. 2i, Appendix 2), both traits characteristic of Maore and Kwale ware. However, as previously mentioned, the rocked zig-zag impressed decorative technique persists on sherds dating to the Late Iron Age (e.g. Soper 1976), and the bevelled rims are not obviously assigned to either Kwale or Maore ware, and thus it is not possible to conclude a Middle Iron Age presence, let alone an early PIA farming/iron-working/coastal trade orientation in Amboseli from this evidence alone.

In comparison to the interior, we have a far better understanding of the Middle Iron Age on the coast of Kenya and Tanzania. A ceramic ware known as Early Tana Tradition (Fleisher and Wynne-Jones 2011) has become fundamentally connected to an early Swahili sphere of interaction (Horton 1994; Sinclair 1995). Like Kwale, Early Tana Tradition (ETT) ceramics exhibit a remarkable distribution, appearing at sites on the northern coast of Kenya and hundreds of kilometres into the interior of eastern Africa, and as far south as Mozambique (see Helm 2000 for review). Pottery identified in the Usambara Mountains and labelled as Group C by Soper (1967b) also falls under the umbrella of ETT (Fleisher and Wynne-Jones 2011: 250; Horton 1984). Sinclair (1995: 107) describes the makers of Tana Tradition ceramics as occupying a multitude of different sub-regions but ‘linked into a macroscale network’. ETT and Kwale pottery may be coeval in a few locations (e.g. LaViolette and Fleisher 1995), though generally ETT follows Kwale ware from around 1400 BP (Fleisher and Wynne-Jones 2011). While the widespread and inland distribution of ETT is demonstrative of the African roots of the coastal Swahili, how this network of shared stylistic commonality actually functioned, and what relations of trade may have operated within it, is largely unknown.

Another notable development of this period is that early urban Swahili settlements begin to emerge from around 1300 years ago on the coast (Horton 1987, 1996). Some of the items that entered long-distance international exchange via the Swahili coast, such as ivory, animal skins, and iron originated inland from an early age (e.g. Sinclair et al. 1993), and it is not impossible that these distribution networks stretched to Amboseli. Wright (2005: 123), for instance, reports that a cowry shell bead was found at the site of Kathuva, along the Galana River in Tsavo, dating to the 5th-7th centuries CE. Zebu cattle may have even possibly entered East Africa via Indian Ocean trade routes during the Middle Iron Age in addition to travelling overland through the Horn of Africa, though this has still to be confirmed (Gifford-Gonzalez and Hanotte 2011). Yet, in the early first millennium, imported goods such as pottery, glass and Asian crops and commensals seem to concentrate on coastal littoral sites, and even then occur only as a small percentage of archaeological assemblages overall (Chami 1994; Crowther et al. 2017; Haaland 1994/5; Prendergast et al. 2017; Wright 1993: 661). Generally, increasing evidence for overseas and inland trade comes from between the 9th and 13th centuries and onward, when stone towns grow dramatically in size and a fully Islamic Swahili urban culture emerges (Wynne-Jones 2007, 2016). Currently, there is no indication of coastal oriented trade in Amboseli in the Early or Middle Iron Age.

7.2. The Late (Pastoral) Iron Age in Amboseli

In the Late Iron Age, archaeological assemblages in eastern Africa are increasingly diversified stylistically and spatially. Further complicating this picture are oral traditions and linguistic evidence pointing to a myriad of complex small-scale population movements, amalgamations and consolidations. The antecedents of many of the socio-economic identities and languages expressed and spoken in East Africa today may be traced to this time period. Evidence for key archaeological sites, land use distinctions, ceramic types, and linguistic, palaeoenvironmental, and economic reconstructions in Amboseli are provided here. These evidence strands will be reviewed separately, as though they are certainly inter-connected, currently, there is simply insufficient data available to attempt to build a grand integrated narrative, nor would one necessarily be useful in so far as facilitating understandings of pastoralism in the Late Iron Age in Amboseli. Instead, in what follows I set out to detail Late Iron Age society in Amboseli using a polythetic range of evidential sources. In doing so, the overall trend is that during the Late Iron Age, the regional economy comprised a diverse array of interrelated production strategies pursued by people belonging to numerous linguistic groups. Archaeological and palynological evidence in Amboseli suggests that those who owned livestock embraced spatially and temporally varied systems of mobility, production, exchange, and consumption that from the 17th century at the latest included agricultural products.

7.2.1. Key archaeological sites

Of the sites excavated in 2015 in Amboseli, it is highly likely that five were occupied during the Late Iron Age (Kirinkai, Lemomo Hill, Ilmaarba, Olopoli, and Irrpurai). The Ilnyangusi Manyatta site may very well have been inhabited in the Late Iron Age in addition to, or instead of, the Middle/Early Pastoral Iron Age. Although the evidence is less conclusive, the site of RB probably has a Late Iron Age occupation episode. Apart from the sites described in Chapter 5, only two other excavations are known to have occurred within the wider Amboseli catchment, one in the Chyulu Hills, and the other in Rombo (Fig. 7.2).

Fig. 7.2 Late Iron Age sites in Amboseli

World Imagery provided by Esri, DigitalGlobe, GeoEye, i-cubed, USDA FSA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo, and the GIS User Community.

Beginning with the Chyulu Hills excavations near Ngungani spring, Soper (1976) identified a group of hut sites supposedly representing an agro-pastoral village along with a number of low mounds with burial deposits, all marked with a system of trackways, possibly the result of repeated livestock crossings. Soper (1976) excavated four earthen mounds: HcJp3, dated to 1415-1645 CE, 2 sigma range,⁵¹ yielded an Indian red drawn glass bead, and two iron arrowheads; HcJp4 had the remains of a child, an oval ring of copper/brass, and an Indian red cane-glass bead; from HpJp1 Mound 7 the partial remains of cattle, sheep/goat and a baby elephant were found; finally HpJp1 Mound 1 contained the burial of an adult female dated to 1320-1798 CE, 2 sigma. Based on the presence of postholes, Soper (1976: 95) hypothesised that the deposits at Mound 1 resulted from a person being interred in a 'sunken dwelling'. Soper (1976: 95) excavated an additional three hollows at the site of HcJp2, located 300 m south of the mounds. He believed these hollows were the remains of four levelled hut-sites from a hillside containing at least twenty-three similar features. Potsherds were found throughout the HcJp2 sites (including some with 'walked' double rows of impressions, a Maore like feature), as well as one iron arrowhead from a deposit dated to 991-1234 CE, 2 sigma (ibid. 98). If the date from HcJp2 is in fact associated with the archaeological material at the site, then there is evidence for iron tool using occupants in the Amboseli ecosystem at the start of the Late Iron Age. No lithics were reportedly recovered from any of these sites.

The early date from HcJp2 may be erroneous, and Soper (1976) himself posits a short-lived occupation occurring around the 16th century is the most likely scenario based on the level of ceramic continuity at the sites he excavated near Ngungani spring. Nonetheless, it is still

⁵¹ Soper's (1976) listed dates have been calibrated using OxCal v4.3.2 Bronk Ramsey (2017) and SHCal13 atmospheric curve (Hogg et al. 2013).

premature to rule out the possibility of multiple occupation episodes in the Ngunguni area of the Chyulu Hills.

There is no direct evidence to support or negate the presence of agriculture at the Ngunguni sites though in the early 20th century Akamba people living here were cultivating maize and other crops in cleared forest areas, in addition to keeping a number of sheep and goats (Soper 1976). Average rainfall for the Ngunguni sites is estimated to currently be around 1000 mm per year (Hijmans et al. 2005). As no archaeobotanical sampling was conducted at the Ngunguni sites it is not possible to say if people were cultivating or consuming plants here, but current land use practices and rainfall regimes indicate it is certainly possible.

The vessels from Chyulu are described as ‘medium to large-sized globular necked pots with round base, relatively wide mouth, and short everted rim’ (Soper 1976: 99). The ceramics at HcJp1 (mound 7) feature rocked zig-zag impressions, decorative elements that Soper (1976: 105) ascribes to be akin to Gatung’ang’a and Maore wares. The presence of double rows of walked impressions and sinuous incised lines on potsherds at HcJp2 also implied to Soper (1976: 105) an affinity with Gatung’ang’a ware. Pots with raised notch ridges are also present at the Ngunguni sites of HcJp1 (mound 1) and HcJp2. Soper (1976: 105) considered the Ngunguni pottery to be an amalgamation of cultural influences from central Kenya and from north-eastern Tanzania. Although it would be advantageous to run a few more radiocarbon dates from the Ngunguni sites, from Soper’s (1976) publication, we have evidence that Late Iron Age inhabitants of Chyulu had livestock but also hunted, and were using iron goods and accessing beads of coastal origin.

Also within the Amboseli ecosystem is the site of Rombo, situated on the north-eastern slopes of Kilimanjaro (Fig. 7.2). As a full detailed account of the excavation of this site has yet to be published, I include here a review of the manuscript Kiriamia compiled on his research in Rombo. Kiriamia (1990: 107) wrote that he found the Rombo site on a plateau a kilometre north of Rombo town, Kenya. Based on this information, we can estimate that the site is located at 1160 m above sea level, currently receiving approximately 950 mm of rainfall per year (Hijmans et al. 2005), making it one of the more well-watered locations in Amboseli, and suitable for cultivation.

The Rombo site is described as eight artifact scatters spaced an average of 26 m apart, possibly representing the location of a single-occupation village (Kiriamia 1990: 107). Excavations were conducted over two of the ‘house scatters’ (ibid.). Kiriamia (1990: 128-129) notes that thirty-nine beads were recovered at the site including twenty-one shell beads of mixed marine (cowry) and terrestrial (*Achatina fulica*) origin, eleven beads made of glass (described as mostly blue-green but with one red Indian glass bead), and seven made of aragonite.⁵² A number of iron goods were also found at Rombo including an arrowhead, two spear tips, a small cylinder and a broken earring, though Kiriamia (1990: 129-130) found no conclusive evidence for iron-working. In addition, fragments of one or more ivory bangles were found during excavations at Rombo (ibid. 110), which may be of elephant ivory.

Lithics were recovered from the Rombo site, and were described as ‘flakes and debitage of obsidian and quartz and some basalt grinding stones’ (ibid. 111). Kiriamia (1990: 111) noted that the obsidian from Rombo turns grey when reflected against the sun, suggesting it could be sourced from the Naivasha-Nakuru basin. However, within the same report Kiriamia (1990: 130) also wrote that only ‘six quartz flakes and three basalt grinding-stones were recovered at the site’, so it is unknown how the obsidian figures into this assemblage.

⁵² Aragonite, sourced from the shell of the Giant Clam (*Tridacna*), is of coastal origin.

From the faunal remains listed by Kiriama (1990: Tables 5.11-5.13) it is apparent that people at the site were consuming mostly sheep and goat, followed by cattle. A wide range of wild animals were also evidently hunted, including impala, gazelle, warthog, and zebra, and a species of Numididae, which could mean people were keeping guinea fowl. No flotation samples were processed from this site, and thus it is unknown if people were consuming or cultivating plants.

The Rombo site also contained a human burial, a single adult male found within what was believed to be the remains of a house (Kiriama 1990: 198). Kiriama (1990: 155) reports that the individual had their two lower incisors removed, and was buried in a contracted position with their head facing Mt. Kilimanjaro.⁵³

Excavations at the Rombo site yielded ~100,000 potsherds (Kiriama 1990: 115), which Kiriama (1990: 125) believes were manufactured locally (see Fig. 4 Appendix 2). Kiriama (1990: 143) conducted multi-variate analysis on ~60,000 of the Rombo ceramics focusing on the layout and sequence of decorations, decorative motifs, and vessel morphology. The same analysis was applied to samples of Kwale and Maore ware, Group B, C, D, and E pottery, Kilimanjaro Groups A,B,C,D, and E pottery, as well as the ceramics from Chyulu and Deloraine (Kiriama 1990). Kiriama (1990: 149) found that the Rombo pottery related most closely to Maore ware ceramics from Usangi hospital.

A cursory examination of a select number of potsherds stored at the NMK indicates the Rombo assemblage contains a range of decorations and vessel shapes. Similarities to Maore ware from Usangi include patterns of double lines of impressions, and double or multiple impressed lines (Odner 1971b), but the impressions on the Rombo sherds do not appear to be made by the walking of a two-pronged instrument on the surface of the clay which is characteristic of Maore ware. Also, the vessel shapes at Usangi hospital include narrow-mouthed carinated bowls and bevelled rims (Odner 1971b), which does not seem to match the Rombo ceramics. Given the evidence, the Rombo assemblage seems to affiliate somewhat with Soper's (1967) Group D ware from Usambara (a regional variant of later Tana Tradition), as both contain round sided bowls, some with horizontal loop handles set below the rim. Decorative elements among both Group D ware and Rombo ceramics include raised 'pimples', and triangles and bands of rounded and hyphen-like dots. However, necked pots decorated with raised ridges also suggest links between Rombo ceramics, Kilimanjaro Groups C and D wares (Odner 1971a), and the pottery from Chyulu (Soper 1976), for example. The Rombo site has never been radiocarbon dated, though both Walz (2010) and Soper (1967b) believe Group D ware occurs in the Usambara area from around 1200-1800 CE. Kilimanjaro Group D ware dates to 510 ± 190 BP, while Group C ware appears sometime in the last two millennia, though probably around 1500 CE (Odner 1971a). A reasonable estimate for the time period during which the Rombo site was occupied would therefore be the latter half of the second millennium CE.

7.2.2. Key land use distinctions

The zooarchaeological assemblages from Late Iron Age sites in the Amboseli lowlands are rather impoverished, making it difficult to reconstruct dietary habits and livelihood orientations. However, Ololopoli and Ilmaarba can be considered pastoral glade sites, and there are some indications that clearings and deposits created by pastoral settlement during the

⁵³ The adult burial at the Ngunguni site was also noted to have three lower incisors missing with complete resorption of the bone (Soper 1976:93). The practice of ritual dental extraction is rather widespread throughout East Africa today however, and is not necessarily telling of any sort of commonality between the Iron Age inhabitants of the Chyulu Hills and Rombo.

Iron Age exist at Kirinkai, Ilnyangusi Manyatta, Lemomo Hill, RB and Osoit. The site of Irrpurai was not well preserved, but cattle remains suggest people were consuming livestock here. Only one site, Irrpurai, contained evidence for domesticated plants. The people who lived at Irrpurai appear to have been consuming finger millet, but none of the sites excavated in the lowlands were situated in areas that can be considered hot spots for cereal cultivation. Beyond the wetlands, by and large the availability of water in the low-lying areas of Olgulului/Ololarashi group ranch is not conducive to the growing of domesticates such as finger millet, pearl millet, sorghum, maize, pulses, and bananas in the absence of irrigation. All of the sites excavated in 2015 are located in places that are still, or were until very recently, occupied by livestock herders. We cannot, however, preclude the possibility that people living in the lowland sites in Amboseli during the Late Iron Age were hunting and also gathering seasonally available wild plants.

There are clear differences in site types across highland-lowland zones in the Amboseli ecosystem. The Chyulu Hills and Rombo sites are all located in higher elevation areas with annual rainfall levels estimated to be around 1000 mm. In contrast, the area surveyed in 2015 is adjacent to the low-lying Amboseli basin, where rainfall averages just 340 mm each year (Altmann et al. 2002). At Rombo, the density of ceramic artifacts far exceeds anything encountered at sites excavated in Olgulului/Ololarashi. Kiriama (1990: 101) also noted during his surveys around Rombo township that artifact densities declined at lower elevations. Additionally, in Olgulului/Ololarashi there is no evidence for architectural features similar to that seen at the Ngunguni sites (post-holes, sunken dwellings, or floors). This suggests that overall, Late Iron Age sites in the lowland areas of Amboseli have archaeological assemblages indicative of more ephemeral occupations, which may be a result of people in the dry lowlands practicing a greater degree of mobility during the last millennium, possibly in their pursuit of activities such as livestock herding or hunting. Along this vein, the archaeological signatures of highland sites suggest they may have been inhabited by people who were practicing more sedentary activities, such as agriculture. We should not conclude that there were two culturally or economically distinct highland and lowland people however, only that these areas are suited to different activities. Indeed, there are indications that these differences did not manifest as purely agricultural highland and purely pastoral/hunter lowland zones, as there is evidence for hunting and livestock consumption at both the Chyulu Hills and Rombo sites during the Late Iron Age. Moreover, archaeobotanical remains from the site of Irrpurai suggest people in the lowlands were consuming finger millet, possibly as early as the 17th century.

7.2.3. Key ceramic wares and decorative techniques

From around the start of the second millennium CE a number of highly diverse ceramic wares seem to indicate degrees of commonality, contact, and shared traditions linking the Swahili coast to its hinterland, to Kenyan and Tanzanian eastern highland communities, and to the lowland areas in between, stretching even to the Great Lakes region. Similarities in ceramic styles across large geographic areas in the Late Iron Age can be explained by both the trade of actual pots and the diffusion of stylistic attributes (Gosselain 2000; Lane 2009: 477-478; Oteyo and Doherty 2006). Archaeologists have yet to fully address the relationships between the pots and the people who inhabited this large and heterogeneous area during the Late Iron Age. Regardless, the ceramic elements that tenuously shed some light on the spheres of interaction linking Amboseli to wider regional networks of trade and connectivity are discussed here. More emphasis is placed on decorative techniques than vessel form, style, and method of production as due to the diminutive size of most sherds, there is not much information on these ceramic attributes in Amboseli.

The Tana Tradition continues into the Late Iron Age on the coast and its hinterland, with a growth in Swahili towns, overseas trade, and urban architecture from the 9th century CE (Wright 1993). Helm (2000: 68) contends that Soper's (1967b) Group D Dotted ware and Group E Graphited ware from the Usambara Mountains may be categorised as later Tana Tradition, suggesting some form of interaction between these areas. Walz (2010: 173) finds Soper's (1967b) Group D pottery emerging near Korogwe from 500-600 BP with marine shell and glass beads all signifying coastal linkages. As mentioned, there are some ceramic elements from the Rombo site that also suggest commonality with later Tana Tradition ware.

Another pottery ware potentially linking the coast and the Kenya/Tanzania interior is identified in the Pare Hills as Group B Combed ware (Odner 1971b; Soper 1967b). Group B Combed ware bears a strong resemblance to Combed Wavy Line pottery found on the Taita Hills and along the Sabaki River valley (Collett 1985) and also recovered at a number of coastal towns (Helm 2000: 67). Group B Comb ware from Bombo in the South Pare Hills and Comb Wavy Line pottery from Shanga both date to around the 9th and 10th centuries CE (Helm 2000: 67). Helm (2000: 67) notes that elements of Group B Combed ware and Comb Wavy Line pottery also appear within what Odner (1971a) calls Group C pottery, found on Kilimanjaro. Group B Combed ware, Combed Wavy Line pottery and Kilimanjaro Group C pottery seem to primarily be distributed between the coast and the eastern highlands (Helm 2000: 67). A solitary sherd collected in the Amboseli basin by Foley appears to have combed wavy line decoration (Fig. 3xi, Appendix 2), and two sherds found within artifact 'clusters' 37 and 72 while surveying in 2015 also have irregular waves (Fig. 2iv-v, Appendix 2) though it is difficult to conclude much from these small sherds.

Raised notched ridges are ceramic decorations that also deserve special consideration for their widespread appearance in the Late Iron Age. Raised notched ridges are characteristic of Kisima ware, a PIA ceramic known to occur in the Laikipia area, in Baringo, and to a lesser extent the south-eastern foothills of Mt. Kenya from around 1200-1750 CE (Causey 2010; Lane 2011b; Petek 2015; Siiriäinen 1984; Soper 1979). Kisima pottery tends to be thin and highly burnished, leading Siiriäinen (1984: 67) to suggest that Kisima is a late derivative of Akira. However, raised notched ridges are seen on pottery that is not classified as Kisima ware near Embu (Soper 1979) on Kilimanjaro (Odner's 1971a Group C and D wares) and also in the greater Amboseli ecosystem at Chyulu (Soper 1976) and Rombo (Kiriamu 1990). Raised notched ridges occur further south for instance on pottery at the Ivuna salt works in western Tanzania, dating to the 13th century CE (Fagan and Yellen 1968). Helm (2000: 68) suggests that sherds illustrated from Shanga as type 5 in ceramic phase A (Horton 1996: 254) are examples of a raised notched ridge ware, again demonstrating the widespread distribution of this decorative technique.

Just as Kwale ware is thought to have transitioned into Maore ware in the areas where it occurs, going inland from the coast, 'Gatung'ang'a ware' is suggested to be a derivative of Kwale (Collett 1985; Siiriäinen 1971). Located in the south-western foothills of Mount Kenya, the site of Gatung'ang'a, dated to the 12th-15th centuries CE, has pottery with distinctive 'rocked' zig-zag line impressions, incised wavy lines, and double lines of walked impressions, similar to that seen on Maore and Kwale ceramics (Siiriäinen 1971). The western distribution of 'Gatung'ang'a ware' appears to be the Aberdares, and it is found to the south near Ngong, and going east to Kilungu in Machakos, the Taita Hills, and Chyulu (Helm 2000: 66; Siiriäinen 1971; Soper 1976). As mentioned before, a solitary sherd from Foley's Amboseli basin collection has rocked zig-zag impressions and may be tentatively classified as either Gatung'ang'a, Maore ware or even Kwale, and an additional sherd (Fig. 3xvii, Appendix 2), was decorated with rows of impressions that resemble sherds seen at the Gatung'ang'a type site and in the Chyulu Hills at HcJp4.

Roulette decorated pottery is rather common in lowland sites in Amboseli as it is throughout eastern Africa. In the Great Lakes area, roulette decorated ceramics could be said to supersede Urewe ware around the beginning of the Late Iron Age (Ashley 2005). In Rwanda and Burundi roulette decorated pottery dates to the 9th century CE (Van Noten 1983), and in western Uganda from the 11th-12th centuries CE (Reid 1996; Robertshaw 2001). This decorative technique that first appears in western East Africa became widespread throughout the entire region as the Late Iron Age progressed, possibly because rouletting can be applied and replicated by potters with relative ease (Gosselain 2000), though roulette decoration is more frequently encountered at sites in the East African interior than at the coast.

In the Eyasi Basin of Tanzania, roulette decorated pottery dates to as early as 900 BP (Prendergast et al. 2007, 2014). Rouletted sherds belonging to a single vessel were also found at the site of Gatung'ang'a (Siiriäinen 1971). This style of ceramic decoration is seen in trace amounts in the Pangani area (Walz 2010: 111), and on the western slopes of Kilimanjaro (Odner 1971a). Most roulette decorated pottery in the Central Rift area is associated with Lanet ware, a PIA ceramic tradition dating to 800-200 BP that features elongated pots with handles (e.g. Posnansky 1967). Lanet ware is widely distributed in the Central Rift (e.g. Leakey 1945; Posnansky 1967) and the western Highlands (Sutton 1973), occurring in most of the areas where Elmenteitan and SPN traditions are found (Lane 2013: 127; Siiriäinen et al. 2009). Associated closely with Lanet ware are 'Sirikwa holes,' fortified pastoral/agro-pastoral settlements dating from around the 12th-18th centuries CE, and situated on hillsides from Lake Elmenteita to the western Highlands as far north as the foothills of Mount Elgon and the Cherangani Escarpment (Lane 2013: 127; Sutton 1998). Twisted-cord roulette decorated pottery was manufactured throughout the Late Iron Age and into the colonial era, however, and cannot all be associated with Lanet Ware. Twisted-cord roulette decorated pottery even features more recently in ethnographic collections made among 20th century Samburu, Pokoma, Luo and Okiek communities (Blackburn 1973; Siiriäinen 1984: 66; Sutton 1964). Some of the ceramics found at a 'Maasai' rockshelter site in Lukenya Hill (GvJm3) presumed to date to the 19th/20th centuries also have twisted-cord roulette decoration, and they are thought to have been acquired through trade with Okiek and Luo potters (Gramly 1975). Twisted-cord roulette decorated pottery is seen at lowland sites in Amboseli (Lemomo Hill, Ololopoli, and possibly Ilmaarba) dating to the 14th-20th centuries and single sherds were also found in artifact clusters 63, 90, and 118.

It is also worth considering sherds decorated with broad shallow grooves, as they were frequently encountered in the lowland sites in Amboseli, appearing at Kirinkai, Ilnyangusi Manyatta, RB, and Lemomo Hill and also in Foley's survey collection (Appendix 2). Outside Amboseli, broad shallow grooves are not an uncommon decorative choice, but neither is this diagnostic of any known ceramic ware. Gramly (1975) noted the appearance of sherds with broad shallow grooves at the supposed Maasai rockshelter site on Lukenya Hill (GvJm3), and he believed they were manufactured by Kikuyu potters in the 19th or early 20th centuries. I have considered whether I should offer the hypothesis that this decoration is diagnostic of Late Iron Age lowland sites in Amboseli. However, all of these broad shallow grooved sherds are from surface deposits, and thus it is unclear if they do in fact date to the Late Iron Age. Indeed, pots decorated with broad shallow grooves were in use in the colonial period, as they are found in stratified 20th century deposits at Empaash. This does not preclude the possibility that pots decorated with broad shallow grooves were commonly used in both the Late Iron Age and the colonial period in lowland areas of Amboseli, but erring on the side of caution, I will for now only consider this a decorative motif of the 19th/20th centuries.

Overall, elements linking assemblages from the Amboseli lowlands and highlands include sherds from both the Chyulu Hills and Foley's survey collection having rocked zig-zag impressions and rows of impressions. Decorative techniques linking the known Amboseli highland site assemblages to each other include raised notched ridges. All of these elements are characteristic of ceramics in the Late Iron Age in East Africa. It is difficult to ascertain if there is any ceramic stylistic elements that may have dominated in the lowland areas of Amboseli during the Late Iron Age. It is true that twisted-cord roulette decorated pottery appears at Late Iron Age sites in the lowlands (Lemomo Hill, Ololopoli, and maybe Ilmaarba) and not in the Chyulu Hills or at Rombo. However, the way that rouletting was applied on the sherds at these three locations appears to have been distinct, and considering the wide-spread appearance of this decorative technique throughout East Africa, including for example on Kilimanjaro (Odner 1971a), this is not evidence for any sort of noteworthy ceramic continuity at lowland sites during the Late Iron Age.

In sum, we can say that ceramics from surveys and excavations in Amboseli are quite heterogeneous but there are certain commonalities with pots seen across much of East Africa during the Late Iron Age, including those recovered in the Central Rift, the highlands of southern Kenya and northern Tanzania, and the coastal hinterland. From this we may conclude that people in Amboseli were not isolated from potting traditions practiced beyond this landscape, and thus there were no impermeable long-term socio-economic boundaries restricting access to this area. Furthermore, there is a great deal of internal diversity across the pottery used by people within the region during the Late Iron Age. The range of ceramic styles suggests that the processes by which people acquired and replicated decorative techniques and/or traded pots were diverse through time and space.

7.2.4. Key linguistic reconstructions

It is worth stating now that attempts to reconstruct population movements that may have taken place hundreds or thousands of years ago from linguistic data gathered from contemporary people is not an exact science (Nurse 1997). A major challenge for archaeologists trying to make sense of linguistic models spanning large geographic areas and temporal periods is the lack of consensus among linguists themselves (Blench 2013). In truth, understanding how people who ostensibly belonged to the same language family may have shared certain cultural practices, landscapes, group identities, and material culture is complex and beyond the scope of any one discipline (Blench 2006). As it stands, the archaeological record in Amboseli does not allow for us to associate Late Iron Age sites with contemporary or 'proto' ethno-linguistic groups. Still, language can certainly be implicated in forming and recreating important social divides that can persist for generations (Blench 2015: 146), and thus linguistic evidence for the peopling of Amboseli during the Late Iron Age is reviewed here.

Historical linguistic and oral historical evidence suggest that the eastern and northern slopes of Mt. Kilimanjaro, presumably including areas of the Amboseli ecosystem, were occupied in the early second millennium by Ongamo-Maa speakers (Ehret 1971; Sommer and Vossen 1993; Vossen 1982). Ongamo-Maa belongs to the Eastern Nilotic language group, and the antecedents of this language group probably emerged somewhere in the region of South Sudan during the first half of the first millennium CE (Ehret 1974; Sommer and Vossen 1993). From this inferred homeland, proto-Ongamo-Maa speakers moved southward toward the Central Rift (Sommer and Vossen 1993) to an area Ehret (2011) contends was the Baringo basin and Laikipia Plateau in the latter half of the first millennium CE. A large number of Ongamo-Maa speaking people evidently migrated onwards to the plains surrounding Mt.

Kilimanjaro by no later than 1000 years ago, while others remained in the Central Rift (Sommer and Vossen 1993).

Ehret (1982: 144) has argued that with the expansion of Ongamo-Maa speakers in the first centuries of the second millennium came the spread of Lanet ware and Sirikwa holes. Sutton (1998), on the other hand, favours the idea that 'the Sirikwa' were in fact an early Kalenjin people. While we cannot know with certainty what languages the makers of Sirikwa holes and Lanet ware spoke, Sutton (1998) has suggested that the Sirikwa sites in the Nakuru region exhibit a reliance on pastoral products that is also seen among later Maasai communities, implying that the Maasai may have been significantly influenced by the so-called Sirikwa. This is certainly possible, although there is no reason to believe that the people who made Sirikwa holes and Lanet ware were the only pastoralists in East Africa during the Late Iron Age. As perhaps attested to by the considerable loan word set that Ongamo-Maa acquired from Eastern Cushitic and Southern Nilotic language speakers (Ehret 1974), it seems that Ongamo-Maa speakers were both influenced by and influential to a number of groups in East Africa and beyond.

Ehret (2011: 141) writes that in the decades immediately following 1500 CE, there was another expansion of Maa-speakers southward from Baringo through the Rift Valley of Kenya and into northern Tanzania. Linguistic evidence and oral historical sources appear to confirm the presence of Maa-speakers in the southern Rift Valley and surrounding plateaus by approximately 1600 CE (Ehret 1984a; Fosbrooke 1948: 5; Jacobs 1972: 83; Lamphear 1993: 69), though as discussed in Chapter 8, people who identified as Maasai may not be present in Amboseli until the 19th century.

The oral-histories of the Ngasseni people recorded by Kathleen Stahl (1964) provide some context to this linguistic reconstruction. The Ngasseni (or Ngasa) are the last speakers of Ongamo, a language that is nearly extinct in East Africa (Batibo 2005: 151). As previously stated, some historical linguists place the arrival of Ongamo-Maa language speakers on Kilimanjaro c.1000 years ago. According to Ngasseni oral-histories, their ancestors were 'hunters and, using trenches to trap wild animals, they lived on game, fruits, and honey' and 'they acquired cattle and planted bananas' living in 'scattered pockets of settlement' throughout the northern side of Kilimanjaro (Stahl 1964: 344). Ehret (1984b: 490) contends early Ongamo-Maa speakers on Kilimanjaro also grew finger millet and sorghum. At some point, conceivably in the last c.500 years, the greatest enemy of the Ngasa, the Maasai (though also possibly a reference to an earlier Maa-speaking group), living in the vicinity of Kilimanjaro's northern slopes and around Ol Molog, attacked the middle zone of Ngasseni occupation and caused them to evacuate in two directions, some going to Ngasseni and others to Siha (Stahl 1964: 344-345). Stahl (1964: 345) also writes that 'according to Ngasseni oral traditions, in the old days the Masai were living 50 to 100 miles away but in the 19th century they moved closer and major cattle raids between the two began.' It is not entirely clear from Stahl's account if the Ngasseni oral history describes the Ngasa retreating from the northern slopes of Kilimanjaro due to an early Maa-speaking group and then being attacked again in the 19th century when Maasai cattle raiders encroached on their territory, or if they were only displaced once and that this happened during the last two-hundred years. It does seem reasonable to assume that before the 19th century, Maa-speaking people would have encountered Ongamo speaking groups on the northern slopes of Mt. Kilimanjaro however.

I have attempted to discern if there is anything to signify the appearance of a new population in Amboseli in the 16th century, which we may possibly associate with an influx of Maa-speaking pastoralists. Lane (2011b: 22) noted that the archaeological record does not indicate the arrival of novel pottery traditions or changes in artifact styles in Laikipia c.500 years ago,

and strong material evidence for such an association has yet to be established elsewhere. In the lowlands of Amboseli, the only sites with radiocarbon dates that could attest to a 16th century occupation are Ololopoli and Lemomo Hill. Looking at the evidence, one could argue that twisted-cord roulette decorated pottery, iron, and beads of coastal origin all appear for the first time in the lowlands of Amboseli at these two sites. If we assume that Soper's (1976) earlier date for HcJp2 is incorrect, then it could also be said that iron and glass beads also appear from the around the 16th century at the Ngunguni sites. However, twisted-cord roulette decorated pottery, 'Indian'/brownish red beads, and iron all feature in the archaeological record elsewhere in East Africa prior to and after c.500 years ago, and thus it is not possible to establish a convincing link between these artifact types and 15th/16th century Maa-speakers from northern and central Kenya.

It is equally plausible to argue for continuity in the material culture. For instance, similarly small lithic assemblages invariably including artifacts made of quartz, chert, and local and non-local obsidian were found at Kirinkai (c.13th century), Ilmaarba (c.15th century), Lemomo Hill (c.14th-17th centuries to contemporary times), and Ololopoli (c.15th-17th centuries). Or we could point to the considerable antiquity of ostrich egg shell (OES) beads, which are used by Maasai people in Amboseli today: an OES bead fragment from the Ilnyangusi Manyatta site was dated to the 13th-15th centuries, and a bead blank from Lemomo Hill was dated to the 14th-17th centuries. In truth, the palimpsest formation of pastoral sites in Amboseli, compounded by ambiguities in the radiocarbon dates, make it rather futile to assert there has been either continuity or change in the material culture that can be associated with a Maa-speaking population expanding southwards c.500 years ago.

While there is more evidence for pre-colonial Ongamo-Maa/Maa speakers having a presence in Amboseli, a focus on these two linguistic groups threatens to eclipse the possibility that there were other languages spoken here during the Late Iron Age. It is thus also worth mentioning that Soper (1976: 109) once suggested that the Ngunguni sites were occupied by a proto-Akamba population in the 16th century, making this tentative assertion because the area has historically been occupied by Akamba people, and because the pots seen here are linked to Kwale and therefore Bantu speakers. Overall, the narrative of continuity wherein early Bantu speaking Kwale makers become the Maore/Gatung'ang'a producing occupants of Chyulu, and finally the contemporary Akamba people of East Africa is problematic. Some linguists argue that the Akamba language is affiliated to western Bantu speakers who migrated into the region during the second millennium CE, negating a connection between Kwale ware and 'proto' Akamba people (Huffman and Herbert 1995). There are other reasons to pause when making direct links between ceramic types and 'proto-identities' not least of which being that stylistic differences and similarities on pots can signal more than just ethnicity (Conkey 2006; Jones 1997). Still, it would be wrong to discount the historically significant presence of Akamba people in Amboseli who some contend (Jackson 1976; Matheka 1992) were pushed out of the Kilimanjaro plains by Maa-speakers in the 16th century, leading them to settle in the Chyulu Hills.

The full range of linguistic groups that inhabited Amboseli in the Late Iron Age is unknown. There may have been Cushitic-speaking people, even descendants of East Africa's Pastoral Neolithic inhabitants occupying this area until quite recently (Sutton 1993b: 49). Linguistic evidence may also indicate that pastures to the east of the Rift Valley including Amboseli and the foothills of Kilimanjaro were inhabited by Tatog or other Southern Nilotic speakers (Ehret 1971). We cannot dismiss the possibility that groups descended from autochthonous LSA hunter-gatherers lived here at some point, and there were clearly several small pockets of hunter-gatherers in the general area documented by early 19th/20th century ethnographers (Lane 2017). Bantu-language speaking groups on Kilimanjaro almost certainly used the area

for hunting, gathering, farming, and grazing prior to the colonial era. Indeed some communities that do not currently reside in Amboseli can still trace their history to this area. For example, Harries (1961: 145-147) documented that the Bantu-language speaking Rabai people have an oral tradition placing the origins of their ethnic community in Rombo, and that sometime during the Late Iron Age they migrated *en masse* from Kilimanjaro to Kilifi. There are examples of individuals and even entire linguistic groups in East Africa adopting new languages, ethnicities and geographic ranges as a result of such factors as marriage, conflict, economic incentives, or environmental stress (Anderson 2016; Cronk 2002; Hjort 1981; Waller 1985a). Certainly further research is required to understand which linguistic and ethnic groups occupied Amboseli over the last 1000 years, and it seems unlikely we will ever know all the details. Like in much of eastern Africa, there are real concerns about correlating archaeological patterns with linguistic ones to create comprehensive models of societal change (Eggert 2005; Kiriama 1993; Robertson and Bradley 2000). What is important to grasp however is that the linguistic landscape of Amboseli during the Late Iron Age was far from homogenous, but appears to have comprised a number of dynamic language groups that included, but was not limited to, pastoral Maa-speakers.

7.2.5. Key palaeoenvironmental reconstructions

In the wider region, east of the Rift the Medieval Warm Period is succeeded by what is generally described as a more humid but drought prone Little Ice Age from c.1250-1550 CE (Russell and Johnson 2007; Verschuren and Charman 2008: 212; Verschuren et al. 2000). In northern Tanzania pollen records indicate a more arid environment from 1420-1680 CE at Lake Emakat (Ryner et al. 2008), and from 1510-1640 CE at Lake Duluti (Öberg et al. 2013). In the Central Rift at Lake Naivasha, there were two decade-scale episodes of intense drought occurring at 1380-1420 CE and 1560-1620 CE (Verschuren et al. 2000). The environmental impacts of Little Ice Age climatic shifts were highly variable on the regional scale (Russell et al. 2007).

Following the Little Ice Age, palaeoenvironmental records indicate that over the last ~500 years the wetlands in Amboseli all experienced significant fluctuations in pollen, macrocharcoal and physiochemical characteristics (Githumbi et al. 2018a,b). Overall, grasslands spread and there are hints that drier conditions prevail in Amboseli after ~550 BP (Rucina et al. 2010) and in Tsavo from around 500 BP (Gillson 2004). Yet some change appears to have been highly localised, complicating straightforward interpretations regarding climatically driven shifts in wetland ecology. Generally, during the last 500 years charcoal concentrations decrease at Esambu, Ormakau, and Enkongu, though increase at Kimana (Githumbi et al. 2018a,b). The Enkongu wetland experienced a drop in water levels and reduction in size within the last five centuries, and the Namelok record shows a continued reduction in the size of the open water area (Githumbi et al. 2018a). Detailed analysis pertaining to the last 400 years has been conducted on the Esambu core, providing more information on this important time period than any other environmental proxy record in Amboseli.

From 400 to 300 years BP at Esambu there appears to have been an increase in open water followed by a drying episode, though dung fungal spore counts are consistent, indicating that large herbivore densities were not decimated by arid conditions (Githumbi et al. 2018b). There also appears to be a significant negative relationship between *Sporormiella* fungal spores and aquatic pollen diversity, and a significant positive relationship between dung fungal spores and Cyperaceae relative abundance over the last 400 years (ibid.), which could possibly suggest that the Esambu wetland was routinely inhabited by large herbivores during

periods of aridity. This may support a long-term pattern of increasing migratory herbivore biomass during dry seasons or droughts in Amboseli, as has been observed in the 20th/21st centuries (see Chapter 2).

Another interesting find from the Esambu pollen core is that from around 300 BP Poaceae pollen grains in excess of 60 µm appear in the record, accompanied by an increase in macroscopic charcoal (Githumbi et al. 2018b). Such large pollen grains fall under the category of morphologically domesticated Poaceae in East Africa (Colombaroli 2018) suggesting ‘more localised’ farming activity in the wetlands of Amboseli (Githumbi et al. 2018b). Likewise, a pollen core from Namelok analysed by Rucina et al. (2010) confirms the presence of domesticated cereals in the wetlands of Amboseli around 400 years ago.⁵⁴ Also found in the Namelok core was *Cannabis sativa* pollen, dating to 300-250 BP. Both the cereal and hemp pollen grains could be derived from plants grown in the wetlands, but we should not rule out the possibility they originated from nearby highland areas, such as Loitokitok for example.

It is important to note that these environmental reconstructions are not providing information on climatic conditions completely divorced from anthropogenic impacts. Research targeting how climate, vegetation, fauna, water availability, and people were all interacting and exerting influences on each other in East African contexts during the course of the Iron Age is in its infancy (see Marchant et al. 2018). For now, we may infer that during the earliest stages of the Pastoral Neolithic herders were not only responsive to environmental conditions, but also conditioned ‘emerging ecosystems’ (Hobbs et al. 2006; Milton 2003). The soil nutrient enhancing properties of livestock dung, for instance, are known to lead to distinct successions of vegetation on abandoned pastoral settlements (see Chapter 2). We can expect that species compositions and relative abundances were driven by human interventions as part of a process of landscape domestication (see Lane 2016a). As agricultural and iron producing communities became more established in East Africa, a transformation in the capacity for people to modify their environments, and to enact ‘human niche construction’ (Boivin et al. 2016) occurred. Introductions of novel agricultural crops to the region would have brought new pathogens, non-domesticated ‘weed’ species, and some pre-existing taxa would have thrived on the biomes emerging on cultivated plots (Baker 1991). The degree to which regional vegetation was modified by iron working is still under investigation, though iron manufacturing in East Africa required charcoal, the production of which can be (though certainly not always) linked to reductions in forest cover (Iles 2016). Defaunation linked to the coastal ivory trade could have been another factor inducing ecosystem shifts in Amboseli, as has been proposed for Tsavo, where increased hunting activity is suggested to have caused an expansion in scrub vegetation (Kusimba 2009).⁵⁵ Anthropogenically driven transformations of flora and fauna, potentially including land clearance and soil erosion on Mt. Kilimanjaro or in the Chyulu Hills may have also intensified during the Late Iron Age. Similar processes have been

⁵⁴ Rucina et al. (2010) found traces of cereal pollen appearing in the Namelok wetland from as early as 2650 cal. yr BP, with a marked increase from 580-400 cal. yr BP. As a pre-Late Iron Age date for cereal pollen has yet to be replicated in any other Amboseli cores (Githumbi et al. 2018a,b) I am inclined to err on the side of caution and only accept evidence for domesticated cereal pollen grains as being widespread in the wetlands of Amboseli c. 400 years ago.

⁵⁵ It is interesting to note that Gillson (2004) did indeed record a transition from wooded to more open conditions occurring around 400-200 years ago, followed by a return to wooded conditions in palaeoecological records from Kanderi Wetland, Tsavo. The expansion of scrub vegetation c. 200 years ago could thus be interpreted as evidence for declining elephant herbivory due to hunting in the 19th century, and not necessarily before. However, phase transitions such as this in palaeoecological records can be related to a variety of interacting factors, including fire, infrequent recruitment events, and herbivory (Gillson 2004) and it is still circumspect as to whether or not elephant hunting brought about ecosystem shifts in Tsavo in the last millennium.

documented in the Pare Mountain bloc over the last 2000 years (Heckman 2014), with a spike in what appears to be human landscape modifications associated with agriculture occurring around 500 BP and 200 BP (Finch et al. 2016). Anthropogenic transformations in Amboseli were not on a linear trajectory however, and as will be discussed in the following chapter, evidence from the 19th century suggests droughts, pathogens, and socio-economic upheavals could all introduce hiatuses and reversals in long-term trends.

7.2.6. Key evidence for trade and cultivation

As documented elsewhere (Crowther et al. 2017; Lane 2011b; Kusimba and Kusimba 2005), a dynamic mosaic of livelihoods including foraging, hunting, herding, farming, specialised craft production, and combinations thereof would have existed in the wider Amboseli area in the Iron Age. During the Late Iron Age, indications for production geared towards trade become increasingly clearer in Amboseli. That is not to say that this was not occurring prior to this period in Amboseli and in the surrounding region (see Kusimba and Walz 2018), but that historical accounts and material signifiers attesting to trade activities among people pursuing diverse livelihood strategies become more apparent.

A good deal of our knowledge for trade during the Late Iron Age is derived from the Swahili coast. While this growth was by no means linear or evenly spread, from the 12th-15th centuries relations of exchange linking the Swahili coast and inland communities in East Africa became more expansive. In 1498, the Portuguese arrived on the Swahili coast, and in the following centuries trade between Africa and Europe experienced a period of intensification, as did efforts at colonisation (Alpers 1992; Sheriff 1987). There is little known of how early European colonisation may have impacted interior communities such as in Amboseli, though Rebmann did write in 1849 that Chagga informants mentioned there having been a Portuguese settlement in Machame on Kilimanjaro two centuries earlier (cited in Odner 1971a: 133). I know of no other mention of this settlement in historical records from the 17th century however, and it is therefore challenging to interpret how pre-19th century European colonial pursuits were experienced by communities inland. Either way, the Portuguese lacked the resources to monopolise coastal trade activities and overpower Swahili and Omani resistance, and by the 1690s they had been expelled from the Zimbabwe plateau, had lost Fort Jesus to the Omani Arabs, and were made virtually redundant by 1750 (Horton and Middleton 2000: 83). The Omani elite went on to develop Kilwa and Zanzibar as the foci of their east African domain, and some consider the 18th century a Golden Age for the Swahili (Horton and Middleton 2000: 85). Others describe the 18th century in less glowing terms, referring to it as the period of Omani colonialism (Wynne-Jones 2010: 225). There is, however, a general consensus that a certain intensification in trade was underway between the coast and the interior by this time (Alpers 1975; Feierman 1974; Roberts 1970; Sheriff 1987).

Though the exact means by which people acquired these objects are unknown, beads at the site of Lemomo Hill, in various deposits at the Ngunguni sites and at Rombo indicate that Amboseli was connected to coastal trade networks, possibly from as early as the 15th century. These beads are not ubiquitous in all archaeological sites in the landscape, suggesting that we should not assume that everyone was acquiring goods through similar relations of exchange, though we can consider that the accumulation and redistribution of beads was linked to the trade in ivory and/or slaves in Amboseli during the Late Iron Age.

Textual silences leave gaps in our understanding of the chronological and geographical extent of slave trading in East Africa. While archaeological research has the potential to address these gaps, there has been a general lack of archaeological attention to slavery in the area (but see Horton 1996; Kusimba 2004; Lane and McDonald 2011; Walz and Brandt 2006). This is

very likely because recognising slavery in archaeological contexts presents certain challenges, not the least of which relate to aspects of equifinality with regards to this labour system (Alexander 2001). Generally speaking, the slave trade is thought to have been ‘modest in scale’ prior to c.1750 CE, though not inconsequential (Lane 2011c: 287). There are for instance estimates that between 2000 and 3000 slaves were being exported per year from the island of Pate (many coming first from Madagascar), as the Lamu archipelago was the main port of call for coastal slave traders from the late 16th century (Vernet 2009). After 1750 CE there was an increase in trade and the growth of chattel slavery (Alpers 1975; Sheriff 1987). From the 17th century Portuguese, Dutch and French powers facilitated the flow of slaves along Africa’s south-eastern coast and the slave trade expanded considerably here in the late 18th century as the demand for labour on French sugar plantations and in other international commercial operations grew (Alpers 1970; Lane 2011c). There was also acceleration in the circulation of firearms in the 18th century as guns became an increasingly desired commodity (Lane 2011c). How slave trading impacted people further north, and in the Amboseli area in particular prior to the 19th century is difficult to discern though destabilisation, migration, and investments in defensive and offensive measures would appear to be hallmarks of this enterprise (Kusimba 2004; Robertshaw and Duncan 2008). Indications for such are currently lacking in the archaeological record in Amboseli, but further targeted excavation of sites dating to the last c.500 years in the wider region could potentially detect trends which may either negate or support there having been disruptions linked to slave trading in this landscape.

The history of the ivory trade is also imperfectly understood. Evidence for ivory working from the mid-first millennium CE in Mozambique (Sinclair et al. 1993), South Africa (Coutu et al. 2016; Huffman 2009), and Botswana (Reid and Segobye 2000), and from the early second millennium CE in Uganda (Reid 2015) all indicate that this resource had value in the African interior and that some of it was very likely flowing to the coast at this time. Between 1000 and 500 BP, as Swahili settlements expanded from southern Somalia to northern Mozambique, demands for ivory in China, the Indian sub-continent, the Middle East and Europe were being met with East African supplies (Alpers 1992; Fleisher 2010; Horton 1987). By the late 16th century, there were extensive ivory-carving operations in the Philippines, China, and the Far East catering to consumers in Portugal and elsewhere, and the bulk of this ivory is believed to have been from African elephants (Alpers 1976; Lane 2015c). The widespread distribution of Swahili settlements along the coast suggests to Håkansson (2004) that the trade and hunting of ivory in the interior of eastern Africa must have been expansive during the Late Iron Age. Thorbahn (1979) has attempted to calculate how much ivory could be procured from the hinterland of Mombasa before supplies became scarce, and argues that coastal elephant populations could not have supported the extent of trade occurring before the 19th century. Thorbahn (1979: viii) asserts that by the 18th century the entirety of eastern Africa was exploited for ivory. Håkansson (2004: 566) pushes this date back further, arguing that by 800 BP at the latest ivory was flowing from much of eastern and south-central Africa to the coast, but this is difficult to substantiate. It is challenging to establish whether or not Amboseli was a popular elephant hunting ground at any point in the Late Iron Age, but elephant remains at the site of HcJp1 in the Chyulu Hills and what may be elephant ivory at Rombo could suggest some sort of connection to this trade.

Kusimba and Walz (2018) have made the point that we must understand Swahili culture as a product of interdependence and interaction between the coast and inland Africa that encompassed a great degree of heterogeneity. Importantly, the trade in ivory and slaves were not the only systems of exchange in place in the Late Iron Age connecting groups on the coast and people inland. Iron producers in the hinterland of south-eastern Kenya and north-eastern

Tanzania for example supplied coastal communities with metal (Chami 1992; Kusimba and Killick 2003; Walz 2010). While recognising that the Swahili world cannot be divorced from inland Africa, we must also acknowledge that glass beads seen at Late Iron Age sites may have been obtained by people in Amboseli not directly from Swahili traders, but through a myriad of possible networks, some of which may have been only tangentially related to systems of exchange oriented towards the coast. As Stahl (2010: 159) has expressed ‘a key insight that has emerged from studies that follow the biographies of objects as they cross cultural boundaries is that goods are not stable entities, fixed by their production and retaining essential qualities wherever they were traded.’ Rather, as Wynne-Jones (2010) has demonstrated at the salt production site of Uvinza in Tanzania, people make things commensurable with local goods and systems of exchange. In other words, focus on the coast and the deep links between the Swahili world and inland Africa need not eclipse the diversity of economic activity occurring in the interior.

During the Late Iron Age, the Great Lakes region for instance also played host to various noteworthy hubs of production and exchange, and we cannot rule out the possibility that people in Amboseli were somehow impacted by these developments, especially considering that in the 19th century some Maasai communities had long-standing relations with chiefdoms in the eastern extent of this area (Waller 1984). From the early second millennium the ‘Bwera’ economy was in place in the western Great Lakes region, based on a co-dependent system of cultivation and cattle herding (Iles 2010: 55; Reid 1990, 1991, 1998), with major communities of salt producers that were so specialised they relied on trade with nearby farmers for their food (Connah 1991). Iron was also produced, and being a commodity in great demand across the region it facilitated the accumulation of wealth in this area (Robertshaw and Taylor 2000: 216). From around the 17th century several medium-sized kingdoms had emerged around the Great Lakes and their prosperity continued to be linked to the control of labour, agricultural products, barkcloth, livestock, iron, and salt (Chrétien 2003; Robertshaw 2003; Sutton 1993c; Vansina 2004). In the 18th century, state capitals became increasingly peripatetic, and their power increasingly derived from cattle wealth (Robertshaw et al. 2004). This history underscores that in parts of East Africa, cattle, iron, and salt were more akin to commodities in the Late Iron Age than subsistence products.

Salt production appears to have peaked in the 19th century at locations frequented by caravans, such as Uvinza on Lake Tanganyika (Sutton and Roberts 1968; Wynne-Jones 2010). There is evidence that production at Ivuna salt works near Lake Rukwa was oriented with long-distance networks exchange from a much earlier age however, as ‘Indian Red’ beads have also been recovered from burials here dating to the 13th to 15th centuries (Fagan and Yellen 1968). Salt was not just produced for exchange with coastal traders, as salt was collected in the Amboseli basin and traded to people on Kilimanjaro in the 19th century (Meyer 1900: 103-104). In section 5.2.8. I discuss the possibility that there was some sort of salt processing happening at the site of Irrpurai in the Amboseli lowlands. There is no evidence that salt production was taking place in Amboseli on the same scale as that seen at the Uvinza or Ivuna salt works, but it seems likely that the ample salt deposits in the central basin were collected and exchanged during the Late Iron Age. Judging from the 20th century trade, much of this salt may have been unrefined. These salts may have been especially valued by people on Kilimanjaro who were stall-feeding their cattle, as is the case today.⁵⁶

Like salt refiners, iron smelters and blacksmiths were another widespread type of craft specialist in East Africa during the Late Iron Age. Evidence for iron production dates to the

⁵⁶ E.g. interview with Tatia Ene Lopenyet in Kimana, April 20 2015; Interview with Nkashau in Kimana, March 07 2015.

first centuries CE in south-eastern Kenya/north-eastern Tanzania (Schmidt 1988; Soper 1967a). From the outset iron smelting was very likely a highly specialised activity. While communities inland had been producing and exchanging iron for centuries (Kusimba and Walz 2018: 4) it may not have been until the Late Iron Age that iron production became truly widespread, and that iron products regularly entered regional rather than local exchange systems in the East African interior (Lane 2014: 295). As iron ore is not evenly distributed, people who were situated near good sources of ore and who had established iron smelting traditions were the ones who pursued this mode of production on a grand scale. Certain Pare and Shambaa clans in north-eastern Tanzania for example are renowned for their long history of smelting, smithing, and charcoal production (Kimambo 1969; Giblin 1992). Evidence for later second millennium iron production can also be found at pastoral sites on the Laikipia Plateau (Iles and Martín-Torres 2009; Iles and Lane 2015), and in the Loita-Mara region (Siiriäinen et al. 2009) and while this production is not on the same scale as that seen in the Pare mountains, smelting was not entirely the purview of non-pastoral groups. It is interesting to note that while iron goods were in use in Amboseli from at least c.500 years ago, no evidence for smelting (e.g. slag, tuyères) has been recovered here, nor are there any known local sources of iron ore. Similarly, though there are reports that iron ore supplies were exploited to a minor extent at Uru, Mamba and Marangu on Kilimanjaro (Wimmelbucker 2002: 62), most iron on the mountain is believed to have been acquired through trade (Moore and Puritt 1977). Likewise at the site of Engaruka (described below) there is evidence for iron tools but none for iron smelting, suggesting the trade in iron may have been expansive from as early as the 13th century around the Kilimanjaro cluster (Lane 2009: 477-478). We can probably safely assume that at least some of the iron recovered at Late Iron Age sites in Amboseli was acquired through trade.

Finally, in the East African interior ‘islands of intensive agriculture’ such as Kilimanjaro played an important role in Late Iron Age trade networks. These islands are situated at or near montane environments that are almost always on the margins of semi-arid lands (Davies 2015). During the Late Iron Age irrigation and terracing systems emerged in these islands allowing people to secure and increase their agricultural returns. The earliest firmly dated irrigation features on Kilimanjaro were built in the 18th century, though oral traditions, historical references, and linguistic evidence indicate that irrigation schemes were present on the mountain by the 17th century at the latest (Stump and Tagseth 2009; Stump 2013b: 675). Such technology was in existence since at least the 13th century as evidenced by the abandoned irrigated and terraced agronomy at the nearby site of Engaruka (Stump 2006; Sutton 2004). The spread of farming aided by irrigation and terracing attests to an intensification in agricultural production during the Late Iron Age, with some of this agricultural produce no doubt being used for trade.

Many people have offered theories as to why agricultural intensification occurred in East Africa during the Late Iron Age, and this will be discussed more in Chapter 8. No one model for intensification will ever be universally correct, as recent studies of intensification are bringing to light how this process can occur in subtle and gradual ways; intensification is not contingent on obvious internal or external pressures nor does it necessarily entail increases in labour expenditures or large-scale landscape modifications (Davies 2015; Stump 2006). Adopting new crops, for instance, can lead to higher yields without increasing demands on labour (Brookfield 1984: 16). For now, I will only mention that among the numerous impetuses for agricultural intensification in East Africa may have been the desire to exchange with herders: surplus crops in return for livestock and pastoral products (Davies 2015; Håkansson and Widgren 2007; Håkansson 2009). For many historical agricultural groups in East Africa, power was accrued in part through mutually beneficial exchange relationships

with herders, promoting dependency between pastoralists and farmers (Davies 2015). Those who had wealth in livestock could invest in labour, and this labour could be used to create infrastructure that intensified agricultural outputs, with these outputs being further invested in livestock, and so on and so forth (Håkansson 1998: 274). It is conceivable that with investments in irrigation and terracing occurring on highland ‘islands’ of intensive agriculture came an escalation in livestock trade having implications for pastoral producers living in the surrounding lowlands.

In this regard, it could be rather telling that at the site of Irrpurai there is evidence for finger millet consumption but not production c.300 years ago. I was advised that finger millet is not commonly cultivated in Amboseli’s wetland or dry lowland growing areas,⁵⁷ and while acknowledging that agricultural systems and landscapes are both liable to transform (e.g. Stump 2016), it seems probable that this finger millet was sourced from a higher elevation zone. There is thus the possibility that the millet recovered at Irrpurai may have been acquired through trade. Historically, irrigation on Kilimanjaro has been more associated with finger millet than any other crop (Stump and Tagseth 2009: 114), and some have even suggested that irrigation systems on the mountain were developed in order to grow *Eleusine coracana* (Dundas 1924: 262; Grove 1993: 441; Masao 1974: 6). According to Stump and Tagseth (2009: 114) finger millet does not fare well at higher and middle altitudes on the southern slopes of Kilimanjaro during the rainy season due to torrential rain and inadequate sunlight, and thus it must be cultivated using irrigation in the dry season (see also Curry 1939: 386; Devenne 2006: 204). Of course, growing conditions are not constant at all elevations and on all faces of Mt. Kilimanjaro. The finger millet found at Irrpurai could have alternatively been produced in closer proximity to Amboseli, perhaps on the northern slopes of Mt. Kilimanjaro (the drier, sunnier side of the mountain) without irrigation technology as is observed today (Campbell 2000: 345). If this was the case, the site of Irrpurai may have been occupied by people who divided their time and labour according to their occupation of highland-lowland areas in the Amboseli ecosystem, and cereal grains found at the site may not have been acquired through trade at all.

Maize on the other hand is commonly cultivated in the lowlands of Amboseli, and does well in the growing conditions of wetlands like Esambu and Namelok. Assuming the cereal pollen grains from the Esambu and Namelok wetland cores are predominantly of local origin, it is possible that some of the cereal pollen is *Zea mays*.

In the last 500 years domesticated plants from North and South America arrived on the African continent as part of the ‘Colombian Exchange’ (Crosby 1972). At least 15 cultivated plants including maize, tobacco, sweet potatoes, cassava, potato, tomato, and Capsicum peppers eventually made their way into the larders of farmers and others in East Africa. American crops such as maize likely arrived at trading ports along the Swahili coast with the Portuguese. Historical sources indicate maize was present on Zanzibar by 1643 (White 1949) and attest to its cultivation in Loitokitok in the 19th century (Meyer 1900: 118). Compared to historical texts, palaeoecological records find maize considerably earlier in inland areas of East Africa, for instance at Lake Naivasha c.500 BP (Lamb et al. 2003) and in the South Pare Mountains by around 400 BP (Finch et al. 2016). Wetland pollen records present the intriguing possibility that maize was being grown in the lowlands of Amboseli in the 17th century.

The adoption of maize in Amboseli may have opened up new avenues to cultivation in lowland areas that had previously been unsuited to cereal agriculture. The incorporation of maize into people’s diets in Amboseli towards the end of the Late Iron Age may have not just

⁵⁷ Email correspondence with Nelson Ng’ida, April 16 2018.

altered the agricultural potential of the lowlands, but also had significant implications for the health and/or wealth of its inhabitants. Maize provides mostly starch and few other nutrients, and must be eaten in combination with certain amino acids to avoid nutritional deficiencies (Miracle 1966: 11). On the other hand, maize has a quick maturation time, low labour requirements, and produces higher yields than many other indigenous African grains (Stahl 1999: 37), thus providing a ‘cheaper’ but less nutritious food source. The cultivation of maize on Kilimanjaro in the 19th century has been linked to a demand for food for trade and consumption in a time of great instability (Wimmelbücker 2002: 220-221 and see also Chapter 8), and similar processes may have also been at work in Amboseli prior to the 1800s.

Perhaps even more interesting is evidence for the presence of hemp in Namelok wetland (Rucina et al. 2010). *Cannabis* pollen in sub-Saharan Africa dates to as early as c.2200 BP on the island of Madagascar (Beujard 2011: 182) and it was widely cultivated throughout eastern and southern Africa c.500 years ago (du Toit 1975, 1976; Warf 2014), with the plant even growing wild in some areas (Burton 1860: 165). *Cannabis sativa* products can be used for fibre and textiles, as a source of food, and can also be smoked, and historical texts and archaeological finds attest to the latter use being common in the interior of eastern Africa around the 19th century (Burton 1860: 273; Sutton 1998: 92). Presumably the hemp grown in Amboseli c.250 years ago was being cultivated and consumed in some fashion by people living here, providing further insight into how not all agricultural pursuits should necessarily be considered oriented towards subsistence in the Late Iron Age.

There is some temptation to associate the Late Iron Age evidence for farming (particularly the tentative suggestion for maize cultivation in Amboseli) with an increase in slave trading, ivory extraction, and predatory capitalistic activity, as has been done in West Africa (Logan 2012). However, to conclude that farming in Amboseli is only ever practiced in response to external stressors and that it signals a deterioration in pastoral functioning would be an oversimplification. We can just as easily draw on ethnographic analogies demonstrating that farming can be carried out by pastoralists to reduce the offtake of livestock, contributing to food security and herd expansions (Homewood et al. 2009: 382). As matters, though, there is no evidence that the people who were farming in Amboseli in the Late Iron Age were also herding livestock.

Importantly, the cultivation and consumption of crops in the pre-colonial period does not appear to have contributed to declining livestock or wildlife populations in Amboseli. While we cannot conclude that agricultural practices in the Late Iron Age were entirely beneficial in ecological terms, in the 19th and 20th centuries Amboseli was renowned for boasting an abundance of large mammals (e.g. Rebmann 1848: 134; Schillings 1906: 90-92; Thomson 1887: 276). There is thus still the possibility that landscape transformations induced by farmers as well as pastoralists have contributed in positive ways to the biodiversity of the Amboseli ecosystem.

In sum, there were a number of goods being traded through regional networks of exchange during the Late Iron Age including, but not limited to, beads, ivory, slaves, iron, salt, agricultural crops, and livestock. Direct evidence for all of these has not yet been confirmed in Amboseli, but as we will see in Chapter 8, they were all being moved through this landscape in the 19th century, and pastoralists were integrated with this exchange. This section has examined how the antecedents of this trade activity in Amboseli may be traced into the Late Iron Age.

7.3. Conclusions

In this chapter I have reviewed the evidence for Iron Age occupation in Amboseli, with a special focus on the last millennium. The Early Iron Age can be very broadly understood as a transitional time, ushering in the widespread appearance of agricultural, iron working and Bantu-language speaking communities though wider regional trends suggest the termination of the PN and emergence of material culture and livelihood pursuits classically identified with the Iron Age would have been a patchy and uneven process. As of yet, no convincing evidence for Early Iron Age settlement has been identified in Amboseli, and evidence for occupation in Amboseli in the Middle Iron Age (or beginning of the Pastoral Iron Age) is uncertain as radiocarbon dates have not been conclusively established.

Towards the end of the Late Iron Age archaeological, linguistic, textual, oral historical, and palynological insights all contribute to painting a more detailed picture, and we can see that systems of agricultural and pastoral production and resource exploitation were both in operation in this landscape. Moreover, people living in Amboseli were receiving glass beads as part of a range of exchange relationships joining inland communities to each other, to maritime commercial worlds, and ultimately to global transactions and entanglements. As has been argued for the coastal hinterland (Helm 2004), Tsavo (Kusimba and Kusimba 2005; Wright 2005), and indeed all of eastern Africa (Stahl 2004b) it seems highly likely that Amboseli was characterised by ‘mosaics’ of interactions linking farmers, pastoralists, craft-specialists and hunter-gatherers in a heterogeneous linguistic and economic landscape. There is nothing to indicate that Amboseli was inhabited by sharply delineated communities of livestock herders, cultivators, and hunters with livelihood practices and ethnic-linguistic affiliations that remained entirely distinct and stable. Following the lead of Kusimba and Kusimba (2005: 412), we can challenge residual colonial perceptions of ethnic groups that have limited understandings of society and social interaction in Amboseli as having been ‘rigid’ and embrace an ‘ever-shifting kaleidoscope’ of livelihoods, land use, material goods, and relations of exchange in the Iron Age.

8 Amboseli in the 19th and 20th centuries

In broad terms, this chapter delves into discussing pastoralism in Amboseli under conditions of coloniality, comparing and contrasting Maasai livelihoods in the 19th and 20th centuries. Despite early alliances between the British and select Maasai people, Amboseli was quite rapidly enclosed within the Maasai Reserve in the early 1900s. This marks the beginning of a long period of proscriptions being placed on the economic, social, and physical mobility of pastoralists and others living here and it is important to not gloss over these transformations. However, I have also sought to challenge preconceptions of Amboseli's recent past that portray change in the colonial period as entailing a complete breakdown of earlier 'traditions'. Some pathways to accumulation did not persist into the 20th century, but others did, for example, barter trade between pastoralists and agriculturalists. New opportunities were also seized by livestock herders in Amboseli in the colonial period. As I will show here, the 19th and 20th centuries can both be understood as times when diversified herding lifeways in Amboseli were entangled with agricultural and hunter-gatherer modes of production, as well as global relations of exchange.

This chapter begins with a look at the economic and political transformations happening on the Swahili coast during the 19th century that can be linked to the emergence of new caravan trade networks and modes of extraction, production, consumption, and exchange in the interior of East Africa. Following this, a necessarily generalised overview of relations of exchange and commodity configurations operational in the wider Amboseli area is provided. The discussion then shifts to how investments in irrigation on Kilimanjaro experienced an increase during the 19th century, and considers how pastoralists in the surrounding lowlands may have been influential to these processes. Compared to the interest that has been expressed towards agricultural intensification in the 19th century, the ways that pastoralists, including the Maasai, may have modified their production systems in response to the changing economic climate have been relatively unexplored however. To address this disparity, we must first immerse ourselves in the question of who were (and who were not) Maasai in the 19th century and how it was that Amboseli came to be associated with this community of cattle herders. Rounding out this examination of 19th century pastoralists in Amboseli is a section devoted to provoking further inquiry into the processes by which Maasai people continuously adapted their practices in response to socio-economic and environmental dynamics. I then turn to an examination of how the colonial encounter impacted pastoral rangelands and people in the 20th century, drawing on material, oral historical, and archival evidence that speak to disruptions and continuities in herding practices and relations over the last two hundred years.

8.1. An introduction to trade in the 19th century

In the 19th century Zanzibar emerged as one of East Africa's main port cities as the trade in slaves and ivory between the coast and inland communities such as Kilimanjaro reached a new level. With the removal of the Portuguese and as internal conflicts between Omani successors de-escalated on the Swahili coast, Said bin Sultan moved his entire capital from Oman to Zanzibar in 1832 ushering in a new era of exchange (Horton and Middleton 2000:86). This new era entailed an intensification in slavery and slave trading in East Africa,

and an expansion of British commercial interests in the western Indian Ocean world (Alpers 1975; Glassman 1995; Sheriff 1987). Enforcement of British anti-slavery laws in the 1820s saw the export of slaves decline, but concomitant with this transition was a growth in sugar, clove and grain plantations on Zanzibar and at other coastal locales (Glassman 1995; Lane 2011c). With the growth of the predatory system of chattel slavery to supply plantations on the coast came more violence and inter-community raiding in the interior (Glassman 1995; Kusimba 2004; Sheriff 1987). The trade in ivory was even more profitable than that in slaves, more lucrative than any other goods being exported from the coast (Beachey 1967: 276). The trade in ivory hit its peak around the mid-19th century when the volume of ivory leaving East Africa increased exponentially (Thorbahn 1979: 285). The growth of the world market for ivory, and the expansion of Zanzibar's hegemony over trade on the coast were changes that had ramifications for communities inland.

Caravans were the means by which ivory and slaves were being moved to the coast in significant quantities in the 19th century, and the establishment of well-defined trade routes (Fig. 8.1) used by large caravans directly impacted interior populations (Håkansson 2007: 145; Koponen 1988: 73; Thorbahn 1979; Wynne-Jones 2016: 118-120). Caravans travelling in the interior for months on end and numbering up to 2000 individuals had to procure food and provisions along their way (Beachey 1967; Rockel 2006). In some locations, people sold their goods to passing caravans on an ad-hoc basis (Rockel 2006). Other communities lying along well-trodden caravan routes modified their production systems to yield surpluses to supply traders (Lane 2011c: 306). The following section provides an overview of the trade networks and currencies in play in the 19th century in the wider Amboseli area, before considering how pastoral and agricultural modes of production may have been influenced by transformations in the pace and scale of exchange at this time.

Fig. 8.1 General location of the main 19th century caravan routes in eastern Africa

Modified from Lane 2011c: 285, Fig. 13.1, originally based on Rockel 2006: 5, Fig. 1

8.1.1. Goods and networks

Trade throughout the region was shaped by the ecological zones in which resources and specialised producers could exist, though some resources were more fixed in the landscape (i.e. crops), while others were mobile (i.e. livestock, elephants). Population-dense farming communities in East Africa also tend to be ecologically constrained as they favour highland areas abutting semi-arid lowlands that are more suitable for pastoralism (Davies 2015). The highlands of Amboseli were the settlement zones favoured by farmers, while hunter-gatherers, herders and their livestock thrived in the vast and arid rangelands surrounding these agricultural islands. The boundaries between farmlands, rangelands and hunting grounds were neither permanent nor impenetrable, and certain landscapes were amenable to mixed livelihoods. Likewise, distinctions between farmers, herders and hunter-gatherers were not fixed, and institutionalised forms of reciprocity and exchange were important means by which people created and re-produced links between different ethnic and economic groups cohabiting East Africa in the 19th century (Waller 1985b: 359). Modes of production could hardly be considered exclusive as livelihoods were entwined by regular interaction and exchange.

Wealthy livestock owners could spread their animals and therefore their influence through loans, reciprocal herding arrangements and marriage, facilitating the transfer of livestock to those who were new to, or transitioning back into pastoralism (Waller 1988: 108). Yet livestock holdings were susceptible to drought, disease, and predatory raids. The internal social networks of pastoralists, reinforced by reciprocal stock exchanges, acted as a form of insurance (Dombrowski 1993: 28; Sobania 1991), although when losses were severe widespread help from stock-holding allies and kin may not have been enough to re-establish herds. Pastoralists in the 19th century always had the option of turning to farmers, hunters and traders to obtain alternative goods, or to diversify their livelihood strategies to varying degrees (Spear 1993; Waller and Sobania 1994: 54). People could also be assimilated into entirely new communities through rituals such as marriage and brotherhood bonds as well as the strength of their pre-existing economic ties (Davies 2015). This kind of social and economic mobility tends to be intense in areas where ecological zones meet, and in these areas personal networks that cross-cut lines of kinship, production and ethnicity can be just as important as membership ties to a single familial, economic or ethnic group (Waller 1985a: 87). Considering the ecological diversity of the Amboseli ecosystem encompassing both arid rangelands, and arable wetlands and highlands, we can imagine that exchange and interaction between herders, hunters, and farmers were of regular occurrence.

In the 19th century, caravan traders also had a significant presence in this landscape. Caravans travelled along three major corridors (northern, central, and southern) and while a multitude of smaller pathways continued to connect producers, consumers and exporters at the coast and inland (Koponen 1988: 68-70), Mt. Kilimanjaro in the 19th century was a main point of attraction for trade in the East African interior (Kersten 1869: 272). The northern route, originating from Mombasa, Tanga, and Pangani went inland to Kilimanjaro and branched off to Lakes Victoria and Baringo (Koponen 1988: 69). Amboseli was situated along this northern route (Wakefield 1870: 315). Traders were reliant on imported goods to meet tax and tribute demands, to pay the wages of caravan personnel, and to purchase foodstuffs and other items in the interior (Pallaver 2009: 23). Caravans specialised in furnishing interior communities with imported goods such as beads, cloth, and copper and brass wire. Different styles and colours of these imports were used by Maasai pastoralists and many others in the interior of East Africa to symbolise status and group identity (Pallaver 2009), as they continue to be today (Klumpp and Kratz 1993). Once acquired these goods were not just amassed however, but also widely circulated through local, interregional and long-distance trade

networks playing the role of intermediary currencies (Pallaver 2009: 22; Von Clemm 1963). Goods such as metal wire, cowries, and beads from the coast percolated throughout East Africa alongside countless locally produced items including foodstuffs, tobacco, ochre, hides, honey, salt, pots and iron (Leakey 1956; Robertson 1997). Much of the trade in the interior of Kenya dealing in more quotidian commodities like food, utensils and leather textiles was organised and conducted by Maasai, Akamba, Chagga and Kikuyu women (Hodgson 1999; Leakey 1956; Robertson 1997). In all likelihood, coastal caravan trade did not so much revolutionise economic activity in the interior as it tapped into existing networks of exchange to acquire food, portage, ivory, and slaves, in the process creating new resources and opportunities for accumulation.

There are few written records pertaining to trade in Amboseli, and there is no evidence that a major market town existed here, but sources indicate that caravans passed through the landscape on a regular basis. Travelling through Amboseli in 1882, Joseph Thomson described how caravans traded metal and beads with the Maasai in return for cattle (for food), donkeys (for carriage) and ivory (to bring back to the coast) (Thomson 1887: 159,161). Among caravan traders and communities inland, prices were correlated with the length of time that commerce had been going on in a particular place, being higher in areas where trade was long established (Burton 1870: 410). It is thus telling that in Thomson's (1887: 162) description of trade activity in the Namanga Hills, to the western most extent of the Amboseli ecosystem, he notes that cattle were obtained at 'enormous prices', suggesting this area was well articulated with caravan trade networks.

Hunters could be found criss-crossing agricultural and pastoral lands and liaising with traders, as they were especially adept at acquiring ivory. Various historical sources indicate that elephants were rarely seen in the area east of Kilimanjaro in the late 1800s due to extensive hunting activities (Wimmelbucker 2002: 130-131). Håkansson (2004) has suggested that from the mid-19th century there were 11,000 elephants killed annually in East Africa to supply markets in Europe and the Americas. However, very little is known about the local circumstances under which elephant populations were hunted in Amboseli. Historical sources from the 19th century indicate that the wetlands of the central Amboseli basin attracted wild animals in abundance, but they do not mention elephants as being among the most populous species (as is the case today), perhaps because ivory hunters were active in this area (Croze and Lindsay 2011: 26; Thomson 1887: 163; Rebmann 1848: 134). The exact extent of defaunation of elephants in the interior of East Africa through time is still under investigation (Coutu et al. 2016b), and for now we can only surmise that ivory was being extracted from Amboseli during the 19th century.

Caravans travelling to and from the coast were not exclusively in contact with elephant hunters though, nor did they necessarily obtain their ivory from the locations in which elephants were hunted. Some individuals in the interior positioned themselves as middlemen, exchanging ivory hunted by others to coastal traders. Certain influential persons, including those in Maasai communities, were well-served to profit from the ivory trade by forging close relations with hunters. The Maasai in Amboseli today refer to hunters using the umbrella term Dorobo. Dorobo can encompass people who have their own language and cultural traditions and do not identify as poor Maasai (e.g. Okiek). Maasai people in Amboseli also commonly affix an alternate meaning to Dorobo, using it to refer to '*hungry Maasai people who have no livestock...so they just decide to go to the forest and hunt animals*'.⁵⁸ Stockless Maasai Dorobo in the 19th century had the option of abandoning pastoralism altogether, or becoming the dependents of wealthier herders (Waller 1985a: 97). Those who opted for the latter route

⁵⁸ Interview with Kaputiti ene Kasaine in Kimana, August 22 2015.

could arrange to exchange livestock in return for labour and honey, and the skins, horns, feathers and ivory of wild animals until they had accumulated a herd of sufficient size to transition back into pastoralism (Berntsen 1976). This arrangement was beneficial to Maasai ‘patrons’ who had good commercial contacts and intelligence in the 19th century, as they could exchange ivory acquired by their dependents for a tidy profit.

Like the Maasai, historical accounts indicate that Akamba people were active in the ivory trade, both hunting elephants themselves and obtaining ivory from others (Håkansson 2007: 147; Kimambo 1996). Some Akamba people were commercial specialists, dealing in the import of goods from the coast and the export of ivory (Steinhart 2000). Krapf (1860: 144) described Akamba caravans of 200-300 people acting as a ‘commercial medium’ between the coast and the interior. Wealth in ivory was often converted by Akamba traders into wealth in cattle (Wimmelbucker 2002: 116), as some Akamba people were also engaged in livestock herding and agriculture. As in the 20th century, Akamba people also produced goods to trade in the interior, such as pottery, iron arrows, poisons, medicines, and surplus agricultural foodstuffs (Jackson 1976: 216-218; Matheka 1992: 82; Robertson 1997: 29). Akamba settlements stretched across a vast network of territories (Thorbahn 1979), including highland areas of the Chyulu Hills (Krapf 1858 cited in Soper 1976: 86). We can thus think of Akamba agro-pastoralists, hunters, and traders as being part of the Amboseli landscape during the 19th century.

In addition to ivory, iron also played a role in the regional economy. A number of communities on Kilimanjaro manufactured metal goods, and among the Chagga there were ‘very able smiths’, working iron ingots into spears and hoes (New 1873: 455). While there are reports that iron ore supplies were exploited to a minor extent at Uru, Mamba and Marangu (Wimmelbucker 2002: 62), North Pare was undoubtedly an important centre for metallurgy, as documented archaeologically and in various oral traditions (Iles et al. in review). Krapf (1860: 358) too observed that Chagga people obtained iron from the Pare region, and possibly from Akamba traders as well. The iron from North Pare was described as being ‘as good as Swedish steel’ (von der Decken 1871: 17). Spears, bracelets, hoes and other utensils were all created by specialists here, as were iron ingots (*menya* or *minya*), which may have been used as a currency (Wimmelbucker 2002: 61). In addition to locally sourced metals, iron, brass, and copper goods were also imported and distributed by coastal traders.

Though regularly overlooked, pastoralists were not just involved in trading metal in the 19th century, but also in producing it. Blacksmiths in pastoral communities provide essential goods and often fill ceremonial roles despite their tendency to occupy a marginal status among their fellow herders (Iles and Lane 2015). Maasai blacksmiths constitute a specialised sub-group called *Il-Kunono*, some of whom are said to have lived at times in settled communities quite distinct from other pastoralists, though they were still recognised as Maasai (Galaty 1979, 1982; Waller 1984: 248). Maasai in Amboseli today are more aware of *Il-Kunono* people having had a significant presence in Narok. The shaping and smithing of iron spears and jewellery was known to have been practiced by some Maasai in the Amboseli area during the colonial period, but not smelting.⁵⁹ Given the availability of iron during the 19th century, it seems likely that there were smiths in Amboseli who were making metal implements, but that smelting was a very marginal activity here, if it occurred at all.

Like iron, many inhabitants of Kilimanjaro were dependent on exchange to gain access to salt (Moore and Puritt 1977). Salt can be found in abundance in Amboseli during the dry season

⁵⁹ E.g. interview with Sayioki Oletilel in Kimana, March 8 2015; Interview with Mboikai Lembakuli in Olgulului/Ololarashi G.R., September 14 2015; Interview with Ngedo Punuka in Olgulului/Ololarashi G.R., September 11 2015; Interview with Peneti in Olgulului/Ololarashi G.R., September 14 2015.

when crusts form on surface deposits due to high rates of evaporation. Salt was collected and used by pastoralists to season their food (Krapf 1854: 25-26), and also traded to people on Kilimanjaro in the 19th century (Meyer 1900: 103-104). There are no indications that salt was being refined in Amboseli on a grand scale, though deposits in the basin were accessed and exchanged at this time.

Pottery was another good sourced from specialised producers, the majority of them women. While some pastoral groups in East Africa do produce ceramics (Grillo 2012), there is little to suggest Maasai in the Amboseli basin were engaged in this activity to a significant degree in the 19th century and the Maasai women that I encountered in Amboseli had no working knowledge of this craft industry. It seems likely that many pastoralists in Amboseli were obtaining pots through trade. Gutmann (1909: 169) recorded two places on Kilimanjaro where pots were being produced: Usseri in the north-east and Machame in the west. High quality pots were otherwise imported from Kahe and Pare (*ibid.*). Many pots making their way into Amboseli during the 19th century were probably acquired at markets on Kilimanjaro though other pathways cannot be discounted. For example, Akamba potters may have had a presence near the Chyulu Hills, or pots may have been obtained from itinerant Kikuyu traders.

More insidious is evidence for the slave trade. As will be discussed, violence could be considered more or less endemic in East Africa in the 19th century. Conflicts were not entirely predicated on the slave trade, but it was not uncommon for people to be sold into slavery following periods of turbulence, and therefore conflict and slavery must be viewed as connected (Iliffe 1979: 50). There is little evidence suggesting Maasai people were prolific slave traders, although Maa-speaking pastoralists are reported to have been sold into slavery on the Swahili coast after having come into conflict with other Maa-speaking pastoral people (Krapf 1854: 11-12). This suggests that Maasai individuals were both victims and, at least indirectly, perpetrators of the trade in human captives.

There were many currencies circulating through networks of exchange in the 19th centuries and they simply cannot all be discussed here, though among the multitude of goods, livestock seems to have played a particularly important role. Throughout the region social relationships were created and maintained through gifts, loans, and payments of livestock, and thus status and influence were conferred on those with stock wealth (Waller 1985a: 96). As ‘the lifeblood of political relationships’ in the regional economy, cattle were in high demand in the 19th century (Håkansson 2008: 248). Access to livestock throughout East Africa was conditioned by socially prescribed pathways including kinship, clan affiliation, age-sets bonds, stock friendships, tribute, patronage, payment for ritual services, marriage, and formal barter (Aktipis et al. 2011; Davies 2015: 9). For those with the right connections or having surplus capital of their own, pastoralists like the Maasai represented a reservoir of cattle wealth that could be tapped. Waller (1985a: 96, quoting John Lonsdale) has gone so far as to refer to livestock as the ‘universal currency’ and the Maasai, as owners of vast quantities of cattle, the ‘bankers’ of the Rift Valley.

This account is of course a necessarily generalised overview that makes trade networks and the Maasai both seem rather immutable and homogenous. As the following sections make clear, this was not the case at all. Rather, trade in the 19th century was conducted at a time when communities on Kilimanjaro were navigating dynamic processes of political centralisation and agricultural intensification, and Maasai identities in Amboseli and elsewhere were regularly being formed and reconstituted.

8.1.2. Evidence for agricultural and pastoral intensification/expansion in the Amboseli area

Irrigation networks in certain areas of Kilimanjaro experienced significant growth during the 19th century (Stump and Tagseth 2009: 111). This growth has been associated by some scholars with the caravan trade, as communities that were generating surpluses could amass and exchange imported goods (e.g. cloth, brasswire, and beads), ivory, slaves, livestock, and agricultural produce and use this wealth to direct more labour towards agricultural production (e.g. Håkansson 2004, 2007). Although the dynamics of intensification are still debated, there seems to be a consensus that such processes were contingent on various feedbacks arising from particular historical developments, environmental, political, and economic conditions, and also the agency of the individuals involved. Therefore, rather than focusing on the principality of any one discrete force driving people to intensification, this section instead discusses how pastoralists were involved in processes of intensification on Kilimanjaro in the 19th century through their role as mercenaries allied with powerful chiefs, as military opponents, and as partners in trade.

There are some who have suggested that agricultural intensification on Kilimanjaro was spurred on by Chagga political centralisation and the rise of powerful chiefs. Stahl (1964), for example, proposed that the initiation of certain spectacular irrigation schemes in the 19th century was undertaken by members of chieftain lineages. Stahl (1964) and other researchers (e.g. Håkansson 2008) have also suggested that intensive trade activities in the 19th century were linked to a centralisation of Chagga-speaking polities on Mt. Kilimanjaro. Orombo, for instance, is described by Stahl (1964: 348) as ‘the first of the empire builders on Kilimanjaro’, emerging around 1820 and coming to have dominion over much of the eastern side of the mountain (see also Wimmelbucker 2002: 93). The rise to power of Orombo and other chiefs on Kilimanjaro is linked to their control over the procurement, production and redistribution of such goods as ivory, iron, cattle and millet beer (Håkansson 2007: 145, 2008: 251; Kimambo 1996: 89; Tagseth 2010: 39). Associated with the ability to accumulate and redistribute wealth and power was the means by which people acquired and defended their resources. Protection and retaliation could be achieved through magical means (Moore 2009: 47), but also by physical measures. Towards this end, chiefs on Kilimanjaro were acquiring firearms (Johnston 1886: 252) and aligning themselves with certain influential Maasai in the 19th century in order to summon pastoral ‘warbands’ (Waller 1985a). However, while the authority of Chagga leaders was a factor in the production of agricultural surpluses, it was but one of many (Moore 2009: 51-52). As Tagseth (2008: 470) has found, oral histories attest to irrigation furrows on Kilimanjaro being initiated not exclusively by chiefs, but also by members of ‘commoner’ lineages, and even entire families of specialists. While centralised authority figures may have been partly responsible for the production of surpluses on Kilimanjaro, they were not the only means by which this was accomplished.

Another theory that has attempted to explain change among agricultural producers on Kilimanjaro in the 19th century is linked to the region wide atmosphere of unrest, and how conflict may have caused farmers to constrict their territorial ranges forcing them towards agricultural intensification. Wimmelbucker (2002: 69-70), for instance, has advanced a hypothesis that prior to the 19th century farmers on Mt. Kilimanjaro did not favour the eastern or southern slopes, nor medium altitude zones, and instead people moved freely and often between their settlements in the highlands to other economic engagements in the lowlands. Wimmelbucker (2002: 70-71) contends that only in the 19th century did growing antagonisms with pastoral lowlanders lead to the development of an agricultural belt at medium and high altitudes on Mt. Kilimanjaro, and a concentration of settlements on the southern and eastern slopes. This proposition has some merit, as the material remains of 19th century violence can

still be seen today on Kilimanjaro in the form of caves, dugouts and bolt-holes that were used to shelter people, cattle and valuables from those vying for control over resources, human captives, tributes, political power, and other elements of the caravan trade (Clack 2009; Silayo 2016). Maasai were known to have been among those that attacked agricultural settlements on Kilimanjaro (New 1873: 367). Orombo may have even clashed with Maasai over the use of hunting grounds and participation in the ivory trade in the late 1830s (Wimmelbucker 2002: 93-94). The oral histories of Ngasseni people of Kilimanjaro also suggest that people were forced to vacate the northern slopes of the mountain due to the incursions of cattle raiding Maasai in the 19th century (see section 7.2.4). We can thus consider that some aspects of state formation and agricultural intensification on Kilimanjaro in the 19th century were linked to what has come to be known as the 'siege hypothesis' (Gourou 1991 cited in Davies 2015 and Widgren 2004). Similar to the population density model for intensification first offered by Boserup (1965), the siege hypothesis argues that if a growing population is confined to a finite area of land, they will find ways to increase their agricultural productivity (i.e. intensification). However, the siege hypothesis does not address the evidence for amicable exchange relations between agriculturalists and pastoralists (e.g. Waller 1985a; Widgren 2004: 14). Though there was certainly conflict and cattle-raiding occurring between pastoral and agricultural groups, it seems that in the interest of self-preservation non-violent if cautious relations were often the norm rather than the exception (Waller 1985a: 88). For example, at the end of the 19th century Meyer (1900: 103-104) observed that farmers in Usseri and Ngasseni engaged in a thriving trade with the Maasai pastoralists living in the surrounding lowlands under the conditions of an armed peace. Therefore, while some communities engaged in farming appear to have undergone a period of spatial restructuring in response to the activities of pastoralists and others, the overarching trend was not one of self-imposed isolation, but rather the opposite.

Returning to the concept alluded to in section 7.2.6 of this thesis, another impetus for agricultural intensification during the 19th century may have been trade with pastoralists. Surplus commodities flowed through horizontal and vertical networks of exchange on and beyond the mountain, and only some of this trade articulated directly with caravans (Moore 2009). Among the configurations of commodities and exchanges operating in the interior of eastern Africa, the accumulation and redistribution of livestock was an important avenue to influence, prestige and in general, a way of creating and maintaining social and economic contacts within and between agricultural and pastoral communities (Håkansson 2007; Moore 2009: 471; Stahl 1964: 157; Waller 1985a; Wimmelbucker 2002: 74). The chief of Orombo, for example, is purported to have had immense herds of cattle that grazed on the eastern slopes of the mountain, animals which were acquired and distributed by means of tributes, trades, gifts, ceremonial offerings, and raids (Håkansson 2008: 251; 2009: 142,146; Moore 2009: 48-49). Not all farming households could invest their labour and resources in tending large herds however, owing to their commitments to alternative economic pursuits (Little 1992: 89-90), but also due to the range of ecological conditions, infrastructural investments, and proscriptions surrounding land use on Kilimanjaro. Thus farmers and agro-pastoralists on Kilimanjaro benefitted from being able to trade agricultural surpluses for livestock.

There was also a high demand for pastoral products in addition to entire animals, and trade was occurring between herders and farmers at highland-lowland 'border' markets on Kilimanjaro where women offered such goods as dried bananas and finger millet in exchange for meat and milk (Gutmann 1913: 502; Johnston 1886: 154,263; Willoughby 1889: 216; Wimmelbucker 2002: 62,110). Every Chagga chiefdom is purported to have encompassed at least one marketplace, and these were regularly visited by Maasai (Moore 2009: 46). Thus, motivations for intensification and the production of agricultural surpluses in the 19th century,

and very likely before this time, can be associated with the desire to acquire livestock and pastoral products from herders.

Unfortunately, the pathways by which pastoralists may have modified their production methods in response to economic changes occurring in the 19th century have been comparatively undiscussed, or are lacking supporting evidence. For instance, Håkansson's claim (2008: 252) that pastoral populations increased to such a degree in the 19th century that areas such as Pangani reached the limits of their livestock carrying capacity is entirely unsubstantiated. Though I believe Håkansson has been correct in furthering the idea that pastoral modes of production in certain locales must have been influenced by economic changes occurring in the 19th century, there were many processes of exchange and interaction between communities engaged in farming, hunting, and herding that predate the more formal global trading networks of the 19th century. Contrary to the notion that production was radically transformed from c.1800, zooarchaeological research in the Pangani area has found that during the 19th century the integration of settlements into caravan trade networks had little impact on animal food procurement strategies and consumption patterns at the household level (Biginagwa 2012; Biginagwa and Ichumbaki 2018). Moreover, at the salt production site of Uvinza in Tanzania, trade intensification and even the establishment of a Swahili/Omani settlement in the 19th century does not appear to have radically transformed social structures, forms of customary ownership, or the material culture corpus of people occupying this place (Wynne-Jones 2010). Davies (2015: 7) has argued that during the 19th century the caravan trade 'piggy-backed' on pre-existing relationships of exchange, but did not necessarily revolutionise them.

There are signs that the pace and scale of economic change in East Africa was significant in the 19th century with major implications for livelihood systems (e.g. Anderson 1988; Håkansson and Widgren 2007; Petek and Lane 2017). Yet there is no one answer to the question of how surpluses were produced and moved through networks of exchange, nor to how these processes differed from earlier times. It is increasingly recognised that regional histories of trade and production are complex and that their roots can be traced back much further than textual sources allow (Lane 2014). For example, trade between the coast and interior communities prior to the crystallisation of caravan routes in the 19th century was unlikely to have been characterised as random or comprised of simple 'down-the-line' exchanges, but probably entailed links with established chiefs or individuals inland (Wynne-Jones 2016: 120). It is also worth remembering that processes of exchange and interaction between specialised pastoralists, agriculturalists, hunter-gatherers etc. are not contingent on established global caravan trade networks (Davies 2015). In section 8.2 of this chapter, I explore these issues further and consider how the pastoral production strategies of Maasai people in Amboseli may have been influenced by the economic context of the 19th century, all the while acknowledging that there is still much work to be done.

8.2. Being Maasai in the 19th century

In what follows I examine the evidence for the 'origins of the Maasai' in Amboseli, and how the trajectory of this heterogeneous and dynamic group of pastoral people may have been influenced by relations of trade and exchange typical of the 19th century in East Africa. The issue of temporal baselines becomes salient here though, as oral histories and textual sources do not extend much beyond the 19th century in Amboseli. Determining whether or not the activities of Maasai in the 19th century represent a radical departure from pastoralists in Amboseli prior to this period requires sources with a greater time depth. Archaeological data can provide this time depth, but archaeologists in East Africa have only recently begun to

systematically study the centuries immediately preceding the 1800s (Lane 2014). The patchy nature of archaeological research in the wider Amboseli area, combined with a recognition that pastoralists can alter their livelihoods in numerous and often subtle ways in response to internal and external stimuli means that only crude estimates of changes in economic functioning can be generated at present. That being said, in the following section I review how historians have conceptualised the trajectory of Maasai people in the 19th century, and argue that this pastoral group (however loosely defined) underwent various transformational processes that although were not driven by any one singular force, were certainly influenced by the economic context of the time.

8.2.1. Maasai ‘origins’ and trajectories in Amboseli

Maasai people living in Amboseli today call the early Maa-speaking pastoralists who lived in the landscape Iloogolala, the ‘*ancestors of our ancestors*’.⁶⁰ Many Maasai traditions feature Iloogolala, who Waller (1979: 152) writes ‘are said to have occupied an area stretching from the Tana River to the Pangani River and including the western edge of Machakos District’ as well as ‘further west in the Loita Hills, Monduli, Simanjiro, and the Sanya Corridor’. Waller (1985a: 144) has further noted however that Iloogolala can be translated derogatorily as ‘people of hard teeth’, which carries connotations of gluttony, and may thus not have been the name the previous inhabitants of Amboseli would have used themselves. Nooltetein, a Maasai woman in Amboseli who is recognised to be of Loogolala descent likewise recalled that ‘*we are being told by our grandmothers that our kids will be born with big teeth and faces, and people are laughing at that*’.⁶¹ The evidence suggests Iloogolala is a name evoked in oral traditions referring to a number of Maa-speaking pastoral sections throughout Kenya and Tanzania that were in conflict with each other in the 1800s, during the Iloikop Wars. The historical identity of the Iloikop, a group that seem to have encompassed the Loogolala, is a pressing question, as it is at the heart of understanding who were and who were not the Maasai, and I will therefore expand on this here.

According to Krapf (1854: 7) Iloikop may be understood as a Maa-word meaning ‘those who are of, or in the country, to whom it belongs, the possessors of it, or those who have been there from the beginning’. The Maa word for land, *engob*, may be of relevance here. By the early 20th century, the unit on which Maasai land proprietorship was structured was the *olosh*. There are currently around 12 *olosh*, or Maasai sections, in Kenya, each corresponding to geographic locales. With further extrapolation, Iloikop may then be conceived of as a term used to refer to all of the Maa-speaking *olosh* in the first half of the 19th century. Yet Waller (1985a: 144) and Spencer (2004: 62-63) favour an alternative interpretation for Iloikop, finding it to be a translation of *iloonkuapi* or ‘people of other places,’ a term used by Maasai of one section to refer to Maasai of a different section. Waller also suggests that Iloikop may refer to Maasai people who have bad relations or ‘bloodguilt’ with other Maasai (1985a: 114). Adding but another level of confusion to this debate, Waller (ibid.) has also remarked that Rendille, Samburu and Parakuyu pastoralists all still use the term Iloikop to refer to themselves, making the bloodguilt explanation problematic. As Berntsen (1980: 5) has noted, a complicating factor for understanding Iloikop identity is that these terms have been undergoing continuous change. As the meaning of Iloikop, Iloogolala, and *olosh* have been ever-evolving, uncertainties arise for historians consulting early written sources that partially and imperfectly describe what it was to be Iloikop, or to belong to the land, at particular moments in time.

⁶⁰ Interview with Kalai Mukaie in Olgulului/Ololarashi G.R., August 23 2015.

⁶¹ Interview with Nooltetein in Kimana, March 4 2015.

Needless to say, tracing the origins of the Maasai has proved to be quite a task given the complexities of deciphering oral and historical sources, and the intricate ways through which collective identities manifest and are reproduced. In a more recent synthesis, Jennings (2005) asserts that Maasai sections first began to distinguish themselves from Iloikop society in the area south and south-west of Kilimanjaro, expanding outwards in the first decades of the 19th century. The timeline laid out by Jennings (2005: 102-103) is as follows: from 1800-1820 Iloikop sections were engaged in intense conflicts in the Lake Manyara area and by 1820 these militant Iloikop sections aligned with the *laibon* (diviner/prophet) Supeet. Other Iloikop groups also followed their own *laibons*, and the Iloikop wars have thus been described by some Maasai in retrospect as ‘a series of magical contests between rival laibons’ (Waller 1979: 217). Supeet encouraged his followers in distinguishing themselves from other Iloikop people and in refining a shared Maasai identity, including the use of a relatively cohesive age-set system that differed from that of other Iloikop communities (Fosbrooke 1956; Jennings 2005: 103). Over the next 30 years, Maasai groups conducted widespread cattle raids and campaigns of assimilation and displacement (Jennings 2005: 103). Around 1870, an alliance of Iloikop people united under the Laikipiak federation staged a resurgence in the Lake Naivasha/Nakuru area that ended with the Maasai becoming the most dominant pastoral group in East Africa (ibid.). Such a straightforward recitation of events by necessity glosses over the complexities of the multi-scalar conflicts and alliances that led to the emergence of the Maasai, all of which took place over the better half of a century. For one, power in the 19th century appears to have had a circumscribed nature among Maasai, as there were multiple people (*laibons* but also age-set leaders, and elders) on whom status was conferred relative to their social and spiritual skills. This power was recognised and could be used to mobilise groups of *il-moran* so long as Maasai followers saw appreciable benefits (Waller 1976: 541), and thus should not be considered as entirely centralised. Additionally, Jennings’ (2005) account is focused on the emergence of Maasai during the mid-19th century because his source materials - historical texts - do not extend beyond this period.

In contrast, Anderson (2016) has recently examined how the Iloikop Wars and the making of Maasai and Iloikop identities occurred in the wake of a catastrophic disaster at the beginning of the 19th century. Palaeoenvironmental records from lakes in Ethiopia, Uganda, and equatorial Kenya all show evidence of reduced water levels and in some cases complete desiccation at the end of the 18th century, followed by a relatively rapid recovery of lake levels around 1830 (Bessems et al. 2008; De Cort et al. 2013; Lamb et al. 2003; Verschuren et al. 2008). There may be signs that a similar drought occurred in southern Kenya and northern Tanzania from around the same time, but palaeoenvironmental records have been less conclusive (Öberg et al. 2012), and no such intense period of aridity has yet been observed for Amboseli.

Anderson (2016) has drawn attention to the fact that Maasai age-set names appear to commence with the Ilmeirishan, c.1811, when the drought would have been in full effect in the north, though not necessarily in the south. This possibly explains why pastoralists in the north, who may have experienced the drought in a more extreme manifestation, had a less well-defined ‘sense of identity’ compared to Maasai in the south (Anderson 2016: 59). For instance, little information exists regarding the Ilmeirishan age-set among northern Maasai communities compared to those in the south (Richard Waller pers. comm. October 2016). The Iloikop Wars also began towards the end of the 1830s, coinciding with the recovery of lake levels immediately following this decades long period of intense drought (Anderson 2016: 58-59). There may have even been a drought in north-eastern Tanzania c.1830 (Wimmelbucker 2009), perhaps acting to further catalyse Maasai movements north into Kenya. The impacts of the severe turn of the century drought on societies in East Africa must have been radical,

causing widespread famine and the loss of livestock and human lives on a grand scale, not to mention prompting major migrations. In the wake of the drought occurring in the early 1800s, we can imagine that livestock fatalities were significant. Cattle raiding was vital to success in the pastoral economy of the Maasai (Waller 1985a), and it is possible that the Iloikop Wars were in part driven by pastoralists trying to recuperate their herds after devastating losses. Violence among pastoral groups may have even been pursued as people were aware of the weakened state of their neighbours, and sought to take advantage by occupying depopulated areas once water availability had become more established. Alliance building through the spread of a united Maasai identity certainly also occurred and smaller communities that had been hard hit by drought and violence would have been incentivised to assimilate with larger, more powerful, groups.

It is challenging to say exactly how, in the years following this extended and extensive drought, the Iloikop Wars impacted pastoralists living in Amboseli. During the 19th century, populations occupying Amboseli were anything but homogenous or stable and the processes by which this landscape became established as a Maasai territory were highly convoluted. Krapf (1854: 5) writes that the Iloikop inhabitants of the area between ‘Usambara, Teita and Ukambani’ were the Enkang Lema, suggesting the Enkang Lema may have been present in Amboseli at some point in the 19th century. Enkang Lema are described by Hollis (1905: 261) as a subdivision of Laikipiak. It is thus interesting to note that in one of my conversations with a Maasai elder that Amboseli was described as having originally belonged to the Laikipiak and Loogolala people⁶², though this account was not widely corroborated among the people I interviewed. Parakuyo oral traditions also suggest a brief occupation of the Loitokitok area by Parakuyo Maasai (Jennings 2005: 44). While it is tempting to refer to Enkang Lema, Parakuyo, and Laikipiak as the pre-Kisongo/Loitokitok inhabitants of Amboseli, the history of territorial occupation by 19th century Maa-speaking pastoral groups, and the very constituents of these groups, is one of rapid and frequent shifts (Waller 1984). Affixing the name of one or two sections or clans to this landscape obscures the bigger picture. In the words of Fosbrooke (1948: 9) ‘a section is in the first place a fortuitous grouping of individuals’, and they are constantly in the process of making and unmaking.

The reality of the Iloikop wars to the north of Kilimanjaro seems to be that there was not a single ousting of a cohesive community from the area, but a series of back and forth confrontations (Jennings 2005: 117; Waller 1985a: 117). Throughout the 19th century Maasai livelihoods and identities continued to be dynamic as pastoral groups radiated, assimilated, dispersed, and pulsed again, largely, though not entirely, supplanting the Iloikop name. Confrontations implicated not only the so-called Iloikop and Maasai, but also a number of other ethnic communities. As Krapf (1854: 5) writes, the Enkang Lema ‘after first receiving a mortal blow from their brethren the Masai, and afterwards from the united forces of the Wakamba, Wanika, Waasuahili and Wateita, has in consequence of this disastrous catastrophe either disappeared, or retreated to the territory of other Wakuafi in order to escape utter destruction’. During this period, the Amboseli area may have become part of the so-called Wakwavi (Swahili term for Iloikop) Wilderness as the Maasai were unable to occupy all of the grazing lands that had been vacated due to conflicts (Waller 1985a: 118). The ‘vacuum’ created by the conflicts between pastoral sections allowed for the expansion of neighbouring groups into landscapes formally occupied by Maasai (ibid. 119). We can thus think of Amboseli as this time as embodying many of the qualities of a ‘frontier’ (Kopytoff 1987). According to an informant of Johannes Rebmann, by the 1840s there were Usseri people residing in the area of Lake Amboseli and Chagga people from the southern slopes of Kilimanjaro travelling to the basin to collect large amounts of ivory (Rebmann 1848: 134).

⁶² Interview with Lekanayia Musere in Loitokitok, March 2 2015.

Rebmann also learned around the same time that the 'Wakuafi' had recently expelled the Maasai who were living at Lake Amboseli (Rebmann 1848: 168). Presumably these Chagga/Usseri individuals were occupying the Amboseli basin for a spell as the pastoralists who had previously been residing in the area had entered into conflict with another Maa-speaking pastoral group.

The lack of consensus among Maasai I interviewed in Amboseli regarding relations with Iloogolala people and the means by which Amboseli became a Maasai territory is telling of a process that followed more than one route and had no clear end or beginning. Some Maasai in Amboseli trace their ancestry to the Loogolala (e.g. Nooltetein), suggesting pathways of assimilation were open, and indeed others explained how the Loogolala were '*the first people to be here*' (Amboseli), and the Maasai never fought with them, but rather '*they came and hid among the Maasai and pretended they are Maasai*'.⁶³ It was also described to me that the way that Amboseli came to be settled by the Kisongo Maasai was more opportunistic than strategic: '*most of us we have been here because of insecurity purposes that brought us here because people were very few and people were fighting here and there so we come from this movement and migrate and we find a place with no people and it's a very suitable place for keeping livestock and just living*'.⁶⁴ In stories of Maasai-Iloogolala relations, violence and conflict do feature however, and it was relayed to me that the Loogolala who had lived in Amboseli before had been chased and killed in a somewhat gradual process as '*they were moving out of Loitokitok side to Kaputei and they are getting diminished and then they are very finished*'.⁶⁵

Agricultural refuges were quite important for pastoralists affected by the turmoil brought on by the Iloikop Wars. The trade and agricultural oasis town of Taveta for example - so closely tied to regional pastoral groups that they adopted Iloikop/Maasai age-set systems - seems to have been an important sanctuary for stockless Iloikop people from Amboseli (Fosbrooke 1956; New 1873: 355; Spear 1997; Waller 1985a: 93). During droughts and periods of conflict pastoralists gained access to agricultural communities by drawing on strong pre-existing ties. Waarusha in Tanzania are another people that participated in Maasai age-sets and rituals, and still today trace their origins to the Maasai (Spear and Nurse 1992). In the 19th century, Arusha peoples had irrigated farms, enjoyed close trade relations with pastoral Maasai, and provided both agricultural produce and refuge to Maasai individuals during droughts (Spear and Nurse 1992: 484). Even certain Chagga communities on Kilimanjaro periodically followed Maasai age-sets in the 1800s (Fosbrooke 1956). It is important to understand that numerous historical sources indicate that while in the 19th century Maasai dietary ideals emphasised the consumption of milk, meat and blood, these proscriptions seem to have been more strictly adhered to by *il-moran*, but generally discounted by women, children and elder males (Waller 1979: 25). In the 19th century, there was no discernible farmer vs herder agenda, but rather complex and dynamic processes of conflict and alliance building, the latter often being predicated on relations of exchange.

The Iloikop Wars seem to have only really reached their conclusion around 1880 (Waller 1985a: 118), though even in the aftermath, instability remained. Maasai territory at this time was beginning a process of contraction after years of expansion, as the Maasai were incapable of defending the entirety of their vast rangelands (Waller 1985a: 119). Maasai in Amboseli, for instance, were on guard against attacks from Akamba in the 1880s (Thomson 1887: 155). There also appears to have been an unusually high concentration of Maasai south of Nairobi

⁶³ Interview with Leah Shinina in Kimana, April 21 2015.

⁶⁴ Interview with Lekanayia Musere in Loitokitok, March 2 2015.

⁶⁵ *ibid.*

at this time (Waller 1985a: 134). Pastoralists may cluster together to access forage during times of environmental stress, and to protect one another from raiders (McCabe 2004), though in doing so are more susceptible to disease outbreaks. Disease did indeed strike hard in the late 1800s and devastation was brought to livestock herders across East Africa in a series of events referred to as *Enkidaaroto*, or ‘the disaster’. An outbreak of bovine pleuro-pneumonia in 1883 was quickly followed by a drought, exacerbating herd losses from 1884-1886 (Waller 1985a: 133). In 1891, rinderpest raged through herds wiping out stock, and then in 1892 a smallpox epidemic hit a number of Maasai groups hard (Waller 1985a: 133-134). Cattle losses are estimated as high as 90%, while Maasai mortality rates have been suggested to have been up to 50% of the population overall (Leys 1973: 111). Raiding intensified among sections desperate to rebuild their herds (Waller 1985a: 134), adding another level of unrest to this period of loss.

The damages of *Enkidaaroto* were not equally distributed in time and space across pastoral rangelands in East Africa, however. In August of 1883, Thomson crossed through Amboseli and encountered Maasai ‘in some number’ with ‘large herds of fine cattle’ (Thomson 1887: 159), while in October found that Laikipia was strewn with the carcasses of cattle and concluded that ‘disease must be raging in the land’ (ibid. 204). Nearly a decade later in 1892, however, a British surveyor travelled to Loitokitok and was surprised to come across any Maasai people still living here at all as he had heard in Taveta that the Maasai were ‘nearly exterminated by famine’ (Smith 1894: 431). Taken together, the accounts of Smith and the German conservationist C.G. Schillings could both suggest that while Maasai populations were widely decimated in the early 1890s, individuals in Amboseli found refuge in highland areas. In 1896 Schillings visited the wetlands of the Amboseli basin during the dry season (when we would most expect the area to be occupied by pastoralists), and found it was entirely uninhabited. Though Schillings (1906: 94,304) encountered hunting blinds and abandoned pastoral settlements around the wetlands of the central basin, he evidently saw no living herders, hunters, farmers or traders at this time. This may be simply because Amboseli was heavily depopulated, but it could also be that Maasai people had become more reliant on agriculture than livestock, and thus were preferentially settling in arable highland zones like Loitokitok in order to rebuild their herds.

Visiting Loitokitok in 1898, Meyer (1900: 118) wrote that some years ago Maasai people here had become far more sedentary, and were cultivating beans, maize, and cassava.⁶⁶ Meyer (1900: 118) even noted that the houses in Loitokitok at this time were taller and more spacious than other Maasai houses, and were covered not with clay and dung as was customary, but with grass-thatching. The circumstances at the end of the 19th century were clearly engendering numerous significant economic and material transformations among pastoralists in Amboseli. Accounts also suggest that Maasai individuals from Amboseli who had sought refuge in Taveta a few years earlier were now returning to Loitokitok (Waller 1976: 534), and we can imagine some of these people provided useful links and skilled labour as agriculture became more established here.

Importantly, despite the shift towards sedentarisation and cultivation, this community was still identifying as Maasai. Evidently the *il-moran* in 1898 were not living in proximity to the agricultural settlements, but were near the wetlands of Amboseli hunting wild game and tending to the livestock (Meyer 1900: 118), and we can assume these individuals were gradually rebuilding their herds. Meyer (1900: 103-104) also noted that Maasai and Dorobo were trading with the Usseri and Ngasseni people, but they were mainly exchanging wild

⁶⁶ Maize and cassava both are fast yielding low labour crops that were often increasingly cultivated in Africa following periods of political and economic upheaval (Logan 2012).

game meat, skins and salt in return for goats, pottery, agricultural produce, iron wire, beads, and cloth. At the turn of the century the remaining Maasai in Amboseli appear to have been reluctant to use livestock for trade and consumption, instead relying on hunting, gathering and farming to obtain food and other goods while their herd numbers were recovering.

European traveller accounts indicate that at the close of the 19th century, Maasai people in Amboseli had suffered a great deal, but through diversifying their livelihoods and exchanging and assimilating with neighbouring communities many individuals were able to navigate these turbulent times. As Waller (1999) has cautioned, while the conditions at the end of the 19th century were in many ways unique, in terms of contemporary documentation and observation this period has no parallel. In other words, we are probably blinded by the fact that we have many descriptions of the 1890s painting it as an extraordinary time, but in reality, stock losses and herder responses of the magnitude and character described above are unlikely to have been entirely without precedent. It is important to note, however, that while agriculture and hunting provided refuge for destitute pastoralists during times of stress, these modes of production were also part and parcel of the wider regional economy of Amboseli during the 19th century. As such, the significance of communities pursuing complementary and alternative livelihoods to pastoral people is not limited to the sanctuary they offered when hardships struck, but additionally encompasses their fluid roles in dynamic networks of exchange throughout the region. Herders as well as hunters and cultivators (not all of whom were stockless Maasai) were integral components of a broader economy in Amboseli during the 19th century, as they were long before this time.

8.2.2. Becoming Maasai in the economic context of the 19th century

Community can be reformed out of chaos, but as it reemerges it conforms to the altered social realities. Change may, however, be disguised by a commitment not so much to 'conservatism' but as to continuity. Thus old forms, persist, but with new meaning and content, and pastoral society continuously reinvents itself (Waller and Sobania 1994: 62).

In acknowledging the magnitude of the drought at the beginning of the 19th century, which may have caused a number of pastoral groups in addition to the Maasai to start/re-start their age sets c.1830 (Anderson 2016; Petek and Lane 2017), the cohesion and longevity of Iloikop and Maasai identities are called into question. In northern Kenya, this drought led to a process of what Anderson (2016) calls 'primary identity formation' (after Bassi 2011) and what Petek and Lane (2017) refer to as 'synthetic ethnogenesis' (after Ogburn 2008) among a number of communities. We may further consider that Iloikop identities may not necessarily predate that of the Maasai in southern and northern Kenya, rather it is conceivable that Maasai and Iloikop 'ethnic identities', and a good many others, were significantly remade in the 1800s in the fallout of a devastating drought and subsequent intra-pastoral community warfare. Economic factors are frequently cited as highly influential to the kind of novel social and political relations that crystallise into new group identities following major social or environmental disruptions (e.g. Kurien 1994; Ogburn 2008; Petek and Lane 2017). The particular economic context of East Africa in the 19th century must have also been important for the emergence or re-configuration of a Maasai group identity in Amboseli, and the practices associated with being Maasai.

It is thus highly intriguing that the Iloikop wars seem to coincide not only with a period of rangeland amelioration in the north, but also with a major ramping up in caravan trade activity from the 1830s on, when Zanzibar became the capital of the Omani empire, and slaves and ivory were being extracted from the east African interior with alacrity. There has not been

enough theorising about why Maasai engaged in a period of expansion in the 1800s, and while the work of Anderson (2016) is a recent step in the right direction, as Moore (2009: 45) has pointed out, there has been a problematic assumption that East Africans in the 19th century just had a natural propensity for conquest and raiding. Also misleading is the way that Maasai participation in the caravan trade has been minimised as something that destitute pastoralists in Amboseli only did during the 1890s as part of a forced strategy of livelihood diversification in order to survive (Croze and Lindsay 2011: 26). This section therefore entails a cursory exploration of select evidence for expansion, intensification, and continuity within the Maasai pastoral system that may have arisen due to the demand for livestock and resource control in the economic context of the 19th century. How pastoral practices transformed in the 19th century in response to various intra and extra-regional economic stimuli could (and should) form the topic of a thesis in itself, and thus what is presented below can be regarded as more provocation than declaration.

Before any more is said however, it must be pointed out that it would be wrong to think that the cultural practices of Maasai people in Amboseli are entirely a product of events occurring in the 19th century, especially as this could lead to the misinformed assumption that Maasai individuals have no connection to the landscape that pre-dates this period. It is worth remembering in this section that while certain aspects of Maasai culture emerging in the 19th century were likely novel, many also had long-established precedents; it is only that the limited time depth of historical sources and oral traditions present challenges in distinguishing between what was new and what was deep-rooted.

That being said, the 19th century caravan trade created new demands for surplus pastoral products. One way that certain Maasai people may have responded to this would have been to grow and sustain their herds through expansion, i.e. by bringing more and more land, resources and livestock under their control. It is thus relevant that the overall trajectory of the Maasai for most of the 19th century was one of constantly establishing, forfeiting, and restoring territorial claims to landscapes in eastern Africa, while carrying out cattle raids. A devastating drought at the end of the 18th century was very likely influential to these developments, and we can imagine in northern Kenya that as rangeland conditions ameliorated around 1830, pastoralists increasingly spread their herds into areas that had been depopulated on account of aridity. Not all territories claimed by the Maasai were denuded of people and stock however. Further south, as Stahl (1964: 345) has reported, Ngasseni oral traditions hold that Maasai groups moved closer to Kilimanjaro in the 19th century, forcing the Ngasseni to relocate from the northern face of the mountain. This was described by Stahl (*ibid.*) as a case of territorial expansion linked to cattle raiding, though presumably, rangeland access also played a part. While it is not particularly helpful to ascribe all episodes of Maasai expansion as being driven by the need to produce surpluses for trade, we should consider that this was a contributing factor.

As the geographic range and herd compositions of pastoral groups underwent transformations in the 19th century, so too did pastoral identities and cultural practices, partly in response to the economic climate. Waller, for instance, has advanced a theory that territorial organisation based on sections is a recent construction for the Maasai. Prior to the 19th century Maasai society may have been structured according to clans with identities linked to a few key corporate descent groups and only later did land-based units evolve in response to episodes of expansion and settlement during and after the Iloikop Wars (Spencer and Waller 2017; Waller 1979: 163). Of significance to this discussion is how the ability of Maasai groups to establish and maintain territorial claims had implications for acquiring and directing commercial contacts and intelligence. Pastoral Maasai had a clear stake in controlling the terms of exchange with coastal caravans in the territories they claimed and were recognised to have

occupied. Highly militarised Maasai communities had the power to decide whether or not to allow traders to travel through their rangelands. One way of controlling access to territories and the resources which lay inside is to inspire fear and awe among neighbours, a tactic that Waller (1985a: 88) argues many Maasai seized upon in the 1800s. Coastal traders were equally attuned to the advantages of discouraging newcomers from pursuing expeditions to Maasai territories, and spread scare stories about the ferocity of the Maasai to reinforce their attempts to monopolise trade (ibid.). Rumours of the aggressiveness of the Maasai are unlikely to have been entirely unfounded, as there are numerous reports of caravans being attacked and porters ransomed (Thomson 1887: 155). Maasai people are also held responsible for the collapse of Orombo's empire in the 1830s, purportedly due to conflict over control of elephant hunting grounds south of the Rombo River, and the ivory trade more generally (Wimmelbücker 2002: 93-94). Alongside these accounts however are mentions of well-to-do elders extending their patronage and protection to coastal trading caravans and dissuading the *il-moran* from attacking (Waller 1985a: 123), suggesting that traders could partner more directly with influential Maasai and conduct business in the territories over which they held sway to the benefit of all parties involved. Wealth generated through the coastal caravan trade could have then been reinvested in livestock, labour, and influence allowing for herds to grow and animals to continue to move through more expansive exchange networks.

We should not, however, imagine that Maasai territories in the 19th century were organised along linear static borders. Historical maps in the 19th century demonstrate that trade routes were not exactly clearly delineated and place names refer to groups of people rather than geographic territories (Wynne-Jones 2011; Wynne-Jones 2016: 120). Indeed, most historians seem to agree that labour was in far scarcer supply than land (Vansina 1990: 251; Waller 1985b: 348). Instead of the Iloikop Wars being fought over and in plots of land, territorial claims were more likely structured around specific resources and nodes (Waller and Sobania 1994: 50). As discussed in section 4.5.4, particular landscape features, including wells, commonly serve as the markers by which pastoralists associate geographic places with themselves and others. It is thus noteworthy that some wells in Amboseli are still remembered as having been built by the Loogolala. Local Maasai accounts of the Iloikop Wars in Amboseli suggest that these wells were points of importance in the 19th century as '*when the Loogolala were being chased by the Maasai as they are moving they are making their water holes for their livestock and their way of living, and they are staying in a place for like five years, Kimana another place, from there another place and the wells that are given names from that side of Lengasim, that is the way the Loogolala are passing.*'⁶⁷ It is also interesting to note that Iloogolala are said to have dug these wells as part of a labour intensive rite of passage from boyhood to junior warrior (*il-moran*) which could suggest a link between constructing wells and claiming the resources and thus territories that *il-moran* were charged with defending.

There is no evidence indicating that wells originated in the 19th century in Amboseli, but oral traditions allude to many such wells having been constructed in the 1800s. We may thus further consider the possibility that in the 19th century, trade created incentives for pastoralists to produce surplus livestock, and wells may have been one solution to intensify production. Pastoral wells could even be considered a form of 'landesque capital' (Brookfield 1984; Håkansson and Widgren 2016). Wells were constructed in strategic areas in part to decrease demands on mobility which taxes the energy of livestock, and also to allow animals to graze in rangelands that they may not have been able to access due to low water availability, all of which could have led to pastoralists swelling their herds. Certainly, control over these resources is remembered as being a critical factor in making Amboseli a Maasai landscape in

⁶⁷ Interview with Lekanayia Musere in Loitokitok, March 2 2015.

the 19th century, and access to these resources could have facilitated herd owners in producing surpluses for trade.

Finally, we can consider that in response to more expansive coastal trade, the Maasai in Amboseli directed more labour toward tending herds, and pastoralists became more specialised (e.g. Håkansson 2004: 577). This idea is not new, as for example there was once a rather entrenched belief that the Iloikop and the Maasai were the longstanding agro-pastoral and pastoral divisions of 19th century Maa-speakers (e.g. Jacobs 1965; Hollis 1905; Sandford 1919). This has since been debunked, however, with evidence indicating Iloikop people could be just as dedicated to animal husbandry as Maasai (Berntsen 1979; Jennings 2005; Waller 1979). Moreover, there are indications that specialised pastoralism existed in East Africa since the Pastoral Neolithic (see Chapter 6) making it challenging to establish whether or not pastoralists in the 19th century were any more or less specialised than their predecessors. The question of the degree of specialisation vs diversification among Maasai pastoralists is an important one, but answering it requires far greater definition of the variability in economic practices between different individuals, households, and ‘ethnic’ groups in Amboseli during and prior to the 19th century than the data currently permits.

Rather than determining that Maasai individuals in Amboseli consistently devoted higher percentages of labour to livestock herding, as it stands, the evidence suggests that pastoralists were also inclined to pursue forms of livelihood diversification. Historical sources and oral traditions indicate there was considerable instability in the 19th century – fortunes in cattle and power were being amassed but also disassembled and in this context livelihood strategies were well served to be adaptable to risk. Some communities, such as the Ilchamus of Baringo, appear to have opted towards specialisation in their modes of production during the 19th century in order to hedge against said risk (Petek 2018). We cannot assume this was a strategy pursued by all Maasai, who exhibit comparatively little social and spatial cohesion as a collective. We can also consider ethnographic analogies indicating that livelihood diversification can help pastoral households cope with periodic shocks (Homewood et al. 2009: 388). As discussed throughout this chapter, among communities calling themselves Maasai, energies were being directed towards other pursuits such as hunting, cultivation, salt collecting, iron working, trading, and even mercenary work. Thus diversification rather than specialisation must also be examined as a possible means by which some pastoralists transformed their livelihoods in response to the economic context of the 19th century.

What is perhaps more interesting, is that despite all of these options for livelihood diversification spurred on by fluctuations in ecological and socio-economic conditions in the 19th century, the accumulation of livestock continued to be of critical importance for pastoralists in Amboseli, with the profits from various endeavours being put towards this goal, even after the disasters in the 1890s. At the heart of the practice of pastoralism in Amboseli is the ecological truth of much of the landscape: in dry grasslands, cattle offer security where agriculture alone cannot. However, I argue that two additional interconnected factors were particularly influential to the continued pursuit of pastoralism for many Maasai: the high economic and cultural value of cattle. It is difficult to avoid circular reasoning when evaluating whether the exceptional value and enormous demand for livestock impacted how Maasai people in the 19th century placed cattle at the centre of their ideological worldview or if the situation was reversed. It is better to regard the two as entangled, with both factors motivating Maasai people to practice pastoralism throughout the 19th century, though they also pursued other avenues to wealth accumulation. Critically, Maasai were incentivised to maintain and reproduce their ‘people of the cattle’ status and identity as both Maasai and non-Maasai individuals were all participating in an economy wherein social relations, family growth, and control over labour were quite regularly underpinned by continuous livestock

transactions. The link between Maasai identity, cattle, and wealth appears to have been strong for most of the 19th century, but this link would be challenged as Amboseli was encapsulated within the colonial state, a process entailing major modifications to pastoral practices in eastern Africa, the ramifications of which are still under investigation.

8.3. Being Maasai in the colonial era

At the Berlin conference in 1884, it was clear that European powers were intent to divide and colonise Africa. By 1891, the Imperial British East African Company (IBEAC) had a monopoly on trade and other privileges in the Kenyan interior though as capital was slow to materialise, the Company expended little effort in exploiting the land between the coast and Uganda, and production and exchange here was still in many ways the purview of communities inland. On Kilimanjaro for instance, people actively dissuaded European visitors into the early 1890s (Wimmelbucker 2002: 259). This would not last though, and in 1895 the British government bought out the poorly performing IBEAC and founded the East Africa Protectorate. Likewise, the German imperial government took over administration of continental Tanzania from the German East Africa Company in 1891. In the decades to come, pastoralists and others residing in Amboseli found themselves situated at a newly formed international border navigating a radical restructuring of economic, social, and political relations, the legacies of which are seen today.

It is challenging in many respects to delineate exactly when European colonialism first exerted an influence in Amboseli however, and thus whether or not it is entirely appropriate to consider the last decades of the 1800s as marking the beginning of the colonial era. Periodisations of colonialism and for that matter, the Enlightenment, modernity and capitalism are habitually contentious (Moore 2011: 3). On the one hand, we can consider that by the early 19th century at least there are indications that the caravan trade was impacting socio-political, economic, and ecological functioning in Amboseli in a significant way. As this trade was fundamentally linked to the extraction of ivory and slaves from the interior of East Africa, activities which in many ways benefited European and North American markets, conceivably, at least by the early 19th century the Amboseli landscape was being drawn into processes of colonisation and capitalisation. As evidenced by the presence of glass beads dating to the Late Iron Age, Amboseli did not exist in a spatio-temporal dimension of its own, but has long been partially constituted through global transactions and entanglements. Still, there were certain processes set in motion by British and German colonial powers after 1884 that had no historical precedent, and as they are implicated in major transformations in the way that people in the Amboseli area valued land, labour, and livestock, the 20th century can therefore be considered as distinct, and is referred to in this thesis as the colonial period.

As will be discussed in following section, under conditions of coloniality, particular inequalities and insecurities among livestock herders were exacerbated, and many pathways to accumulation were proscribed. Yet rather than viewing the colonial period as a time of irreversible decline for the Maasai in Amboseli, it is more accurately represented as a time of transition (Waller and Sobania 1994: 55), as practices associated with pastoralists in the 19th century continued into the 20th, and herders were also able to adapt to new opportunities.

8.3.1. Initial Anglo-Maasai and Deutsch-Maasai relations

While one could argue that the southern limits of Amboseli have always been a border land in the sense that it encompasses the ecotone wherein the dry lowlands of the central basin transition to the fertile highlands of Kilimanjaro, in 1886 Britain and Germany established

their own geo-political border here. Amboseli officially fell within the East Africa Protectorate, under the control of the British though the area was not uninfluenced by German activity. The interventions of British and German colonialists ultimately served to constrict the Maasai, who were already enduring a period of destabilisation due to the disaster (*Enkidaaroto*) at the turn of the century. In the early years of the colonial encounter, Maasai pastoralists were not immediately relegated to the margins of power and influence in East Africa however. Seizing an opportunity presented by conditions of coloniality, some Maasai actually aligned with the British and in doing so, rebuilt their herds. This alliance was not universal among all Maasai, nor, as I discuss below, was it long-lived, but it signifies that in the history of pastoral-state relations, Maasai people were neither intractably unwilling nor unable to transform their means of accumulation in response to a changing political landscape.

Between 1891 and 1900, German colonial officials participated in a large number of military engagements in an effort to subjugate and pacify pastoralists in what is present day Tanzania (Wimmelbucker 2002: 329). The Germans were interested in forging alliances with the Chagga chiefdoms of Kilimanjaro, but not with the Maasai (Waller 1976: 546). The violence of the German occupation even prompted Maasai individuals in Loitokitok in 1900 to seek refuge in Taveta (ibid. 535). For those who remained in German East Africa, a Maasai reservation was established in 1905. While the reservation was supposedly to prevent cattle raiding, its creation was more a pretext for the annexation of rangelands south-west of Kilimanjaro and near Mt. Meru (Wimmelbucker 2002: 310). Maasai pastoralists became trespassers when attempting to access their former dry season grazing lands and agricultural trading partners, and rangelands were increasingly converted into farmlands (Waller 1976: 546; Wimmelbucker 2002: 311). Maasai relations with German powers remained 'chronically hostile' (Waller 1976: 545) until northern Tanzania came under British military occupation after 1916.

In some respects, early British relations with Maasai were markedly different. During the 1890s, many Maasai acted as allies to the British. As pastoralists were withdrawing from their former rangelands due to the disastrous impacts of disease and drought, Maasai grazing areas were being encroached upon by herders and raiders from other ethnic groups: in Amboseli this included the Akamba (Thomson 1887: 155). Larger Maasai sections such as the Kisongo took up raiding themselves, and there was a certain disintegration of social cohesion among Maasai groups, as evidenced by the War of Morijo (Waller 1976: 534). Thus, some Maasai north of the German border sought protection with the British, and the opportunity to engage in British-sponsored raids to acquire stock. The British welcomed this arrangement as they were able to not only deploy *il-moran* in their conflicts with other tribes, but also to mitigate the risk of engaging in combat with the Maasai, which they ill equipped to win (ibid. 536). Not all Maasai *il-moran* were closely aligned with this new imperial power however, as in Loitokitok certain individuals who had been exiled by the British were conducting raids not in collaboration with the state, but in direct defiance (ibid. 544). Still, any inter-Maasai raiding was acknowledged to be advantageous to the British and the Germans alike, as the more bloodshed between the Maasai, the less of a threat they posed to the colonial administrations (ibid. 546), and by 1900, the balance of control had shifted toward the colonial powers.

From the time the British first established the East Africa Protectorate to the commencement of European settlement in the Highlands their concerns with the Maasai had morphed from establishing alliances to establishing outright dominance. By 1900, the Foreign Office of the British government was keen to attract European settlers to the new East African Protectorate and was thus forced to confront the issue of native grazing rights (ibid.). This was done with little concern for pastoralists or the livestock herding economy. In the words of Charles Eliot,

raiding cattle in Taveta, legislation was passed by 1906 making the cross-border movement of pastoralists in Amboseli illegal (Outward H.H. Comm. 1907). In 1911, a Second Maasai Treaty was signed and the Maasai people living in the Laikipia northern Reserve began a reluctant process of resettlement to an extended southern Reserve. By 1913, the forced relocation of the Maasai from their northern grazing pastures was complete (Hughes 2006), and Amboseli was officially situated in 'Maasailand'. It is important to examine the circumstances of early Maasai-Anglo relations, as for the remainder of the colonial period the Maasai inhabitants of Amboseli were regularly portrayed as 'governed by conservatism' (KDAR 1944: 2), and said to be a people that 'have no real desire for anything more. All they want is to be left alone.' (KDAR 1931: 6). This point is made most salient in an excerpt from a piece of 'useful propaganda' distributed by the Maasai District Commissioner to Maasai people:

They (the Maasai) did not understand and many have not yet learnt that since they and the surrounding tribes became subjects of the British King Emperor they could not enrich themselves by raiding without the risk of being punished. They have been slower than other tribes to make use of new opportunities which Law and Order brings. In the meantime they have suffered in many ways...while the surrounding tribes have increased in number, wealth and importance. Some of the misfortunes of the Masai might have been averted if they had tackled their difficulties in the spirit in which their ancestors overcame the troubles which beset them. It is for the Masai to seize their opportunities in these different surroundings. (MIRMD 1936- October: No.1)

As Waller (1976) has made clear however, the formation of alliances between Maasai and British actors in the 1890s illustrates that pastoralists did not have a history of failing to 'make use of new opportunities'. Any perceived disparities in 'importance' between Maasai and other ethnic groups are far better explained by British and German attempts at establishing control through the removal of Maasai to the geo-political and economic periphery of their colonial states.

It has been implied that the Maasai of Amboseli traditionally lived in a 'closed' society (Western and Manzi 2004: 5). Yet, partly in light of their deliberate marginalisation from processes of state construction in colonial times what ultimately may be perceived as the isolated character of the Maasai (and all of the difficulties in access to healthcare, infrastructural developments, education and economic opportunities that this has at times entailed) is inadequately explained as a devotion to 'traditional' practices

8.3.2. Reordering the rangelands

As discussed in this chapter and Chapter 7, agriculture in Amboseli was not just a phenomenon of the 20th century, nor was the residence of non-Maasai individuals. Rather, efforts to transform and order space were a significant means by which colonial states intervened, modified, and restricted pathways for trade and mobility throughout East Africa, leading to transformations and re-orderings of pastoral-agricultural relations. In addition to damaging proscriptions on mobility and access to land, the pastoral economy in Amboseli was also undermined by colonial development paradigms that sought to privatise land, directly and indirectly encouraging agricultural expansion at the loss of rangelands.

The newly established Maasai District was meant to enclose only Maasai people within its borders, as the British took it as natural that people could be divided into discrete tribes, whose territories could be ruled indirectly through chiefs (Mamdani 1996). Like ethnic identities, modes of production were also meant to conform to the patterns set by reserve

boundaries (Waller 1984: 246). From the beginning, the idea that Amboseli was only for the Maasai was both illogical and unjust as when the reserve was formed it enclosed non-Maasai residents (Waller 1993), immediately threatening to convert their status to ‘illegal aliens’ if they failed to become Maasai assimilates. Furthermore, in creating African Reserves, the colonial government fostered the conditions for cross-border movement by Maasai and others to be defined as trespass or infiltration and subject to state sponsored evictions (Hughes 2006: 9; Parsons 2011). In the precolonial period there was fluidity that, in response to any number of factors, allowed communities to be re-shaped and for individuals and groups to change livelihoods, ethnic identities, and geographic locales. In the 19th century individuals of more multifaceted identity (e.g. ‘mixed Maasai’, Chagga assimilates) were well positioned to access resources situated in varied landscapes and to act as intermediaries or brokers in economic and social exchanges and this continued into the 20th century. However, under the colonial state these individuals could face persecution as illegal migrants, smugglers, or tax-dodgers if they failed to disassociate themselves with all but one ethnic identity (Waller 1984: 246). In essence, ethnic boundary making imposed more rigid frameworks by which concepts of identity, livelihood, and territory were to be evaluated. A complete dissolution of spatial, social, and economic fluidity in colonial times was never achieved, however (Waller and Sobania 1994: 59). Just as before, farmers from different ethnic groups within Amboseli and beyond continued to be partners for trade, marriage, and important suppliers of labour and agricultural produce (Waller 1993). Distinctions between Maasai and non-Maasai continued to be subjective and people I spoke with in Amboseli provided countless examples of individuals that were once Akamba, Waarusha, Kikuyu, or Chagga, becoming Maasai. This was commonly achieved through marriage but also by individuals being hired by Maasai to herd or tend agricultural plots leading to their eventual adoption.⁶⁸ Importantly, during the colonial period agriculture in Amboseli was not the pursuit of any one monolithic group, but featured non-Maasai ‘immigrants’, poor and wealthy Maasai, and some Maasai of ‘mixed’ heritage (Rutten 1992: 215, 241, 257).

While Maasai officials certainly did express concern over their ability to retain control over who was permitted to reside in their Reserve/District (MIRMD 1936-April: 1/2), colonial officials do not appear to have fully grasp how engrained economic and ethnic fluidity was to the Maasai, nor the importance of access to agricultural products. As the officer of the Masai District remarked, ‘the attitude of the Masai to this problem is not easy to understand or explain. As a tribe they have been emphatic in refusing to agree to impenetration but as individuals they have welcomed the Kikuyu.’ (MIRMD 1936- December: 6/7), and later ‘Interpenetration is no doubt largely due to the supine attitude of the Masai themselves, as there is little doubt that in their indolent manner they have allowed their so-called ‘Kikuyu shamba boys’ to establish villages and cultivation on their own doorstep. (MIRMD 1936-January: 2). It is worth noting that this ‘interpenetration’ did not flow in one direction, and links with agriculturalists from other ethnic communities continued to allow Maasai pastoralists to seek refuge with non-Maasai cultivating people beyond the borders of their own reserve, especially during times of famine (MIRMD 1935-January: 1). As was recalled to me by one Maasai elder who currently resides in Amboseli, during periods of extreme hardship in the colonial era, children were sometimes assimilated into Chagga families in Tanzania: *‘There are Chagga, good Samaritans, and if there is a boy who all of his people and cows have died, he is going to Tanzania, and finding a Chagga, and he is going to live with them like a son.’*⁶⁹ Given the nature of the rhetoric used to describe the Maasai, it is

⁶⁸ E.g. interview with Suyia Lemomo in Olgulului/Ololarashi G.R., September 14 2015; Interview with Seleni Kolay in Kimana, August 5 2016.

⁶⁹ Interview with Kaputiti ene Kasaine in Kimana, August 22 2015.

unsurprising that in the 1930s Maasai officials felt the need to pronounce to the Kenyan government that their views concerning the supposed customary pastoral diet of meat, milk, and blood, and a disdain for agriculture, were out of touch with reality (Rutten 1992: 234). Cultivation was being practiced in the district not due to the 'indolent manner' of the Maasai, but rather as a way for some pastoralists to expand and diversify their wealth. Farmed produce was also an important means by which Maasai could supplement their diets, particularly when pastoral yields were low, as attested by the demand for agricultural products grown in Amboseli during droughts, and the expansion of land under cultivation following periods of stock loss (Rutten 1992: 241,257). Agriculture was neither untraditional nor unwanted in 'Maasailand'. The later point was made clear during the Kenya Land Commission, chaired by Sir Morris Carter, when Maasai officials requested that an area to be used for agriculture be added to their reserve (KLC 1934: 1226). Maasai leaders also offered a large portion of the Chyulu Hills to landless Kikuyu in return for an expansion of the Maasai Reserve (MIRMD 1936-April: 1). Both requests were denied, but they serve to highlight that while land scarcity and security were key issues in the early colonial period in Amboseli and elsewhere, not all Maasai perceived cultivation and Africans from other ethnic groups as jeopardising their rangelands.

While it is important to note that we cannot simply construe farming and farmers as foreign and undesirable in Amboseli, the colonial encounter did provoke transformations in the pastoral economy, including the large scale conversion of rangelands to farmlands, that by no means benefited all herders. During the colonial period the influx of farmers and herders into Amboseli was happening at a level that appears unprecedented as legislation favouring the interests of white settlers created a scarcity of land throughout the surrounding region (Hughes 2006; Kanogo 1987). The creation of ethnic reserves in Kenya was implemented irrespective of local African circumstances, and conducted largely in order to control the labour market and to advance the settler economy (Overton 1987). Likewise, large areas of land on the Tanzania side of Kilimanjaro were annexed for commercial cultivars like coffee and wheat for consumers living far beyond the interior of East Africa, and at first grown exclusively on European plantations (Swynnerton 1949). Throughout the colonial period, there was a steady growth in population concomitant with a major expansion in agricultural activity on the lower slopes of the mountain, as farmers were increasingly pressed for space elsewhere (Chuhila 2016; Tagseth 2006). By as early as 1927 plots of land were being illegally bought and sold on Kilimanjaro (Moore 2009: 59). These developments all contributed to issues of land scarcity and insecurity in Amboseli.

While the British regarded pastoral modes of production as flawed, they also exhibited some inconsistencies in their responses to the proliferation of agriculture in Amboseli. For example, in the 1930s the Maasai District Commissioner (DC) desired for a group of Akamba to remain in Loitokitok as they were paying taxes, developing the agricultural sector, and providing labour, but despite his protests, the DC Machakos arranged for their forced relocation to the Kamba Reserve (KDAR1930: 6; Rutten 1992: 189). Such forced evictions continued, among Kikuyu people especially, some of whom were 'becoming Maasai' themselves, but these were not so much motivated by a desire to safeguard rangelands as they were by the need to maintain the authority of the state, and to serve the interests of the settler economy (Forstater 2002: 50; Rutten 1992: 214,257; Waller 1984, 1993). When Kikuyu communities were forcefully removed from the Reserve in the 1930s, for instance, Maasai individuals were encouraged to cultivate the fields from which they were evicted rather than allow them to be used for pasture (MIRMD 1936-October: 2).

On the whole, colonial agents were of the opinion that funding the state was best done through stable, taxable cultivators and the cash crops they produced, rather than disorderly

and unproductive pastoralists (Waller 2012: 6), and thus the conversion of rangeland to farmland was perceived favourably. More often than not, the mantra was ‘we hope the Masai take up agriculture.’ (MIRMD 1936-July: 2). Even when efforts were made to develop the pastoral economy in Amboseli they were habitually executed in a maladroit fashion, undermining pastoral livelihoods.

For much of the colonial period, pastoralists in Amboseli were alleged to be carriers of disease and in order to protect the settler dairy and beef industries in Kenya strict quarantines were imposed limiting the movement of herds (Anderson 2010; Waller 2004). The Maasai were also infamous in the eyes of both the German and British colonial governments for their irrational and wasteful overstocking tendencies, although claims of overstocking are highly debatable (see Chapter 2). While Kenyan colonial agents complained of high stocking densities, their policies often did little to negate them as the allure of official livestock market outlets for herders in Amboseli was significantly diminished by quarantine measures and the frequently low prices offered by regulatory bodies (KDAR 1931: 6). Livestock were however requisitioned under quota (especially during World War II), and sales were enforced by hut and poll taxes in Amboseli (Rutten 1992: 247; Tignor 1976: 91). During interviews with people in Amboseli, the most common grievance expressed to me about the British colonial state were their tax demands: *‘if you had only two cows, you have to sell them both to pay the tax, or risk being fined, or going to jail. They taxed the Maasai very highly and kept the money, it was a very big problem and we were very happy when they left.’*⁷⁰ For Kenya’s settlers, taxation was justified as a means to ‘avoid waste’ on the reserve, for it was often espoused that Maasai were unwilling to part with their livestock for cash as their wants were said to be minimal (MIRMD 1936-November: 5). The problem was not so much that Maasai would not bring stock to market however, but that they did not want to sell their stock for prices they judged to be poor (Anderson 2010), and the Kenyan state very often offered paltry compensation for livestock (Campbell 1981a: 217; Rutten 1992: 232, 236). In fact, the illegal trade in livestock was thriving during the colonial period, particularly along the poorly policed Tanzanian-Kenyan border at places like Loitokitok and Ilasit (KDAR 1946: 10; KDAR 1955: 16). Illegal trade was unregulated and thus unquantified (Waller 1984; Anderson 1986) but Waller (2012: 14) posits it was absolutely larger than the official market economy. Given the off-take of stock for the clandestine economy, and the loss of livestock to drought and disease (no doubt compounded by proscriptions on mobility), it is not clear that a regular marketable surplus of stock actually even existed within Maasailand (Waller 2012: 14). What this meant, just as Olemwanda remembered, is that pastoralists with barely sufficient herds could be pushed over the edge into insolvency trying to meet quota and taxation demands.

As some pastoralists were facing economic hardships in Amboseli in the 20th century, it is perhaps telling that during excavations of sites occupied during the colonial period (Empaash and CB), we were able to identify the remains of wild fauna. I was told during interviews that Maasai people hunt wild animals for a number of reasons, such as getting hides for making shields or ropes, and also for meat.⁷¹ Consuming wild meat was more often than not associated with poverty, or described as an activity that *il-moran* might engage in when out with the cattle.⁷² However, I did notice people were quite evasive with regard to the topic of hunting wild animals, and it was a challenge to learn about the degree of wild meat

⁷⁰ Interview with Olemwanda in Olgulului/Ololarashi G.R., August 24 2015.

⁷¹ Interview with Olekumbua in Kimana, April 21 2015; Interview with Ronkoyieni in Olgulului/Ololarashi G.R., September 11 2015.

⁷² Interview with Peneti in Olgulului/Ololarashi G.R., September 14 2015; Interview with Mboikai Lembakuli in Olgulului/Ololarashi G.R., September 14 2015.

consumption during the colonial period. Reticence to discuss hunting can be attributed to the consumption of wild meat being associated with poverty, linked to illegal activity, and also non-compliant with the ideals of 'Maasainess' held by many in the conservation community (e.g. Kangwana and Browne-Núñez 2011: 34). As a researcher in Amboseli it was often assumed I was interested in wildlife, and thus not wanting to hear that the Maasai eat wild meat. Regardless, while existing faunal assemblages by no means allow for comparison of robust trends through time, wild animal consumption appears to have been rather common among pastoralists in Amboseli during the colonial period. Taboos surrounding this practice could indicate that wild meat was consumed not by preference so much as necessity. This is not particularly surprising as archival sources also show that food scarcity and famines were experienced in Amboseli during the colonial period (KDAR 1929: 2; KDAR 1944: 8; MIRMD 1935-April: 1; Rutten 1992: 125). While poverty was not a new facet of pastoral life in the 20th century (Waller 1999), archival records and perhaps excavated deposits suggest it was persistent in Amboseli under the colonial economic development paradigm. Still, basic statistics relating to the relationship between livestock numbers and human populations in Amboseli are sorely lacking, with the first somewhat comprehensive census not being conducted in Kenya until 1948 (Anderson 2010). For this and other reasons pertaining to the vagaries of how poverty is defined by pastoralists themselves and by external observers (see Anderson and Broch-Due 1999), it is difficult to estimate longer term trends in the relative wealth of herders in Amboseli, let alone extricate all possible causal factors, and attempting to do so invites oversimplification.

That being said, the privatisation of communal rangelands stands out as a transformational process that exacerbated inequalities and hardships for pastoral producers in Amboseli. The history of this process in Kajiado District is covered in excellent detail by Rutten (1992), and I will but recap the main points. From the early colonial period, policies were in place that laid the foundation for the commodification of land, including Maasai herders in Amboseli being required to lease grazing grounds from the Tanzanian state during times of drought (MIRMD 1934-October: 1). This escalated in the post-World War II years. Well-versed narratives of overstocking reinforced by the idea of the 'tragedy of the commons' all contributed to communal landholding systems being painted as dangerous (Homewood and Rodgers 1987). The end result was a major move toward development schemes intending to contain pastoral movements and manage stock numbers within discrete ranching 'units' (KDAR 1952: 1; Swynnerton 1955). Through the 1950s, communal lands were increasingly adjudicated into individual holdings and conservation spaces that made it increasingly challenging for pastoralists to access the resources required for their herds (Kangwana and Browne-Núñez 2011: 32-33; Rutten 1992: 216-218). These policy interventions, aiming to 'rehabilitate' Amboseli, brought about a wholesale reordering of rangeland management and economics, and ultimately, the commoditisation of land. In the words of Anderson (1999: 242) 'nothing has been more destructive of eastern African pastoralism than this.'

In 1931, there were estimated to be less than 1000 acres of land under cultivation in the entire Maasai Reserve (Rutten 1992: 241). The situation by the late 1960s was drastically different, as over 16,000 ha of land on the slopes of Mt. Kilimanjaro had been allocated, overwhelmingly to a small group of prominent Maasai men, and owing to the high monetary value of this land, it was promptly subdivided, and sold or rented as smaller farming plots (Rutten 1992: 267). More often than not colonial development schemes sought to benefit wealthier, more 'progressive' pastoralists, but also unintentionally, those ready to capitalise on land speculation (KDAR 1959: 1/19), contributing to a widening of the gap between rich and poor (Waller 2012: 19). Thus the fragmentation of rangelands, spurred on by issues of land insecurity, has resulted in many people being regulated onto units non-viable for

transhumant pastoralism, ultimately contributing to agricultural development being both an opportunistic choice and a matter of necessity.

Livestock remained an important investment for many East Africans in the colonial period, but in significant ways the colonial state reinforced agricultural production over pastoral, and some have argued that as a result, cattle no longer led so clearly to the path of wealth and influence as they did in the 19th century (Kitching 1980; Lonsdale 1989; Waller 1999: 30). Still, it was the wealthier and more influential individuals in Amboseli who were better capitalised and secured in their modes of production, and thus capable of exploiting their relative positions, a situation that continues today (Zaal and Dietz 1999). In the context of rangeland annexation, conversion and commodification, falling livestock-per-capita ratios, and seemingly rising inequality, individuals/households wishing to stay in and return to herding had to negotiate considerable obstacles, and this was especially true for those operating on Amboseli's economic margins.

Yet, as I explore in the following section, pastoral responses embodied resilience, for instance in the continuation of an informal exchange economy that included agricultural producers. Resilience can also be found in the way that pastoralists circumvented geo-political borders, largely by pursuing contacts and allegiances beyond fixed tribal territories. These actions did not resemble the 'official blueprint for a better pastoralism' as devised by colonial administrators, but rather reflected the requirements and expectations of pastoralists themselves (Waller 2012: 18). Considering Kajiado's livestock numbers do not appear to have declined overall for much of the 20th century (Grandin 1991: 26), pastoral adaptations were by no means entirely unsuccessful.

8.3.3. Archaeological insights on trade in the colonial period

Given how fragmentary the data pertaining to trade is prior to the colonial period, and even into the 20th century (Waller and Sobania 1994: 48) it is in some ways futile to attempt to determine what we should consider 'baseline' conditions as far as commoditisation of the livestock economy goes. Pastoralists arguably had a pre-existing disposition towards currency and capital, for like cash, livestock can be both, possessing the faculty to 'make commensurable different forms of value and to convert one form into another' (Broch-Due and Anderson 1999: 9). Moreover, production beyond the level of subsistence to meet the demands of local and international markets was not a new development in the interior of East Africa in the colonial period.

These points notwithstanding, irrefutably novel patterns in the totality of transactions occurring across the region can be linked to various schemes for economic expansion (including the commodification of land) tailored to suit the demands of colonial governments. Increased commoditisation of the livestock economy beginning in the colonial period has been held responsible for driving pastoralists to economic diversification (including cultivation), and for amplifying inequalities (e.g. Campbell 1993; Fratkin 2001; Galaty 1982, 1994; Hodgson 1999; Rutten 1992). Yet, as Ogundiran and Falola (2007: 42-43) have highlighted, there has been a problematic tendency to portray colonialism and capitalism as having completely 'overwhelmed' people, leading to the loss of 'authentic African culture'. It is of course a valid point that focusing on subaltern agencies under conditions of coloniality and capitalism threatens to silence and exonerate their effects (González-Ruibal 2015: 441). Undeniably, during the colonial period trade and exchange were operating in conditions that had no precedent, often with negative ramifications for pastoralists living in Amboseli. I by no means wish to suggest that East African social and economic functioning was not deeply disrupted by the colonial encounter, nor that these disruptions be repudiated. Yet, in order to

move beyond what Moore (2011: 9) has called ‘the binaries of impact/response, capitalism/culture, western/non-western’ in this section I discuss how during the colonial period in Amboseli, among inequities in power and access, pastoralists forged new connections and engaged in novel relations of exchange while also participating in forms of trade that exhibit deeper continuities.

A main area of concern during interviews with local Maasai people was generating an understanding how objects encountered in archaeological contexts were produced, exchanged, and used in Amboseli during the colonial period. In doing so I have come to conceptualise objects found in this landscape as not simply indicative of either continuity or change, but as material culture that can embody the persistence of certain practices and social relations while simultaneously revealing novelty and transformation. Table 8.1 displays the range of objects that were mentioned to me as being acquired through trade during the colonial period by pastoralists in Amboseli.⁷³

As Table 8.1 demonstrates, markets served as nodes in networks of trade managed by a great many interconnected communities. The Amboseli ecosystem was host to a number of these economic hubs, including at Illasit and Loitokitok where the British established official markets. Pastoralists living in Amboseli disclosed to me that during the colonial period they knew of markets spanning a vast area however, including Emali, Tarakea, Mamba, Arusha, Namanga, and Engare Nairobi, to name but a few locales.⁷⁴ While a variety of commodities were sold at markets in and around Amboseli, much of the activity centred around the exchange, sale and purchase of food stuffs. From the perspective of pastoralists, the primary function of these markets may be considered buying, selling and trading livestock, and also the acquisition of grain, bananas, and root crops.

While some contend that the terms of trade during the colonial period shifted to favour agricultural producers over herders in Kenya (Waller 1999: 30), due to a lack of data it is nearly impossible to say whether this was also true in Amboseli. There is mention that on Kilimanjaro Chagga farmers who were considered poor were able to purchase livestock using cash earned from wage labour and coffee cultivation, whereas before they were dependent on inheritance or debt-pledges to obtain cattle (Moore 2009: 57), which could suggest a devaluation of pastoral products. On the other hand, Chagga farmers with cash in hand were buying their stock from Maasai pastoralists in places like Amboseli, meaning herders were seeing some sort of profit. Dietz et al. (2001) have also made the rather convincing argument that the caloric terms of trade were on average advantageous to pastoral producers in the district of Kajiado towards the end of the colonial period. This relationship was prone to reversal when rangeland productivity was in decline (e.g. MIRMD 1935-April: 1), but it seems that overall, pastoralists were able to boost their caloric intake by exchanging milk and meat for crops (Dietz 1993; Zaal and Dietz 1999). This trade had clear advantages for pastoralists, as they could maximise the food security of their households, while minimising the offtake of meat and milk from their herds, facilitating the accumulation of more livestock.

⁷³ As responses during interviews were prompted by examining artifacts found while surveying and excavating in Amboseli, the list compiled from these discussions is biased towards tangible, recoverable items and the goods that were exchanged and sold in order to acquire them. In other words, the list is far from exhaustive, and there were no doubt many other commodities that flowed through countless configurations during the colonial period.

⁷⁴ E.g. interview with Olekumbua in Kimana, April 21 2015; Interview with Ronkoyieni in Olgulului/Ololarashi G.R., September 11 2015; Interview with Peneti in Olgulului/Ololarashi G.R., September 14 2015; Interview with Toret in Olgulului/Ololarashi G.R., September 12 2015.

Table 8.1 Trade items and means of exchange during the colonial period in Amboseli

Items	Acquired with	Sold by	Acquired through
Spears	Goat Calf Money	Chagga Waarusha	Markets Itinerant traders
	Money	Indians	Dukas
Metal for jewellery	Goat Money Milk Meat	Chagga	Markets Itinerant traders
Arrow heads	Goat Money	Akamba Chagga	Markets (with discretion)
Poison (for arrows)	Goat Money	Akamba	Markets (with discretion)
Beads	Money	Indians	Dukas
	Money	Somali	Itinerant traders
Cowry shells	Money	Indians	Dukas Itinerant traders
	Money	Akamba	Markets
Shukas	Money	Indians	Dukas Itinerant traders
	Money	Chagga	Markets
Sufrias	Goat Money	Chagga	Markets
	Money	Indians	Dukas
Honey	Calf Goats	Maasai Dorobo Waarusha	Markets
Bananas	Milk Meat Beaded necklaces	Chagga Waarusha	Markets Itinerant traders
Maize	Livestock Money Meat Salt	Chagga Waarusha Kikuyu	Markets
	Money	Indians	Dukas
Potatoes	Milk	Chagga Waarusha	Markets
Tobacco	Money	Waarusha Chagga Maasai	Markets
Ceramic pots	Milk Money	Chagga Waarusha Akamba	Markets Itinerant traders
	Money	Kikuyu Pare	Markets
Livestock	Money Livestock	Somali	Markets Itinerant traders
	Money Livestock Labour Honey	Maasai Chagga Akamba Kikuyu Waarusha	Markets Itinerant traders

Words in bold signify these responses were the most common.

This practice did not originate during the colonial period, but considering fluctuations and long-term declines in livestock-per-capita ratios in Amboseli during the 20th century (Rutten 1992), being able to trade pastoral products for agricultural foodstuffs was of continued significance to the health and wealth of livestock herders.

This is not to imply that it was business as usual in the early 20th century, as markets and exchange networks were undeniably re-routed for the benefit of the colonial economy (Waller and Sobania 1994: 54). During this process, some pathways to accumulation were increasingly proscribed. For example the ivory trade was curtailed by colonial game laws, and as Europeans became professional hunters, Africans were by and large relegated to the status of poachers (Iliffe 1979: 130; Steinhart 2006). Other avenues for exchange were created by the actions of the state as, for instance, trains, roads and official stock routes directed the flow of goods and people from households, to markets, towns, factories, cities, and ports. Unofficial paths were also taken by pastoralists and others, often in defiance of borders and quarantines. In fact, rarely did people that I spoke with in Amboseli remember exchange between Kenya and Tanzania being seriously hampered, as movement across the border was poorly policed.⁷⁵ During the colonial period the variable environmental, geo-political and economic conditions along the southern border of Amboseli led to the continuous emergence of markets, both official, and, despite the efforts of colonial agents, unregulated (Moore 2009: 57). Like in many borderland contexts (e.g. Dereje and Hoehne 2010; Galaty 2016), people were incentivised to move within this area to profit from invariable dissimilarities arising in resources, prices, supplies, demands, and now, state policies and a willingness to enforce them.

In addition to the multitude of exchanges occurring at markets along the newly created international border separating Amboseli from Tanzania, trade networks maintained by entrepreneurial Indian and Somali individuals were also encouraged in Amboseli during the colonial period. Far reaching networks of itinerant Somali traders operating on cash and barter terms were active during the early 20th century, and they were mentioned during interviews as being important for linking pastoralists in Amboseli to larger livestock markets in expanding urban centres with growing demands for meat.⁷⁶ Similarly, during the 20th century, Indian traders moved inland from the coast as British rule was being established in Kenya, and they maintained networks of small stores in places that had been frequented by caravan routes or in proximity to early colonial administrative posts (Horton and Middleton 2000: 108), such as Loitokitok. Indian traders were suppliers of such items as glass beads, cowry shells, *shukas* (a draped cloth garment) and metal goods (especially *sufrias* or metal pots) and also in the early days, purchasers of ivory. In a sense, Indian owned *dukas* (shops) took on some of the roles that caravan traders once held. In later years, Indian traders were important purchasers of hides from Maasai pastoralists, allowing herders to obtain some cash income during periods of stock loss, which could be used to access alternative food stores. Indian traders in Amboseli were recalled as being reticent to engage in barter, however, preferring cash transactions,⁷⁷ possibly because licensed Indian traders could be penalised for bartering (Richard Waller pers. comm. June 2018).

Barter trade was far more difficult to control, tax and license and thus British colonial authorities were adamant that the Maasai pastoral economy be monetised (MIRMD 1937-

⁷⁵ E.g. interview with Noorete Kapusia in Olgulului/Ololarashi G.R., August 28 2015; Interview with Paramari Tilei in Kimana, March 4 2015.

⁷⁶ E.g. interview with Kaputiti ene Kasaine in Kimana, August 22 2015; Interview with Kidemi Okutuko in Olgulului/Ololarashi G.R., September 11 2015.

⁷⁷ Interview with Mboikai Lembakuli in Olgulului/Ololarashi G.R., September 14 2015; Interview with Peneti in Olgulului/Ololarashi G.R., September 14 2015.

June: 5), though this was never fully achieved. The failure of colonial authorities to realise this aspiration can in part be traced to their policies and practices of monetisation which served to disenfranchise women in particular from participating in cash transactions, among both pastoral and agricultural communities (Hodgson 1999; Moore 2009: 61). The demand for animal skins and milk, nevertheless, to some extent may have allowed women to access money (Waller 1999: 35) as the processing and disposal of both items are typically considered to fall under the domain of Maasai women rather than men (Hodgson 1999; Mutie 2003: 162). For the most part the cash requirements of Maasai women were ignored by colonial governments however (Hodgson 1999). This was a sentiment expressed during an interview with Mboikai Lembakuli who recalled how challenging it was for women like her mother and herself to access cash:

We didn't have anywhere to go to get money to buy something that we wanted unless we are just given by our husbands. Even this shuka if it's just finished then I'm going to approach my husband and my husband will try maybe to go buy another one for me. In those days there are not many ways of creating money. Now you can even buy many things without informing your husband, maybe you sell milk, you take things to the cultural boma for example and sell things there, but in the past there is nothing like that and if there are any problems in the family you have to ask your husband.⁷⁸

In this context, the continuation of barter trade was absolutely critical for Maasai women who were not maintaining a steady income of cash from the trade in milk and hides. Barter, however, allowed women to be able to exercise autonomy in the sale and acquisition of agricultural and pastoral products and ceramic pots, items of central importance for culinary pursuits and food security on the household level.

Female itinerant traders of Waarusha, Chagga, Akamba, and Kikuyu backgrounds were especially relied on by Maasai women for accessing agricultural products and ceramic pots. Trade between women outside of the formal market context was often described as being founded on friendships bolstered by reciprocal gift giving:

It is the clever women who were able to get pots and things, because we were keeping some milk, and finding women and starting to make friendships by taking presents, and then these Chagga are coming to our homes and we just put some milk in a calabash and give to them, and then they will bring something for you. You had to be very clever and have many friendships with people, but if you did, you would not go hungry.⁷⁹

Whether at markets or among itinerant traders, those Maasai who had friends or kin who were of different ethnicities or engaged in different livelihood pursuits were offered better terms of trade. Equivalents of exchange were often determined by the strength of these affiliations. Just as reciprocal stock exchanges allow pastoralists to hedge against risk and seek assistance from kin and non-kin allies, so does it allow those from herding and agricultural backgrounds to foster cross-cutting ties of support.

We can further consider that trade, exchange, and gift giving not only allowed people to access goods on favourable terms, but also fostered peaceful intergroup relations. For example, wild animal skins, meat, horns, and feathers were mentioned as having been gifted from Dorobo or Akamba people hunting in Amboseli as a sort of concession or favour to Maasai individuals, these items being offered and accepted during chance encounters or, less

⁷⁸ Interview with Mboikai Lembakuli in Olgulului/Ololarashi G.R., September 14 2015.

⁷⁹ Interview with Mboikai Lembakuli in Olgulului/Ololarashi G.R., September 14 2015; Interview with Olekumbua in Kimana, April 21 2015.

commonly, more purposeful episodes of redistribution in order to promote an accommodative atmosphere.⁸⁰ Trade and exchange were invoked during interviews as having been of historical importance not just for obtaining goods and services but also for demonstrating a mutual willingness to live in harmony with other groups:

There was a time, before Uhuru, when Maasai people were fighting Waarusha, and the Maasai wanted to finish them. The Waarusha wanted to please the people to make them stop fighting, so they came and bribed with honey, beehives and also pottery, they come and exchange a lot with the Maasai to please them, so not to be chased everyday... We assimilate them by telling them that we shall need honey and sheep, so that we can let you be combining with Maasai, so you find they are almost Maasai... We have a few in Kenya living just along the border and they are herders, cultivators, and traders with the Maasai.⁸¹

Or put another way: *‘The Maasai just come and stay with the Chagga or Waarusha because they are the people who made many things like spears and pots, so they come and live together at the border just like friends, they live like brothers.’⁸²* Obviously, it would be far too simplistic to conclude that Maasai people lived in perfect accord with non-Maasai groups in and around Amboseli however, as any casual inspection of the Monthly Intelligence Reports for the Maasai District reveals that incidents of cattle raiding and disputes over resource access and trespassing were common during the colonial period. My point is only that people in Amboseli have a history of forging and maintaining mutually beneficial interethnic and economic links by regularly engaging in trade and exchange.

Change brought about by the colonial encounter in the 20th century led to transformations in the personal exchange relationships that had existed between pastoralists, hunters, cultivators, and traders, concomitant with transformations in the material culture corpus of Maasai households in Amboseli. If it were possible to rule out issues of preservation, the absence of certain cultivars in the archaeobotanical record at sites like Empaash and CB could, for example, be illustrative of major upheavals in land use and market systems. While finger millet was being consumed in Amboseli prior to the 19th century, this grain is somewhat conspicuously lacking at colonial period sites and from the memory of many Maasai people, who do not recall this being a commonly encountered crop in comparison to maize and bananas.⁸³ The apparent falling rate of millet consumption is likely linked to the fact that on Mt. Kilimanjaro there was a decrease in investment in irrigation in the uplands and a decline in millet production in favour of the cultivation of commercial crops for the world market during the 20th century (Tagseth 2006, 2010). While maize consumption was not a new activity to Maasai in Amboseli in the 20th century, it does seem that maize meal became more of a dietary staple among pastoral Maasai during this time, supplanting millet and bananas. Much of this maize was imported into the Maasai district/reserve and sold by shopkeepers in addition to being grown in ever-expanding agricultural plots in areas like Loitokitok (Rutten 1992). Maize meal came to be increasingly cooked in metal *sufrias* acquired for cash from state licensed traders, rather than in ceramic vessels fired by potters in neighbouring agricultural communities. The apparent rise of maize consumption and cultivation and acceptance of metal cooking pots among pastoralists in Amboseli reflect many similar

⁸⁰ E.g. interview with Mboikai Lembakuli in Olgulului/Ololarashi G.R., September 14 2015; Interview with Olekumbua in Kimana, April 21 2015.

⁸¹ Interview with Sayioki Oletilel in Kimana, March 8 2015.

⁸² Interview with Ronkoyieni in Olgulului/Ololarashi G.R., September 11 2015.

⁸³ E.g. interview with Mboikai Lembakuli in Olgulului/Ololarashi G.R., September 14 2015; Interview with Olokida Makau in Endonet, September 13 2015; Interview with Ngedo Punuka in Olgulului/Ololarashi G.R., September 11 2015.

processes taking place within the shifting economic conditions of the colonial period by which new materials and practices were gradually incorporated. The integration of novel technologies, livelihood pursuits, and trade partners is demonstrative of the opportunism of pastoralists who adapted to operating within a landscape that was not only facing escalating processes of fragmentation, but was also being drawn into what do seem to have been increasingly extensive, fast flowing commodity networks. On some levels, these transformations superseded the interdependence of older more socially prescribed cultivator-pastoralist-hunter-trader outlooks on exchange, accumulation, and land use in Amboseli.

Yet, during discussions with people in Amboseli regarding the possible origins of objects of material culture recovered from archaeological contexts in the landscape, it became clear that transactions continued to be carried out between individuals on the basis of intimate social and economic bonds, and by no means were they displaced by the cash economy in the colonial period. Such transactions, operating on the strength of interpersonal relationships, were incredibly important in that they could realise mutual benefits for the parties directly involved, as well as for those in the wider community. It should thus be of no surprise that in discussions with Maasai regarding the possible histories of objects recovered from pastoral sites in Amboseli, I found that these items of material culture inexorably emulate an impression of social and economic intimacy between Chagga, Akamba, Waarusha, and Kikuyu communities. Ceramics, for instance, long the mainstay of archaeologists attempting to differentiate between cultural groups, were acquired by Maasai women from a diverse set of non-Maasai trade partners, and this practice continues today as ceramic pots are still valued as superior cooking vessels despite the ubiquity of metal *sufrias*. It is virtually unheard of for Maasai women to manufacture these pots themselves in Amboseli, attesting to a commitment to patterns of acquisition that link pastoralists in Amboseli to others communities in the wider region.

During the colonial period certain pathways for accumulation among pastoralists were hampered by new regulations and economic reconfigurations, and the terms of trade between herders, cultivators, hunters and others underwent transformation. Many pastoralists exhibited success in their ability to navigate new opportunities emerging under conditions of coloniality. Some of these opportunities were seized at the behest of colonial authorities, while others emerged in direct defiance of state policies attempting to make manifest a formally regulated and fully monetised pastoral economy. Importantly, Maasai in Amboseli embraced new opportunities, but resisted the complete termination of long-held relations of exchange that have interlocked and reinforced herding, farming, and hunting livelihood strategies.

8.4. Conclusions

This chapter relates to a time of particular salience as far as understanding Maasai pastoral adaptations in Amboseli today is concerned. The 19th century is widely regarded as having been a transformative era for many East African societies and as I have discussed here, it may even be conceptualised as the period in which Maasai identities emerged, or at least re-emerged in this landscape. Intensifications in modes of exchange and production were a hallmark of the 19th century in a number of locales, in association with the formalisation of caravan trade routes traversing the coast and East African interior. On Mt. Kilimanjaro processes of intensification among agricultural producers should be evaluated as having had occurred under unique economic, environmental, and political conditions which encompassed a diversity of fluid and closely entangled groups of varying livelihoods and ethnicities, including pastoral Maasai. Maasai pastoralists in Amboseli can be understood as having a

rather convoluted emergence in this landscape, establishing this rangeland as their territory following a major drought and prolonged period of intra and inter-community conflict. The history of Maasai in Amboseli in the 19th century must also be conceived in relation to the economic context in which it occurred. Towards this end, in this chapter I have speculated on how issues of rangeland expansion, resource control, territoriality, and livelihood diversification and specialisation among Maasai people in the 19th century in Amboseli can be evaluated in association with the dynamics of the caravan trade.

A critical point that is raised repeatedly throughout this chapter however is that in the 19th and 20th centuries Amboseli was under constant transformation due to ever shifting social, economic, political and environmental dynamics, but throughout this period there also runs a current of continuity in that pastoralists in Amboseli have been able to turn to agriculture and hunting and back to livestock herding with relative alacrity. This is not to minimise the disruptive impacts of the colonial encounter which entailed processes of land commodification and proscriptions on pastoral mobility, rangeland access, and pathways of exchange. My aim in this chapter has rather been to demonstrate that in Amboseli and throughout eastern Africa, the robust collaborative links between farming, herding, and hunting communities, and the ability for people to transfer in and out of these modes of production altogether, have long underpinned their resilience.

9 Conclusions

In the preceding chapters, I have told a history of pastoralism in Amboseli from its origins to the end of the colonial period, drawing on archaeological, ecological, palaeoenvironmental, archival, ethnographic, linguistic, and material lines of evidence. My aim in this thesis was broad scale in both geographical and temporal focus, owing to the paucity of previous archaeological work to build on, and the nature of the research questions this project sought to answer. Ultimately, I have endeavoured to produce as comprehensive a culture history of pastoralism in Amboseli as possible in a manner that eschewed a focus on homogeneity, stability, and isolation.

In Chapter 6 of this thesis I have argued that even the earliest herder adaptations in Amboseli, dating to the Pastoral Neolithic, should be understood as having arisen within a regional context characterised by a heterogeneity of livelihood practices, featuring long distance networks of exchange. In Chapter 7, I discuss how a diversity of technological repertoires and modes of production persist in eastern Africa in the Early and Middle Iron Ages, with novel adaptations also emerging. We can consider that the trade relations linking various socio-economic groups were influential to, though not determinant of, the tempo and scale at which livelihoods experienced transformation.

In the researching and writing of this thesis, I have shown that my study area has a comparatively strong occupation signature dating to the last millennium. A valid question to consider in future research is why this may be. In Chapter 4, I suggest the area is undergoing processes of sediment aggradation, which may explain the lack of conclusively identified Pastoral Neolithic/Early-Middle Iron Age sites, though we cannot entirely rule out the possibility that the survey area was somewhat de-populated prior to the Late Iron Age. Addressing this issue requires further survey and excavation work in locations more resistant to taphonomic processes that obscure and displace archaeological deposits.

One important contribution that this thesis has made, therefore, has been to explore the variability in the archaeological record within the Amboseli landscape during the last millennium, when we have more evidence to draw on. The Late Iron Age is an era that has been largely overlooked by the many archaeologists in eastern Africa, who tend to invest their interests in earlier periods (Lane 2010: 300; Lane 2016c). This lack of interest quite possibly relates to the assumption that the Late Iron Age grades into the ethnographic present, implying that the people who created these archaeological deposits were only slightly different from contemporary rural Africans (Stahl 2001: 13). In actuality, as I have shown here, the Late Iron Age, the 19th century, and the colonial period all entailed environmentally, socially, and economically transformative events, some of the effects of which continue to resonate today, making the last millennium a particularly significant time for those interested in discussing pasts with contemporary relevance.

In collating archaeological evidence on a macro-scale, for example, it was shown how highland and lowland Late Iron Age sites in Amboseli are distinct in terms of material remains, architectural features, and degrees of ephemerality. These results, in combination with palaeoenvironmental and linguistic data, emphasise the heterogeneity of livelihoods, land use and cultural groupings in the Amboseli landscape prior to the 20th century. Within

this thesis, I have also highlighted evidence suggesting that the 19th century entailed a number of important socio-economic transitions for pastoralists in Amboseli, and can be conceptualised as having ushered in the era of the Maasai in this landscape; something that finds parallels in other parts of Kenya, as shown by other recently completed projects (Boles 2017; Petek 2018). Finally, I have drawn attention to the diachronic continuity of the links between Maasai and non-Maasai people, and the resilient synergies between farming and herding livelihood practices in this landscape from the 19th century into the colonial period, despite the large-scale transformations occurring at this time.

The research presented here was motivated by a desire to craft a culture history of Amboseli, but also to do so using an historical ecology approach, which has allowed for a presentation of pastoral pasts in Amboseli that takes into account ecological and socio-economic perspectives, as outlined in Chapter 1. As discussed throughout this thesis, there has been much recent interest in the way that pastoral settlements create pastoral landscapes, and how the dense deposits of dung found at Maasai homesteads in Amboseli have appreciable benefits for ecosystem functioning (see Chapter 2 in particular). It is becoming increasingly accepted that rangeland ecology in Amboseli has developed with herders and their livestock as fully integrated actors, and thus a driving motivation behind the research featured here was an acknowledgment that in order to understand the present and future prospects of this landscape, we must develop an appreciation of the historic socio-economic and environmental variability that has led to its realisation. To illustrate this very simply, in examining habitation sites in Amboseli from an archaeological perspective, one is not only likely to detect enhanced levels of soil nutrients and vegetative biomass, but also to encounter ceramics, iron, glass beads, cowry shells, stone tools, and even the remains of cultivated plant foods. These material assemblages have their own histories that speak to the complexity of anthropogenic influences on the ecology of Amboseli, and all can provide insights into the paths that helped create and recreate this landscape. I have presented evidence attesting to how some of these goods were acquired through trade and exchange with people who reside beyond Amboseli, or derive from those who were not themselves exclusively engaged in livestock herding, and all are illustrative of the entanglements that are part and parcel of pastoral livelihoods in this landscape. Analysis of these remains offers a different, but important, vantage on how pastoralism has functioned in Amboseli than that which studies of the soil nutrient and vegetation profiles of glades can provide. I hope this thesis will confirm that the techniques that ecologists typically use for understanding African pastoralism can be aided by archaeological inquiry, particularly that which draws upon historical ecological and usable past approaches. In my closing remarks, I offer some final reflections on the methods employed in this project, discussing the strengths, limitations, and future directions of this research overall.

Many questions remain with regards to the benefits, detriments, and projected longevity of livestock husbandry, agriculture, and commodity exchange networks in Amboseli in their current iterations. This thesis has underscored the importance of acknowledging the nuances and distinctions within and between pastoral, market, and farming practices however. Simple blanket statements pertaining to the novelty and disruptiveness of agriculture and expansive networks of trade among pastoralists in Amboseli detract from our understanding of the sustainability of particular livelihood practices in this landscape, and how this dynamic ecosystem has functioned through time. In what follows, I thus also explore the significance of this research with regards to how pastoralism in Amboseli is conceptualised and engaged with today, with a focus on the individuals and organisations that play a role in deciding the sorts of development initiatives to be launched within this landscape.

9.1. Methodological reflections and avenues for future research

As I have discussed in the survey and excavation report chapters of this thesis, the archaeological record in Amboseli has been subject to taphonomic processes and is in a constant state of flux. In combination with the fact that mobility is so characteristic of herding people, the archaeological traces of pastoralism can often be exceedingly faint. The realities of the archaeological process do not typically encourage expending considerable efforts on investigating such traces, and it is those sites that are rich in material culture with obvious architectural features that tend to become the focus of extensive study. This focus, however, limits the range of sites that are investigated and even recorded by archaeologists, shaping our outlook on what ‘the archaeology of pastoralism’ comprises. The consequence of this outlook is that the numerous instances of more ephemeral registers of pastoralism tend to go unexplored, despite the widespread recognition that the archaeology of pastoralism is fundamentally the archaeology of the more ephemeral (Bradley 1992: 214; Leshnik 1972: 151; MacDonald 1999). In this thesis I have endeavoured to pursue a different course of action, and rather than invest all resources in excavating a limited number of materially dense sites, I have instead taken the landscape as the unit of my analysis.

Thanks to advances in the accessibility and reliability of GIS recording instruments and analytical software, I have been able to carry out a survey in Amboseli wherein all archaeological materials were mapped and collected. As has been described, the research design of this project sought to build on the earlier work of Robert Foley (1981a,b), who pioneered off-site archaeological approaches in the Amboseli landscape. It proved challenging, however, to discern whether or not there has been marked continuity or change in pastoral land use through time in Amboseli, and while Foley (1981a) has suggested that mid-20th century Maasai and Pastoral Neolithic herders tended to occupy significantly distinct zones, my own findings did not substantiate this. Arguably, in the area surveyed in 2015, there is more evidence for overlap in the location of mid-20th century Maasai settlements and archaeological artifacts associated with earlier periods than there is disjuncture. This analysis clearly has its limitations with regards to establishing precise chronological and even spatial trends in landscape use through time. Importantly, however, through examination of patterning in the distribution of various material objects, it was discerned that taphonomic factors appear to be impacting the recovery of artifacts in this landscape, a conclusion that aligns with Foley’s (ibid.) results. Generating a better understanding of the biases acting on the recovery of artifacts and the visibility of sites in a study area is a valuable, and I would argue necessary, contribution in terms of evaluating pastoral land use through time, as the paucity of material diagnostic of pre-Iron Age archaeological cultures encountered during the 2015 survey can now be interpreted more convincingly as an issue of preservation rather than actual absence. As digital elevation models, satellite imagery, and other remote sensing datasets are becoming increasingly available and of higher resolution, there is much scope for off-site archaeological approaches to be further refined in Amboseli and other areas of eastern Africa where pastoral archaeology is practiced.

In keeping with the landscape theme, a methodological choice I made during fieldwork was to not exclusively focus my excavation efforts on one or two exceptionally promising sites, but instead to conduct smaller scale test pitting in a total of ten different locales. This had the advantage of allowing me to build an understanding of certain continuities and dissimilarities in material culture types. Lithic artifacts, for example, seem to decrease in use throughout the Late Iron Age, and do not appear to feature in stratified deposits at sites post-dating c.1800. Iron implements and glass beads also evidently become more common after c.1500 CE. Such trends would not have been noted in a more site-focused study.

In interpreting the archaeological record at these sites I have drawn on a host of analytical techniques including lithic, ceramic, zooarchaeological, and archaeobotanical analysis, also incorporating radiocarbon dates, vegetation survey data, satellite imagery, archival texts, and local knowledge in the mix. Given the exploratory nature of this fieldwork, the aim was to generate a lower resolution but more holistic perspective of Late Iron Age and colonial period archaeological occurrences in the study area, and I contend that the results vindicate my approach. It was possible to identify, describe, and in the majority of cases, date sites of a wide temporal range spanning the last millennium.

An inherent risk associated with this strategy was that of spreading my time and resources too thinly throughout the study area, limiting the potential to examine the spatial organisation of sites, and to accrue and comprehensively analyse large material, zooarchaeological, and archaeobotanical assemblages from temporally well-defined contexts. In common with a great many researchers before me, the survey and exploratory excavations in Amboseli were also a process of trial and error, of building an appreciation for which sites have the deepest occupation sequences, the best preserved artefactual records, and which methodological approaches can ultimately offer the highest returns. Yet reflecting on this work, it is apparent that the methods that were of most importance at some sites proved less relevant at others, emphasising the need for a multi-pronged approach. For instance, examining satellite imagery of Olopoli allowed for an identification of anthropogenic sediments, though the same could not be said for the Inyangusi Manyatta. A key lesson to be drawn is that flexible research strategies are essential for understanding archaeological manifestations of pastoralism in this landscape, and most probably other regions as well.

There is much scope for further refining understandings of these sites, as for example, vagaries relating to whether or not certain sites featured livestock enclosure sediments (and may be more convincingly labelled pastoral settlements) could be explored through micromorphological and geochemical analysis. Yet, due to the palimpsest formation of Osoit, RB, Inyangusi Manyatta, and Lemomo Hill, it is highly uncertain that it would have been at all possible to understand the spatial organisation and discrete episodes of occupation at these sites in their entirety. Moreover, at sites that appear to have had more singular occupation horizons such as Ilmaarba, Kirinkai, Olopoli, and Irrpurai, due to issues of bioturbation and preservation, even the use of geoarchaeological techniques would not guarantee the identification of specific elements, such as gateways and house floors (see Boles 2017). My point here being is that no one analytical technique promises to reveal all, and as my archaeological survey and excavations in the Amboseli landscape were largely exploratory, it proved advantageous to draw on a wide range of approaches as opposed to intensively following one line of inquiry, as may have needed to have been the case had my research questions been different.

I identify adaptiveness to the realities of the archaeological record as being one of the most significant aspects of my research design.⁸⁴ At one stage, for instance, I had harboured ambitions to carry out isotopic analysis of domestic faunal enamel with an emphasis on strontium signatures in order to investigate the patterned mobility of livestock over the last millennium, complementing my primary interest in understanding how Amboseli herders have moved within and beyond this landscape. This proved to be an untenable line of inquiry

⁸⁴ Another aspect of embracing flexibility in my research design was that when presented with the opportunity to have obsidian samples exported for X-ray fluorescence analysis, and for soil samples to be analysed for phytoliths, I of course agreed. Unfortunately, due to the timing of these arrangements, the results of these analyses have yet to be generated. Thus a clear avenue for further research in the immediate future will be interpreting and sharing the data from these ongoing analyses as it emerges.

given the paucity of zooarchaeological material available for sampling. In abandoning this strategy, I instead was able to direct more time toward conducting interviews with local Maasai, using a biographical approach to understand how a host of material things have circulated within and beyond the Amboseli landscape in the 20th century, and how these exchanges are illustrative of the way that pastoralists themselves were entangled in inter-regional and global relations. While isotopic analysis and engagement with local knowledge sources are starkly different analytical techniques, both methods can touch on similar themes and thus it was still possible, broadly speaking, to continue pursuing my original research objectives.

This thesis has also demonstrated that it is possible to recover identifiable macrobotanical remains from pastoral sites, something that has rarely been attempted in East African contexts. In order to maximise interpretive returns on the archaeobotanical samples from the Amboseli sites however, looking to the future, there is a need to build a more comprehensive reference collection for East African grasses, common small-seeded taxon, and tuberous plant parts. Additional research avenues that could assist in better understanding archaeobotanical assemblages from the Amboseli sites include experimental archaeological approaches. For example, one could design a series of experiments to determine which macrobotanical remains it is possible to identify in the dung of various domestic animals and in the deposits generated at contemporary pastoral settlements. Finally, methods have recently been developed to identify and analyse small charred lumps of ‘bread-like’ or ‘porridge-like’ food remains from archaeological contexts (Carretero et al. 2017). Using scanning electron microscopic analysis, the microstructures of charred food fragments can indicate the presence of certain plant species, the forms of food represented (bread or porridge) and the methods used to prepare these foods. Within the Amboseli samples there was a single fragment of charred plant food suspected to be ‘porridge-like’, identified at the colonial era site of CB, and this could be a candidate for SEM analysis. In many parts of sub-Saharan Africa cereal and tuber porridges are staple foods, and developing this methodology to explore African crops and culinary traditions has huge promise.

A running theme throughout this thesis has been that pastoral livelihoods should be historically conceptualised and evaluated as intricately entwined with hunter-gatherer and agricultural modes of production. Consequently, surveying in other areas of Amboseli is also encouraged, particularly near the wetlands and in highland zones where agriculture is more likely to have been practiced. I would also recommend that archaeobotanical sampling be carried out at the Ngunguni sites in the Chyulu Hills, and at the Rombo site on Kilimanjaro.

In writing this thesis I was particularly frustrated by the paucity of ethnographic, palaeoenvironmental, archaeological, and historical information available for the northern slopes of Kilimanjaro, as much of the research pertaining to the mountain derives from the Tanzanian side. In this sense, Kiriamas’s Rombo site (Kiriamas 1990) is of considerable relevance, being the only systematically excavated archaeological occurrence on the northern slopes of Mt. Kilimanjaro. The Rombo site is extraordinary in terms of the density and diversity of material remains encountered, and generating radiocarbon dates and publishing information on the finds and temporal range of its occupation should be a high priority.

Further palynological work in the wetlands of Amboseli would complement many of the discussions and inquiries raised within this thesis. In particular, it would be advantageous to know when maize came to be cultivated in the wider landscape, a question that could be addressed by quantifying the size range of the Poaceae pollen grains recovered in the

Amboseli wetland cores.⁸⁵ Additionally, it would be of relevance to conduct further experiments to determine the contemporary pollen catchment area for various grain types in the different wetlands sampled. Pollen traps were in fact placed in Kimana and Namelok wetlands by Esther Githumbi and other REAL project colleagues in an effort to answer this very question, though unfortunately these traps were displaced before they could be retrieved. Determining which pollen grains are more likely to be locally derived and which are more likely to have been transported considerable distances will assist in establishing whether or not cultivation was ever practiced in the wetlands of Amboseli prior to the 20th century.

Finally, as expounded on in my introductory chapter, this thesis offers a contribution to the archaeology of recent African pasts. My research on Amboseli in the 19th and 20th centuries incorporated both archival source materials and interviews organised around archaeological artifacts and sites identified in this landscape. There is still much scope to consult a wider range of archival documents pertaining to Amboseli's past. Due to time constraints I was only able to visit the Kenya National Archives, but collections such as those housed at the Rhodes House Library in Oxford, and the National Archives at Kew pertaining to East Africa's colonial era no doubt hold further insights. Greater understanding of pastoralists and others living on the northern slopes and surrounding lowlands of Mt. Kilimanjaro in the 19th and 20th centuries could also be generated by consulting a wider range of non-English language archival and historical texts.

Another tactic that has proved fruitful in unlocking stories pertaining to everyday change among pastoralists in East Africa has been the distribution of ethnographic photographs obtained during the colonial period (Derbyshire 2017). This strategy would have also been well suited to my research with Maasai people (who may be among the most photographed pastoralists of all time) and I contend it should be pursued by those interested in the history of Amboseli. However, as Derbyshire (2017: 30) acknowledges, while such images are representative of the lives of pastoral people, they are also the products of colonial and Western visions of African cultures (see Waller and Sobania 1994: 59) in ways that material objects collected from the landscape are not, meaning a combined material/photographic approach is likely to generate the widest range of insights.

Additionally, it would be remiss to not recommend that further inquiries into Amboseli's recent past incorporate a greater plurality of individuals from varying ethnic groups and economic backgrounds than are featured in this present study. Conspicuous in their absence from Chapter 8 are the voices of non-Maasai people who have also inhabited the Amboseli landscape and the surrounding region, and whose livelihoods have been closely entwined with Kisongo pastoralists. As discussed in Chapter 1, however, this thesis has never claimed to be a product of a truly community archaeology approach, but rather is better described as having been influenced and informed by local people and perspectives.

My research in Amboseli admittedly does not conform with the ideal of 'community archaeology' as stated by Wynne-Jones and Fleisher (2015: 110), which is that 'we must seek to do community archaeology through recognizing the efforts of local groups who need to forge their own paths to collaboration'. Thus, rather than providing my own recommendations on how better to incorporate local perspectives and epistemologies into the archaeological process, a fruitful endeavour for future archaeological work in Amboseli may be to simply begin with an inquiry among local people of diverse identities to determine what forms of historical research they would value being conducted in this landscape. Such an approach

⁸⁵ Taking a conservative approach, Poaceae grains > 80 µm can be assumed to represent *Zea mays* (Eubanks 1997; Tsukada and Rowley 1964).

would also align closely with emerging principles of knowledge co-production (Pohl et al. 2010).

9.2. Sustainability, intervention, and reframing pastoral pasts in Amboseli

In the introductory chapter of this thesis I remarked on how Amboseli is renowned internationally as a conservation space, and this is indeed one of the reasons why it draws the interest of researchers from diverse backgrounds, including myself. As conservation is very much on the agenda in Amboseli, current development interventions in this landscape are frequently oriented toward accommodating and promoting the well-being of wildlife, the tourism industry, and pastoralism; the latter a livelihood that is increasingly understood as being able to contribute to the ongoing biodiversity of rangeland. In Chapter 2, I examined how ecologists and conservationists in Amboseli have made great strides in reversing tired narratives of pastoralists as inherently illogical resource managers whose actions promote environmental destruction. Chapter 2 also reviewed some of the key issues that are understood to be undermining the continuation of pastoral livelihoods in the Amboseli landscape, including sedentarisation, rangeland subdivision, and agriculture. Sustainable development in Amboseli in this context is a complex, political, and delicate issue, but it is also of major significance, and it is therefore ill-advised to attempt to implement this development using specious historical narratives. While seemingly innocuous, in much of the conservation and ecological literature pertaining to Amboseli it is a common practice to summarise the history of pastoralism in this landscape. This becomes problematic, however, as conventional accounts of Amboseli's past tend to overemphasise how pastoralism traditionally functioned in this landscape in a hermetic and 'pure' fashion, and the narratives employed are both ambiguous and largely unsubstantiated, though they are rarely presented as such.

There is a danger here, as Leach and Mearns (1996) have put it, of swapping one 'received wisdom' with another: in the case of Amboseli, eschewing the old idea that pastoral land use practices are environmentally destructive and economically unsound in favour of the notion that agriculture is inherently unnatural and at odds with livestock herding and wildlife in this landscape. As discussed in Chapter 8 of this thesis, it is important to consider how agricultural pursuits and farming people of varying ethnicities have long been entangled with Maasai livelihoods in Amboseli. While there are numerous influential studies that have challenged dominant assumptions about how African farmers mismanage resources (e.g. Caretta et al. 2018; Fairhead and Leach 1996; Reij et al. 1996), I refrain from arguing the case that because agriculture has been practiced in Amboseli for centuries we may therefore conclude it is sustainable. Such a line of reasoning harkens back to arguments employed during the colonial period that recognised the longevity of African agronomies but overlooked the possibility for technical innovations and disruptions having occurred in antiquity (Stump 2010: 1253). The sustainability of current horticultural regimes in Amboseli should remain under critical evaluation, as continuity of cultivation in the broadest sense cannot be equated in any simplistic way with continuity of technological, social, or economic practices. The longevity of irrigation in Amboseli, for instance, is still entirely unknown.

Moreover, I share the concerns of many conservationists and ecologists working in Amboseli with regards to the continuation of livestock herding practices, and the welfare of people and wildlife who inhabit this landscape. I would agree that in some instances, the diversification of pastoral livelihoods is more accurately labelled fragmentation, as former herders seek sporadic, unskilled, and low paid employment (Homewood et al. 2008: 390). Those who lack livestock, land, and other forms of capital are challenged to re-establish themselves as

pastoralists, and adversities can be especially acute due to the marginalisation of pastoral groups in eastern Africa (ibid.). There is consternation that the poor in Amboseli are faced with diminishing access to resources (Southgate and Hulme 2000: 109, 113). The pace and scale at which wetlands in Amboseli are being converted to farmlands is presenting complications to livestock and wildlife alike, as these areas offer key resources and drought refuges but are currently undergoing large-scale transformations (BurnSilver 2009; Campbell et al. 2003). The wetlands of Amboseli are still highly productive, and Loitokitok division is one of the largest irrigation areas in all of Kenya, but despite this fecundity, many residents here periodically require emergency food relief (Southgate and Hulme 2000: 81), as there are estimates that as much as 90% of the produce grown is destined for markets in Mombasa (Kimani 1988: 5-23, cited in Rutten 1992: 156). The sustainable and equitable management of resources in Amboseli demands ongoing attention requiring solutions the likes of which would be inappropriate to speculate on in this thesis, given the scope of this research. Rather, my goal in the preceding chapters has been to demonstrate that it is not just any form of market activity and integration of cultivation into pastoral livelihoods that is novel to the Amboseli landscape. In failing to mark the distinctions between varied manifestations of livelihood diversification, cultivation, and relations of exchange, we not only limit our understandings of how a multiplicity of anthropogenic activities have shaped the Amboseli landscape through time, we also risk minimising the transformative impacts of the 20th century that encompassed the colonial encounter, the commodification of land, and the incorporation of Amboseli within hyper-extractionist, capitalistic world systems.

Denying or simplifying histories of local resource use to rationalise the appropriation of land or other forms of intervention is an unfortunately well-established practice in eastern Africa harkening back to the colonial period (e.g. Anderson and Grove 1987; Shetler 2007; Stump 2010: 1253). As discussed in Chapter 8, under the colonial gaze, Maasai pastoralists in Amboseli were perceived as a group economically and ethnically divorced from other people in eastern Africa. Regrettably, there are echoes of colonial era rhetoric in the narratives put forth by conservationists and ecologists regarding the un-Maasai character of market integration and association with agriculture, and the alien status of non-Maasai people in Amboseli. Unsurprisingly, archaeology too has been impacted by such formulations, and ethnic identifiers have been viewed as absolute criterion. The colonial promotion of notions of ethnic identity have had disturbing influences on African communities, especially where perceived physical, social and economic proclivities were attached to supposedly easily demarcated tribal groups such as the Maasai, Chagga, and Kamba.

Importantly, ethnicity continues to be a factor in people's ability to access and retain resources and representation in Amboseli, and this has led to conflict between Maasai and non-Maasai individuals (Southgate and Hulme 2000: 97-98, 111). Conservation organisations can become embroiled in clashes where ethnicity is instrumentalised, as has been the case in Mikululo, in the Chyulu Hills. Episodes of violence between Maasai and Kamba people have periodically erupted in Mikulolo over control of this land for decades. The Kenya Wildlife Service, which has been involved in forced evictions in Mikulolo, has been accused of favouring Maasai over Kamba people in their portrayal of agriculture as more environmentally damaging than herding (Mutie 2003: 198-199). From both a logistical and ethical standpoint, development interventions and policies in Amboseli are well-served to be enacted with sensitivity to the potential for these forms of conflict to occur, and must be critical of the ways in which they engage with narratives that portray people from certain ethnic groups as 'primordial' conservationists (Lane 2015a), and others as modern and destructive interlopers.

To be clear, I am in no way arguing that conservationists and ecologists in Amboseli are deliberately misrepresenting local histories in order to justify interventions. I fully acknowledge that it has been a gradual process wherein I myself have come to the realisations that I have shared in this thesis, and have been able to demonstrate how unsubstantiated certain perceptions of Amboseli's past actually are. The dismantling of entrenched paradigms requires robust empirical historical, palaeoenvironmental, ethnographic and archaeological evidence and the integration of these sources has been, until recently, lacking in Amboseli. It has been of significant advantage to conduct this research within the Resilience in East African Landscapes project, as archaeological, palaeoenvironmental, ecological and historical inquiries were launched co-operatively in Amboseli and the surrounding region, promoting the sharing of results and collaborative interpretations (e.g. Githumbi et al. 2018a). The theoretical framing of this evidence has also been of importance. In this thesis I have taken a usable past and historical ecological approach which both recognise the strength and utility of archaeology and other complementary disciplines in questioning unsubstantiated historical narratives that portray certain livelihoods and human actions as either sustainable or short-lived (Balée and Erickson 2006: 12; Stump 2013a: 281). As Stump (2010: 1259) has noted, it is unrealistic to demand that development agencies and governmental organisations delay discussing ecosystems and implementing plans while they wait for historical data to be generated and synthesised, though it is the place of historians, archaeologists and palaeoecologists to analyse and comment on the use of erroneous historical narratives. The research presented here was designed to be just such a contribution, and will hopefully provide a platform from which further explorations of complex pastoral pasts in Amboseli may embark.

Kenya National Archive Citations

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Additional resources

Supplementary data pertaining to the attributes and location of the lithics, ceramics, and special finds encountered while surveying and excavating in Amboseli in 2015 has been made available to download at DiVA, Uppsala University's online academic archive.

URN: urn:nbn:se:uu:diva-355266; OAI: oai:DiVA.org:uu-355266DiVA; id: diva2:1228237

Appendix 1

Lithics

Table 1 Attributes recorded during lithic analysis

Variable	Description	Modified after
Raw material	Obsidian, chert, quartz, basalt	
Obsidian color	Opaque, green, grey, coffee, indeterminate	
Obsidian quality	1 - Pure glass with little to no flaws or inclusions 2 - Opaque, slightly waxy texture, with no flaws or inclusions or pure glass with some flaws or inclusions 3 - Waxy opaque color with some flaws or inclusions, semi-grainy to grainy texture, or striations of granular bands 4 - Opaque color with granular texture, or heavily banded with large inclusions. May have large bubbles or be very porous, flake morphologies obscured	Goldstein 2017: 118
Cortex	An estimate, to the nearest 5% of the dorsal flake surface, or total surface of the core, featuring the chemically or mechanically weathered exterior of the parent material	
Patination	1 – Light, surface is lightly coated, flake scars are sharp 2 – Medium, flake scars are present, but lack flake-edge shape definition 3 – Heavy, patination erases flake scars	Hranicky 2009: 110
Post-depositional damage	Type, extent, and location of post-depositional damage	
Platform type	Plain, dihedral, punctiform, lineal, faceted, microfaceted, abraded, cortical, crushed, removed, retouched	
Platform comment	Complete/incomplete platform, presence/absence dorsal-proximal faceting	
Bulb	Presence/absence	
Flake portion	Proximal, medial, distal	
Flake fragmentation	Lateral break(s), retouched piece, non-diagnostic fragment	
Termination	Feathered, hinged, stepped, broken, crushed, retouched, segmented	
Longitudinal symmetry	Left asymmetrical, right asymmetrical, or symmetrical when viewed along the longitudinal axis looking at the ventral surface with the platform uppermost	
Curvature	Looking longitudinally and sectionally, how the flake curves from the platform (curved, slightly curved, or straight)	
Scar count	Total number of visible major flake scars on the dorsal surface	
Hinge scar count	Count and direction of hinge terminations on the dorsal surface	

Scar directionality	Predominant flake scar direction on the dorsal surface, from which most flakes have been struck. (bidirectional, bidirectional parallel, bidirectional sub-parallel, crossed, perpendicular, unidirectional, unidirectional convergent, unidirectional parallel, unidirectional sub-parallel)	
Retouch	Type, extent, and location	
Edge-damage	Type, extent, and location	
Flake metrics	Length, width, and thickness of complete flake or flake portions, maximum dimension of flake fragments, weight	
Platform metrics	Width, thickness, exterior-platform angle	
Core blank	The type of blank produced from the core, either bipolar, blade, flake	
Bipolar type	If core is bipolar, indicate whether <i>outil écaillé</i> , normal, or broken	
Core orientation	Flake scar orientation is opposed, rotated, unidirectional, radial, multiplatform	
Core morphology	Core on flake, chunk, triangular, rectangular, elongated or sub-forms of.	
Number of platforms	Number of remaining striking platforms	
Core metrics	Maximum dimension, length and width of largest scar, and weight	

Table 2 Lithic tool types

Tool type	Description
Geometric microlith*	Small flakes or bladelets backed on multiple edges or angles to form a triangular, crescentic, or trapezoidal shape.
Backed blade	Blade blunted on one side by the removal of flakes.
Utilised blade	Blade exhibiting use-wear.
Scraper*	Pieces with semi-abrupt to abrupt unifacial retouch. The number and steepness of working edges, and other morphological attributes provide the basis by which scrapers are further subdivided into side scrapers, end scrapers, notched scraper, convergent pointed end scraper, nosed scraper, thumbnail scraper, and disc scraper.
Notch*	Blades or flakes with deep concavities formed by intentional retouch and/or utilisation.
Percoir/Bec*	Percoirs are tools with a sharp point formed by retouched edges that come together at an angle < 90°. Similar pointed features formed by retouched opportunistic spurs on a flake are labelled as becs.

**descriptions after Goldstein (2017:120-122)*

Fig. 1 Select cores

i) notched bipolar core on flake (cluster 27); ii) notched bipolar core on flake (cluster 87); iii) outil écaillé core on flake (cluster 99); iv) chunky bipolar core (cluster 108); v) microblade core, later used as bipolar, (cluster 46); vi) irregular multiplatform core (cluster 16)

Fig. 2 Select core rejuvenation flakes

i) core rejuvenation flake (Osoit, surface find); ii) core rejuvenation flake (cluster 3)

Fig. 3 Select backed pieces

i) backed blade, crescentic (cluster 40); ii) backed blade, broken (cluster 94); iii) backed blade (cluster 28) iv) backed segmented blade (cluster 28); v) backed blade (Osoit, surface find); vi) backed blade, broken (cluster 69); vii) backed blade (cluster 46)

Fig. 4 Select utilised blades

i) utilised blade (cluster 99); ii) utilised bladelet (cluster 87)

Fig. 5 Select crescents

i) crescent (Osoit, surface find); ii) crescent (cluster 19); iii) crescent (cluster 82); iv) crescent, broken (isolated surface find); v) crescent with percoir at both ends (cluster 32); vii) crescent, broken (cluster 46)

Fig.6 Select combination/other tools

i) retouched blade with 2 notches and 2 percoir (Ilnyangusi Manyatta, surface find); ii) percoir (Ilnyangusi Manyatta, surface find); iii) bec (Ilnyangusi Manyatta, surface find); iv) notch (Ilnyangusi Manyatta, surface find); v) truncated piece with retouched notch (cluster 13); notched strangulated blade and end scraper (cluster 99)

Fig. 7 Select scrapers

i) thumbnail scraper (cluster 82); ii) thumbnail scraper (cluster 49); iii) thumbnail scraper (cluster 94); iv) notched side scraper (Osoit, surface find); v) notched side scraper (cluster 14); vi) double side-scraper (cluster 46); vii) end-scraper (cluster 82); viii) notched scraper (Irrpurai, surface find)

Appendix 2

Ceramics

Fig. 1 Amboseli vessel forms

i) bowl (straight rim), CB, surface find; ii) bowl (straight rim), cluster 83; iii) bowl (slightly inverted rim), Lemomo Hill, surface find; iv) jar (everted rim), cluster 91; v) bowl (slightly everted rim), Irrpurai, Unit 1 Layer A; vi) bowl (straight rim,) cluster 93; vii:undecorated jar (everted rim), cluster 80; viii) bowl (straight rim), cluster 107

Fig. 2 Decorated sherds from Amboseli, 2015 surveys

i) bevelled rim; ii) twisted cord-roulette decoration on broken rim (cluster 63); iii) twisted cord-roulette decoration on c.f. handle (cluster 118;); iv) irregular waves (cluster 72); v) irregular waves (cluster 37); vi) brushing; vii) grooves perpendicular (cluster 63); viii) bands of triangular impressions (cluster 72); reddish slip (cluster 67); x) deeply incised lines (cluster 81); xi) incised line, c.f. Akira ware? (cluster 91)
 * note that only surface ceramics unaffiliated to excavated sites are depicted here

Fig. 3 Decorated sherds from Foley's Amboseli ceramic sample assemblage

i) herringbone decoration, (Ileret?); ii) circular impressions; iii) comb-stamp design (Narosura?); iv) incised decoration ; v) incised banded decoration ; vi) incised lines; vii) circular punctates; viii) square punctates; ix) rim with incised line; x) rouletting; xi) wavy-lines; xii) incised lines (irregular); xiii) rocked zig-zag impressions (Kwale/Gatung'ang'a/Maore?); xiv) diagonal grooves checked; xv) grooves horizontal; xvi) tear-shaped impression; xvii) rows of impressions (Gatung'ang'a?)

Fig. 4 Sub-selection of ceramics from Herman Kiriama's excavation of Rombo

i) bands of fingernail impressions, bowl with inverted rim and handle; ii) raised ridge decoration, open-mouthed jar; iii) sub-circular impressions, bowl with slightly inverted rim; iv) impression rectangular panels; v) impression rectangular panels, open mouth jar; vi) incised line rectangular panels, bowl with inverted rim; vii) raised ridge and bands of impressions; viii) incised line rectangular panels, bowl with everted rim; ix) impression rectangular panels, bowl with everted rim; x) raised notched-ridge; xi) bands of fingernail impressions, and triangular pattern impressions; xiv) shell impressions; xv) raised 'pimples'; xvi) sub-circular impressions and unnotched ridge; xvii) sub-circular impressions

Fig. 5 Kirinkai ceramics

i) 'pleated' decoration, surface find; ii) parallel horizontal grooves, surface find

Fig. 6 Inyangusi Manyatta ceramics

i) parallel grooves with vertical hatching, surface find; ii) rim, Unit e Layer B

Fig. 7 Lemomo Hill ceramics

i) twisted-cord roulette decoration on bowl with slightly inverted rim, surface find; ii) twisted cord-roulette decoration, surface find iii-iv) checked grooves, surface find

Fig. 8 Ilmaarba ceramics

i) circular punctate impressions, Unit 2 Layer A; ii) tear-shaped punctate impressions, Unit 2 Layer A; iii) circular punctate impressions, surface; iv) rim, Unit 2 Layer A; v) twisted-cord roulette decoration? Unit 4 Layer A

Fig. 9 Ololopoli ceramics

i-ii) handles, surface finds; iii-iv) twisted-string roulette decoration, surface finds; v) applied decoration, surface find; vi) dark reddish-brown 'type', surface find vii) rim, Unit 3 Layer A

Fig. 10 Osoit ceramic

i) rim with tapered lip featuring carination along which short vertical lines have been incised, surface find

Fig. 11 RB ceramics

i) parallel grooved lines, surface find; ii) rim with bevelled lip, surface find; iii) parallel grooved lines, surface find

Fig. 12 Irrpurai ceramics

i) horizontal striations, surface find; ii) reddish-brown medium thick vessel type, surface find; iii) reddish-brown medium thick, surface find; iv) reddish-brown medium thick sherd from bowl with slightly everted rim, circular punctate decoration, Unit 1 Layer A; v) thick brown rim, Unit 7 Layer A; vi) reddish-brown medium thick vessel type, bands of circular impressions, surface find; vii) reddish-brown medium thick vessel type, surface find; viii) thick brown base sherd, Unit 2 Layer A.

Fig. 13 Empaash ceramics

i) body sherd with lug, surface find; ii) yellowish-red coil manufactured type, surface find; brown medium thick type, parallel grooved decoration, Unit b Layer A; iv) brown medium thick type, bidirectional grooves, Unit c Layer A

Fig. 14 CB ceramics

i) yellowish-red sherd type, Unit d Layer B; ii) yellowish-red sherd type, straight rimmed bowl, surface find iii) brown sherd type, surface find iv) globular jar with circular punctate decoration, Unit 5 Layer C

Appendix 3

Special finds

Fig. 1 Stone bowl fragment, surface find

Fig. 2 Grinding-stones

i) Empaash, surface find; ii) Irrpurai, surface find iii) cluster 71 iv) cluster 59 v) Lemomo Hill, surface find vi) cluster 32 vii) Ilnyangusi Manyatta, surface find; viii) CB, Unit c Layer C
*All grinding-stones are fragments except for viii).

Grinding-stone	Length (mm)	Width (mm)	Thickness (mm)	Comments
i	195.5	145.9	38.6	Local basalt, coarse, pitted articulation surface
ii	88.82	68.66	22.31	Sandstone, smooth surface
iii	91.88	117.55	43.8	Local basalt, ochre stained, concave
iv	76.08	54.80	25.18	Sandstone, smoothed surface, ochre stained
v	95.71	66.03	24.35	Gneiss, smoothed surface
vi	86.56	52.54	15.03	Gneiss, smoothed surface
vii	47.52	40.67	13.09	Sandstone, smoothed surface
viii	84.89	82.2	31.42	Local basalt, ochre stained

Fig. 3 Lithic 'manuports'

i) partially manufactured bead, c.f. feldspar (cluster 11); ii) smoothed chert, found on the surface of Irrpurai; iii) 'bao stone', Unit e Layer c Ilnyangusi Manyatta

Fig. 4 Beads and cowry shells

i) Ilnyangusi Manyatta, Unit d Layer A; ii) Lemomo, surface find; iii) cluster 90, surface find; iv) cluster 80, surface find; v) Irrpurai, surface find; vi) Empaash, Unit e Layer B; vii) OES bead blank, Lemomo Unit 1 Layer A; viii) OES bead blank, Lemomo Unit 4 Layer B; ix) OES broken bead, Ilnyangusi Manyatta Unit 6 Layer B; x) cowry shell, Lemomo surface find; xi) cowry shell, Lemomo surface find; xii) cowry shell, Ilnyangusi Manyatta surface find; xiii) cowry shell, Empaash, surface find

Fig. 5 Select metal finds

i) iron bracelet, isolated surface find; ii) iron earring, Ololopoli, surface find; iii) iron bead, CB Unit 1 Layer A; iv) iron wire, isolated surface find; v) iron object, unknown, CB, surface find; vi) iron wire fragments, cluster 80; vii) copper coil, Lemomo Hill, surface find; viii) iron awl, Empaash, Unit 6 Layer A; ix) iron blade, Ololopoli Unit 4 Layer A; x) iron projectile, isolated surface find; xi) iron projectile, cluster 66; xii-xiii) iron projectiles, Irrpurai surface finds

Appendix 4

Artifact clusters

Fig. 1 Artifact cluster distributions

Cluster Number	No of Rims	Decoration	Vessel forms	Total sherds	No of Flakes	No of Cores	No of tools	Tool types	Green	Grey	Opaque	Obsidian Total	Basalt	Chert	Quartz	Metal	Other	Extent (m)
1					4		1	GM	3			5						86
2					6	1	1	E Sc	2		4	8						95
3					8	2			7	1	2	10						42
4					2	1			3			3						8
5					7		2	BB, GM	6	1	2	9						9
6					5	2			4	1		6			1			64
7					10	6	2	BB	5	2	3	14	1		3			137
8					4	2			2			5	1					109
9					15	4	1	BB	4	4	11	20						132
10					4	1	1	GM		3	2	5	1					155
11					3	1	1	Bec		4		4	1				M	122
12	1			3														69
13					5	1	1	GM/Ntc	1	1	2	7						97
14					5		3	BB, C Sc/Ntc, S Sc	1	3	2	8						138
15					2		2	GM, CBB	2	1	1	4						87
16				1	3	1			1	1		4						80
17					6						5	5		1				65
18					2			S Sc	1	1		2	1					73
19					2		1	GM	1		1	3						111
20					3				2		1	3						87
21					3					1	1	2			1			44
22					2		1	BB	1		1	2		1				127
23					1	1	1	BB			2	2			1			142
24					2	1				1	2	3						61
25					2		1	Ntc	2	1		3						90
26					3	1			1		3	4						151
27					1	1	2	Bl, Ntc	1		1	4						96
28					2		2	BB	1	2	1	4						83
29					4						4	4						92
30					4	1					1	2	1		2			42
31					9	1	1	Bl		2	3	8	1		2			173
32					2		1	GM	2			3					GS	95
33					8		1	GM		4	5	9						167
34					2	1				2		2		1				163
35					31					3	26	31						113
36					2	1					2	3						146
37		irregular waves		1	2		2	BB, Ntc	2		2	4						126
38					5	2			1	1	2	5			2			52
39					7	1	1	GM	1	3	4	8			1			66
40					2	5	1	GM		4	2	7			1			57
41					2					1		1		1				41
42					1	3	1	S Sc	1	2		4	1					54
43					3	1				1		4						116
44					3				1	1	1	3						97
45					3	2			1		4	5						30
46					6	2	7	C Sc/Ntc, S Sc, BB, GM, Ntc	1	3	8	14		1				190
47					2	1	1	Bl			3	4					GS	46
48					4				1			3	1					23
49					3		1	TN Sc	2		2	4						13

Cluster Number	No of Rims	Decoration	Vessel forms	Total sherds	No of Flakes	No of Cores	No of tools	Tool types	Green	Grey	Opaque	Obsidian Total	Basalt	Chert	Quartz	Metal	Other	Extent (m)
50					3					1		3						58
51				2	6		1	BB	2	1	2	7						162
52					4				1	1	1	4						15
53					3				2	1		3						9
54					9				1	3	5	9						29
55					5	1				1	5	6						31
56				2														73
57				5								0						102
58	1		handle	6													Co	134
59				5	3		1	BB, Ntc	2	1	1	4					GS	157
60				4	1						1	1				wire		88
61				15														106
62				2														107
63	2	grooves perpendicular and twisted cord roulette		7	3		1	Sc	3		1	4				wire		167
64	1			9	1									1				115
65	2		bowl (straight rim)	44	1				1			1				unknown		102
66				2	2	1			1			2		1		projectile		78
67		slip		22	10	1			1	5	4	11						100
68				2														30
69				3	1		1	BB	2			2						82
70		grooves bidirectional		24	8				2	1	5	8					GS	170
71	5	applied decoration and twisted cord roulette	handle	60	1		1	C Sc/Ntc	1			1			1	ring		92
72		bands of triangular impressions and irregular waves		5	1	2	2	BB, CBB		3		5						151
73	4	grooves checked and twisted cord roulette	bowl (slightly everted rim)	27	6	1				3	2	6			1	wire	Co, GS,	179
74	3			13	1							1						36
75				3	1		3	BB, Ntc, Bl	3			4						51
76	1	grooves horizontal		14	5		1	BB	1		2	4		2				67
77					5	1	1	Sc	1	1	1	3	4					79
78				22														74
79	5	notched rim, bands of circular impressions, circular punctates, striations	bowl (slightly everted rim)	48	7	1	3	CBB, D Sc, TN Sc	2	4	3	10			1	projectile	Be, GS, M	300
80				3	9	2				4	5	11				wire	Be	184
81	1	deeply incised lines		4	12	2	1	BB	4	7	2	14			1			153
82				4	9	3	4	TN Sc, E Sc, BB, GM		10		12	1		3			120
83	3		bowl (straight rim)	32														15
84		grooves with vertical hatching		6	7		4	Bec, Ntc, Pre, Pre/Ntc	1	6	4	11					Co, GS	169
85				2	1		1	BB/Ntc			1	2						69
86				1	30	3	5	Bl, Ntc, GM	9	13	3	36		2				107
87				7	8	1	3	Ntc, Bl, Sc	5		7	12						179
88					3	1				1		2		1	1			15
89				13	4		1	BB		2	3	5						99
90	4	twisted cord roulette	jar (everted rim)	58	1							1					Be	148
91	2	incised line	jar (everted rim)	7	2	1				1	2	3						99
92				2	6	1			3	1	3	7						105

Cluster Number	No of Rims	Decoration	Vessel forms	Total sherds	No of flakes	No of Cores	No of tools	Tool types	Green	Grey	Opaque	Obsidian Total	Basalt	Chert	Quartz	Metal	Other	Extent (m)
93	1		bowl (straight rim)	2	8	1			1	2	6	9						112
94				1	1		2	BB, TN Sc	2		1	3						98
95				4	2	1			1			2			1			122
96	1			1	13	1			6	2	3	13			1			115
97				4	2		1	Bl	1	1	1	3						145
98				2	5	5			2		7	10						46
99					5	4	2	Bl, E Sc	2	6	2	11						100
100				15	1	2	1	GM		1		3	1					52
101		punctates		11	2	1	1	Bl	1	1	2	4						71
102					5	1	1	BB		1	2	3	4					109
103		punctates (circular)		46	3	1	2	CE Sc, Ntc	1			5		1				127
104					2	1			2		1	3						120
105	1	short incised lines (vertical)		1	11	4	4	BB, C Sc/Ntc, GM	1	7	8	19						78
106				4	3	1			2		2	4						110
107	3		bowl (straight rim)	48	21	3	2	Ntc	9	1	15	26						351
108				6	3	2			3		1	4			1			206
109					4		1	BB		1	4	5						10
110				1	4				1		3	4						122
111				1	1		2	Sc, GM	2		1	3						107
112				1	2				1			1		1		wire		82
113		pleating and grooves horizontal		17	9	1	1	BB	2	1	2	8		1				94
114				2	2	1	1	N Sc			2	4						107
115				8	1		1	TN Sc						2				174
116					7	3	1	BB		2	7	10	1					93
117				6	2					2		2						187
118		twisted cord roulette	handle?	13														117
119					2						1	2						18
120					3						1	3						88
TTL	41			684	519	102	98	98	151	153	252	655	20	17	25	10		

Tool types: BB = backed blade; CBB = curved backed blade; Bl = utilised blade; C Sc= concave scraper; CE Sc = convergent pointed end scraper; E Sc = end scraper; N Sc = nosed scraper; S Sc = side scraper; TN Sc = thumbnail scraper; D scraper = disc scraper GM = geometric microlith; Bec = bec; Prc = percoir. Other finds: Be = bead; CO = cowry shell; GS = grinding-stone; M = lithic manuport.

Appendix 5

Chi² and Kendall's rank correlation analysis tables

Table 1 NDVI values goodness of fit test

	NDVI Values	Af	Obs	Exp = $\frac{\text{Obstot}}{100/\text{Af}}$	Test statistic $(\text{Obs}-\text{Exp})^2/\text{Exp}$
Pastoral settlements*	-0.998-0.13	18	10	18	3.56
	0.13-0.208	47	51	47	0.34
	0.208-0.998	35	39	35	0.46
	$P \text{ value} = 0.113; DF = 2; \text{Chi}^2 = 4.35$				
Ceramics (minimum number of vessels)	-0.998-0.13	19	77	44	23.76
	0.13-0.208	51	11	121	1.95
	0.208-0.998	30	64	72	31.85
	$P \text{ value} = < 0.00001; DF = 2; \text{Chi}^2 = 57.56$				
Ceramics (all)	-0.998-0.13	19	163	130	8.37
	0.13-0.208	51	469	354	37.36
	0.208-0.998	30	62	210	104.30
	$P \text{ value} = < 0.00001; DF = 2; \text{Chi}^2 = 150.04$				
Lithics (all)	-0.998-0.13	19	270	151	93.8
	0.13-0.208	51	460	411	5.84
	0.208-0.998	30	76	244	115.67
	$P \text{ value} = < 0.00001; DF = 2; \text{Chi}^2 = 215.30$				
Flakes	-0.998-0.13	19	196	108	71.70
	0.13-0.208	51	330	292	4.95
	0.208-0.998	30	48	174	91.24
	$P \text{ value} = < 0.00001; DF = 2; \text{Chi}^2 = 167.89$				
Cores	-0.998-0.13	19	34	20	9.8
	0.13-0.208	51	59	54	0.46
	0.208-0.998	30	13	32	11.28
	$P \text{ value} = 2.1\text{E-}05; DF = 2; \text{Chi}^2 = 21.54$				
Tools	-0.998-0.13	19	38	20	16.2
	0.13-0.208	51	62	56	0.64
	0.208-0.998	30	9	33	17.45
	$P \text{ value} = < 0.00001; DF = 2; \text{Chi}^2 = 34.30$				
Green obsidian	-0.998-0.13	19	57	33	17.45
	0.13-0.208	51	104	88	2.91
	0.208-0.998	30	13	53	30.19
	$P \text{ value} = < 0.00001; DF = 2; \text{Chi}^2 = 50.55$				
Grey obsidian	-0.998-0.13	19	69	32	42.78
	0.13-0.208	51	87	86	0.01
	0.208-0.998	30	13	51	28.31
	$P \text{ value} = < 0.00001; DF = 2; \text{Chi}^2 = 71.11$				
Opaque obsidian	-0.998-0.13	19	105	66	23.05
	0.13-0.208	51	210	178	5.7528
	0.208-0.998	30	35	106	47.56
	$P \text{ value} = < 0.00001; DF = 2; \text{Chi}^2 = 76.33$				
All artifacts	-0.998-0.13	19	352	199	117.63
	0.13-0.208	51	596	538	6.25
	0.208-0.998	30	109	320	139.13
	$P \text{ value} = < 0.00001; DF = 2; \text{Chi}^2 = 263.01$				

*Obs is calculated as the total % of land associated with each NDVI value category within a 25m radius of the centre of each settlement. Exp is calculated as the total % of land within the study area associated with each NDVI value category.

Table 2 Geological zones goodness of fit test

	Geological zones	Af	Obs	Exp = $\frac{\text{Obs} \cdot \text{Total}}{\text{Total Af}}$	Test statistic $(\text{Obs}-\text{Exp})^2/\text{Exp}$
Pastoral settlements	Kili. volcanics	25	27	19	3.37
	Lake bed	75	51	59	1.08
	$P \text{ value} = 0.035; DF = 1; \chi^2 = 4.45$				
Ceramics (minimum number of vessels)	Kili. volcanics	23	68	55	3.07
	Lake bed	77	169	182	0.93
	$P \text{ value} = 0.046; DF = 1; \chi^2 = 4.00$				
Ceramics (all)	Kili. volcanics	23	232	161	31.31
	Lake bed	77	462	533	9.46
	$P \text{ value} = < 0.00001; DF = 1; \chi^2 = 40.77$				
Lithics (all)	Kili. volcanics	23	195	182	0.93
	Lake bed	77	589	602	0.28
	$P \text{ value} = 0.271; DF = 1; \chi^2 = 1.21$				
Flakes	Kili. volcanics	23	156	133	3.98
	Lake bed	77	418	441	1.20
	$P \text{ value} = 0.023; DF = 1; \chi^2 = 5.18$				
Cores	Kili. volcanics	23	19	25	1.44
	Lake bed	77	87	81	0.44
	$P \text{ value} = 0.170; DF = 1; \chi^2 = 1.88$				
Tools	Kili. volcanics	23	23	25	0.16
	Lake bed	77	85	83	0.05
	$P \text{ value} = 0.647; DF = 1; \chi^2 = 0.21$				
Green obsidian	Kili. volcanics	23	30	40	2.5
	Lake bed	77	144	134	0.75
	$P \text{ value} = 0.071; DF = 1; \chi^2 = 3.25$				
Grey obsidian	Kili. volcanics	23	41	39	0.10
	Lake bed	77	128	130	0.03
	$P \text{ value} = 0.718; DF = 1; \chi^2 = 0.13$				
Opaque obsidian flakes	Kili. volcanics	23	78	52	13
	Lake bed	77	145	171	3.95
	$P \text{ value} = 3.8E-05; DF = 1; \chi^2 = 16.95$				
Opaque obsidian cores	Kili. volcanics	23	6	6	0
	Lake bed	77	20	20	0
	$P \text{ value} = 1; DF = 1; \chi^2 = 0$				
Opaque obsidian tools	Kili. volcanics	23	4	8	2.0
	Lake bed	77	25	21	0.76
	$P \text{ value} = 0.097; DF = 1; \chi^2 = 2.76$				

Table 3 Kendall's Rank Correlation results for CTI values and artifact weights (g)

Artifact type	Kendall's Tau correlation coefficient	2-sided p-value
Ceramics (all)	-0.005	0.850
Lithics (all)	-0.033	0.229
Flakes	-0.024	0.450
Cores	-0.108	0.140
Tools	-0.049	0.526
Opaque obsidian	0.005	0.918
Green obsidian	<u>-0.100</u>	<u>0.093</u>
Grey obsidian	-0.048	0.413

Table 4 CTI values goodness of fit test

	CTI Values	Af	Obs	Exp = $\frac{\text{Obstot}}{(100/\text{Af})}$	Test statistic $(\text{Obs}-\text{Exp})^2/\text{Exp}$
Pastoral settlements*	0-4.901	5	6	5	0.20
	4.901-9.45	81	82	81	0.01
	9.45-23.25	14	12	14	0.29
	<i>P value = 0.779; DF = 2; $\text{Chi}^2 = 0.50$</i>				
Ceramics (minimum number of vessels)	0-4.901	6	18	12	3
	4.901-9.45	78	159	164	0.15
	9.45-23.25	16	34	35	0.03
	<i>P value = 0.204; DF = 2; $\text{Chi}^2 = 3.18$</i>				
Ceramics (all vessels)	0-4.901	6	30	37	1.32
	4.901-9.45	78	470	490	0.82
	9.45-23.25	16	130	103	7.08
	<i>P value = 0.010; DF = 2; $\text{Chi}^2 = 9.22$</i>				
Lithics (all)	0-4.901	6	33	36	0.25
	4.901-9.45	78	484	478	0.08
	9.45-23.25	16	98	101	0.09
	<i>P value = 0.815; DF = 2; $\text{Chi}^2 = 0.41$</i>				
Flakes	0-4.901	6	21	26	0.96
	4.901-9.45	78	370	352	0.92
	9.45-23.25	16	61	74	2.28
	<i>P value = 0.124; DF = 2; $\text{Chi}^2 = 4.17$</i>				
Cores	0-4.901	6	5	5	0
	4.901-9.45	78	63	64	0.01
	9.45-23.25	16	14	13	0.08
	<i>P value = 0.956; DF = 2; $\text{Chi}^2 = 0.09$</i>				
Tools	0-4.901	6	7	5	0.8
	4.901-9.45	78	57	64	0.77
	9.45-23.25	16	18	13	1.92
	<i>P value = 0.175; DF = 2; $\text{Chi}^2 = 3.49$</i>				
Green obsidian	0-4.901	6	6	7	0.14
	4.901-9.45	78	111	100	1.21
	9.45-23.25	16	11	21	4.76
	<i>P value = 0.047; DF = 2; $\text{Chi}^2 = 6.11$</i>				
Grey obsidian	0-4.901	6	10	8	0.5
	4.901-9.45	78	103	108	0.23
	9.45-23.25	16	26	23	0.39
	<i>P value = 0.571; DF = 2; $\text{Chi}^2 = 1.12$</i>				
Opaque obsidian	0-4.901	6	13	14	0.07
	4.901-9.45	78	185	182	0.05
	9.45-23.25	16	36	38	0.11
	<i>P value = 0.891; DF = 2; $\text{Chi}^2 = 0.23$</i>				

*Obs is calculated as the total % of land associated with each CTI value category within a 25m radius of the centre of each settlement. Exp is calculated as the total % of land within the study area associated with each CTI value category.

Table 5 Distance from pastoral settlements goodness of fit test

	Distance from pastoral settlements	Af	Obs	Exp = $\frac{\text{Obstot}}{100/\text{Af}}$	Test statistic $(\text{Obs}-\text{Exp})^2/\text{Exp}$
Ceramics (minimum number of vessels)	0-500	43	101	86	2.61
	500 -1000	33	77	66	1.83
	> 1000	24	22	48	14.08
<i>P value = 9.5E-05; DF = 2; $\chi^2 = 18.53$</i>					
Ceramics (all)	0-500	43	284	267	1.08
	500 -1000	33	260	208	13
	> 1000	24	81	150	31.74
<i>P value = < 0.00001; DF = 2; $\chi^2 = 45.82$</i>					
Lithics (all)	0-500	43	407	304	34.90
	500 -1000	33	206	236	3.81
	> 1000	24	99	172	30.98
<i>P value = < 0.00001; DF = 2; $\chi^2 = 69.69$</i>					
Flakes	0-500	43	295	223	23.25
	500 -1000	33	154	174	2.30
	> 1000	24	74	126	21.46
<i>P value = < 0.00001; DF = 2; $\chi^2 = 47.01$</i>					
Cores	0-500	43	54	40	4.90
	500 -1000	33	29	31	0.13
	> 1000	24	11	23	6.26
<i>P value = 0.004; DF = 2; $\chi^2 = 11.29$</i>					
Tools	0-500	43	56	42	4.67
	500 -1000	33	28	32	0.5
	> 1000	24	14	24	4.17
<i>P value = 0.009; DF = 2; $\chi^2 = 9.33$</i>					
Green obsidian	0-500	43	83	66	4.38
	500 -1000	33	51	51	0
	> 1000	24	20	37	7.81
<i>P value = 0.002; DF = 2; $\chi^2 = 12.19$</i>					
Grey obsidian	0-500	43	86	64	7.56
	500 -1000	33	41	50	1.62
	> 1000	24	24	37	4.57
<i>P value = 0.001; DF = 2; $\chi^2 = 13.75$</i>					
Opaque obsidian	0-500	43	145	106	14.35
	500 -1000	33	74	82	0.78
	> 1000	24	29	60	16.02
<i>P value = < 0.00001; DF = 2; $\chi^2 = 31.15$</i>					

Table 6 Distance from streams goodness of fit test

	Distance from streams (m)	Af	Obs	Exp = $\frac{\text{Obs tot}}{(100/\text{Af})}$	Test statistic $(\text{Obs}-\text{Exp})^2/\text{Exp}$
Pastoral settlements	0-100	4	1	3	1.33
	100-200	4	6	3	3.0
	200-300	4	9	3	12.0
	300-400	4	6	3	3.0
	400-500	4	4	3	0.33
	500-1000	19	9	15	2.4
	> 1000	61	43	48	0.52
<i>P value = 0.004; DF = 2; $\chi^2 = 10.99$</i>					
Ceramics (minimum number of vessels)	0-100	7	13	18	1.39
	100-200	8	42	18	32.0
	200-300	7	16	15	0.07
	300-400	4	16	10	3.6
	400-500	3	9	7	0.57
	500-1000	15	57	36	12.25
	> 1000	56	84	133	18.05
<i>P value = < 0.00001; DF = 2; $\chi^2 = 41.83$</i>					
Ceramics (all)	0-100	7	23	52	16.17
	100-200	8	113	53	67.92
	200-300	7	47	45	0.089
	300-400	4	39	29	3.45
	400-500	3	24	20	0.8
	500-1000	15	233	105	156.04
	> 1000	56	195	390	97.5
<i>P value = < 0.00001; DF = 2; $\chi^2 = 264.64$</i>					
Lithics (all)	0-100	7	45	60	3.75
	100-200	8	49	59	1.69
	200-300	7	83	51	20.08
	300-400	4	43	33	3.03
	400-500	3	39	22	13.14
	500-1000	15	113	119	0.30
	> 1000	56	410	440	2.05
<i>P value = 0.024; DF = 2; $\chi^2 = 7.49$</i>					
Flakes	0-100	7	40	43	0.21
	100-200	8	28	44	5.82
	200-300	7	57	38	9.5
	300-400	4	30	24	1.5
	400-500	3	27	16	7.56
	500-1000	15	74	87	1.94
	> 1000	56	318	322	0.05
<i>P value = 0.154; DF = 2; $\chi^2 = 3.74$</i>					
Cores	0-100	7	1	8	6.13
	100-200	8	8	8	0
	200-300	7	13	7	5.14
	300-400	4	6	4	1
	400-500	3	8	3	8.33
	500-1000	15	17	16	0.06
	> 1000	56	53	59	0.61
<i>P value = 0.393; DF = 2; $\chi^2 = 1.87$</i>					
Tools	0-100	7	5	8	1.13
	100-200	8	13	8	3.13
	200-300	7	13	7	5.14
	300-400	4	7	5	0.8
	400-500	3	4	3	0.33
	500-1000	15	22	16	2.25
	> 1000	56	44	61	4.74
<i>P value = 0.004; DF = 2; $\chi^2 = 10.89$</i>					
Green obsidian	0-100	7	5	13	4.92
	100-200	8	15	13	0.31
	200-300	7	13	12	0.08
	300-400	4	9	7	0.57
	400-500	3	9	5	3.2
	500-1000	15	14	26	5.54
	> 1000	56	109	98	1.23
<i>P value = 0.034; DF = 2; $\chi^2 = 6.79$</i>					
Grey obsidian	0-100	7	4	13	6.23
	100-200	8	5	13	4.92
	200-300	7	21	11	9.09
	300-400	4	10	7	1.29
	400-500	3	12	5	9.8
	500-1000	15	45	25	16.0
	> 1000	56	72	95	5.57
<i>P value = 1.9E-05; DF = 2; $\chi^2 = 21.75$</i>					
Opaque obsidian	0-100	7	29	21	3.059
	100-200	8	20	21	0.05
	200-300	7	35	18	16.06
	300-400	4	19	12	4.08
	400-500	3	11	8	1.13
	500-1000	15	28	42	4.67
	> 1000	56	136	156	2.56
<i>P value = 2E-05; DF = 2; $\chi^2 = 21.68$</i>					

Table 7 Distance from wetlands goodness of fit test

(1 of 2)	Distance from wetlands (km)	Af	Obs	Exp = $\frac{\text{Obstot}}{100/\text{Af}}$	Test statistic $\frac{(\text{Obs}-\text{Exp})^2}{\text{Exp}}$
Pastoral settlements	0-1	1	2	1	1.0
	1-2	6	5	5	0
	2-3	10	11	7	2.29
	3-4	10	4	8	2.0
	4-5	11	14	8	4.5
	5-6	11	8	10	0.4
	6-7	12	2	9	5.44
	7-8	13	5	10	2.5
	8-9	13	10	10	0
	9-10	11	15	9	4.0
	10-11	2	2	1	1.0
	11-12	n/a	n/a	n/a	n/a
<i>P value = 0.01; DF = 10; $\chi^2=23.13$</i>					
Ceramics (minimum number of vessels)	0-1	2	0	5	5
	1-2	6	8	15	3.27
	2-3	10	10	23	7.34
	3-4	15	43	35	1.82
	4-5	11	26	26	0
	5-6	8	21	20	0.05
	6-7	10	14	23	3.52
	7-8	14	41	32	2.53
	8-9	11	36	27	3.0
	9-10	9	13	21	3.05
	10-11	3	18	7	17.29
	11-12	1	7	3	5.33
<i>P value = < 0.00001; DF = 11; $\chi^2=52.21$</i>					
Ceramics (all)	0-1	2	0	16	16.0
	1-2	6	14	42	19.08
	2-3	10	16	66	38.29
	3-4	15	70	103	10.47
	4-5	11	40	77	17.10
	5-6	8	70	58	2.57
	6-7	10	42	67	9.49
	7-8	14	159	94	44.91
	8-9	11	190	78	158.77
	9-10	9	50	61	1.96
	10-11	3	30	21	3.82
	11-12	1	13	10	0.89
<i>P value = < 0.00001; DF = 11; $\chi^2=323.76$</i>					
Lithics (all)	0-1	2	3	18	12.5
	1-2	6	119	49	100
	2-3	10	87	77	1.3
	3-4	15	142	119	4.45
	4-5	11	89	90	0.01
	5-6	8	87	67	5.97
	6-7	10	33	78	25.96
	7-8	14	72	109	12.56
	8-9	11	48	91	20.32
	9-10	9	26	71	0.35
	10-11	3	22	25	0.36
<i>P value = < 0.00001; DF = 11; $\chi^2=205.11$</i>					
Flakes	0-1	2	2	13	9.31
	1-2	6	95	35	102.86
	2-3	10	68	55	3.07
	3-4	15	94	85	0.95
	4-5	11	59	64	0.39
	5-6	8	55	48	1.02
	6-7	10	24	56	18.29
	7-8	14	49	78	10.78
	8-9	11	37	65	12.06
	9-10	9	59	50	1.62
	10-11	3	15	17	0.23
	11-12	1	17	8	10.13
<i>P value = < 0.00001; DF = 11; $\chi^2=170.71$</i>					

(2 of 2)

	Distance from wetlands (km)	Af	Obs	Exp = Obs/tot (100/Af)	Test statistic (Obs-Exp) ² /Exp
Cores	0-1	2	1	2	0.5
	1-2	6	19	7	20.57
	2-3	10	11	10	0.1
	3-4	15	26	16	6.25
	4-5	11	9	12	0.75
	5-6	8	12	9	1.0
	6-7	10	3	10	4.9
	7-8	14	9	14	1.79
	8-9	11	5	12	4.08
	9-10	9	4	9	2.78
	10-11	3	1	3	1.33
	11-12	1	6	2	8.0
<i>P value = < 0.00001; DF = 11; Chi²=52.05</i>					
Tools	0-1	2	0	2	2.0
	1-2	6	10	7	1.29
	2-3	10	6	10	1.6
	3-4	15	18	16	0.25
	4-5	11	19	12	4.08
	5-6	8	16	9	5.44
	6-7	10	6	11	2.27
	7-8	14	9	15	2.4
	8-9	11	6	12	3
	9-10	9	7	10	0.44
	10-11	3	6	3	3.0
	11-12	1	5	2	4.5
<i>P value = 0.001; DF = 11; Chi²=30.28</i>					
Green obsidian	0-1	2	3	4	0.25
	1-2	6	38	11	66.27
	2-3	10	30	17	9.94
	3-4	15	14	26	5.54
	4-5	11	11	19	3.37
	5-6	8	25	14	8.64
	6-7	10	8	17	4.76
	7-8	14	12	24	6.0
	8-9	11	9	20	6.05
	9-10	9	7	15	4.27
	10-11	3	7	5	0.8
	11-12	1	10	2	32.0
<i>P value = < 0.00001; DF = 11; Chi²=147.90</i>					
Grey obsidian	0-1	2	0	4	4.0
	1-2	6	22	10	14.4
	2-3	10	17	16	0.06
	3-4	15	50	25	25.0
	4-5	11	20	19	0.05
	5-6	8	9	14	1.79
	6-7	10	4	16	9.0
	7-8	14	11	23	6.26
	8-9	11	7	19	7.58
	9-10	9	15	15	0
	10-11	3	8	5	1.8
	11-12	1	6	3	3.0
<i>P value = < 0.00001; DF = 11; Chi²=72.94</i>					
Opaque obsidian	0-1	2	0	6	6
	1-2	6	25	17	3.76
	2-3	10	27	27	0
	3-4	15	39	41	0.10
	4-5	11	41	31	3.23
	5-6	8	35	23	6.26
	6-7	10	11	27	9.48
	7-8	14	21	38	7.61
	8-9	11	22	31	2.61
	9-10	9	39	24	9.38
	10-11	3	7	9	0.44
	11-12	1	11	4	12.25
<i>P value = < 0.00001; DF = 11; Chi²=61.12</i>					

Appendix 6

Vegetation survey results

Note that the following abbreviations are used in the tables in this appendix: major (Ma = >50%), moderate (Mo = 20-49%), minor (Mi = 5-19%) and minimal (Min = <5%).

Table 1 Vegetation survey at Kirinkai (HdJn7)

Tree species	Uses	%	Shrubby/other species	Uses	%	Grassy species	Uses	%
<i>Acacia tortilis</i>	E, M, L	Mi	<i>Sericocomopsis palida</i>	L	Mi	<i>Sporobolus spicatus</i>	L	Min
<i>Balanites glabra</i>	E, M, L	Mi	<i>Indigofera arrecta</i>		Mi	<i>Cenchrus ciliaris</i>	L	Min
<i>Acacia mellifera</i>	M, L	Mi	<i>Salvadora persica</i>	M	Min			
<i>Boscia angustifolia</i>	M	Min	<i>Solanum campylacanthum</i>	M, L	Min			
			<i>Dobera glabra</i>	M	Min			
			<i>Grewia tenax</i>	E, L	Min			
			<i>Lycium europaeum</i>		Min			
Total tree		Mo	Total shrub/other		Mo	Total grass		Mo

Table 2 Vegetation survey at Ilnyangusi Manyatta (HcJn1)

Tree species	Uses	%	Shrubby/other species	Uses	%	Grassy species	Uses	%
			<i>Sericocomopsis hildebrandtii</i>	M, L	Mi	<i>Dactyloctenium aegyptium</i>	L	Ma
			<i>Heliotropium zeylanicum</i>	L	Mi			
			<i>Leucas martinicensis</i>		Min			
			<i>Alternanthera pungens</i>		Min			
Total tree			Total shrub/other		Mo	Total grass		Ma

Table 3 Vegetation survey at Lemomo Hill (HdJn4)

Tree species	Uses	%	Shrubby/other species	Uses	%	Grassy species	Uses	%
<i>Acacia tortilis</i>	E, M, L	Mi	<i>Sericocomopsis hildebrandtii</i>	M, L	Min	<i>Cenchrus ciliaris</i>	L	Mi
<i>Balanites glabra</i>	M, E	Mi	<i>Leucas calostachys</i>		Min	<i>Dactyloctenium sp.</i>	L	Mi
<i>Acacia mellifera</i>	M, L	Mi	<i>Leucas martinicensis</i>		Min	<i>Eragrostis sp.</i>	L	Mi
<i>Commiphora africana</i>	M, L	Min	<i>Maerua decumbens</i>	L	Min	<i>Themeda triandra</i>	L	Mi
<i>Acacia nubica</i>	M	Min	<i>Ocimum americanum</i>		Min			
<i>Acacia nilotica</i>	M, L	Min	<i>Cyathula polycephala</i>	L	Min			
			<i>Eriosema shireense</i>	E	Min			
			<i>Sida ovata</i>	L	Min			
			<i>Erlangea calycina</i>		Min			
			<i>Alternanthera pungens</i>		Min			
			<i>Solanum campylacanthum</i>	M, L	Min			
			<i>Aspilia mossambicensis</i>	L	Min			
			<i>Aerva lanata</i>	M	Min			
			<i>Hibiscus micranthus</i>		Min			
			<i>Grewia tenax</i>	L	Min			
			<i>Celosia anthelmintica</i>		Min			
			<i>Phyllanthus sp.</i>		Min			
			<i>Ipomea mombassana</i>		Min			
			<i>Dolichos trilobus</i>	M	Min			
			<i>Cyperus rotundus</i>	E, L	Min			
			<i>Aloe myriacantha</i>		Min			
Total tree		Mo	Total shrub/other		Mo	Total grass		Mo

Table 4 Vegetation survey at Ilmaarba (HdJn1)

Tree species	Uses	%	Shrubby/other species	Uses	%	Grassy species	Uses	%
<i>Balanites glabra</i>	E, M, L	Mi	<i>Lycium europaeum</i>		Mi	<i>Sporobolus virginicus</i>	L	Mo
<i>Acacia tortilis</i>	E, M, L	Min	<i>Maerua sp.</i>		Mi			
<i>Acacia mellifera</i>	M, L	Min	<i>Tribulus terrestris</i>		Min			
<i>Cordia monoica</i>	E, M	Min	<i>Solanum campylacanthum</i>	M, L	Min			
			<i>Sericocomopsis hildebrandtii</i>	M, L	Min			
			<i>Indigofera arrecta</i>		Min			
			<i>Cyathula polycephala</i>	L	Min			
			<i>Asystasia sp.</i>		Min			
			<i>Leucas martinicensis</i>		Min			
			<i>Aerva lanata</i>	M	Min			
			<i>Grewia tenax</i>	E, L	Min			
Total tree		Mo	Total shrub/other		Ma	Total grass		Mo

Table 5 Vegetation survey at Olopoli (HdJn5)

Tree species	Uses	%	Shrubby/other species	Uses	%	Grassy species	Uses	%
<i>Acacia tortilis</i>	E, M, L	Mo	<i>Lycium europaeum</i>		Mo	<i>Cenchrus ciliaris</i>	L	Mo
<i>Balanites glabra</i>	E, M	Mi	<i>Solanum campylacanthum</i>	M, L	Min			
			<i>Tribulus terrestris</i>		Min			
			<i>Sericocomopsis hildebrandtii</i>	M, L	Min			
			<i>Heliotropium zeylanicum</i>	L	Min			
			<i>Cyathula polycephala</i>	L	Min			
Total tree		Mo	Total shrub/other		Mo	Total grass		Mo

Table 6 Vegetation survey at Osoit (HdJn5)

Tree species	Uses	%	Shrubby/other species	Uses	%	Grassy species	Uses	%
<i>Balanites glabra</i>	E, M, L	Min	<i>Cyathula polycephala</i>	L	Mi	<i>Cynodon dactylon</i>	L	Mo
<i>Capparis tomentosa</i>	M	Min	<i>Sericocomopsis pallida</i>	L	Min	<i>Dactyloctenium aegyptium</i>	L	Mi
<i>Commiphora Africana</i>	M, L	Min	<i>Sericocomopsis hildebrandtii</i>	M, L	Min			
<i>Acacia Senegal</i>	M, L	Min	<i>Heliotropium zeylanicum</i>	L	Min			
			<i>Grewia tembensis</i>	E, L	Min			
			<i>Grewia tenax</i>	E, L	Min			
			<i>Tragia brevipes</i>	M	Min			
			<i>Cissus quadrangularis</i>	M	Min			
			<i>Justicia sp.</i>		Min			
			<i>Senna sp.</i>		Min			
			<i>Lycium europaeum</i>		Min			
			<i>Portulaca quadrifida</i>		Min			
			<i>Hypoestes sp.</i>		Min			
Total tree		Mi	Total shrub/other		Mo	Total grass		Mo

Table 7 Vegetation survey at RB (HdJn3)

Tree species	Uses	%	Shrubby/other species	Uses	%	Grassy species	Uses	%
<i>Acacia mellifera</i>	M, L	Min	<i>Hypoestes sp.</i>		Mi	<i>Sporobolus spicata</i>	L	Ma
			<i>Sericocomopsis pallida</i>	L	Mi			
			<i>Pavonia patens</i>	L	Min			
			<i>Sericocomopsis hildebrandtii</i>	L	Min			
			<i>Solanum campylacanthum</i>	L	Min			
			<i>Hibiscus micrantha</i>		Min			
			<i>Justicia calyculata</i>		Min			
			<i>Asteraceae</i>		Min			
			<i>Kalanchoe lanceolata</i>		Min			
			<i>Commelina africana</i>	L	Min			
			<i>Cyathula polycephala</i>		Min			
			<i>Erlangia sp.</i>		Min			
			<i>Azima tetracantha</i>		Min			
Total tree		Min	Total shrub/other		Mo	Total grass		Ma

Table 8 Vegetation survey at Irrpurai (HcJn4)

Tree species	Uses	%	Shrubby/other species	Uses	%	Grassy species	Uses	%
<i>Balanites glabra</i>	E, M, L	Mi	<i>Sericocomopsis hildebrandtii</i>	L	Mi	<i>Cynodon dactylon</i>	L	Mo
<i>Acacia tortilis</i>	E, M, L	Mi	<i>Maerua decumbens</i>	L	Mi	<i>Aristida kenyanensis</i>	L	Mi
			<i>Solanum campylacanthum</i>	M, L	Min	<i>Eragrostis cilianensis</i>	L	Mi
			<i>Lycium europaeum</i>		Min	<i>Chloris roxburghiana</i>	L	Mi
			<i>Pavonia patens</i>	L	Min			
			<i>Leucas calostachys</i>		Min			
			<i>Vigna frutescens</i>	E, L	Min			
			<i>Senna sp.</i>		Min			
			<i>Justicia flava</i>	L	Min			
			<i>Kalanchoe lanceolata</i>		Min			
			<i>Hibiscus micranthus</i>		Min			
			<i>Hypoestes sp.</i>		Min			
Total tree		Mi	Total shrub/other		Mo	Total grass		Ma

Table 9 Vegetation survey at Empaash (HcJn3)

Tree species	Uses	%	Shrubby/other species	Uses	%	Grassy species	Uses	%
<i>Acacia tortilis</i>	E, M, L	Min	<i>Sericocomopsis pallida</i>	L	Mi	<i>Eragrostis superbra</i>	L	Mi
<i>Balanites glabra</i>	E, M, L	Min	<i>Maerua decumbens</i>	L	Mi	<i>Eragrostis ciliaris</i>	L	Mi
			<i>Pavonia patens</i>	L	Min	<i>Sporobolus sp.</i>	L	Mi
			<i>Tribulus terrestris</i>		Min	<i>Cynodon plectostachyus</i>	L	Mi
			<i>Leucas calostachys</i>		Min	<i>Eleusine indica</i>	L	Min
			<i>Hypoestes sp.</i>		Min			
			<i>Ocimum sp.</i>		Min			
			<i>Sida ovate</i>	L	Min			
			<i>Solanum campylacanthum</i>	L	Min			
			<i>Justicia sp.</i>		Min			
			<i>Crassula alba</i>		Min			
			<i>Indigofera arrecta</i>		Min			
			<i>Cyperus rotundus</i>	E, L	Min			
			<i>Cyperus sp.</i>	E, L	Min			
Total tree		Mi	Total shrub/other		Ma	Total grass		Mo

Table 10 Vegetation survey at CB (HdJn6)

Tree species	Uses	%	Shrubby/other species	Uses	%	Grassy species	Uses	%
<i>Acacia tortilis</i>	E, M, L	Mi	<i>Maerua decumbens</i>	L	Mi	<i>Cenchrus ciliaris</i>	L	Mo
<i>Balanites glabra</i>	E, M, L	Mi	<i>Megalochlamys kenyensis</i>		Mi	<i>Eragrostis ciliaris</i>	L	Mo
<i>Acacia mellifera</i>	M, L	Mi	<i>Tribulus terrestris</i>		Min			
			<i>Sericocomopsis hildebrandtii</i>	M, L	Min			
			<i>Heliotropium zeylanicum</i>	L	Min			
			<i>Leucas martinicensis</i>		Min			
			<i>Lycium europaeum</i>		Min			
			<i>Solanum campylacanthum</i>	M, L	Min			
			<i>Hibiscus micranthus</i>		Min			
			<i>Ocimum gratissimum</i>		Min			
			<i>Ocimum americanum</i>		Min			
			<i>Achyranthes aspera</i>	M	Min			
			<i>Indigofera arrecta</i>		Min			
			<i>Aerva lanata</i>	M	Min			
Total tree		Mo	Total shrub/other		Mo	Total grass		Mo

Appendix 7

Archaeobotanical analysis

Fig. 1 *Eleusine coracana* photomicrograph and sketch

i) *E. coracana* basal view, Irrpurai, Unit 12 Layer B; ii) *E. coracana* basal, dorsal and lateral views, Irrpurai, Unit 2 Layer B

Fig. 2 Photomicrographs and sketches of select Poaceae

i) *Setaria* sp. RB, Unit 6 Layer A; ii) *Eragrostis* sp. Ilnyangusi Manyatta, Unit f Layer B; iii) *Digiteria* sp. Unit f Layer B, Ilnyangusi Manyatta; iv) *Urochloa* sp. Ilnyangusi Manyatta, Unit 6 Layer B; v) *Orizoid* grass Ilnyangusi Manyatta, Unit d Layer B; vi) *Panicum* sp. Ilnyangusi Manyatta, Unit f Layer B

Fig. 3 Photomicrographs of select seeds

i) *Amaranthaceae* perisperm, Lemomo Hill, Unit 5 Layer B; ii) *Apiaceae*, Kirinkai, Unit 6 Layer B; iii) *Cyperaceae* (type 1), Kirinkai Unit 6 Layer B iv) *Cyperaceae* (type 2), Empaash, Unit 1 Layer A; v) *Rutaceae*, RB, Unit 6 Layer A; vi) *Solanaceae*, RB, Unit 6 Layer A; vii) *Capparaceae/Caryophyllaceae/Aizoaceae* type, Ilnyangusi Manyatta, Unit 4 Layer B

Fig. 4 Photomicrographs of select *Fabaceae*

i) Kirinkai, Unit 6 Layer B; ii) Irrpurai, Unit 13 Layer B; iii) Ilnyangusi Manyatta, Unit 6 Layer A

Fig. 5 Photomicrographs of select tuber fragments

i) tuber fragment indet., Kirinkai, Unit 6 Layer B; ii) tuber fragment indet., Ilnyangusi manyatta, Unit 6 Layer B, lateral view; iii) tuber fragment indet., Ilnyangusi Manyatta, Unit 6 Layer B, cross-section; iv) Cyperaceae tuber fragment, Ilnyangusi Manyatta,, Unit 6 Layer B

Fig.6 Scanning electron photomicrographs of tuber fragment, indet., Ilnyangusi Manyatta, Unit 6 Layer B

Table 1 Macrobotanical remains identified in flotation samples from Kirinkai

Unit	DBS (cm)	Amaranthaceae	Fabaceae	Poaceae	Apiaceae	Cyperaceae	Indeterminate seed	Seed total	Fruit/nut shell	Parenchyma	Tuber fragment	Thorn	Indet. charred plant remains	Wood charcoal (g)	Bone (g)	Livers floated
6	0-5						3	3		38			21	0.525		2.5
6	5-10			1			8	9						0.174		0.5
6	10-15	1		10		2	24	37		8		1	14	0.029	0.086	2
6	15-25		3	20	3		3	29		10	1	4	1	1.842	0.103	1.8
6	25-35								3	3			6	0.172		1.2
6	35-45						1	1	2	1			5	0.477		3.6
TOTAL		1	3	31	3	2	38	79	5	60		5	47	3.220	0.189	11.6

Table 2 Macrobotanical remains identified in flotation samples from Ilnyangusi Manyatta

Unit	DBS (cm)	Capparidaceae/Caryophyllaceae/Aizoaceae type	Amaranthaceae	Solanaceae	Cyperaceae	c.f. Juncaceae	c.f. Fabaceae	Poaceae	Panicoid	Panicum sp.	Setaria sp.	Eragrostis sp.	Digitaria sp.	Urochloa sp.	Orizoid	Indeterminate seed	Seed total	Fruit/nut shell	c.f. Fruit/nut shell	Parenchyma	Tuber fragment	c.f. Tuber fragment	Thorn	Indet. charred plant remains	Wood charcoal (g)	Bone (g)	Livers floated
4	25-30																	2		26				1	41.594	0.018	2.5
4	30-35		1													2	3	3		11		1		36	12.126	0.087	3
6	0-5	1					1				1					2	5	4		17					0.017		1.6
6	5-10	1														2	3			2					0.066	0.068	0.6
6	10-15	1																		2				2	0.495	0.379	3.3
6	15-20	2	1													3	6			11					2.435	0.099	3.5
6	20-25		1	1			1							1		4	8	2	7	74	13			28	106.25	0.321	4.8
6	25-30				1												1	2	4	63	2			15	95.098		0.8
6	35-40	2														1	3			5				8	0.527		2.9
a	0-5							1									1								0.012	0.017	3.3
a	5-10															1	1								0.034		3.4
a	10-15				3											7	10			5					0.034	0.314	3
a	15-20	1			5											14	20					1			0.075	0.242	2.8
a	20-25	3			8											8	19			3					0.044		3.1
a	25-30							1									1			1					0.046	0.117	3.6
a	30-35				1			2								6	9								0.051		3.3
a	35-40	1												1		2	4			4					0.036		3.1
a	40-45	1															1								0.005		3.2
a	45-50																					1	1		0.006		2.8
d	0-5				1											6	7			6					0.022	0.102	2.7
d	5-10				1			1								4	6								0.077	0.049	3
d	10-15							1								9	10								0.272	0.195	3
d	15-20				13			1	1			1				10	26			33	4				0.208		3.6
d	20-25				4		1		1								6			1				1	0.163	0.167	3.2
d	25-30	1			2			1	5							6	15			10				1	0.154		2.8
d	30-35																			1					0.0000		3
d	35-40				4									1	11	16				13					0.083	0.045	3.6
f	0-5					1										2	1			1				1	0.004	1.000	3.6
f	5-10					1											1							1	0.060	1.000	2.9
f	10-15	2														2	1							5	0.042		2.2
f	15-20	1					1				2	1				4	9			4				1	0.057		3.0
f	20-25	3			8				1		3					13	28							5	0.095		2.9
f	25-30						1	1						1		3	8							6	0.047		3.0
f	30-35										1					12	13		1	5				10	0.075		2.4
f	35-40				4	1		2								15	22	4		1					0.053		3.1
f	40-45				2											2	5			7					0.005		2.8
f	45-50																1	1						3	0.009		3
TOTAL		20	3	1	54	2	6	1	7	14	1	1	1	1	3	150	273	20	12	306	19	2	1	125	260.377	4.221	108.4

Table 3 Macrobotanical remains identified in flotation samples from Lemomo Hill

Unit	DBS (cm)	Amaranthaceae	Capparidaceae	c.f. Malvaceae	c.f. Asteraceae	Cyperaceae	Poaceae	c.f. Poaceae	Indeterminate Seed	Seed total	Fruit/nut shell	c.f. Fruit/nut shell	Parenchyma	Tuber fragment	c.f. Tuber fragment	Thorn	Indet. charred plant remains	Wood charcoal (g)	Bone (g)	Liters floated
3	60-70																1	0.004		8
5	0-10						1		2	3		1				1	1	0.017		2.5
5	10-15					1			3	4	1		3				4	0.031		3.8
5	15-20	1							1	2			1			3		0.128	0.038	5.7
5	20-30						4		2	6		1					4	0.054		9.7
5	30-40					1			3	4			2				1	0.028		7.5
5	40-50								1	1						1		0.008		6
a	0-5																		0.036	2.5
a	5-10																	0.012		2.8
a	10-15						1			1	2						2	0.003		3.1
a	15-20														1			0.008		2.9
a	20-25																	0.001		2.7
a	25-30														1			0.002		2.6
c	0-5							3	1	4							1	0.03	0.025	3
c	5-10										1		1				8	0.054		2.7
d	5-10					2			3	5							4	5.65	0.046	2.4
d	10-15	1			1				9	11			15	2				20.436	0.141	3
d	15-20		1			1			4	6							10	0.037		2.8
d	20-25												4					0.065		2.7
d	25-30																1	0.032		2.4
d	30-35			1			1		3	5							3	0.005		2.8
d	35-40																	0.002		3
d	40-45																	0.006		2.8
d	45-50																1	0.003		2.6
d	50-55																2	0.071	0.068	2.9
d	55-65												1				2	0.002		2.8
d	65-70																	0.005		2.3
e	10-15										1							0.137		2.6
e	10-15								3	3								0.040		2.7
e	15-20								1	1							5	0.007		2.6
e	20-25																	0.032		2.7
e	25-30																2	0.002		3
TOTAL		2	1	1	1	4	8	3	36	56	5	2	27	2	2	5	51	26.894	0.353	111.6

Table 4 Macrobotanical remains identified in flotation samples from RB

Unit	DBS (cm)	Amaranthaceae	Fabaceae	Cyperaceae	Poaceae	Setaria sp.	c.f. Poaceae	Rutaceae	Solomonaceae	c.f. Euphorbiaceae	Indeterminate seed	Seed total	Tuber fragment	Parenchyma	Indet. charred plant remains	Wood charcoal (g)	Bone (g)	Liters floated
6	0-5	2	1		5	5		1			6	20		6	2	1.139		3.6
6	5-15			3	4		7		1	1	9	25	1	3		0.153	0.306	8
6	15-30						4					4	1			0.172		4.1
6	30-40						1					1		4	1	0.446		5
6	40-50															1.073		2.2
6	60-75										1	1		1	5	0.404		4.5
TOTAL		2	1	3	9	5	12	1	1	1	16	53	2	14	8	3.387	0.306	27.4

Table 5 Macrobotanical remains identified in flotation samples from Irrpurai

Unit	DBS (cm)	Amaranthaceae	Fabaceae	c.f. Fabaceae	Poaceae	Pooid	<i>Eleusine coracana</i>	c.f. <i>Eleusine coracana</i>	Indet. seed	Seed total	Fruit/nut shell	c.f. Fruit/nut shell	Parenchyma	Tuber fragment	Indet. charred plant remains	Wood charcoal (g)	Bone (g)	Liters floated
2	0-5								3	3			1			0.073		5
2	5-10								2	2				1		0.145	0.006	8.6
2	10-20	1				1			3	5			25		2	0.131		12.6
7	0-5			1						1		1			2	0.025		3
7	5-10															0.044	0.767	3
9	0-5	1							2	3						0.043	0.229	3
9	5-10															0.026	0.084	2.9
9	10-15								1	1	1					0.009	0.022	3.1
9	15-20															0.055		3
9	20-25															0.056	0.109	3.1
12	0-5														2	8.066		3.2
12	5-10	2					2		1	5						0.509		3.5
12	10-15						1									0.501		3.4
12	15-20				1					1						0.143		3.6
12	20-25															0.167		3.5
12	25-30														3	0.066	0.014	3.6
13	5-10		1							1						0.134	0.017	3.5
13	10-15															0.107		3
13	15-20								2	2						0.047		3.2
13	20-25				1			1	2	3			1			0.100		3.4
14	0-5								1	1			2			0.214		3.7
TOTAL		4	1	1	2	1	3		17	29	1	1	40	1	9	10.658	1.249	84.9

Table 6 Macrobotanical remains identified in flotation samples from Empaash

Unit	DBS (cm)	Cyperaceae	Amaranthaceae	Capriparaceae/Caryophyllaceae/Aizoaceae type	c.f. Fabaceae	Poaceae	c.f. Poaceae	Panicoid	Orizoid	Indet. seed	Seed total	Fruit/nut shell	c.f. Fruit/nut shell	Parenchyma	c.f. Tuber fragment	Thorn	Indet. charred plant remains	Wood charcoal (g)	Bone (g)	Liters floated
1	0-7	1				1	1			3	6		1	10	1	1	1	0.147	0.015	2.8
1	7-10													3				0.015		3.6
1	10-15					1				1	2							0.006	0.040	3
1	15-20									1	1			1				0.019		3.1
1	20-30					1					1				1			0.002		3
b	0-5																	0.335	0.733	3.1
b	5-10		2		1			1			4			1			2	0.004		2.7
b	10-15																	0.023		3.1
b	15-20																2	0.001	0.015	3.2
b	20-25																	0.007		2.8
c	0-5		1							4	5			7		1		0.073	0.588	3.3
c	5-10		1			2	1			2	6			17	1		1	0.050		2.6
c	10-15									1	1						1	0.012	0.019	3
c	15-20									1	1	1	3	1			3	0.007	0.099	3
d	0-5			1		3				2	6	1		3				0.223	0.449	2.8
d	5-10														1			0.008	0.075	2.6
d	10-15																	0.008	0.284	2.9
d	15-20																	0.004	0.124	2.8
d	20-25													1			3	0.006	0.024	2.9
d	25-30																	0.000	0.000	2.8
f	0-5	1							1		2			1				0.209	0.398	3
f	5-10																	0.023	0.030	3
f	10-15																	0.048	0.073	2.7
f	15-20									1	1							0.022	0.081	2.8
f	20-25																	0.003	0.041	2.9
TOTAL		2	4	1	1	8	2	1	1	16	36	2	4	45	4	2	13	1.254	3.089	73.5

Table 7 Macrobotanical remains identified in flotation samples from CB

Unit	DBS (cm)	Amaranthaceae	Capparidaceae/Caryophyllaceae/Aizoaceae type	Fabaceae	c.f. Fabaceae	Poaceae	<i>Eragrostis</i> sp.	Indeterminate seed	Seed total	Fruit/nut shell	c.f. Fruit/nut shell	Parenchyma	Tuber fragment	c.f. Tuber fragment	Thorn	Indet. charred plant remains	Wood charcoal (g)	Bone (g)	Litters floated
2	30-40																0.002		9.3
2	40-50																		7
2	50-60							3	3			4	1			1	0.072		6.4
2	60-75																0.026		8.5
7	0-5							1	1							1	0.026		4.5
7	5-15											10					0.036	0.171	9.5
7	15-25									2		21					0.068		3.5
7	25-35							3	3		1	7					0.109	0.061	5.2
7	35-45											1					0.147	0.081	5.4
7	45-55			1					1			8					0.085	0.036	6.8
7	55-65							2	2	1		5	1				0.067		6.5
7	65-75					2			2			4					0.026	0.011	3.5
7	75-85			1				1	2								0.008	0.055	3.6
7	85-95															1	0.014		2.5
d	0-5							5	5	1		2	1			3	0.067	0.113	2.8
d	5-10											7	1				0.03	0.120	3
d	10-15				1			6	7			7				1	0.072	0.178	2.7
d	15-20							3	3			6		1			0.061		3.4
d	20-25													3		1	0.018		2.5
d	25-30									2		6					0.018	0.058	2.7
d	30-35											1				1	0.061	0.007	2.5
d	35-40											4					0.024	0.134	3
d	40-45							1	1								0.049	0.071	2.7
d	50-55											2				1	0.026		3.1
d	55-60				1			4	5			2					0.031		2.9
d	60-65																0.011		2.7
d	65-70																0.001		3
e	1-15															1	0.019		3.1
e	15-20							1	1								0.027	0.190	3.3
e	20-25				1			1	2			3		1			0.041		2.2
e	25-30										1	3			1	1	0.085		3
e	30-35											10				2	0.065		3.4
e	35-40		1					2	4			4					0.081		5.4
e	40-45																0.022		2.7
e	45-50				1			3	4							1	0.009		1.6
e	55-60							2	2			4				1	0.003		2.3
g	0-5											1		1		1	0.013	0.116	3.2
g	5-10											2					0.034	0.041	2.4
g	10-15											2	1				0.049	1.013	3
g	15-20							3	3			1				4	0.03	0.050	2.8
g	20-25				1			1	2			3					0.022	0.069	2.6
g	30-35							1	1	2		10	1			1	0.099	0.053	2.9
g	35-40											3	1				0.100		3.3
g	40-45											7					0.16		6.6
g	45-50											6	1				0.064	0.072	3
g	50-55											7				1	0.054	0.001	2.8
g	55-60											7					0.038		2.7
g	60-65	1					1		2	4		1					0.012		2.7
g	70-75											1					0.003		3
g	75-80																		2.9
g	80-85																		2.8
TOTAL		1	1	2	5	2	1	43	56	12	2	172	8	6	1	2	2.177	2.701	192.9

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