TUGEN TRAILS:

THE ROLE OF TRADITIONAL KNOWLEDGE AND LOCAL

VALUES OF ECOSYSTEM SERVICES

IN THE RIFT VALLEY OF KENYA

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Tugen Trails: The Role of Traditional Knowledge and Local Values of Ecosystem Services in the Rift Valley of Kenya

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The concept of ecosystem services for human well-being is emerging as a strategic framework within environmental governance. It seeks to place values on the ecosystems on which humanity depends. This interdisciplinary study investigates the knowledge and values of ecosystem services for the Tugen people in the Rift Valley of Kenya; for one community, Sandai; and for one sector of that community, women. The study addresses issues of equity of ecosystem service valuations with regard to level of governance and heterogeneity of communities. The questions: 'Whose value counts?' and 'Who pays the price?' are asked repeatedly.

A fresh approach is taken to the methodology by using hodology, the study of paths and interconnected ideas, to explore the natural and the intellectual environments. A long distance trail was walked across the Rift Valley to record links between environment and traditional knowledge. In Sandai, the competing value of the swamps for grazing, cultivation and biodiversity is demonstrated. Walking with Tugen women carrying heavy loads of water raised issues of equity in their roles in management of ecosystems services and their lack of involvement in environmental governance. In ecosystem service assessments women may pay the price for others' decisions. Participatory video and mapping are linked with these walked trails and local voices are heard alongside my own. Finally, visualisations were produced using different media including Google Earth. Also a mediascape 'Walking with water' which enables an embodied understanding of the lives of women.

This research demonstrates how local values for ecosystem services are directly related to human needs. It contributes to understanding how traditional knowledge and values may be used in ecosystem service valuations and debates. It argues that commodification of nature is problematic in communities where the ability to pay is hypothetical and presents novel ways in which local values of ecosystem services may be communicated.

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Acronyms and Abbreviations

ACC	African Conservation Centre
CBD	Convention on Biological Diversity
CBO	Community Based Organisation
ESPA	Ecosystem Services for Poverty Alleviation
ESRC	Economic and Social Research Council
FAO	Food and Agriculture Organisation
FONB	Friends of Nature Bogoria
GI	Geographic Information
GIS	Geographical Information Science (System)
GLCF	Global Land Cover Facility
GK	Government of Kenya
GPS	Global Positioning System
IBA	Important Bird Area
IISD	International Institute for Sustainable Development
IK	Indigenous Knowledge
IPBES	Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services
IPCC	Intergovernmental Panel on Climate Change
IUCN	International Union for Conservation of Nature
KWS	Kenya Wildlife Service
LBNR	Lake Bogoria National Reserve
MA	Millennium Ecosystem Assessment
MDG	Millennium Development Goal
MRWTF	MidRift Wildlife and Tourism Forum
NEMA	National Environment Monitoring Authority

NERC	Natural Environment Research Council
NGO	Non-Government Organisation
PES	Payment for Ecosystem Services
PGIS	Participatory GIS
PRA	Participatory Rural Appraisal
PV	Participatory Video
TEK	Traditional Ecological Knowledge
UN	United Nations
UNCCD	United Nations Commission to Combat Desertification
UNDP	United Nations Development Programme
UNEP	United Nations Environment Programme
UNPFII	United Nations Permanent Forum on Indigenous Issues
WRI	World Resources Institute
WRUA	Water Resource Users Association
WWF	World Wide Fund for Nature

Glossary

Baraza   public meeting

Duka   small shop

Mursik   fermented milk drink

Mzungu   white person

Mzee / wazee   old man / old men

Pan dam   small earth dams for storing ground water

Shamba   farm or small holding; specific plots of cropland

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Tugen Trails:

The Role of Traditional Knowledge and Local Values of Ecosystem Services in the Rift Valley of Kenya

Katharine Elizabeth Moore

Dedicated with love

in memory of my parents

Chapter 1

Introduction

The Start of the Trail

Knowledge of the world is gained by moving about in it, exploring

it, attending to it, ever alert to the signs by which it is revealed.

(Tim Ingold 2000:55)

Chapter 1 Introduction

1.1 The trails of this thesis

This thesis presents my intellectual and physical journeys as I undertook research with the Tugen people in the Rift Valley of Kenya. The study is concerned with how ecosystem services are valued from the perspective of local communities and how those values are communicated. It makes use of polyvocal presentation (Crang 1992) so that the voices of the people who shared some of their lives, thoughts and values with me can be heard alongside my own. Polyvocality is also used in the sense of integrating different styles of academic literature within this interdisciplinary work (Evans and Randalls 2008).

The discourse around ecosystem services for human well-being gained international momentum through the Millennium Ecosystem Assessment (MA 2005) following the theoretical works of Costanza et al (1997) and Daily (1997) that advocated putting an economic value on natural capital and the ecosystems on which society depends. Within the MA (2005) there are endeavours to integrate indigenous and local knowledges of ecosystem services across scales and knowledge systems (Reid et al 2006), but there is still in my view a gap in bridging understanding and recognising how ecosystem services are valued and experienced at local scales. This thesis takes journeys across parts of the Kenyan Rift Valley, following physical, ecological, social, and also theoretical trails, to investigate how values of ecosystem services are constructed. Along the way it assesses traditional influences, conservation initiatives and fundamental human needs. Through ethnographic and participatory studies, the traditional knowledge, practices and values of a Tugen community are collected. Material gathered in the form of text, video and maps is analysed and discussed with

reference to indigenous, postcolonial and feminist approaches to draw out the discourses of knowledge and power that still persist across scales of value in the ecosystem services arena. A non-economic approach is taken that compares relative values of ecosystem services at a local scale although the 'nature of Value and the value of Nature' (Daily et al 2000) are explored. Finally, novel ways of communicating local values and embodied experience to decision makers at different levels are developed and evaluated.

Writing a thesis may be likened to going on an academic journey of discovery about the world around you, and also a reflective journey of self-discovery. As with any journey there is a beginning, a point of departure for the journey. This chapter seeks to outline the start of the voyage I was to embark on and signpost the subsequent trails which I undertook and which are documented through the thesis The initial background, or point of departures, to this thesis, including the concept of hodology, is discussed in section 1.2, with the key research questions, aims and objectives that were eventually developed being presented in section 1.3. Section 1.4 then introduces concepts and challenges of interdisciplinary research that are significant to this study. This is followed by the outline of the thesis itself in section 1.5 where the main arguments for each chapter are presented.

1.2 The start of the trail

The journeys of this thesis for me evolved after thirty years of working in academia, first as departmental cartographer, then, after training in Geographical Information Science (GIS), as Research Assistant on the Virtual Field Course project (Moore et al 1999; Moore 1999; Dykes et al 1999) and lecturer on the MSc in GIS at the University of Leicester. This was accompanied by a deep personal interest in wildlife conservation

and a love of interacting with people from different cultural contexts instigated through teaching international students. So, when an opportunity arose and enabled me to take the first steps on a new journey, I set off, firstly on a career break to travel independently, and afterwards to study for a PhD that would integrate my experience and interests.

I was fortunate to be awarded a joint ESRC/NERC research scholarship with the support of my supervisors to be: Sue Page and Clare Madge. The proposal initially was "to investigate the role of indigenous spatial and ecological knowledge to inform and enhance wildlife conservation using Participatory GIS" which seemed to bring together my interests in a truly interdisciplinary study linking GIS, social science and natural science. My career break travels commenced in Nairobi in September 2005 at 'Mapping for Change', a Conference on Participatory GIS (PGIS), at which I presented a paper on teaching spatial literacy in an international context (Moore 2005), but more importantly, I was inspired by the participatory approaches of people such as Chambers (1997; 2006), Rambaldi (Rambaldi et al 2006a) and McCall (McCall & Minang 2005). The following week I was guided by local Kenyan research assistants working with the University of Leicester who introduced me to Bogoria as well as nyama choma (roast goat meat) and other aspects of living in Kenya.

Through serendipity, when I started my PhD a year later in October 2006, I received an invitation from a fellow PhD student to visit Kenya on a scoping study. The academic journey had begun. However, as I will discuss, the paths, or trails, on a journey may be branching and there may be many routes between beginning and end. My academic journey was such that I tried several routes, reached a few dead ends but eventually have reached my destination.

My second visit to Kenya in 2007 on a field site scoping study again commenced with a conference, the Society of Conservation GIS Kenya meeting, hosted by UNEP in Nairobi where I presented a research paper (Moore 2007a) and led a training workshop on PGIS and was again inspired, this time by Nobel Peace Prize Winner and Kenyan environmentalist, Wangari Maathai (Maathai 2008a). Enthusiasm for PGIS was high within the conservation mapping arena. I was particularly keen to develop multimedia in the context of PGIS after teaching the topic to international Master's students at ITC in the Netherlands in April 2007. Later, a workshop on participatory video (PV) (High 2008) in November 2007, and the work of Sarah Pink (2007) on visual methodologies further kindled the idea to adopt PV alongside participatory mapping.

The first trail to find a research site led to Amboseli, working with the African Conservation Centre (ACC 2010), David Western (Western 1997) and the Maasai. However the theme of my research closely paralleled a local Kenyan student so, rather than overlap studies, I prepared to transfer my fieldwork to work with the Samburu in Northern Kenya, in conjunction with Earthwatch (Earthwatch 2010). This was due to start in January 2008.

National and tribal politics took over, however, as, following the close fought Kenyan elections held on December 27th 2007, civil unrest broke out and my fieldwork was suspended. This was a time of uncertainty about when, or even whether, I could return to Kenya. In mid-March a coalition was agreed between the two major parties and I returned at the beginning of April 2008, but because of perceived safety issues, I went to a third safer fieldwork site at Bogoria in the Rift Valley to work with the Tugen people. Bogoria was already known to me through previous travels, contact with David Harper in the Department of Biology at the University of Leicester, and through the

auspices of a previous MSc student at Leicester and Chief Warden at Bogoria, William Kimosop.

Accordingly, three changes of field sites and tribal groups (Figure 1.1) had an impact on the focus and material support for my research. All three ethnic groups were pastoralist or agro-pastoralist (see Chapter 2 Literary Trails) but the Tugen people had become more sedentary and the conservation issues, although similar, were of a different nature. The Maasai and Samburu were enigmatic symbols of Kenya's cultural heritage, yet the Tugen people seemed to represent a changing lifestyle that was more common place in rural Africa. Consequently, their traditional heritage, lifestyle and values were potentially more valuable as a study in that they represented the situation of many other people living in semi-arid areas of Africa, yet had an identity of their own. In terms of material support, I arrived in Bogoria having prepared my background reading and spatial data for another area, with no supporting GIS facilities as I would have had working with ACC or Earthwatch, and I had to reconfigure my approach quickly. Luckily participatory approaches to fieldwork open the way to the researcher being guided by her participants. I soon found that although biodiversity conservation was my major theme, to the people whom I was getting to know other issues were more pressing, more important and more valued. "I wanted to learn about wildlife conservation, they wanted to tell me about water." (Personal diary 2008). The trail of my journey now led me to modify my research and in the literature I saw connections in giving a value to nature (Costanza and Daly 1992; Costanza et al 1997) and the emerging concept of ecosystem services (Daily 1997; MA 2005a). These literatures seemed to have clear relevance to the numerous environmental challenges that the people that I was meeting in Kenya were facing, and offered the opportunity to

integrate my interests in biodiversity and wildlife conservation with participants' immediate concerns: water, natural resources and livelihoods, under one framework.

A second influence was William Kimosop, who was keenly discussing his boyhood dream of opening up a walking trail across the Rift Valley (see Chapter 4 Tugen Trails). I was fascinated and saw this as a way to quickly get an overview of the people and environment in which I had arrived. The literature described this as hodology: the study of paths and interconnected ideas (Turnbull 2007). This theme gave a structure to formatting the thesis, a method appropriate for rural Kenya, as well as links to some emerging research in human geography and other disciplines.

In Africa, the most common mode of travel by local people is on foot. Ancient trails are still in use and intertwine with wildlife tracks. A small trail created by antelope may be widened by cattle herders and their livestock, discovered by 'explorers' from colonising countries in the past and followed by walkers and adventurers of today. Trails form networks that connect spaces and places and, as such, are of concern to geographers such as Wylie (2005) and anthropologists such as Ingold (Ingold 2004; Ingold and Vergunst 2008) as a means for capturing understanding of the interconnectedness of people and the natural world. As walking, in a practical sense, was the best form of travel by which to connect with people in Kenya and simultaneously explore the environment, trails became a central framework for this study. They offered tangible connections between people and landscapes, metaphoric links between society and nature, methodological links between ecosystem services and human well-being, and a way to bridge the academic divide between 'physical' and 'human' sciences. I came to believe that this concept of hodology was an appropriate framework in which to research the semi-nomadic heritage of the Tugen people and their values for the ecosystems on which they depend.

Figure 1.1 Landscapes and people at my potential field sites: Amboseli, Samburu, Bogoria

Maasai women welcoming the birth of a child

Diversity of large mammals in Amboseli National Park, once the lands of the Maasai

Samburu men within the arid landscape of Northern Kenya

Grevy's zebra, icon for conservation in Samburu

Dancing at a Tugen ceremony

Flamingos at Lake Bogoria

Walking trails with the Tugen people, therefore, was one of the fundamental methods (see Chapter 3 Methodology Trails) used to gather knowledge at different scales, from the long distance trail across the Rift Valley, to the walk around Sandai location to the domestic walk with women carrying water from river to home. Each in turn became the storyline shaping chapters in this thesis. The storytelling continued as I sought to recreate the trails through maps and film and, ultimately, trails again structured the visualization process. The concept of trails then became a storytelling that evolved to encompass each individual chapter to create the journey that is this thesis.

The use of storytelling is also significant in the use of 'cameo' storylines that introduce some of the chapters. The reader is asked to absorb these, to mentally conceive the place being described and to be empathetic to the lives of the central characters of these pieces. They are designed to generate an understanding within the mind of the reader that sets the scene for the analysis that follows.

1.3 Research Questions, Aims and Objectives

The main research questions posed in this study are: (1) "What are the roles of traditional spatial and ecological knowledge for the valuation of ecosystem services across scales of governance?" and (2) "What forms of representation may be used to visualise, or give 'voice' to, personal expressions of place in order to communicate the localised values attributed to ecosystem services?"

These two research questions give rise to a number of other questions that are addressed in the thesis, such as:

- What are the benefits and challenges of ecosystem services in supporting livelihoods in a rural community in Kenya?

- What role does traditional knowledge play in the valuation of ecosystem services?

- How do ecosystem services contribute to debates on environment and development at different scales?

- What are the benefits of combining participatory video and mapping for integrated qualitative and quantitative visualization of ecosystem services?

These research questions are formalised in the following aims and associated objectives.

Aim 1: To investigate the role of traditional spatial and ecological knowledge for the valuation of ecosystem services.

- Objective 1.1: To examine traditional ecological and spatial knowledge, beliefs and practices with reference to ecosystem services

- Objective 1.2: To review critically the role of traditional values for ecosystem services at different levels of governance

Aim 2: To explore methods for incorporation of alternative representations of cognitive knowledge and values within participatory mapping and geographical visualization praxis.

- Objective 2.1: To develop a participatory methodology to integrate mapping technologies and video.

- Objective 2.2: To compare critically video and mapping within the context of visualization of the values of ecosystem services

Overarching the aims and objectives is the interdisciplinary nature of my research, therefore the following section addresses some of the challenges and opportunities that this has presented.

1.4 Connecting Trails

 A connecting network of trails that provided an early perspective to this thesis was that of interdisciplinary research, an ideal which promoted the funding source of this PhD through an ESRC/NERC joint scholarship. Geography is ideally placed to be at the forefront of this research with its diverse interests both as a discipline and its connections with other subjects spanning humanities, social sciences, natural sciences and technology although geography's identity as a discipline has been questioned (Unwin 1992). Different epistemological approaches, and academic rivalries, have often caused lengthy debates and schisms between the different sectors although there is a growing emphasis on bridging this divide (e.g. Massey et al 1999; Harrison et al 2004) and exploring the 'environmental borderlands' (Zimmerer 2007). A greater emphasis is being placed on breaking down the perceived barriers that include lack of common vocabulary and lack of academic funding, rewards and opportunities for interdisciplinary research (Fox et al 2006). Barriers may be breached by fully integrated research on which to build a mutual respect between natural and social scientists, a willingness to understand the strengths and weaknesses of different epistemologies and methodologies, and recognising the relationship between power and knowledge (MacMynowski 2007). Oughton and Bracken (2009) identify the need for both reflexivity and negotiation and that "It is vital to acknowledge the continued role of reframing" (Oughton and Bracken 2009:8) throughout interdisciplinary research (see Chapter 3 Methodology Trail).

Evans and Randalls (2008) advocate a 'paratactical' approach to interdisciplinarity where both science and social science are placed side by side in a non-hierarchical relationship although this results in research that is characterised as breadth over depth. This they see as problematic for the normal narrow and deep literature reviews of

standard PhD research. This has certainly been an issue faced in writing this thesis, which draws on literatures from geography, anthropology, development studies, ecology, biological and conservation sciences, as well as geographical information science. At times certain issues have had to be quite cursorily discussed so as to allow other themes to be reviewed in more depth. Many words written when considering particular subjects have, indeed, not made it into the final thesis text due to constraints of word length and a desire to focus on the principal routes eventually taken. Paratactical writing should allow the researcher to engage with different elements by tracing links across the disciplines (Evans and Randalls 2008). However, defined word limits and differences in writing style required to target specialised audiences is antithetical to writing in an interdisciplinary manner. As an example, a postcolonial GIS (Moore 2007b) paper I presented at a GI Science conference was received well but perceived as something out of the norm despite this type of paper having well established roots in critical cartography (Harley 1990; Pickles 1995; Pickles 2004; Harvey et al 2007) , qualitative GIS (Kwan 2002; Kwan & Ding 2008; Jung and Elwood 2010) and indigenous cartographies (Chapin et al 2005; Louis 2007). More attempts at building partnerships through presentation of cross-disciplinary papers will encourage greater understanding of different epistemologies and ontological approaches (Schuurman 2006).

The research here seeks to be interdisciplinary in both its philosophical approaches and methodology and its focus on ecosystem services for human well-being may be justified as this concept has been seen as "fertile ground for transformative interdisciplinary work" (Brauman et al 2007:90). The discussion is led here from a postcolonial, indigenous and feminist stance that will contribute to ecosystem service debates from a new perspective. As will be discussed in Chapter 2, so far much of the literature is

positioned within environmental science and environmental economics, and neglects many issues which might be raised by writers within, for example, other social sciences and cultural studies. Paratactical writing is approached here by intermixing qualitative styles of text with more quantitative analysis, linking themes from environmental research and social science disciplines. The mixed methodology also addresses interdisciplinary concerns. Although many of the methods have their roots in social science, there are elements from environmental surveys as well as the mapping and a strong use of visualization methods from geographical information science that are used to communicate the qualitative understandings of place in Chapter 7. The research therefore links three disciplinary areas: natural science, social science and GIS or, more practically, ecosystem services, traditional knowledge and geographical visualisation, illustrated in Figure 1.2.

A secondary problem, or opportunity, is that of 'polyvocality', which in this research has two important meanings. In interdisciplinary academic studies it is taken to be 'conflating two or more strands of literature' or 'to traverse literatures that were more methodologically and philosophically different' (Evans and Randalls 2008). Evans and Randalls (2008) seem to view polyvocality, in the interdisciplinary context as problematic. Certainly, the writing styles of the same topics in different types of journal have made reviewing the literature challenging. Yet, understanding and integration of different styles of academic languages, although challenging and time consuming, generates a more textured approach to thinking about and writing up research. My own voice necessarily adopts different modes of academic language but, rather than becoming schizophrenic, patterns of association and holistic meaning seem to emerge.

Figure 1.2 Linking disciplines, fields of knowledge, philosophical approaches and methods in this interdisciplinary research
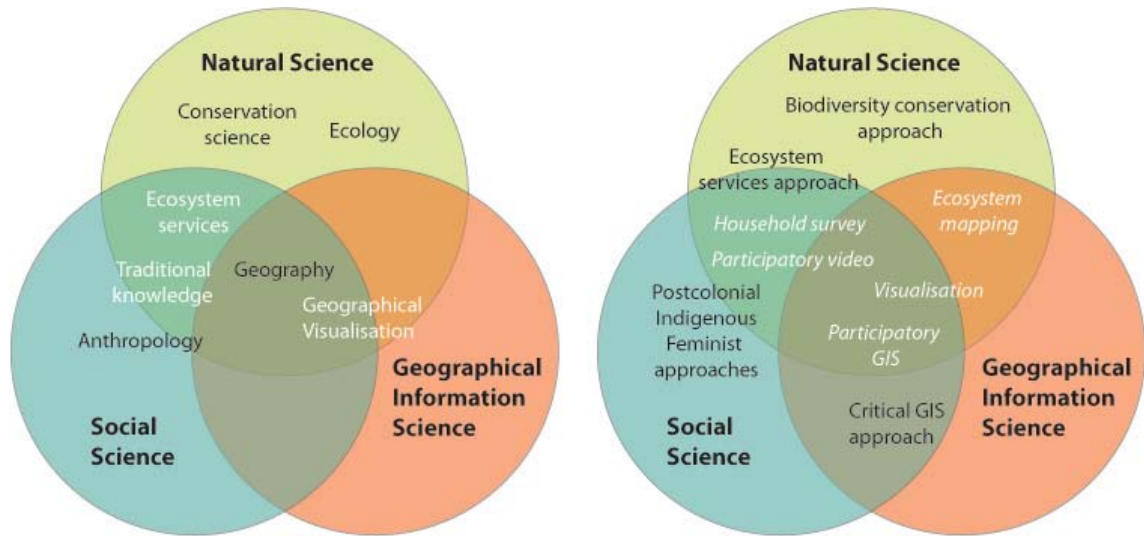
My thoughts presented in the text and other media are a medium in which local knowledge, conservation science and geographic visualization come together in a balanced relationship, as far as this is possible in an academic work. One of the challenges of using multiple academic languages was where the same word has different meanings across disciplines, which may cause confusion. For instance, 'ontology' in the social sciences refers to the philosophical nature of being, "a foundational reality, the essence of an object or phenomena" (Schuurman 2006:731); in GIS literature Schuurman (2006:728-9) found that it is "primarily concerned with implementation of complex philosophical and cognitive concepts in a computational environment". Bracken and Oughton (2006) advocate 'active listening' to overcome this problem and developing a common understanding between disciplines in the context of academics from different disciplines working together.

The term 'polyvocality' also refers to the individual voices that appear in the text alongside my own in a 'coherent texture' (Crang 1992). The impetus for this lies in the indigenous, decolonising and feminist philosophical approaches underlying the research

together with ethical approaches necessary within participatory methods (see Chapter 3 Methodology Trails). Both Western texts and academic research may be criticised as they often lose meaning for those who are participating (Spivak 1988; Papageorgiou 2007). Therefore, as well as interpreting material from people's discussion and film, I felt it important to impart a sense of, and do justice to, the people themselves, their situation, thoughts and values through the use of multiple voices throughout the text and culminating in the multiple representations of ecosystem services and the values attributed to them that are presented in Chapter 7 Visualization Trails.

Making interdisciplinary connections has therefore been both a challenging and a rewarding intellectual journey. As the introductory quotations imply, exploring and attending to what has been revealed by the Tugen people, I feel that I am journeying along the paths that connect (Ingold 2000) both the actual and the interdisciplinary landscapes.

1.5 Following the academic trail

This chapter has briefly highlighted some of the concerns which led to the writing of this thesis. I will now signpost the journeys which the reader might follow in the chapters that ensue. Chapter 2 explores the literary trails of the thesis, investigating some of the diverse published work on defining, analysing and demonstrating how ecosystem services function and provide benefits to human well-being. The chapter develops an argument that the value of ecosystem services changes in relation to scale and that questions need to be asked about whose values are being counted in assessments of ecosystem services.

The methodological 'bricolage' (Yardley 2008) used in this interdisciplinary study is described in Chapter 3. The chapter discusses the decolonising and ethical

underpinnings of the methodology. The mixed qualitative and quantitative methodology includes participatory approaches using video and mapping, semi-structured interviews and a household questionnaire on the value of ecosystem services that are brought together in a grounded theory approach to analysis (Crang and Cook 2007). An initial description of the visualization methods is presented. The whole methodology is bound together, once more, through the concept of hodology.

Chapter 4 provides an empirical test of hodology; by combining walking, video, participation and reflection (Anderson 2004; Pink 2007; Wylie 2006a) that interconnect the study of paths and ideas (Turnbull 2007). The chapter is based on a long distance walk, a cultural and environmental transect, across the Rift Valley of Kenya. The fundamental links between human well-being and ecosystem services, particularly direct provisioning services such as water, were evident. There was evidence of ecosystem dis-services; environmental hardships such as drought, famine, wildlife conflicts are common place and short term subsistence priorities take precedence over provisioning for the future through environmental conservation; it is at this juncture that conservation and human welfare collide (Chan et al 2007).

Chapter 5 Resource Trails focuses on a single Tugen community which typifies many such communities in Kenya, and across Africa. The chapter presents the results from a quantitative evaluation of the relative values placed on ecosystem services alongside interviews and participatory approaches. The results show high values are placed on wetlands for competing ecosystem services and there are trade-offs in use and function. Similarly, the proposed creation of a community wildlife reserve increases the value of recreation and biodiversity as ecosystem services over use of land for grazing, although evidence shows that community conservation initiatives may not bring the benefits foretold (Barrow et al 2000). The inference from these studies is that the rhetoric

surrounding ecosystem services perpetuates global structures of power and knowledge. This chapter argues that, although placing economic values on nature may bring some benefits, trade-offs and problems (Bockstael et al 2000) should also be considered, particularly in areas of high poverty.

Chapter 6 considers the role of women and ecosystem services, specifically domestic water supply, and argues that the impact of valuation of ecosystem services has to be considered in terms of social equity. Yet, the implications of gender within the management of ecosystem services rarely appear in discussions.

Chapter 7 both critiques and creates a number of representations using different media: words, video, images, maps and audio to illustrate how subjective are these representations. Media are then combined to create two novel forms of visualisation to illustrate the trails discussed in previous chapters; the first for global dissemination and the second to create a personal embodied experience. It is proposed that these visualizations will provide alternative and more effective means for local people to express their needs and values of ecosystem services to decision makers to open up the multiplicity of different epistemologies that are necessary in ecosystem service valuation (Wilkinson and Eidinow 2008).

The final chapter draws together conclusions from this study. Debates on the lack of dialogue between political scientists and conservation biologists (Agrawal and Ostrum 2006) have proposed that ecosystem management is best undertaken at a scale at which ecosystem processes take place. However, over-arching environmental decision-making continues to occur at political units of governance such as in international arenas and national governments. New mechanisms for knowledge exchange to bridge scales, such as Google Earth or mediascapes will help to confer not only knowledge about ecosystem services but understanding of the human needs of those services.

Chapter 2

Literary Trails

I still find each day too short for all the thoughts I want to think, all the walks I want to take, all the books I want to read and all the friends I want to see.

John Burroughs (American Naturalist 1837 – 1921)

Until the lions have their historians, tales of the hunt shall always glorify the hunter.

African proverb

Chapter 2 Literary Trails

2.1 Introduction: Navigating the network of trails

The following review brings together the key literatures that form the background to this interdisciplinary study focusing on four main themes: ecosystem services, environmental governance, traditional ecological knowledge and critical mapping. The first concept is used to evaluate the services that ecosystems provide to support human well-being, the second and third are used to give perspective to how values of nature are constructed and the fourth to critique how these values are communicated. Other important themes are reviewed in context: Chapter 3 Methodology Trails includes a review of postcolonial approaches and participatory methods and Chapter 6 Women's Trails includes a section covering women and environment literature.

This chapter begins with a selective review of the rapidly growing body of literature surrounding ecosystem services for human-well being (Section 2.2) including discussions on the conceptual framework, the arguments given for the benefits of the approach and the criticisms that have been made. The ways in which nature is valued, as applied to ecosystem services, are then critiqued in Section 2.3. Section 2.4 provides a brief overview of environmental governance and policy that construct global and Kenyan national values for nature and ecosystem services. Section 2.5 introduces some discussion about the formation of traditional knowledge and local values from a review of literature surrounding traditional ecological knowledge and practices including the case of pastoralism. Section 2.5.2 links writings from critical GIS that highlight the role of 'place' in contributing to values of ecosystem services. This chapter is summarised in Section 2.6 by justifying this research in the context of previous studies, in which gaps

show where the contribution of this interdisciplinary work lies in forwarding knowledge about society and nature under the theme of ecosystem services.

2.2 Ecosystem services

2.2.1 The ecosystem services approach

Ecosystems are viewed by natural scientists as functional entities including living life forms, their interactions with each other and their environment (CBD 2010); they are complex and dynamic units composed of biotic and abiotic factors. The complexity of ecosystems is recognised in the natural world but also in social systems and policy (Ascher 1999). People depend on ecosystems for supply of resources such as food, water, timber, fuel and fibre. Ecosystems are also essential for less immediate services such as climate regulation, air and water purification, nutrient recycling and disease control and the less tangible aesthetic and cultural needs that all unite in the support of life and well-being. Ecosystem services are "the conditions and processes through which natural ecosystems, and the species that make them up, sustain and fulfil human life" (Daily 1997:3). The ecosystem services approach promotes the need effectively and sustainably to manage ecosystem functioning (Peterson et al 2010), as escalating anthropogenic activities on ecosystems worldwide, the rapid increases in human exploitation and influence on the world's resources, are leading to changes in the health, productivity and function of ecosystems (MA 2005a). It also emphasises the value of ecosystem services to support human well-being and poverty alleviation. The concept of ecosystem services has seemingly repositioned questions in the natural sciences about what ecosystems *are* (Townsend et al 2008) into interdisciplinary debates about what ecosystems *do* for humanity (Phillips & Mighall 2000; Castree 2005). The position has moved from defensively protecting ecosystems *from*

development to promoting the concept of ecosystems working *for* development (Ranganathan et al 2008). Within this move towards a human centred approach to ecosystem services, arguments are made that the true economic and social values of ecosystem services for human well-being should be incorporated into policy making and planning (Costanza et al 1997; Daily 1997; MA 2005a; Daily et al 2009).

Global discourses around ecosystem services were formalised through the Millennium Ecosystem Assessment (MA 2005a) which produced a scientific appraisal of changes in the World's ecosystems and their services together with assessments of how they can best be strategically managed sustainably to support human well-being and poverty alleviation. Human well-being is central to the assessment but the intrinsic value of biodiversity and ecosystems are also considered (MA 2005a). The MA framework (MA 2003) offers policy-makers a means to understand better the synergies and trade-offs involved in decisions concerning the environment and to design response options at scales of governance where they can be most effective. This approach provides a means to link livelihoods with nature in an approach that gives value to the previously hidden contributions of ecosystems to human life. The MA was undertaken at multiple scales: global, regional, national, watershed and local. However, the emphasis was on global assessments with selected sub-global case studies.

Categorization of ecosystem services

The MA framework (MA 2003) catalogues the benefits provided by ecosystems for human well-being defined in terms of 'ecosystem services'. These services are categorised into four main groups (Table 2.1): provisioning services (food, water, etc); regulating services (those that affect climate, water quality, etc); cultural services (recreational, aesthetic, and spiritual); and the underlying supporting services including biodiversity (MA, 2003).

Table 2.1 Categorisation of ecosystem services (MA 2003)

PROVISIONING SERVICES	REGULATING SERVICES	CULTURAL SERVICES
Products obtained from ecosystems	**Benefits obtained from regulation of ecosystem processes**	**Nonmaterial benefits obtained from ecosystems**
• Food • Fresh water • Fuel • Fibre • Genetic resources • Biochemicals	• **Air quality regulation** • **Climate regulation** • **Water regulation** • **Erosion regulation** • **Water purification** • **Disease regulation** • **Pest regulation** • **Pollination** • **Natural hazard regulation**	• **Spiritual and religious** • **Aesthetic** • **Recreation and ecotourism** • **Inspirational** • **Educational** • **Sense of place** • **Cultural heritage**
SUPPORTING SERVICES		
Services necessary for the production of all other ecosystem services		
• **Soil formation** • **Nutrient cycling** • **Primary production**		

There have subsequently been successive discussions on the categorisation of ecosystem services and attempts to define them (de Groot et al 2002; MA 2005a; Costanza 2008; Fisher and Turner 2008; Fisher et al 2009; Haines-Young and Potschin 2010), although some of these methods have been criticised as ill-defined and ad hoc (Boyd and Banzhaf 2007). Some methods reduce economic services to those that can be evaluated in purely economic terms and can be equated to conventional marketing units (Boyd and Banzhaf 2007) and non-ecological contributions are omitted. For instance, managed harvests include many factors that are not based purely on ecosystem functions such as labour or capital whilst subsistence farming does not include such inputs, so ecosystem services are more direct. Standard classifications are criticised for double accounting (Wallace 2007) as they mix the processes, such as pollination or soil formation, and services, such as food production. However this is refuted by Costanza

(2008) who argues that multiple classifications are needed and goes on to show that ecosystem services can be categorised by their spatial characteristics such as proximity (refugia) or non-proximity (climate regulation) to use, or that they are related to user movement (tourism), in-situ use (food production) or by directional flow to use (water supply).

One ecosystem service that is difficult to classify, does not appear at all in some classifications, and may mistakenly be used synonymously, is biodiversity; yet the distinction is important. The concept of ecosystem services evolved from previous global debates on biodiversity conservation and sustainable development (see Section 2.4) but with a different emphasis. An area protected for its ecosystem services may have different values and need a different management strategy to one protected for its biodiversity (see section 2.3.1). Some see biodiversity as more than an ecosystem service, as the 'living web' connecting the elements of healthy ecosystems (Blignaut and Aronson 2008) in which biodiversity both sustains and depends on ecosystems. Elsewhere it is classified as a supporting service or has multiple functions (Haines-Young and Potschin 2010).

Most classifications focus on the global context and it can be argued that the terminology and classification used in local assessments needs to be modified to suit the local situation so as to bring local knowledge and values into international debates (Petheram and Campbell 2010). For this research, selected categories were used and defined to cater for local understanding.

Human well-being and poverty

Different ecosystem services cater for different components of human well-being. These were also defined in the MA (Table 2.2) where well-being is concerned with the

quality of life (Dasgupta 2002). Yet, despite the apparent centrality of human well-being to the ecosystem services concept, the emphasis of assessments has been on compiling biophysical data (Menzel and Teng 2009) rather than societal understanding. Although the state of well-being has been central to other studies (Prescott-Allen 2001) there is a need for the human dimension to be more explicit and for closer links between ecosystem services and the social sciences (Butler and Oluoch-Kosura 2006).

Table 2.2 Constituents of Well-Being.

Security	Basic material for a good life	Health	Good social relations
• personal safety • secure resource access • security from disasters	• adequate livelihoods • sufficient nutritious food • shelter • access to goods	• strength • feeling well • access to clean air and water	• social cohesion • mutual respect • ability to help others
Freedom of choice and action			
• opportunity to be able to achieve what an individual values doing and being			

There is increasing emphasis on the role of ecosystem services for poverty alleviation and better understanding is required of the relationships between ecosystem services, well-being and poverty (ICSU-UNESCO-UNU 2008; MA 2005a). At its simplest, poverty is seen as the lack of the elements that constitute well-being (MA 2005a) and issues around poverty are well documented (Maxwell 1999; Dasgupta 2002) but the complexity of links and trade-offs between poverty alleviation and ecosystem services are poorly considered (Agrawal and Redford 2006; Bulte et al 2008; Comim et al 2009). The rural poor, in particular, rely heavily on ecosystem services but this is often overlooked in poverty assessments and statistics. The result is governance strategies that do not make the connection between environment and development.

This   is disturbing as some of the poorest groups live in rural areas in developing countries, are directly dependent on provision of goods from the environment and are vulnerable to changes; changes that are often bought about because of the lack of value given to 'free' environmental services and goods.   Often the emphasis on using ecosystem services to support economic development is to link conservation to poverty relief through ecotourism (Tallis et al 2008) or livelihood diversification (Assan et al 2009) but there is little reliable evidence of what may be achieved in using ecosystem services for poverty relief (Tallis et al 2008). Many note the inadequate understanding of the importance and value of ecosystem services to local people and how that differs at different levels of governance (Comim et al 2009; Tallis et al 2008) which gives scope to this research.

Significant adverse changes to the world's ecosystems have been identified (MA 2005) particularly in areas occupied by the world's poor.   Of the 24 ecosystem services assessed by the MA (2005), 15 were identified as being degraded and there is evidence that some of the changes in ecosystems are both irreversible and escalating. It is seen that certain sectors of society have reaped benefits from the environment yet at a cost to the health and future functionality of the environmental support mechanisms on which humans depend (MA 2005). Examples of this can be seen in debates on climate change (IPCC 2010), desertification (UNCCD 2010), loss of forests (UN-REDD 2010) and loss of wetlands (RAMSAR 2010). The effects are not even across the globe and some countries have gained substantially from economic development whilst others have born the cost of environmental change and degradation. A review of ecosystem services and poverty for Kenya listed four major wellbeing determinants affected by ecosystems services: "ability to be adequately nourished; ability to access adequate clean water; ability to have energy and to keep warm; and ability to earn a livelihood" (UNEP and

IISD 2005). Where there is a scarcity in the ecosystem services that fulfil these aspects of well-being further degradation of ecosystems may ensue.

Drivers of change and trade-offs

The degradation of ecosystem services is driven by anthropogenic and environmental factors (MA 2005). The importance of applying an ecosystem services approach is in providing decision makers with information about the costs and benefits to human societies of ecosystem goods and services and the effects and trade-offs to the environment from different drivers of change (Figure 2.1). Drivers of change are direct, such as change in land use, climate change or irrigation, or indirect such as market forces, government policy or demographic change such as population growth. There are complex links between human development and ecosystem services. Drivers of change may improve or cause decline in ecosystem services and there may be trade-offs between the effects of change on goods and benefits received from different services (Nelson et al 2009). Ecologically, there are significant trade-offs between provisioning services and almost all regulating and cultural services but, in general, maintaining the provision of regulating services, produces greater diversity of ecosystem services (Raudsepp-Hearne et al 2010).

Scenario building is being used widely in ecosystem service assessments to assist in understanding trade-offs and links between past trends, the current situation and plausible futures (Carpenter 2006b; Rounsevell and Metzger 2010). The MA sought to illustrate trade-offs between different futures through four scenarios; two arising from sustainable use of ecosystems and resources and two focused on economic drivers of change (Carpenter et al 2006b; Cork et al 2006). Different environmental, political, social and economic factors result in different trade-offs in how future environment and development policies may operate. One illustration of the two-way effects between

ecosystem services and well-being is that well functioning human societies may protect or enhance ecosystem services whereas societies with impaired well-being may find a decline in ecosystem services (Butler and Oluoch-Kosura 2006).

Figure 2.1 Complex linkages between direct and indirect drivers of change, ecosystem services, human well-being and scale (MA 2005a: vii)
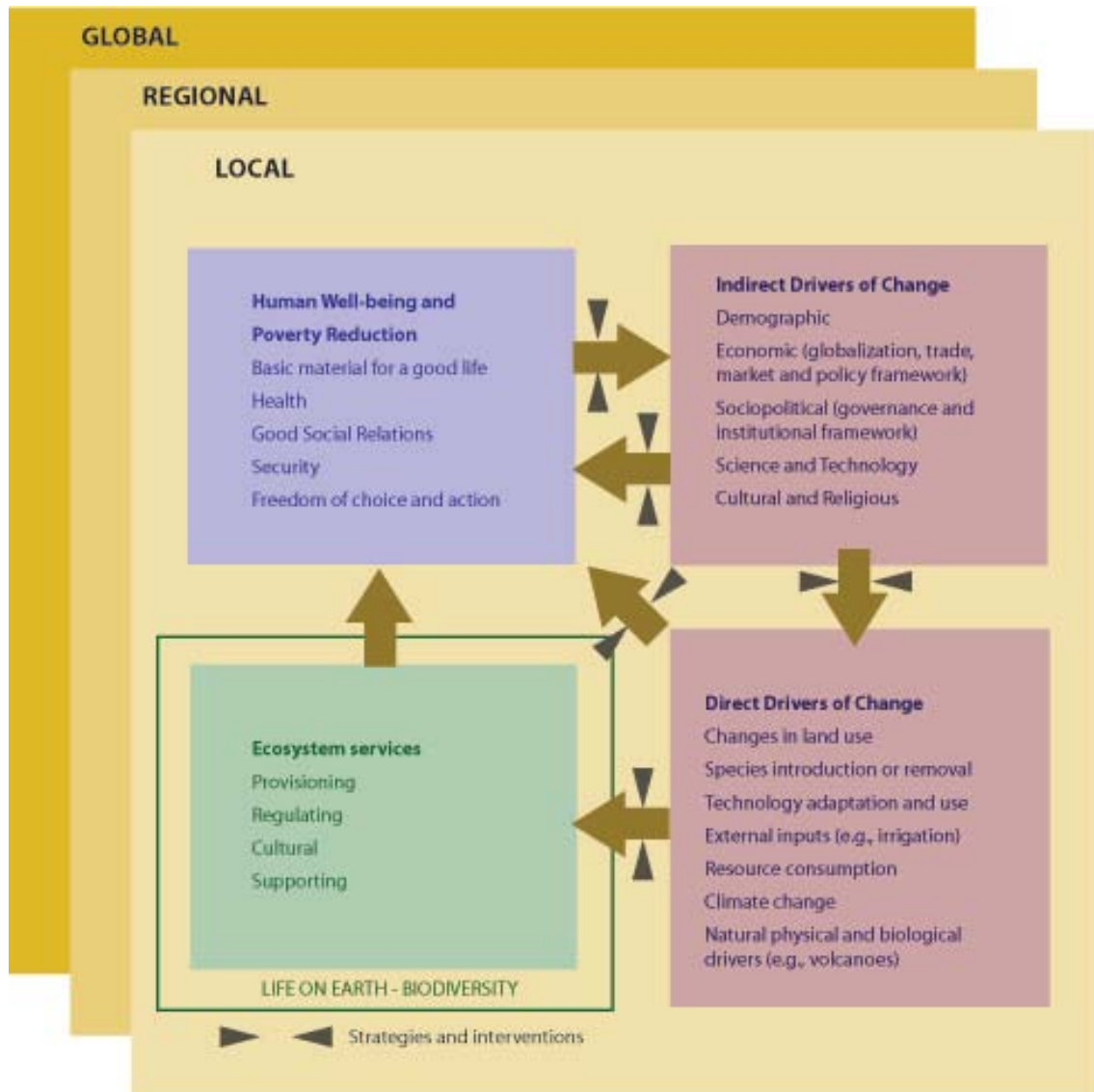
It is often difficult to reverse the effects of change in ecosystem services and the consequent impacts on societies. Central to the ecosystem service approach is to calculate the value of ecosystems and the cost of change particularly related to

economic market values but ecological, social and intrinsic values should also be considered.

2.3 The nature of Value and the value of Nature

The nature of value and the value of nature (Daily et al 2000) are two debated concepts that are of profound significance within ecosystem service assessments, yet often the first may be unspecified and the second is evaluated primarily in economic terms. Value is seen as a tricky term (Harrington et al 2010) and is used in many contexts. This section firstly looks at how the values of ecosystem services are defined and measured in Section 2.3.1. Then, whilst recognising the benefits of putting a value to nature, section 2.3.2 critiques the commodification of nature that underlies the approach.

2.3.1 The nature of value

Definitions

In definitions discussed by Farber et al (2002), 'value systems' are the "norms and precepts that guide human judgment and action" (Farber et al 2002:375) which relate to worldviews, beliefs and practices of different societies. "Value" is taken to mean "the contribution of an action or object to user-specified goals, objectives or conditions" (Farber et al 2002:375-6 after Costanza, 2000) which is related to the 'value system' as that moderates the relative importance of an action or object. This implies that the values for any action or object, including ecosystem services, held by different societies, communities or individuals may vary. 'Valuation' is "the process of expressing a value for a particular action or object" (Farber et al 2002:376).

Values may be conceptually sub-divided in a number of ways, two of which are outlined here. The move towards a more human centred approach to nature gives emphasis to the distinction between intrinsic and instrumental values (Goulder and Kennedy 1997). Intrinsic value is described as "the value of any action or object measured by its contribution to maintaining the health and integrity of an ecosystem or species, per se, irrespective of human satisfaction" (Farber et al 2002:376) or value 'for-its-own sake' (Uggla 2010). Within the biodiversity arena, the concept of the 'intrinsic' value of nature is often promo   2007). The Convention on Biological Diversity (CBD 1992) is introduced with the statement "of the intrinsic value of biological diversity and the ecological, genetic, social, economic, scientific, educational, cultural, recreational and aesthetic values of biological diversity and its components'' (Glowka et al. 1994: 9 cited in Uggla 2010) in which statement intrinsic value seems to be positioned against more anthropocentric, or instrumental, values. The MA is criticised as utilitarian (McCauley 2006) as intrinsic values were omitted from the conceptual framework (ICSU-UNESCO-UNU 2008) in a more pragmatic approach to valuation. Instrumental values have more identifiable and, possibly, quantifiable values for humanity; they are values in the present (Uggla 2010). Uggla (2010) also distinguishes bequest values or values for the future. However, the distinction between intrinsic and instrumental values may be problematic when considering traditional values and different worldviews and one view is that intrinsic values may be related to collectivist preferences and cultural needs (Turner 2010).

Another set of terms used in relation to decision-making are: ecological values, socio-cultural values and economic values (de Groot et al 2002). Natural scientists use concepts of ecological value, although "'value' is a term that most ecologists and other natural scientists would prefer not to use at all" (Farber et al 2002:381) as non-human

life is presumed not to have conscious goals, although this may be debated (Lovelock 2000; Whatmore 2002). Yet the ecological value of causal relationships between parts of an ecosystem, such as trees that bind soil and prevent erosion (Farber et al 2002) are central to ecosystem service analysis. Socio-cultural values are perceived values and may be concerned with equity but mainly related to non-material well-being, which is problematic when considering a diversity of worldviews. However, Bryan et al (2010) demonstrate a method for mapping social values of ecosystem services for identifying high priority management areas that may be used in conjunction with ecological and economic values.

Economic valuation

The main emphasis in most ecosystem service assessments is placed on economic measures of value and it is the close linking of ecological science and economics that predominates although some aspects of ecosystem services cannot be valued in economic terms. Standard methods for economic/monetary valuation of nature are well documented and discussed (see Edward-Jones et al 2000; King & Mazzotta 2000; Bockstael et al 2000; Heal 2000; Fisher et al 2008; Gowdy et al 2010). Different economic valuation methods may be adopted dependent on the type of ecosystem service or the particular situation. For instance, many provisioning service or direct use values may be assessed by relating to conventional markets and the value of traded goods such as food commodities, biological controls such as natural pesticides or medicines. The implicit market approach looks at the willingness to pay, dependent on consumer behaviour such as the popularity of a particular ecotourism destination. The constructed market approach is hypothetical but asks the consumer directly how they would be willing to pay. Indirect use of ecosystem functions, including nutrient recycling, soil formation and management, pollination, climatic regulation and pest

control, are more difficult to value (Gaston and Spicer 1998). Yet, these indirect services are essential to maintain the quality of our environment in general. Without these controls plagues and extreme climatological events become more common and the health of the environment suffers.

Typically, the economic valuation of ecosystem services is a process of modelling the causal links that produce marginal changes in ecosystem services (Figure 2.2) under different scenarios, rather than calculating absolute costs, and evaluating the costs and benefits to different beneficiaries (European Communities 2008). However, products that are marketed for direct use are more easily (and therefore more often) valuated than products of indirect use and subsistence direct use (Kumar and Kumar 2008).

Figure 2.2 Causal links between policy, effects on ecosystems and valuing changes due to those effects (DEFRA 2007:4).

Policy change	→	Impacts on ecosystems	→	Changes in ecosystems	→	Impacts on human welfare	→	Economic value of changes in ecosystem services
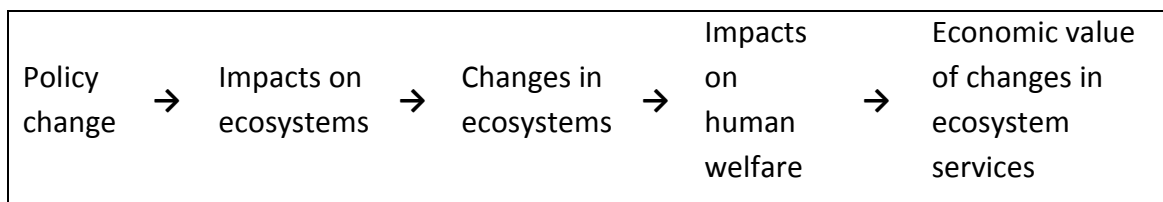
There are often value trade-offs between ecosystem service provision; for instance, maximising the market value of timber from forests minimises their traded value for carbon storage when the forests are felled (Bateman & Sen 2010). Another example quantifies the trade-offs and costs of maintaining ecosystem health of dryland savannah under livestock (Teague et al 2008) in which the relationship between livestock levels, short-term and long-term profit as opposed to lost revenue through reducing livestock numbers and improved condition of the rangeland is assessed. The implications are that a loss of profit, i.e. direct use of services now, provides sustainability and continuation of ecosystem services of higher value in the future.

Quantifying the value of ecosystem services is more complex than pricing standard goods and markets. Methods of valuation are varied (Barbier 2007; Farber et al 2002; Wilson and Howarth 2002; IUCN 2004a; European Communities 2008) and are still the topic for much deliberation, particularly when trying to put market values to regulating, cultural or supporting services or creating aggregate values from a number of assessments where social process and shared knowledge is important (Daly and Cobb 1989). Many valuation methods look at aggregated individual values which are valid when looking at 'private' use of services but are problematic when dealing with 'public' goods or commons (Farber et al 2002). Consensus valuation through group deliberation is a more realistic method for assessing values on behalf of a society (Wilson & Howarth 2002).

There are many limitations of the process of economic valuation of ecosystem services, such as the subjectivity of the process (Harvey 1996; Castree 2003), the often narrow criteria for valuation, inaccuracies of assessment, particularly due to lack of knowledge of the biophysical environment (Carpenter et al 2006a; Carpenter et al 2009), and fear of ulterior motives (Ranganathan et al 2008). Measures of economic and ecological value of biodiversity and ecosystem services may at times conflict with one another (Farber et al 2002). Most importantly, there is a fear that ecological values and intrinsic values will be lost in economic markets and the commodification process (Peterson et al 2009; Ranganathan et al 2008). It is therefore important that quantitative monetary values are not used alone in assessments but that they are integrated with qualitative analysis and biophysical indicators (Costanza et al 1997; European Communities 2008).

2.3.2 The value of nature

Payment for ecosystem services

Bringing economic costing and global trading of ecosystem services is being seen as both a means to encourage sustainable use and protect the environment (Balvanera et al 2001; Egoh et al 2007) combined with a route to poverty alleviation and development (Adams et al 2004; Bulte et al 2008; Tallis et al 2008). Some believe that wealth can be good for the environment and the relief of poverty is achievable through economic means given the right political, technological and environmental conditions but sound investments have to be made to ensure sustainability (Sachs 2005). A number of economic mechanisms are being employed ostensibly both to protect ecosystem services and work for sustainable development. Giving economic costing to ecosystem services has opened up possibilities to compensate for trade-offs in resources use and the effects on the environment by trading of ecosystem services. On the global scale, this includes carbon offsets (Corbera et al 2007; Duraiappah 2007; UN-REDD Programme 2010) which generally implies payments to countries in the South to protect their forests to offset the carbon emissions of countries in the North (Wunder and Wertz-Kanounnikoff 2010).

Payments for ecosystem service (PES) schemes are receiving wide attention at national and local scales for both environmental protection and poverty alleviation. PES is defined as "a voluntary transaction whereby a well-defined ecosystem service, or a land-use likely to secure that service, is being 'bought' by at least one buyer from at least one provider – if, and only if, the provider secures the provision of the service" (UNEP and IUCN 2007 adapted from Wunder 2005). However, PES schemes should not be designed just to address poverty and the environmental benefits should be well understood (Pagiola et al 2005). PES schemes may stave off rapid loss in ecosystem

services now that are essential for well-being in the future (Wunder 2007). Examples in Africa, that are considered to be beneficial to both communities and ecosystems, include initiatives such as WWF's Valuing the Arc programme in Tanzania (Swetnam et al 2010) and the Working for Water scheme in South Africa (Turpie et al 2008). In Tanzania, PES schemes enhance community based conservation initiatives but are often enabled by limited opportunity for other forms of development (Nelson et al 2010). They also require good governance structures and established land tenure which is not always compatible with pastoralist livestock practices.

The validity and efficacy of focusing on economic values to protect biodiversity is contested (Redford and Adams 2009). The PES ideology is no 'silver bullet' (Ferraro and Kiss 2002) offering "dramatic solutions to humanity's chronic disregard for nature" (Redford and Adams 2009:785). There are many criticisms of PES related to institutional complexity, cost effectiveness, development benefits, sustainability, method of investment and equity so the process to achieve successful outcomes from a PES scheme is complex (Ferraro and Kiss 2002). The following examples illustrate selected issues. First, as ecosystem services are increasingly given economic value, there is a danger that they become scarcer, more valuable and consequently maximised to increase revenue. Second, markets are only available for certain identifiable ecosystem services and at certain scales, which does not lead to the conservation of biodiversity but the preservation of selected ecosystems in market desirable locations and timescales. It follows that the results of privatisation of these services could have significant human welfare issues. Third, support for eco-tourism ventures and marketing may promote keeping ecosystems relatively intact provided that local people are able to meet their short-term interests through direct use of essential resources. Fourth, service recipients should be satisfied that the ecosystem service they are paying

for is being supplied before payments are made, for instance, payment by downstream users for water supply that is extracted by upstream users and benefit transfer between locations may be problematic in who benefits (Plummer 2009). Finally, PES requires assignment of property rights, and possibly privatisation, which may be problematic in lands under communal tenure systems.

Value and scale

Another significant, and unresolved, issue is recognising how value changes at different scales. Global environmental assessments and the ecosystem service approaches can be critiqued as colonial (Adams 2004). How values are assessed is reduced to terms recognised by global markets that are for the most part steered and based in the North. Spiritual, cultural, social and intrinsic values are subsumed into the economics of capitalist market forces and valuations. Differences in social and economic structures of different societies, and different world views tend to be overlooked in global markets; imposing monetary values on different cultures that don't share those values therefore raises moral and ethical issues (Bawa and Gadgil 2007). Debates have moved from whether scale is important to debates the practicalities of local assessments (Wilbanks 2006), although global implementations are slow. For instance, international pharmaceutical companies may give high monetary value to plants that are the source of important genetic resources, whilst local people may derive medical and cultural value directly from the plant and its depletion brings about both monetary costs (if money is available to pay for alternatives), consequences to health, well-being and cultural loss.

The scale at which ecosystem services are used makes, in some cases, a significant difference to ecosystem services values (Vermeulen and Koziell 2002) (Table 2.3). A top-down approach to ecosystem service valuation may produce very different results to

assessing ecosystem services values from a local level. Local scale variations in availability, use and value of ecosystem services are complex. 'Nature's Benefits', a comprehensive atlas of ecosystem services for human well-being in Kenya produced by the WRI (2007a), critiques the mapping of this complexity,

> *even though this atlas maps—for the first time—important livelihood*
>
> *components such as hunting, wood gathering, and charcoal production,*
>
> *it cannot adequately represent the variability and complexity of the*
>
> *livelihoods of poor families.* (WRI 2007a:135)

Particularly in areas of extreme poverty, the direct reliance on resources and who relies on them and manages them have to be evaluated alongside the functioning of the ecosystems that provide those resources and services.

Table 2.3 Differences between global and local biodiversity values (Vermeulen & Koziell 2002)

GLOBAL	LOCAL
Indirect use and non-use values are primary concerns	Direct use values as important or more important than indirect use and non-use
Emphasis on conservation, with or without sustainable use	Emphasis on sustainable use
Usually no specified user groups	Specified user groups
Endemics and other rare species given high value	Endemics no more important than other species
Focus on genotypes	Focus on phenotypes
Wild and agricultural diversity treated separately	No clear boundary between wild and agricultural biodiversity

The MA also recognises the effect of scale on assessments:

> *Focusing exclusively on values at only one level often hinders responses*
>
> *that could promote values at all levels or reconcile conflicts between the*
>
> *levels. Effective responses function across scales, addressing global*
>
> *values of biodiversity while identifying opportunity costs or synergies*
>
> *with local values.*   (MA 2005b;69)

Even individual identity may also impact on valuation of ecosystem services (Kumar and Kumar 2008) and it is important to recognise the ecological identity of individuals and societies in the decision making process and valuation methodologies; economists should take better account of the diverse man-nature relationships and philosophies.

Potentially, economic valuation and payment for ecosystem services is strategically important, however the risks to biodiversity conservation and human welfare, particularly in subsistence economies or areas of high poverty, should be considered critically before global enthusiasm for this approach causes harmful repercussions (Redford and Adams 2009). Values for ecosystem services are being constructed based primarily on knowledge of their biophysical properties and the drivers of change. These values are then being communicated to institutions at different levels of governance from which policies are formed (Figure 2.3). However, social and political concerns for the environment are equally as important in policy making as scientific understanding of ecosystem services (Daily et al 2009). To address these there is a need for communicating local values into policy and novel ways to achieve this are described in Chapter 8 Visualisation Trails. Society has the power to construct how it values nature (Castree 2005) and it should be questioned as to what the nature of value actually is, whose society constructs these values and at what scale.

Figure 2.3 Communicating the values of ecosystem services to institutions for decision-making but it is important to question 'Whose values count?' (Adapted from Daily et al 2009)
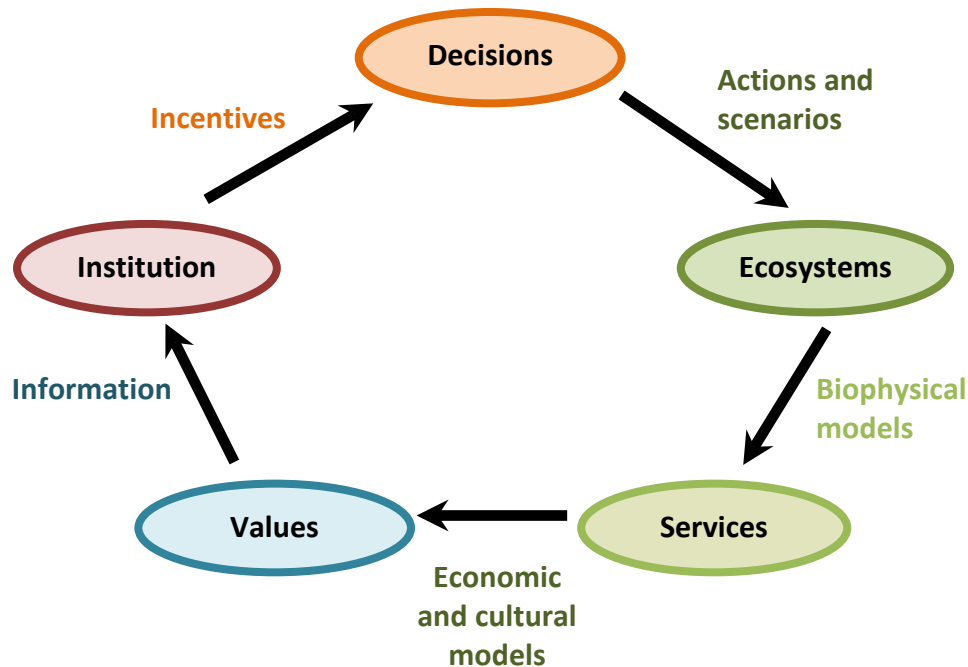
2.4 Environmental Governance

International approaches to ecosystem services and development

There is a growing acceptance by global, national and regional governance bodies that the future of human development and the Earth's ecosystems are bound together (Mainka et al 2005) but priorities between different actors in development and environmental arenas differ and may be manipulated due to political-economic interests (Neumann 2005). This section briefly reviews the integration of environmental debates into international and Kenyan development and policy making and illustrates how conflicting priorities may influence the values attributed to ecosystem services in the process of commodification.

Debates surrounding environmental governance were brought to the fore through global summits at Rio (Quarrie 1992) and a decade later in Johannesburg (UN 2002). These summits raised international commitment by governments to recognise the increasing loss of biodiversity and moved from "the protection of the environment and the search for 'appropriate' forms of social and economic development" at Rio (Quarrie 1992) to a strong 'sustainable development' and governance emphasis at Johannesburg (Potschin & Haines-Young 2006:163). The onus was placed on political governance to protect the environment from depletion of the Earth's natural resources in the pursuit of human development (Hens and Nath 2003:38). Operationalising international commitments proved more of a challenge (IUCN 2005) as the concept of sustainable development which conjoins with societal demands for development using a finite supply of resources is difficult to resolve (Williams and Millington 2004).

The growth in interest in concepts of 'natural capital' (Costanza et al 1997) and ecosystem services that could be values in global markets seemed to offer new impetus to sustainable development particularly through the MA and ensuing national assessments. The shift in emphasis from biodiversity conservation for intrinsic values to a more anthropocentric concern is inevitable in a world with rising population desiring economic growth (Holt and Webb 2010); putting a price on nature will gave it meaning in a globalised world. Ecosystem services seem central to environmental conservation policy which recognise the links to poverty and development (Agrawal & Redford 2006; Adams et al 2004). Yet there are dangers in commodifying nature in terms of the equity of this process (Pagiola et al 2005) to both nature and societies, and the validity and efficacy of focusing on economic values to protect biodiversity is contested (Redford and Adams 2009). In 2010 a new intergovernmental forum was established, the Intergovernmental science-policy Platform on Biodiversity and Ecosystem Services,

styled on the IPCC (Larigauderie and Mooney 2010; Marris 2010). This deals with current opinion on environmental sustainability and biodiversity. However in the initial review ecosystem services were not mentioned once in the main text (Larigauderie and Mooney 2010). The concept of ecosystem services may not yet have credibility in the biodiversity conservation arena.

Different perspectives may be identified in the way international development and environment arenas approach related issues such as the Millennium Development Goals (MDGs) (UN 2010) and the MA (MA 2005a). The MDGs take a practical approach to aspects of development including poverty, health and education and set targets for achievement by 2015. Of the eight MDGs only one is directly concerned with the environment yet all of them, it can be argued (Mainka et al 2005; Maathai 2009), rely to a greater extent, on a healthy environment and sustainability of its services. In the view of Maathai (2009:240), the environment "is the most important, and all of the other goals should be organized around it." Others also argue that issues of poverty and development are linked to environmental conservation (Agrawal & Redford 2006; Adams et al 2004) and that they should be jointly presented to policymakers (Sachs et al 2009:1502). In 2002, the target, "to achieve by 2010 a significant reduction of the current rate of biodiversity loss" was appended to the MDGs but as it has become evident that neither the 2010 targets to reduce biodiversity loss, nor all the MDG 2015 targets for poverty alleviation (Mainka et al 2005; UN 2008b; Mooney and Mace 2010) will be met, it is believed that this will restrict poverty reduction and achievement of the MDGs (Sachs et al 2009). The environment still seemingly lacks significance in the MDGs as shown in the 2008 MDG (UN 2008) report in which there were a mere two references to environmental sustainability and six uses of the term biodiversity. This lack of concern gives rise to criticisms of the top-down approach presented by the

MDGs, the scale of their approach and the way they are used by global-scale institutions as "biased against poor people, workers, women and the environment" Bond (2006:339).

Following on from the MA, Mainka et al (2005), in an IUCN report, highlight the key links between the MDGs and the MA and call for a more equitable balance between economic, social and environmental concerns in development (Figure 2.4) with a greater emphasis on understanding the essential supporting role that the environment plays. Although international and national actors are beginning to appreciate the links, the World Trade Organisation (WTO) and private sector companies in particular are criticised for not seriously considering sustainable development or the role and value of the environment (Mainka et al 2005:19). Integration of human well-being and ecosystem services into development planning is seen as essential, as is increasing the impact of multilateral environmental agreements, such as the CBD, in national development (Mainka et al 2005). Mainka et al (2005) recognise the potential of decentralising natural resource management, with capacity building support, to empower local communities to sustainably manage the resources on which they rely. They also recognise the need for equity in natural resource management. However, environmental governance cannot work in local isolation so Mainka et al (2005) recommend the need for financial support and landscape scale integration of management.

Global environment and development arenas therefore appear to have different perspectives, with some commonalities, on the value of ecosystem services but for the most part pressures for economic and social development seem to blind development organisations to the need for sustainable environmental governance.

Figure 2.4 Sustainable development (Source: Mainka et al 2005:24).

    (a) the theory   **(b) the current situation**   **(c) the way to move ahead**
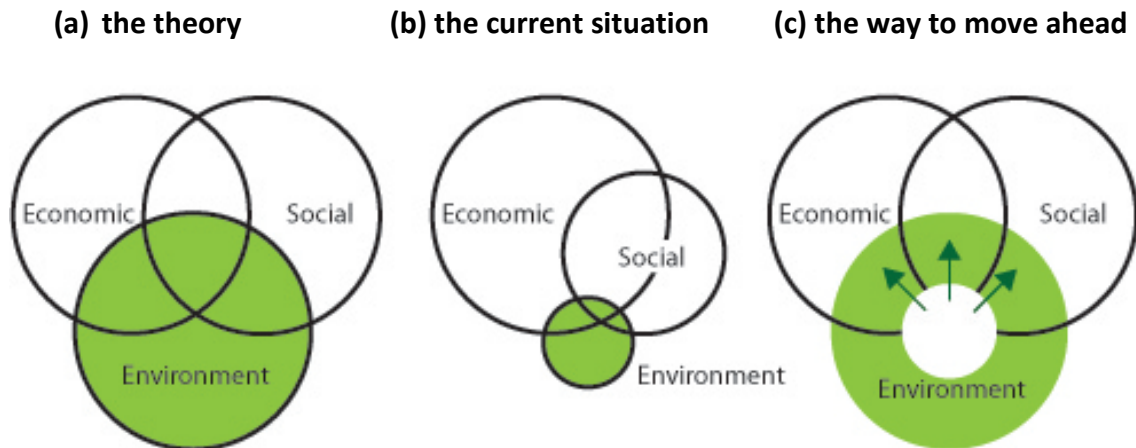
The Kenyan context

In the Kenyan context environment and development also seem to appear in different policy arenas. Environmental resources have supported development in Kenya for centuries and in recent years there has been a rapidly growing awareness of the need to monitor how resources are utilised and to pay greater attention to future sustainability. International organisations, such as UNEP, and UNDP, international NGOs such as WWF, and grassroots activism such as The Greenbelt Movement (Maathai 2003) amongst others have made governments more accountable for the impact of development and economic growth on the valuable natural resources in which many people in Kenya depend for their livelihoods. However, as in many developing nations, there is an inherent conflict between the impetus for economic growth and urgent calls for environmental protection, exacerbated in Kenya by rapid population growth over the last century.

Kenya has experienced rapid population growth in recent years and is reported at an annual average of 2.6% for 2002-2008 (World Bank 2009) with the population in 2009 recorded at 38.6 million, up from 28.7m in 1999 (KNBS 2010). Impacts of this are worrying, for instance, USAID warns that national development in Kenya is put at risk

(Anyangu-Amu 2010) and advocate population control. Although others see that population increase is now due to longer life expectancy and may be beneficial for economic development (Fengler 2010). In general, increasing population together with high levels of poverty is considered to put great pressure on natural resources, for instance population increase has been shown to be one of the main drivers of degradation in a dryland agro-ecosystem in Sub-Saharan Africa (Enfors and Gordon 2007). Environmental impacts of population growth may include increase in cropland, increased abstraction of water from rivers and wetlands for irrigation; degradation of grazing lands through increase in livestock and depletion of scarce natural resources. However this view is contested as the situation is diverse and complex (Matthieu 1998). Increase in human capital may help to increase productivity. The rise in urban populations also increases the demand for cash crops and therefore intensification of agricultural practices even on marginal lands. Population growth is therefore one of the key drivers of change to ecosystem services.

The Kenyan Government have developed ambitious plans for Kenya in its Vision 2030 based on three pillars, economic, social and political, and does not include environment. In general, Kenya's Vision 2030 barely focuses on environmental issues except for "specific strategies that will involve promoting environmental conservation in order to provide better support for the economic pillar flagship projects and for the purposes of achieving the Millennium Development Goals (MDGs)" (GK 2007:19), although it is implicit in plans for improving health and in reducing pollution and improving water and sanitation. However, the emphasis of the whole plan is on projects that support economic growth. Even the tourist trade, based on the country's rich biodiversity and earning the largest share of Kenya's foreign exchange, 10% Kenya's GDP in 2007, (Ministry of Tourism 2010), will be promoted through 'aggressive strategies' for

developing and marketing the high-end tourist industry, rather than protecting and improving the environment on which this industry depends. The links between poverty and environment in national and regional policy, in general, have been found to be 'far less visible' than in focal case studies (Swallow 2005: 315).

Despite the apparent dearth of commitment to environmental issues by the Kenyan Government there has been an interest generated in conjunction with international NGOs. The World Resources Institute has mapped ecosystem services against poverty on a national level to set down what is known about the links between ecosystem services and human well-being in Kenya (WRI 2007) but, more importantly it has raised issues and concerns about the lack of knowledge that is imperative if use of natural resources is to be maintained. One of these is the narrowness of the mandates of institutions within and without government and the lack of 'more integrated cross-cutting work' (Nackoney et al 2007: 177). The ministerial structure in Kenya gives evidence that there is national concern for the environment, although the four different ministries plus their subsidiaries that have overlapping control of environmental issues tend to complicate policy making.

The overriding national interest for environmental protection stems from the well-established, and lucrative, wildlife conservation and tourism sectors based on biodiversity and recreation as ecosystem services. Yet the equity of benefits from these sectors across Kenyan society is questioned (Norton-Griffiths 2007). Inequity may be traced to colonial times when game parks and protected areas were established for hunting but was propagated post independence when African governments perpetuated state run wildlife areas (Adams and Mulligan 2003; Matheka 2008). The influence of Europeans on conservation policies has been criticised as 'undiminished', and the 'image of Africa' still imposed on the African landscape (Anderson and Grove 1987).

Much of the income from these industries rests with state and private individuals rather than the local communities and people of Kenya resulting in inequity of benefits from tourism and biodiversity as ecosystem services. Exclusion of people from protected areas results in local communities paying the opportunity costs of conservation (Adams 2004) through loss of use of the land, resources and ecosystem services.

Just as national government appears hampered by complex ministerial structure, wildlife and environmental management in Kenya is problematic through the diversity of actors within conservation. The government parastatal that manages wildlife across Kenya is the Kenya Wildlife Service (KWS 2010) although the autonomy of KWS to manage wildlife has been impeded by political intervention when seen to be lucrative (Cobb et al 2007). At the same time, NGOs also have a controlling influence, having a larger budget and more power to lobby governments. NGOs have been able to act as intermediaries between international conservation and development agencies, although this may become problematic where international NGOs micromanage conservation set by global priorities rather than considering local needs (Cobb et al 2007).

Environmental governance schemes in Kenya are often closely linked to wildlife conservation. There has been a move to conservation partnerships (Mburu and Birner 2007) and community conservation approaches, such as the 'Parks beyond Parks' programme (KWS 1996; Rutten 2002). These partnerships seek to redress criticisms based in political ecology (Jones 2006) of the imbalance in power, knowledge and financial benefits of conservation (Barrow and Fabricius 2002; Gadd 2005; Redford et al 2006). This top-down approach may neither be practical or ethical (Swiderska et al 2008). However, community conservation is not without challenges (Worah 2002). Community-based conservation and the level of involvement of local people in environmental governance can be seen as a continuum of adaptive co-management, a

partnership between community, government and other stakeholders and a sharing of power and responsibility (Berkes 2006). The proportion of share in governance will vary dependent on the capacity of the community to participate, the level of control imposed from the top-down and local incentives. Given the right support and policy framework community conservation has been shown to provide incentives for local people to improve sustainable resource management and income generation (Barrow et al 2000). Yet, biodiversity is seen as economically 'invisible' and local conservation remains small scale with little support whilst mainstream national development continues to degrade land outside of parks (Swiderska et al 2008). "Environmental protection is too often perceived as a constraint to development—environmental assets need to be recognised as producers of welfare for the poor and revenue for national economies" (Swiderska et al 2008: viii). Biodiversity governance is seen as weak compared to trade and development in Kenya, there is a lack of attention to the link between conservation and development and they are often in conflict (Swiderska et al 2008). Another review of Kenyan rangelands recommends that good environmental policy has to take account of both development and environment agendas; must be able to evaluate local knowledge and views from multiple sources and develop feedback to evaluate how policy is operating (Homewood 2004).

The number of actors and conflicts of interest in global and Kenyan environmental governance means that valuation, particularly economic valuation, of the services that the environment provides for human well-being is problematic. There are socio-political implications for global, national, regional and local policy-making in terms of scale of analysis, lack of understanding of the impacts of change, and equity in valuation.

In order to address the top down over enthusiastic uptake of the ecosystem services concept, this study looks at the importance of ecosystem services in one region, the Rift Valley of Kenya, for one community and for one sector of that community. It also investigates how traditional cultural knowledge and values may be woven into this current and dynamic debate around valuation of ecosystem services. However to do this, a review of literature concerning traditional and indigenous knowledge is required to understand the value of ecosystem services for agro-pastoral communities.

2.5 Local knowledge and traditional values

This section explores the literature surrounding indigenous and traditional ecological knowledge, practices and values. It reviews the use of the terms indigenous, traditional and local and critiques the allusion that knowledge is static and unchanging (Section 2.4.1). This approach sets the scene for the research with Tugen communities in Kenya, where changing lifestyles, knowledge and values all come under review. Section 2.4.2 discusses the importance of traditional ecological knowledge (TEK) for inclusion within ecosystem assessments at different scales. Section 2.4.3 reviews how spatial knowledge is linked to a sense of place which in turn, it may be argued, constitutes part of the process of valuing ecosystems. It also reviews writings from a critical GIS standpoint with reference to how mapping and other spatial representations are used in understanding nature and the values of place, a theme which is continued in Chapter 8 Visualisation Trails.

2.5.1 Defining indigenous, traditional, local and culture

Traditional people and local communities living subsistence lifestyles have an intimate knowledge of their environment and the ecology within their sphere of use. "Traditional

knowledge refers to the cumulative and dynamic body of knowledge, know-how and representations possessed by peoples with long histories of interaction with their natural milieu. It is intimately tied to language, social relations, spirituality and worldview, and is generally held collectively" (UNESCO 2006:1). This knowledge is variously known as Indigenous Knowledge (IK), Traditional Ecological Knowledge (TEK) or ethnoecology (Hadley & Schreckenberg 1999; Gregson & Blount 1999). TEK was often previously seen as primitive, naïve or unscientific but now there is a growing awareness that this knowledge is valuable both in its own right and in conjunction with other scientific knowledge (Agrawal 2002; Hughes 2003; Karlsson et al 2007; Raza & du Plessis 2003; Johnson et al 2007). Where local communities have been excluded from their lands and resources through colonialism and political control of ruling societies (Adams & Mulligan 2003; Beltran 2000) traditional land use regimes may no longer help to maintain specific ecosystem functions (Western 1997) and new knowledge and practices have had to evolve for local communities to survive. Through growing global concerns for political equity and sustainability, the status of indigenous and traditional people is being recognised as well as their traditional knowledge and practices becoming increasingly important for development and conservation alike (World Bank 1998; IUCN 2004b; UNESCO 2006; UNPFII 2007; Springer & Alcorn 2007). The MA (2003) set out to incorporate multiple scales and multiple knowledge systems within its global assessment products yet, "this was quite rare in practice" (Reid et al 2006:5). This gives scope for this thesis to contribute to understanding how local knowledge may be used more fully within ecosystem services valuation and debates.

The terms indigenous, traditional and local are often used indiscriminately because of vagueness in defining the terms and the varied meanings in which they apply to

communities. I found a wealth of knowledge embedded in Tugen beliefs and practices, particularly in the context of livestock and medicines, as well as traditional understanding of the use and control of resources within their lands. Knowledge was locally-situated and based on traditional custom, handed down through generations, yet modified by time through cultural and environmental changes. Themes of indigeneity were encountered in the voices of local people primarily in the context of advocacy, activism and land claims (Breen 2010) and there are issues of 'becoming indigenous' in Africa that are a recent phenomenon (Igoe 2006). Throughout this thesis, in the context of knowledge, indigenous, traditional and local are used synonymously although, aware of critiques by postcolonial geographers (Shaw et al 2006; Briggs and Sharp 2004; Hughes 2003), this by no means intends to amalgamate indigeneity into some kind of monolith.

In its narrowest form indigenous knowledge is described as a unique entity; "the local knowledge – knowledge that is unique to a given culture or society" (Warren 1991:1). Other communities, not labelled 'indigenous' may also hold a wealth of traditional knowledge and cultural values developed through time and practices developed to cater for local needs. A more inclusive and meaningful conception of indigenous knowledge is when it is used synonymously with traditional and local knowledge; this separates knowledge held by a community from the global knowledge system or Western knowledge (Warren 1992; Raza and du Plessis 2003). Traditional knowledge, like indigenous knowledge, implies that which has been passed down from generation to generation, whereas local knowledge is a matter of scale, specific to a particular area or intimate to a locale (Raffles 2002). Brosius (2006) identifies two distinct invocations of 'local' and the ways that knowledge is mediated to decision-makers. First, "the voices of peasants, farmers, fishers or indigenous people living in out-of-the-way places,

frequently marginalised politically and economically" (Brosius 2006:130) whose knowledge is conveyed through social science researchers. Second, "the voices of those who *are delegated* to speak for local or indigenous communities" (Brosius 2006:132) whose knowledge is mediated through international discourses of 'indigeneity'. This distancing of 'decision-makers' and local people makes indigenous knowledge seem a 'passive' form of science rather than an active means for advocacy (Brosius 2006).

Common definitive meanings for TEK are seen as problematic as knowledge itself is always changing; it is not 'set in stone' and knowledge systems, wherever founded, influence each other. Migration of people has always seen a movement, exchange and adaptation of knowledge and knowledge systems. For instance, Nesheim et al (2006) reviews "the dynamic local intuitive knowledge, arising directly from practical experiences" in the case of migrant communities moving between Guatemala and Mexico. They find that the driving forces that promote adaptation of knowledge are changes to a new natural environment and the change of social and economic setting. Communities 'culture' and societies are adaptable and knowledge adapts with environment, societal mixing and time. Cocks (2006:185) discussing, "cultural values of the natural environment", concludes that "the concept of culture must be understood as involving a dynamic process of transcultural exchange and constant re-articulations of tradition resulting in the persistence of certain cultural practices. This approach reveals that the concept of biocultural diversity is also applicable to non-indigenous traditional communities." Conservation organisations such as WWF are also recognising that "they are working with many non-indigenous as well as indigenous communities in their field projects" (Springer and Alcom 2007). Therefore, TEK should

not be seen as the sole prerogative of indigenous societies but should incorporate the knowledge held by other local and traditional communities.

There are also flaws in the emphasis on preserving indigenous 'culture'. The term 'culture' is used in many ways and contexts from a general meaning that covers most aspects of human life to a particular or distinct feature of humanity; "'culture' is one of those words which is used without any exact shared understanding of what it means" (Allen 2000:443). For the purpose of this study culture may be problematic but it is also a useful term to highlight the complexities and ambiguities in human societies. Culture is based in traditional ideas and their attached values (Kroeber & Kluckholm 1952; Allen 2000). Culture can define shared values within a group and can be a shared symbolic approach to understanding and communicating about the world. This does not mean that culture is tied within static or closed social systems, as implicated by early anthropological studies and development practices; culture can and does change and is in constant flux (Adams 2001). It is important not to define culture too tightly; it may be conceptualised as "the context in which political, economic and other activities occur" (Allen 2000:465). Culture changes, is fluid and increasingly hybridised through social interactions, particularly as the world becomes more globalized.

In my own work, I found it useful to acknowledge the importance of culture and understand cultural differences in research as a decolonising process to try to balance my own Eurocentric thinking. In this thesis traditional knowledge and local values are discussed with the understanding that they are hybridised through connections to colonial, Western and other African societies and evolving through a process of cultural and environmental change.

2.5.2 Ethnoecology: the importance of traditional knowledge

The material, cultural and spiritual means for survival of many people is dependent upon nature and the natural resources found in the regions where they live and from this close association with nature comes knowledge about its functions and the practical use of natural resources, although traditional practices may or may not be sustainable particularly under environmental and socio-economic changes. Berkes (1999:5) defines ethnoecology as "an interdisciplinary approach that explores how nature is viewed by human groups through a screen of beliefs and knowledge, and how humans use their images to acquire and manage natural resources." This holistic approach to ethnoecology Berkes (1999) defines as Kosmos, Corpus and Praxis (Table 2.4) although these are also modified by social institutions, such as rules of access, tenure and social relationships.

Table 2.4 Three levels of knowledge (after Berkes 1999)

KOSMOS	Believing	A worldview – conceptual understanding of the world, belief systems or cosmovision.
CORPUS	Knowing	The whole repertory of knowledge or cognitive system, particularly environmental information, knowledge of species, their behaviour, distribution and systems for classification.
PRAXIS	Doing	The practices, tools and techniques for using and managing resources plus the knowledge needed for their development.

Ethnoecology has developed from roots in anthropology, although little significance was originally given to local knowledge in comparison to Western 'scientific' knowledge. Increasingly it is now being incorporated into ecological research and conservation strategies, for instance, Agenda 21 calls for the "recognition of values, traditional knowledge and resource management practices with a view to promoting

environmentally sound and sustainable development." (Quarrie 1992). Much of the emphasis originally was on information gathering for environmental management and a new means to understand complex ecosystems and to mitigate human impact (Brodnig & May-Schonberger 2000). The use of traditional knowledge as a rapid and effective means of data collection is still being employed by researchers although different criteria may be used in assessments between local and Western researchers (Mueller et al 2009).

Some researchers have investigated the mutual relationship of indigenous and local people with nature and how their culture and livelihoods are inextricably linked with the natural environment in which they live. Shiva (1999) believes that traditional knowledge has been beneficial to the environment and has been developed and geared towards this understanding and respect for ecosystems. There is concern that local communities dependent on natural resources are most affected by the destruction of those resources on which their livelihoods depend and reports that local ethnoecological knowledge appears to be disappearing faster than biodiversity (Oldham 2002; Zent 1999). However, care has to be taken not to view indigenous people as 'noble savages' (Whelan 1999; Davis 2006). There is no assurance that indigenous and local people are natural conservationists and their practices may not be sustainable (Hughes 2003). Where this is the means to their survival people may protect their resources but as their lands are reduced and population and land use pressures increase, over-hunting and over-grazing can cause extinction of species and ultimately of the people themselves. Rapid environmental and cultural changes pose challenges to traditional knowledge if it cannot adapt quickly (Fabricius et al 2006). Nevertheless, traditional knowledge has much to contribute to global understanding of environmental issues, how or for what

purpose it is assessed and categorised should be negotiated with care so that it is neither reified nor degraded.

Often science has been seen as superior to local knowledge and control of scientific knowledge and whose knowledge is significant in governance and political power (Agrawal 1995; Berkes 1999) has created a hegemonic relationship. However, increasingly indigenous knowledge is being integrated with scientific knowledge to provide a better understanding of natural ecosystems together with their human-nature relations (Rist and Dahdouh-Guebas 2006). Local understanding about the natural world has been shown to be very sophisticated Chambers (1997) but "Too often, it is simplistically conceived as a pale reflection of mainstream knowledge, in particular, Science." (UNESCO 2006: 1). Rather than highlighting the differences in knowledge and practices it is recommended that commonality across difference should be sought to find a 'common ground' (Pickerill 2009). Karlsson et al (2007) investigate the North-South knowledge divide finding that only 13% of papers in leading international journals are generated in the South and calls for making knowledge generation more equitable by including other groups in knowledge making and by expanding the consideration of non-scientific knowledge sources such as using grey literature and including indigenous and local knowledge.

An intercultural perspective, based on mutual respect for different ontologies of nature, can provide a more beneficial way of collaborating and communicating over issues of concern. Ethnoecology has a practical basis for natural resource management but also incorporates more conceptual tools that include social, cultural and cognitive aspects of nature. Indigenous people can contribute greatly to environmental knowledge, but the sharing of this knowledge may not give equal benefits to conservationists and local people. There are many examples of exploitation of traditional knowledge, not least the

cases of biopiracy where local medicinal plants are extracted and traditional knowledge stolen to make profits for Western pharmaceutical companies (Shiva 1999; Swiderska 2006).

There are numerous debates as to the comparability of indigenous knowledge (IK) and scientific knowledge. Agrawal (2002) critically discusses this 'scientisation' of IK, identifying the selective collection and storage of easily classifiable knowledge at the expense of less immediately useful information. For instance the World Bank-led initiative on IK (World Bank 1998) considers IK to be an under utilised resource, yet this initiative omits knowledge that is not valid or storable in the database. This process of 'sanitisation' results in the removal of much of the knowledge in the form that makes it indigenous. Agrawal (2002) identifies three ways in which knowledge is sanitised. Firstly, the subtlety and context is lost; secondly, perceived division between 'indigenous' (and its metaphors of local, traditional or practical) and 'scientific' (and its metaphors of western, rational, global and modern) reduces understanding; and thirdly, preservation of this knowledge in a database results more readily in the appropriation of the knowledge and perpetuates inequality of power between the groups. Some concerns have been raised about the political outcomes of indigenous knowledge gathering through mapping and Bryan (2009) criticises the way indigenous knowledge through maps is being used in propagating colonial power relations. There is a political dimension in the way superiority is given to scientific knowledge which is legitimised and gives superiority to those holding it, so marginalising traditional knowledge (Agrawal 2002). Another critique believes adapting IK as complementary to Western scientific knowledge merely continues "arrogant confidence in the almost unquestioned validity of science and Western knowledge" (Briggs and Sharp 2004:662). Yet the false dichotomy between indigenous and Western epistemologies which create

knowledge has been questioned (Watson and Huntington 2008). It follows that knowledges are changing as traditional knowledge is altering both in response to Western ideas and practices but also to changing environmental and social conditions (Briggs and Sharp 2004). Sub-global assessments of the MA (2005) included multiple knowledge systems and the authors admit that: "Local knowledge is both complex and inherently contextual", but that "including multiple knowledge systems increased the relevance, credibility, and legitimacy of the assessment results." (Ericksen and Woodley 2005:87).

Knowledge and values are associated concepts but as yet there are few studies addressing local values of ecosystem services. Burger et al (2008) compare the holistic tribal view of ecosystem services of Aleut people from North America and critique the narrower hegemonic Western view. They consider that ecosystem services should include socio-cultural values, such as land, landscape and natural resources and that these are lessened through ecosystem degradation.

There are many reported examples of research and practice of traditional knowledge in socio-ecological systems (Folke 2004). Of particular relevance to this study are the cosmos, corpus and praxis of pastoralist and agro-pastoralist societies.

Pastoralist knowledge systems

The arid and semi-arid environments in East Africa are closely associated with tribal groups predominantly following pastoral lifestyles (Lesorogol 2005; Lesorogol 2008; Western 1997; Galaty 1991) and who still follow the patterns of rainfall with their livestock. Some such as Tugen (Anderson 2002) have become more sedentary, agro-pastoralists with settled homesteads and subsistence farms yet still maintaining, often large, herds of livestock. Therefore, pastoralism is not a single way of living, it "does

not constitute a single phenomenon and certainly does not represent a distinct mode of production, but reflects the diverse cultural and historical settings and political-economic circumstances found throughout the continent" (Galaty 1991:4). Pastoralists may be considered as farmers who specialise in livestock production on arid lands (Norton-Griffiths 2007). Pastoralism is centred around animal husbandry, but may also include other forms of food production along a 'pastoral-agricultural continuum' (Bonte and Galaty 1991:6); also described as the continuum of economic subsistence strategies (Smith 1992) which are related to the ability to sustain crop yields due to rainfall abundance and reliability (Figure 2.5). Yet studies of pastoral lifestyles have primarily focused on nomadic pastoralists in the process of settlement and there appears to have been fewer in-depth studies that have looked at the changes in knowledge and values of agro-pastoral communities and their altering lifestyles that is still centred on livestock but also subsistence cropping.

Figure 2.5 Continuum of economic subsistence strategies (adapted from Smith 1992)
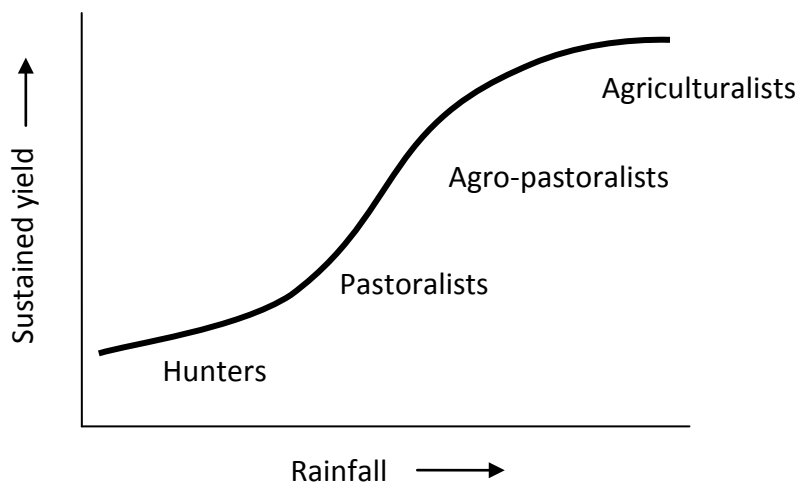
Arid and semi-arid ecosystems make up the majority of Kenya's land surface and their ecology is reciprocally bound to the lifestyles of the people who live in them (Swift et al 1996). Cultural adaptations to cope with these conditions include acquisition of large herds of livestock, to allow for losses in times of drought; communal use of grazing lands, so that all members of the community can access good grazing; and traditional systems of land governance (Niamir 1995). Indigenous ecological and spatial knowledge of pastoralists in East Africa has been well studied and, as climate change escalates, this knowledge of sustainable use of drylands may prove invaluable (Hesse and MacGregor 2006). Pastoralist livelihood systems add significantly to local and national economies but their value is difficult to quantify in monetary terms (Odhiambo 2006). Pastoralists' knowledge and practices are particularly important in the way environmental resources are managed through traditional systems in dryland environments (Galaty and Bonte 1991; Fratkin 1997; Lane 1998; Hesse and MacGregor 2006; Hesse and MacGregor 2009; Hatfield and Davies 2006; Niamir 1995). In general, they practice seasonal movement to access resources in wet and dry seasons, they are concerned with the needs of their livestock and are governed by informal and formal rules of occupancy and tenure. Often this means a communal use of resources. Niamir (1995) argues that Hardin's 'the tragedy of the commons' (Hardin 1968) is a myth and intimate knowledge and observation of the environment have led to techniques for protecting and effectively managing resources for times of hardship.

These examples show that indigenous knowledge has been proved to have a place in sustainable development and equitable management of natural resources and ecosystem services. However, much of the discourse of TEK is still framed around the practical application of indigenous knowledge with little understanding of the subjective value judgements that result from the alternative epistemologies or knowledge systems that

underlie this knowledge. Identifying and understanding one identifiable aspect of traditional knowledge, that is traditional spatial knowledge, including the sense of place, has formed the basis for current critical debates (Johnson et al 2007a) and is essential for understanding values attributed to the environment in which people live.

2.5.3 Critical discourses on ethnic mapping and a sense of place

The evidence for different types of spatial knowledge can be identified in literature from a variety of sources. Writings on biocultural diversity (cited in Cocks 2006) identify places of cultural identity that contribute to a people's sense of place. Other indigenous or traditional ways of spatial knowing have been identified, such as aboriginal dreaming that links time and place (Brazil 2000; Gibbs 2004). Some aspects of spatial knowledge are comparable with scientific knowledge, such as knowledge of shifts in vegetation types and grazing value of arid landscapes that form indicators of degradation (Mapinduzi et al 2003; Oba and Kaitira 2005); but these aspects of knowledge are localised, specific to certain areas and constitute a part of TEK, such as knowledge of hunting and gathering areas, water sources and medicinal plants. Other aspects are known to different actors within the society, such as women's use of places or communal or shared land use rights. Finally specialised spiritual meaning of places may be restricted to particular individuals in a society. McCall (2007) suggests classification of indigenous spatial mapping into three types: Indigenous / local (spatial) technical knowledge, 'counter maps', different viewpoints of local spatial knowledge, and sacred spatial knowledge or 'cosmovisions'. This seems to reflect mapping spatial elements in line with Western Cartesian structuring of space and mappings of 'place'.

Discourses of place (Cresswell 2004; Massey 1994) and the cultural belonging to place that may be at the heart of indigenous understandings of the spaces and landscapes in

which they live, but a 'sense' of place may be lost and disappear from discourse as debates change from local to global (Cameron 2004). Johnson and Murton (2007) evaluate the displacement of nature from society in Western thought, and colonial action, and the reduction of the "unique character of places in favour of spatial uniformity" (2007:127) This sense of place incorporates belonging and associations that have significance to the 'value' of nature, and representations of spatial components of the environment, particularly in traditional communities. Indigenous knowledge and science intimately promote a "heightened awareness of the subtle qualities of place" (Cajete 2000:20 cited in Johnson and Murton 2007:126) and mediate between the human community and nature on which humans depend. Johnson and Murton go so far as to suggest that place may offer a "'common ground' between Western and indigenous thought" (2007:127).

In this concept of place, some aspects of ethnographic spatial knowledge may be likened to cognitive mapping having less tangible geometric forms. Spatial awareness is learnt through practice and mental maps are formed and used in daily life as opposed to representational drawings. Cognitive mapping is the "representation of the geographical environment as it exists within a person's mind" (Downs and Stea 1997:4) or a "mental process through which people come to grips with and comprehend the world around them" (Downs and Stea 1997:61). However these definitions suggest that mental maps have as much to do with representation of 'place' as spatial demarcation. They contain subjective values and understanding not just spatial or geometrical form. Although Kitchin and Dodge (2007: 335) argue that "Maps are of-the-moment, brought into being through practices (embodied, social, technical), always remade every time they are engaged with ... maps are practices, always mappings", meaning in the process of being mapped. Western geographic information science has globalised a standardised form of

mapping that registers areas of the earth into a planar form, with common frames of reference.

Philosophies that attempt to decolonise GIS theory and practice are evolving (Eades 2005; Moore 2007b). The following section draws heavily on the paper, 'Towards a Postcolonial GIS' by Moore (2007b). Since Brian Harley's critical reviews (1989, 1990), a new debate has emerged amongst social theorists on 'deconstructing the map' and the impact of cartography and GIS in society (Pickles, 1995). This has formed the basis for a literature on critical cartography. Initially the debate was on the place of mapping and GIS within society but more interesting developments evolved looking at the nature of cartography itself and the covert political and social meanings inherent in the act of representing place (Pickles 1995; Monmonier 1996) and the power inherent in GIS representations of nature (McCusker and Weiner 2003; Harris and Hazen 2005).

Maps are more than just tools of power but can predefine the territories that they represent and they can actively form reality (Pickles 2005). Pickes (2005) critiques mapping for concentrating on the scientific technical achievements of cartography and 'the general incredulity towards issues of metaphor' (Pickles, 2004:13). Instead he values the 'non-representational mappings of indigenous and non-modern peoples' (Pickles, 2004:14) and advocates 'post-representational' cartographies. Indeed, Golledge (1981:21) alerted us to "the risk of becoming dogmatic by trying to force all worlds into one very limited format, and in doing so we ignore, belittle, or forget the others." There is a growing literature that reviews indigenous representations of place and advocates for these representations to be valued alongside Western maps (Johnson et al 2006). Cartesian mapping systems of western societies often differ from traditional knowledge systems. They "are not equipped to validate traditional knowledge and wisdom observations and conclusions about the natural world. The Cartesian system

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thus unwittingly marginalizes indigenous peoples and their ways of knowing, losing an invaluable source of information and guidance." (Merculieff 2002:524) Traditional peoples often have a more fluid way of demarcating and sharing land, such as pastoralists, and therefore understanding boundaries and space. Contrary to striving for greater precision in mapping, Indigenous maps may be more appropriate if they allow imprecision to characterise the mapping and to reflect vagueness. It can be argued that methodologies and visualisations as used in GIS rarely include alternative, more individual, ways of thinking spatially. Instead they are grounded primarily on the developed world's cultural heritage of spatial literacy.

There are a few attempts that call for an extension to the repertoire of analysis and visualisation techniques to incorporate other ways of spatial knowing. Turnbull (1998) calls for outside (Western) mapmakers to 'strive toward a post-colonial, post-modern cartography'. Johnson et al (2006) use the example of a different epistemology embedded in Hawaiian culture that is represented through dance performance. Bodily directions represent and communicate information about space. Similarly, 'topographic signs' enscribed on the surface of a Sami shaman's drum are seen to "invoke microcosmic and macrocosmic aspects of the region's indigenous way of life" (Keski-Säntti et al 2003:123), a fusion of sound, signs and spirituality. However Western map makers have difficulty recognising these cartographic performances based on song, performance or story telling. They are down-graded and subsumed by the colonial cartographies that are embedded in GIS and which, without care, may be propagated through the PGIS mechanism. "The vast majority of PGIS systems cannot authentically reflect and represent the 'mental maps' of people that are situated in non-Cartesian, non-positivist, ambiguous, fuzzy, and non-discrete spatial ontologies." (McCall 2007)

Few of the social theorists and critics of cartographic practice and geographical information science have endeavoured to put theory into practice. Mai-Po Kwan approaches cartography from a feminist perspective and supports the theory with empirical work tracking women's engagement with urban places in spatio-temporal mapping (Kwan 2002) and mapping of emotion (Kwan 2007). Women's life paths are followed "to understand the gendered experience of individuals across multiple axes of difference and geographies of the body" (Kwan 2002:646) and to visualise women's experiences and activities related to their diaries (Kwan and Ding 2008). This process of mapping bodily experiences seems applicable to other worldviews.

Therefore I argue for three changes to cartographic practice that would work towards incorporating different cultural perspectives of place. Firstly, that the spatial concepts used by indigenous groups are not fully understood or being incorporated into what are essentially Western ways of thinking. As there are many languages and ways of knowing the world should there not be other ways of analysing or at least visualizing reality? Secondly, the fluid use and sharing of space by many indigenous groups is less bounded than Western cartographic practice allows and in the past the line on the map has created the reality. Can spatio-temporal mapping truly show porous boundaries (Moore 2007) and fluid and overlapping land utilisation? Thirdly, how can mental maps, a cognitive understanding of space and place, be visualised?

Within this current thread of research and development to incorporate other ways of seeing, there are avenues that may be pursued to link cultural methods of portraying spatial knowledge with modern technology. Ways need to be developed to bridge the gap, to empower people in their own spatial languages and to help to educate GI scientists and other users to adopt new ways of thinking so as to see with other mind sets. Users of technologies already have to make mental leaps to fully 'read' maps, so it

should be possible to learn new mapping systems. Further, technologies such as multimedia and virtual reality systems are now becoming more sophisticated but instead of the constant strive to recreate reality in Cartesian forms, it is also possible to recreate other realities and other ways of seeing (Moore, 1999). Perhaps a new step is for GI scientists to allow themselves a more subjective engagement with space instead of the structured approach of much geographical analysis. For instance, theoretical constructs from phenomenological discourses that concentrate on understanding the world rather than trying to explain it may be applied to understand firstly one's own and then other forms of spatial knowledge (Moore 2007). A re-evaluation of cognitive mapping (Downs & Stea 1977; Kitchin & Blades 2002), linked to geographical information science (Mark et al 1999), within new visualisation and computational methodologies may prove productive. Indeed, the question asked by Mark et al (1999:764), "What would a place-based, rather than coordinate-based GIS look like?" may be a starting point for theorising on an alternative GIS. Chapter 7 Visualisation Trails goes on to demonstrate how embodied forms of mapping using mediascape may go some way towards visualising place.

2. 6 Summary

As the above discussion shows, current debates are focusing on ecosystem services for human well-being and poverty alleviation and by reframing nature as beneficial to humans there are added incentives to conserve it (Cox and Searle 2009). In ecosystem service debates there is a need for a greater body of empirical work looking at how ecosystem services are managed and valued at the local level and there are significant gaps in the literature that this thesis will start to address. There is a lack of understanding of how changes in ecosystem services will affect poverty alleviation;

how those effects vary through temporal and spatial scales and how variability within communities affects values and equity of the benefits attributed to ecosystem services. Attempts to value ecosystem services without addressing these questions are difficult because ecosystems and anthropogenic use of them is constantly changing.

The discussion above illustrated how values of ecosystem services are formed from traditional knowledge and local livelihoods. Different sets of priorities and values may be constructed through global and national development or environmental governance structures. Chapters 4 and 5 use empirical studies to illustrate how local values may be influenced by outside forces such as national conservation objectives.

Geography, and interdisciplinary research, is well placed to critique this 'selling nature to save it' concept of ecosystem services (Liverman 2004). The commodification of nature raises issues of equity of the costs and benefits from ecosystem services and is shown to be problematic for local communities where the ability to pay is hypothetical in Chapter 5. The lack of literature addressing the equity of women's roles in ecosystem service management is approached in Chapter 6 Women's Trails.

Finally, there are distinct gaps in understanding ecosystem services from a local perspective and methods for communicating this knowledge between different levels of governance. Chapter 3 Methodology Trail discusses further developments that will contribute to new interdisciplinary research methods. It introduces a mixed methodology including non-monetary means of ecosystem service valuation whereby local ways of knowing and valuing nature may be incorporated including a Comparative Valuation method that is easily adapted for local communities to understand. In Chapter 7 Visualisation Trails a number of visualisation methods are explored and assessed that attempt to convey value through a sense of place.

Chapter 3

Methodology Trail

"The traveller or storyteller who knows as he goes is neither making a map nor using one. He is quite simply mapping."

(Tim Ingold 2000:230-1)

Chapter 3 Methodology Trail

3.1 Introduction

3.1.1 Overview

Interdisciplinary research inevitably becomes a form of storytelling, a journey of conceptual trails through ideas, philosophies, fieldwork and words. Each method is a trail and the methodology the means by which the journey itself, by the interlinking of trails, is mapped from concept to completion. The interdisciplinary approach of this research demands a balance of methods: a methodological bricolage (Yardley 2008), that integrates qualitative and quantitative tools and "provides alternative interpretative angles and mediating possibilities" (Yardley 2008). The methodology therefore draws on techniques and mixed methods (Brannen 2008) from the three disciplinary areas but fused together centrally through participatory mapping, participatory video and (auto)ethnographic reflection with a framework built on the concept of walking trails.

The components of the bricolage were built from several sources. First, traditional knowledge and values of the environment were identified and elicited through interviews and participatory processes. Second, primary and secondary data on the spatial characteristics of the environment and ecosystem services were acquired from conservation workers, NGOs, and governmental organisations. Third, visualisation tools for integrating and representing scientific and cognitive spatial knowledge were produced for disseminating the results. Figure 3.1 shows the process linking methods, data and outcomes.

Figure 3.1 Linking methods, data and outcomes
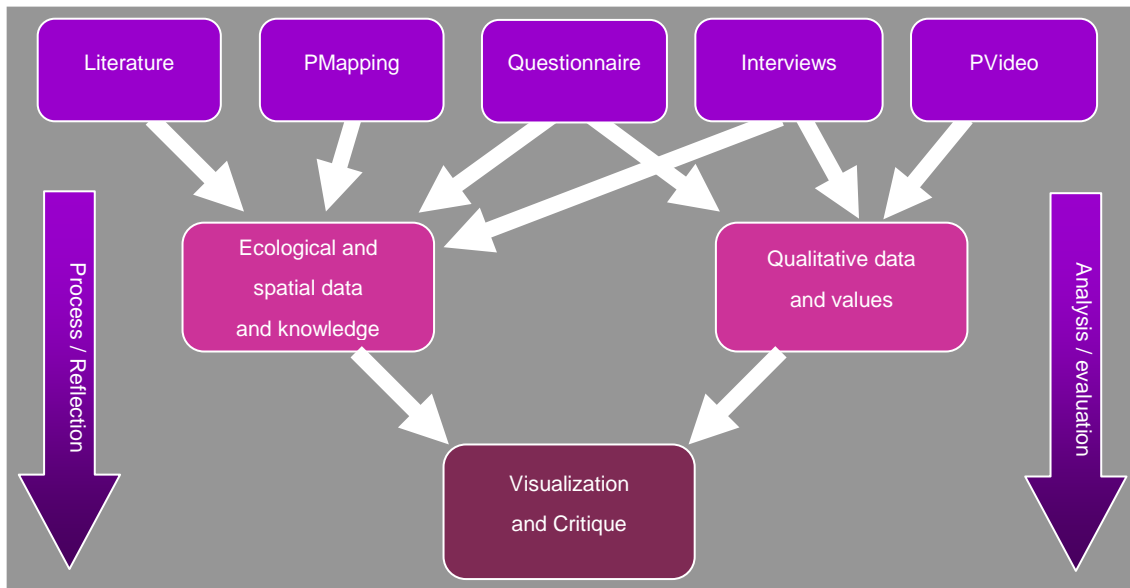
Each research objective has been addressed using a selection of the methods discussed in more detail in this chapter. Table 3.1summarises aims, objectives and the methods used to address each objective, although there is considerable overlap in the data generation process.

The chapter starts by discussing in detail the theoretical rationale behind the methodological approach that underpins the implementation of participatory research of this nature and which is embedded in the very process of decolonising research in Section 3.2. The data collection processes used in acquiring community knowledge and values and methods used for supplementary ecological survey and secondary data acquisition are then explained in more detail in Section 3.3. Section 3.4 outlines the analytical methods used and how qualitative and quantitative data has been fused through visualisation. Section 3.5 discusses research ethics and outlines the logistical challenges behind setting up the fieldwork. The chapter ends with a critical summary of the methodology in Section 3.6.

Table 3.1 Linking Aims, Objectives and Methodology

Aims	Objectives	Methodology
1. To investigate the role of traditional spatial and ecological knowledge for the valuation of ecosystem services.	1.1. To examine traditional spatial and ecological knowledge, beliefs, practices and their representations with reference to ecosystem services	Participant observation Focus groups Participatory mapping Walked trails GPS tracking Semi-structured interviews Participatory video Grounded theory analysis Visual analysis
	1.2. To critically review the role of traditional values for community conservation at different levels of governance	
2. To explore methods for incorporation of alternative representations of cognitive knowledge within participatory mapping and geographical visualization praxis.	2.1. To develop a participatory methodology to integrate mapping technologies and video.	Participatory mapping Participatory video GPS tracking Google Earth Mediascape
	2.2. To critically compare video and mapping practices as research tools within the context of visualization of the values of ecosystem services.	Reflective diary Mapping Video Google Earth Mediascape

3.2 Rationale - Decolonising approaches to fieldwork

Research methodologies are evolving in both social sciences and natural sciences particularly regarding the nature and inclusion of qualitative research methods and their underpinning philosophies. The natural sciences increasingly incorporate qualitative research methods as a process of validating quantitative and scientific data. However, there are changes in the manner in which qualitative research itself is conceived and carried out and "transformations in the way these methods are being used to make claims to understanding and intervening in the world" (Davies and Dwyer 2007:257). By taking new approaches to qualitative research through reflexivity and openness, such

as engaging the notion of 'place' through performance, rather than categorisation and closure, they propose that qualitative methods can produce 'forms of knowing that exceed cognition' (2007:262). This resonates within my own research in three ways. Firstly, the use of video and maps enabled the community to produce their own performances of knowledge. Secondly, through my own reflective diaries and documentation of the process I provide a critique of the tangible methods used. Finally, new methods are used to enhance communication and understanding of other ways of knowing.

This theme of understanding knowledge in multiple ways endorses the validity, indeed the essentiality, of using a decolonising perspective within cross-cultural research. Cross-cultural research should be undertaken both with an awareness of the impact upon the communities involved in the project and the positionality (Mullings 1999; Mohammed 2001) of the researcher within the process. There is an increasing literature on the approaches that should be taken when undertaking cultural research, particularly when the culture is not that of the researcher (Sidaway 1992). Therefore, elements from postcolonial (Raghuram and Madge 2006; Smith 1999), cross-cultural (Walsh and Mitchell 2002) indigenous (Louis 2007; Smith 2003) and feminist (Nast 1994; Kindon 2003) concepts are embedded within my work. I approached the fieldwork with a desire to look 'alongside' rather than 'at' the research subjects (Kindon 2003).

The focus of this research, to some extent, echoes ideas of postcolonialism in the theorising of the relationships between indigenous knowledge and Western science (Agrawal 2002). However the complexity of positioning this discourse firmly within postcolonialism is both supportive but at times distinctly unhelpful. It is a paradox of postcolonialism that it relies to a great extent on that which it vilifies - the dualism and subjectivity of thoughts and representations. Therefore this research will take a

pragmatic approach to postcolonial theory and distil it to look at the covertly produced power relations between cultures. It will to some extent decolonise the postcolonial frame to look at culture values, difference, power and how these can be equalised in cognition and practice.

Postcolonialism is concerned with decolonisation of the mind. That is, "working through the embedded modes of reasoning, thinking and evaluating that secrete assumptions about privilege, normality and superiority." (Sidaway 2000, cited in Barnett 2006:148) For instance, postcolonialism critiques the terms 'developed' and 'less developed' or 'developing' as they presuppose a set of cultural practices that are a benchmark on which subjectively to judge others. In research with indigenous people this is not a straight forward reintroduction of traditions as this can also form a dualism that denigrates other societies. "The invocation of 'authentic' traditions has, in fact, been one of the most problematic ways in which postcolonial elites have continued to wield political power over their citizens." (Barnett 2006: 148).

Postcolonialism looks at the production of power through discourses of difference which has practical applications in studying politics, organisations, societies and economies but most importantly for this research it provides a framework to how cross-cultural understanding should be approached without invocations of cultural relativism and universalism (Barnett 2006), and depends not on the mastery of meaning but on openness of mind to difference. Barnett (2006:157) succinctly refers to the roots of postcolonialism developed in the works of Said (1979) and Spivak (1988) who "criticise Western traditions for their failure to be adequately attuned to the forms of communication through which genuine pluralistic universalism might develop; these forms involve developing an ear for other ways of apprehending the world, opening up to other ways of knowing." However postcolonialism paradoxically also recognises that

"difference is not a barrier to relating and understanding but is their very condition" and it is a way of opening the mind to styles of sharing knowledge.

I find that postcolonialism is more accessible as a methodological issue rather than a purely philosophical stance. It is concerned with how to relate to different cultures with more understanding and to question underlying Eurocentric assumptions and viewpoints [including my own]; so fostering an awareness of how other cultures think and act in order to work together with equality and respect. Traditional ethnographic approaches (O'Reilly 2005), that may once have been applicable for community research, employ recording from an 'outsider' perspective the activities and knowledge of the group being researched, often leading to a judgemental or superiority in viewpoint. This 'othering' is the antithesis of decolonising methods and an approach that I consciously seek to avoid.

Modified ethnographic methods based on full involvement of the community within the research through creative use of focus groups, visual participatory methods and iterative-inductive analysis whereby research, analysis and data collection are inextricably linked (O'Reilly 2005:181) provided the basis for more innovative qualitative and decolonising methods.

The principles of participatory methods in general appear to be oriented towards a decolonising ethos. The participatory process in this study transformed the study 'of' communities to a study 'with' participants (Shaw et al 2006). The work of Chambers (1983; 1997; 2006) in his development of Participatory Rural Appraisal (PRA) practices uses methods that enable local people to take control of their own development process. However as Kapoor (2005:1203) remarks: "Participatory Development ostensibly implies discarding mainstream development's neo-colonial tendencies, Western-centric values and centralised decision-making processes." He criticises these very empirical

methods (Kapoor 2002; 2005) for the lack of theoretical and political underpinnings of the practice and because it is Western 'complicity and desire' that blind practitioners to some of the pitfalls. Therefore, adapting the 'hyper-self-reflexive' (Kapoor 2004) view I took of my research within the context of practical participatory exercises, I hope to identify and overcome some of the pitfalls. As, "Politicising and publicising the prejudices and prerogatives of the facilitator should help de-centre and democratise power relationships" (Kapoor 2005:1216).

Kapoor proposes that ideally, participation should also extend beyond the local and build-bridges to wider national and transnational democratic politics. To address this, this research helped empower the community with a better understanding of their knowledge and values through a cross-exchange of knowledge and facilitated a communication mechanism with other communities, conservationists and decision-makers. Also by understanding different ideas and approaches myself I am better able to communicate at different levels of governance. Although this research is essentially about ecosystem services and traditional knowledge it is also about the process of communicating understanding.

The mixture of methods employed form a process of enabling this communication. I incorporate interviews with key stakeholders from conservation organisations as well as community leaders. Participatory approaches are used to understand different perspectives of community members and their values and aspirations for development of their livelihoods founded on community conservation initiatives. But rather than just reporting findings I have attempted to develop methods for intra and inter community dialogue and communication to people from different cultural and political backgrounds using a process of communication of knowledge through visual means.

Finally, in a reflective mode, I acknowledge that I could not totally detach my research from my fundamental beliefs in the inherent values of the natural environment, biological diversity and the importance of 'nature' including, not apart from, humanity. I approached the research with a basic attitude of reconciliation and 'fairness' in influencing actions that are appropriate for both non-human and human livelihoods and well-being. This may be born of my Eurocentric view of 'wildness' or a deeper humanistic world view but, nevertheless, it is a fundamental part of the incentive for this research.

3.3 Studying knowledge and values

3.3.1 Initialising the study with a Tugen community

Planning to work in remote areas in a developing country inevitably involves complex logistical planning. Kenya is no exception. Therefore, this research was undertaken in a series of interspersed fieldwork and university based research periods (Table 3.2) (see Chapter 1).

During my scoping study in July-August 2007 I visited three communities in Kenya including the Tugen community of Sandai location (a location is a Kenyan administrative unit) in the Rift Valley (Figure 3.2). The Sandai community was identified as appropriate to participate with the research. They are agropastoralists and within the community are several generations that have experienced different lifestyles through change from traditional pastoral to agricultural practices. They have undergone rapid development and change. Also through close proximity and association with Lake Bogoria National Reserve (LBNR) they are starting the process of developing a community wildlife sanctuary. They were approached to participate in the research with the benefits of developing mapping and video resources to aid in natural resource

management; exchanging knowledge of traditional practices with conservationists and to communicate their values of wildlife and livelihoods. Introduction to the communities was initially arranged via staff at LBNR.

Table 3.2 Fieldwork timetable

Time Period	Activities
July - August 2007	Scoping study to Amboseli, Samburu and Bogoria
	Procurement of research permit
	Interviews
Nov 2007 – Dec 2007	Collected map data, procured vehicle
	Fieldwork cut short on Foreign and Commonwealth Office advice due to election clashes.
April - August 2008	Initiated study at LBNR and in Sandai
	Participatory mapping and video
	Key interviews
	Walked the TransRift Trail
Jan – March 2009	Ecosystem services survey in Sandai
	Key interviews
	Evaluation with conservationists and the Sandai community

The first step in integration with the community was to arrange an introductory meeting with village chiefs, elders and local councillor at which my research and the benefits for the community and conservation in the area were described and discussed. Involvement of and subsequent benefits to the local community were outlined. To invert perceived power relations, I asked the community to be my teachers, as I was a student, and that I wished to learn from them. Different social groups (wazee, (old men), farmers and women) were invited to participate and to discuss their cultural, practical and social use of natural resources and ecosystem services. Chapin (2006:95) remarks that ground preparation should be time consuming to overcome suspicion and build trust;

transparency and time are the prerequisites for establishing trust for successful implementation of PGIS practices within a community (Corbett et al 2006: 16). However I was aided by 'gatekeepers' who were both members of the community and conservation staff at LBNR so my acceptance by the community was fairly rapid. The community was also familiar with British researchers who have a base at the education centre in Loboi.

Introductory meetings were held with two community groups, the Chuine Sanctuary Committee (mostly men) and a group of women at a school meeting and later at a women's development meeting. Both these groups initially took part in a participatory sketch mapping exercise and produced sketch maps of Chuine sanctuary and the topography of Sandai location respectively. Two groups, four men and five women, were elected from these initial meetings to participate in regular mapping and video exercises.

Eventually seven focus groups took part in the research (Table 3.3); however the two above mentioned focus groups from Sandai received more in-depth video training. Focus group meetings and training sessions normally lasted from two to four hours. The number in each focus group was small because of the practicalities of training them using a single video camera. Two other meetings were held with wazee (old men): a group of four from Sandai and a group of five from the wider Bogoria area who discussed their lives in the past and changes they had seen. A fifth group was formed from the TransRift trail guides, organised by the Chief Warden, William Kimosop, who participated in mapping and video along the trail (see Chapter 5 Tugen Trails). The walk across the Rift Valley was mutually beneficial to train the guides, to 'pioneer' the trail and for research. A training camp was organised at Sacho in March 2009 from

which a guide forum has been established in conjunction with the MidRift Tourism and Wildlife Forum.

Figure 3.2 Kenya showing elevation and location of study region (Data source: USGS 2004a)
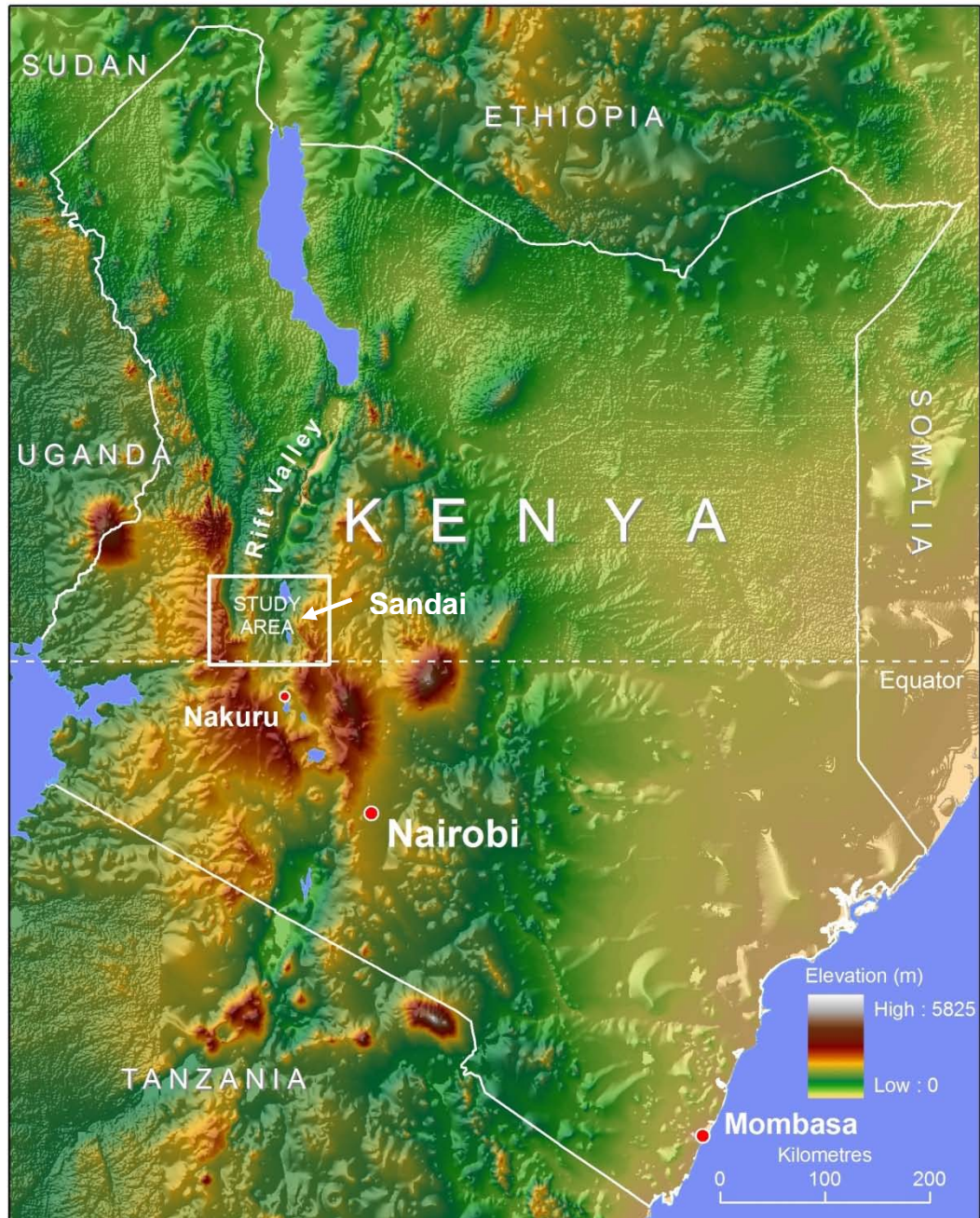
Table 3.3 Focus groups

Focus group	Location	Number of meetings	Number participating	Activities
Chuine Committee	Sandai	1	Over 15	Sketch mapping Sandai
Women's group	Sandai	2	Over 20	Initial video camera handling. Creating sketch map of Sandai and environs
Women's group	Sandai	Over 20	5	Participatory video Walked transects
Men's group	Sandai	Over 20	4	Participatory video Walked transects
Wazee (old men)	Sandai	1	4	Participatory video
Wazee (old men)	Sandai, Kapkuikui, Loboi	1	5 (plus two translators)	Participatory mapping Video interviews
Trail guides	Sacho camp	1 (plus walking the TransRift Trail)	10	Participatory mapping and GPS Video interviews

Both forms of participatory methods that I used were enjoyed by all the groups and formed a large part of my research. All the participants were interested and keen to be involved. The two principal groups of men and women both received separate video training. All men spoke English but one younger woman translated for the women's group. I wanted the participants to control the process as far as possible so I encouraged the groups to decide on the themes for their own films and create story boards so that the films had a variety of shots and a strong story line. After filming we would watch

the clips and discuss framing, and camera handling. Lack of electricity and computers in Sandai meant that I did the editing but one of the participants from the women's group helped construct the films from the video clips and translate from Kalenjin to English.

Two factors made it difficult to arrange regular meetings in Sandai. First, the patriarchal nature of the Tugen people made it difficult for the women to meet at certain times as participation had to be fitted into their daily domestic lives. Second, men and women were heavily involved in planting seed during June and July 2008 to make use of the unpredictable rains so I had to structure meetings around this which for a while limited activities. Nevertheless both groups told me they felt they had benefitted from engaging with videoing and mapping which helped them to reflect on the community use of resources and the problems they encountered. For the women in particular, who previously had had no opportunity to participate in such research, this process was a rare opportunity for 'building community' (McCall 2003:553) and empowerment. They requested me to take them to LBNR as two had never been there even though the northern end of the lake was less than 10 kilometres from Sandai. The films they made and the songs they wrote to accompany the films reflect their enthusiasm.

Concepts and methods from ethnographic research and development through social anthropology were instrumental to the overall participation process. However, such phrases divorce what actually occurred from the personal involvement that I experienced. Chambers (2007) discusses this in more depth as a process of 'immersion' with which many researchers and development workers are familiar. Key elements that led to the sense of belonging and established trust came not from enquiry but through other social interactions. As I worked amongst the villagers a young boy joined in the fun and would carry the equipment. Geoffrey was 10 years old but was deaf with no schooling and I eventually sponsored him to a school for the deaf in Nakuru. The

Christian church plays a major part in people's lives and I accompanied my friends to the Catholic church on several occasions. Camping and walking trips to the Chuine sanctuary, to the Lake and on the Tugen Trail also developed bonds of friendship. People there will always have different expectations from a 'mzungu' (white person) but the delight in exploring, discussing and expressing those differences built bonds that paradoxically had a decolonising effect. When I returned for the final time to Kenya I was greeted as part of the community as though a trust had built up because of my return. Much of my acceptance within the community and feelings of friendship and belonging came not through the direct research but through a social involvement that also became integral to the research.

3.3.2 Participatory mapping and video

Participatory methods have been used in development practice since the 1970s, although the form of participation has varied over time and in different locations (Chambers 2002; Chambers 2005). Participatory practices are used with a range of levels of involvement by stakeholders to different levels of effectiveness in environmental management (Reed 2008). Participatory Rural Appraisal and Participatory Action Research (Kindon et al 2007) methods have more recently incorporated emergent participatory mapping practices, Participatory GIS and Participatory Video (PV) which are all developing bodies of practice in their own right. Both PV and PGIS are being used extensively to aid marginalised groups and for community development by encouraging social change (Corbett & Keller 2006; Corbett et al 2006). Developments have also seen the emergence of participatory research tools using PV (High 2008) and PGIS (Elwood 2006). This research draws on, and develops, these methods so that qualitative mappings of values using PV are used directly alongside spatial mapping practices.

The forms of participatory research used in this study included focus group discussions, participatory video, participatory mapping and, in essence, participatory interviewing when residents participated in household questionnaires as both interviewers and interviewees. There is a strong critical literature around participatory approaches (Brohman 1996; Cooke and Kothari 2001; Kapoor 2005) that questions the rhetoric of empowerment of communities through participation, particularly when facilitated by external bodies. Aware of these "messy, entangled, highly variable and contingent" (Kesby et al 2007: 19) benefits and ethical considerations surrounding participatory practices, I undertook this research with awareness and sensitivity to moderate the power relationships involved in the research.

Visual methods are increasingly being employed within ethnographic research (Hume-Cook et al 2007) although image-based research still has limited acceptance within mainstream qualitative research (Prosser 1998). Film-making within different disciplines has an active agenda. Sarah Pink is particularly notable for promoting video within anthropology (Pink 2001; Pink 2006; see also Henley 1998) and Gillian Rose (2001) within geography.

Visual anthropology is not new, having its roots far back in the colonial photography of the nineteenth century (Edwards 1992; Pink 2006) and anthropological films of Haddon's 1898 British expedition to the Torres Strait Islands, reported in Pink (2006) which was a large, multidisciplinary scientific expedition to study the Island's people. Pink (2006) discusses the historical rise and falls in interest in and validity of using visual media for anthropological research through to the present, and particularly its relevance for interdisciplinary and future research. Current academic and applied studies are making use of the accessible and affordable technologies such as digital video together with communication technologies such as hypermedia and internet geo-

spaces such as Google Earth to exploit the potential of visual media. However visual interventions are not just a readily available technological tool. Researchers are finding that the visual 'offers a route towards collaboratively produced knowledge' (Pink 2006:16) and MacDougall (1998) argues that for phenomenological understanding film has greater 'potential for communicating about sensory experience transculturally that cannot be achieved in writing' (Pink 2006:17).

The usability and reduced cost of video cameras has facilitated a growth in their use in a participatory setting. The film-maker is no longer the researcher so the viewpoint has changed and the boundaries between investigator and investigated have blurred. This in itself challenges postcolonial thinking and enables decolonising research methods. However, there is more limited understanding of participatory video as a research tool or in ways that it can be analysed. Current work within the UK PV-net group is establishing guidelines for good practice within this field (High 2008).

Focus groups were established and invited to formulate themes to film in connection with their use of resources and ecosystem services. Focus group discussions (Conradson 2005; Walsh and Mitchell 2002) developed on the pastoralist lifestyle, cultural connections within the landscape, local knowledge, beliefs about wildlife, conservation and land use. The participatory exercises later concentrated on the community values of the land, natural resources and wildlife using the concepts of ecosystem services. Perceived changes over time were also recorded.

Participatory Video was introduced at an early stage so that the process was recorded by the participants themselves (Figure 3.3). "Participatory Video (PV) is a set of technologies to involve a group or community in shaping and creating their own film." (Lunch and Lunch 2006: 10) The process can be an effective tool for communities to express and communicate their own perspectives on issues and also to engage people in

Figure 3.3 Participatory video

One of the underrated benefits of participatory technology is the sheer fun and enjoyment experienced by participants.

At times I was concerned about the health and safety of participatory video practices when trying to get the perfect shot or unusual angle!

Sandai Women Film-makers at Lake Bogoria National Reserve.

Filming in Chuine with members of the committee

Watching the videos

active research (Lunch 2007; Ramella and Olmas 2005). PV differs from documentary film-making in that the 'story' is written and filmed by community members themselves and is not an 'authored product' of an external film-maker. Like participatory mapping it initiates a process of analysis of local knowledge and practices but it can provide an aspatial understanding of space and place and as such in the context of this research PV offered a complementary method to participatory mapping.

Some initial video training was given primarily to the women's group and the Chuine group of men. One advantage of PV in practice is the immediacy of results that can be achieved through rapid participatory exercises that introduce participants to handling equipment and develop expertise through use. Via progressive training participants built a library of footage of scenes, activities and 'talking heads' and then, with their advice, a series of short documentaries were created. The audio was often recorded in Kalenjin, the local dialect, and subtitles overlaid in English. Although there may be questions as to the imposed 'framing' of video within one format, results from other projects have proven the methodology to be empowering (White 2003). Other outcomes of PV are the potential for 'horizontal learning and peer teaching' (such as exchange of ideas and practices between different local communities with similar livelihoods) and 'vertical communication' (Snowdon 1984) (such as using video to communicate more effectively with administrators or local government). "PV can bring local experiences and knowledge into a global network, allowing all relevant actors to learn from each other." (Lunch 2004:4). Participants used a video camera to photograph and film their use of the land, both natural and cultivated, in order to understand the contribution of ecosystem services to livelihoods.

Community members were invited to express their cognitive spatial knowledge through both mapping (Figure 3.4) and other appropriate cultural methods (Walsh and Mitchell

2002). Due to limited time and resources, I adopted only the initial phases of a workflow developed by Minang and McCall (2006) that gradually introduced participatory mapping methods to progressively elicit knowledge and develop mapping skills within the community.

I used a selection from the wide range of methods already being used within PGIS (Table 3.4) (Corbett et al, 2006). In particular ephemeral mapping, sketch mapping and satellite imagery were used to assess ecosystem services. Ephemeral mapping can take the form of representations of space and place in dance or song such as the traditional songs, modified for ecotourism, performed by The Lake Bogoria dance group. Sketch mapping (Kesby et al 2005) has been used extensively within PRA practices and were used here to provide knowledge of land, environment and wildlife. Sketch mapping was undertaken with different groups: the Chuine committee, the women's group and the TransRift trail guides. It was also attempted with the wazee but less successfully because of age and lack of understanding. Satellite imagery from Landsat ETM provided a basis for further discussion. Participants identified key features and cultural meaning in the landscape as well as resources using Landsat satellite imagery as base data although the plan view of the world and the unnatural colouration was unfamiliar to some participants. This resulted in them having difficulty in identifying three dimensional landscape features from the two dimensional perspective. Some participants were provided with handheld GPS units to map the swamps and training was given in mobile mapping (Verplanke 2004). Unfortunately because of lack of computing facilities in the region more complex GIS mapping was not undertaken with the community but was used later in analysis and visualization.

Figure 3.4 Participatory sketch mapping activities

The Chuine committee mapping out the proposed sanctuary at an early meeting in Sandai.

Women of Sandai map out the location of villages and resources.

Participatory mapping: many hands create the women's map of Sandai.

Guides produce an annotated map of features along the TransRift Trail at the training camp in Sacho.

Table 3.4 The range of PGIS methods and applications (after Corbett et al 2006) from which appropriate methods were selected for this research.

Method	Description	Application
Ephemeral maps	Non-permanent maps and diagrams often drawn in the soil. May use sticks, stones, and leaves etc to mark features.	Traditionally used by some indigenous peoples. Representative of cognitive maps, cultural representations of space.
Performance / oral cartography	Spatial representation embedded in song, dance or oral histories.	Cultural representations of place
Sketch mapping	Normally drawn on paper with pencils, crayons or felt tip markers. Drawn from memory or observation. Does not rely on accuracy or scale.	Cognitive mapping Resource identification
Scale mapping	As sketch mapping but drawn to scale and geo-referenced to ground coordinates.	Resource mapping Cultural mapping
3D modelling	A physical relief model built from elevation data onto which features and cultural information is added using paint, pins and yarn. (Rambaldi *)	Cultural mapping Resource mapping Land use planning
Photomaps	Orthorectified satellite or aerial photographs are used as a base, often overlaid with a transparent sheet on which features are plotted.	Cultural mapping Resource identification and mapping Land use planning
GPS	A satellite system from which a unit (hand-held or base station) on the ground can accurately establish their location and height.	Resource identification and mapping
GIS	A computer-based system for capturing, storing, managing, analysing and visualizing spatial information and its associated attribute data.	Resource mapping, analysis Land use planning
Multimedia mapping	Documents, photographs and video linked to features on a digital map.	Recording IK and practices. Creating scientific, cultural, social, spiritual representations of place
Virtual reality	3D and interactive computer environment. Augmented reality involves use of field computers and headsets that can record and display information about the user's location.	Recording IK and practices. Creating scientific, cultural, social, spiritual representations of space and place

[orange]	community participation
[blue]	mapping by the author

In any form of participation the process that people go through often holds as much importance as any outcome. The process of mapping "incorporates both map as noun and map as verb" (Rocheleau 2005:358). Within this participatory information gathering process the participants maintained control over the research to generate a sense of ownership in the work. Incentives to participate were provision and use of cameras, screening of video and photographs and ultimately this developed into a project through which the participants could express their associations with the natural environment. Initially participation was voluntary and it was expressly discussed that no money was available for participants and that both parties would benefit through exchange of knowledge. Later financial incentives were requested by participants but given in the form of aid for education.

3.3.3 Interviews with key stake holders

In-depth interviews were recorded with seven government, NGO and community officials working in conservation to ascertain their views (Table 3.5). These were used together with the participatory research, attendance at village barazas (meetings), meetings (Table 3.6) between conservation workers, such as KWS and WWF, and community officials, and by review of available literature (Anderson 2002; Chesaina 1991) for acquiring information about traditional knowledge and how it feeds into community conservation initiatives in Kenya. Semi-structured interviews used a conversational approach to ask loosely predetermined questions. This allowed interviewees to explore and expand on issues that they saw as important to the topic (Longhurst 2003). The meetings and interviews were later transcribed, analysed and extracts used extensively throughout chapters 5, 6 and 7.

Table 3.5 Recorded interviews with key informants in Kenya.

Interviewee and Affiliation	Date and length of interview (H:M)	Location	Topics in Discussion
David Western Scientific Director, African Conservation Centre (ACC)	24/07/2007 2:20	ACC, Nairobi	Maasai and Amboseli; Community conservation in Kenya; conservation mapping
William Kimosop Chief Conservation Officer, Koibatek County Council	1/05/2008 1:05 21/07/2008 0:40 3/03/2009 0:50	Drive to Sacho LBNR Sacho camp	Childhood and career into conservation; Traditional values of wildlife Bogoria; Wildlife conservation TransRift Trail; Tourism
Christine Boit Chief Ranger Baringo District, Kenya Wildlife Service	18/04/2008 0:45	KWS Offices Kabernet	KWS policy; Community conservation
John Kiptek Chairman, Lake Bogoria Water Resources Association (WRUA)	1/07/2008 2:16	Sandai	Sandai; Water; Tradition and change; changing farming practices; pressures on swamps; Chuine sanctuary
Sheila Cheburet World Wide Fund for Nature (WWF)	10/03/2009 0:31	LBNR Office, Bogoria	WWF development initiatives; role of women in conservation and development
Daniel Koros World Wide Fund for Nature (WWF) Freshwater Programme, Nakuru	23/05/2008 1:36 2/03/2009 0:50 9/03/2009 0:46	WWF, Nakuru WWF, Nakuru LBNR Office, Bogoria	Chuine sanctuary Chuine sanctuary developments WWF initiatives; water
Titus Amdany Senior Warden, LBNR	15/05/2008 1:30	LBNR Office, Bogoria	Chuine sanctuary; community conservation

Table 3.6 Key meetings (barazas) attended that informed the research

Date	Purpose	Attendees	Themes of discussion
5/4/08	Initial meeting in Sandai	Chiefs, community members, University of Leicester students, Chuine committee	Introduction to research Mapping Chuine
7/4/08	Loboi Development Committee, Bogoria	Chiefs, Local government officials, Community officials, LBNR staff	Livestock and farming, Education, Health, Wildlife and Environment
12/4/08	Initial meeting with women	Women from Sandai	Mapping Sandai Election of women's focus group
14/6/08	Friends of Nature Bogoria	FONB monitors and officials	Kudu monitoring
22/8/08	Chuine Sanctuary	Chiefs, LBNR staff; Chuine committee	Developments and challenges to establishing the Chuine sanctuary
23/2/09	Human-Wildlife conflict	KWS officers, LBNR staff, chiefs and officials from local communities inc Tugen and Njemps	Ostrich eggs, poaching, encroachment by other tribes
24/2/09	Women's visit to Lake Baringo	Women's focus group; women's grass plot group	Grass plots; Boat trip on lake
28/2/09	Trail guide camp at Sacho	Trail guides, William Kimosop	The TransRift Trail, future developments and training
2/3/09	Debriefing and evaluation meeting	Interviewing team, focus group participants	Benefits of questionnaire to community, initial findings and results, participatory video, attitudes of community to research, Chuine, responsibilities of chiefs
6/3/09	Visit to Rugus sanctuary at Lake Baringo	Representatives from Chuine sanctuary and Rugus sanctuary	Objectives of Rugus: Peace, tourism, livelihoods, conservation How these objectives can be applied to forward the registration and development of Chuine.

3.3.4 Walking as a research method

Throughout this thesis trails are used as a uniting theme and to give a structure to the narrative. However the act of walking these trails has been used as a research method that performs several functions depending on the situation. Chapters 5, 6 and 7 each use a physical walk that is mapped by GPS as a framework that binds the research. The walked trails across the Rift Valley (Chapter 5), carrying water with the women (Chapter 7), and the transect identifying ecosystem services within Sandai (Chapter 6) all exploit the decolonising advantages of 'talking while walking' discussed by Anderson (2004:260) which produces a 'collage of collaboration'. Anderson (2004) builds on the writings of Casey (2000, 2001) by employing the philosophy of a socio-spatial character of knowledge. Engaging with companions on a walk is a means to use place as a way to stimulate knowledge recollection and to produce new ideas.

> *"This practice of talking whilst walking is also useful as it produces not a conventional interrogative encounter, but a collage of collaboration: an unstructured dialogue where all actors participate in a conversational, geographical and informational pathway creation. As a consequence, the knowledge produced is importantly different: atmospheres, emotions, reflections and beliefs can be accessed, as well as intellects, rationales and ideologies."*

> (Anderson 2004:260)

His method takes into account the lack of attention that is paid to the context of place in eliciting knowledge (Elwood and Martin 2000), particularly in the use of participatory research and semi-structured interviews. Casey (2001:684 cited in Anderson 2004) proposes that it is not just a 'reciprocal influence' between people and place but

'constitutive coingredience'; places and people are essentially formed together. Talking while walking "can successfully tap into the non-mechanistic framework of the mind and its interconnections with place to recall episodes and meanings buried in the archaeology of knowledge" (Anderson 2004:260). Walking is also the normal mode of travel in rural Kenya so that by walking I became closer to the people whom I wanted to interview although paradoxically if was through a consciousness of identity.

> *"I found that I could not help but be conscious of my white identity as I travelled with my Tugen guides. It was a topic of conversation and laughter most of the time as we each explored our differences in culture and outlook. The act of walking opened up a relaxed and fluid communication between myself and my guides. Rather than formal structured interviews, I soon found this was a methodology in itself that made a more equal partnership between interviewer and interviewee."*

(Reflective diary Moore 2008b)

Walking helped dissolve the colonial boundaries that road transport builds. As Amato (2004:29) explains, "Trails and paths, which conjoined animal and human ways, contrast with modern roads. The former belong to villages and tribes, the latter to societies and nations."

Walking is being examined as a research method in several disciplines including education (Bassett 2004), art (Fulton 2009; Keating 2008) and cultural geography (Phillips 2004; Wiley 2005). Trails are a well established feature of teaching, such as urban trails and geological trails (Higgitt 1996). They promote personal experience of places for gaining knowledge.

They also offer an adaptable method on which to attempt interdisciplinary research. In parallel to my own concerns, Phillips (2004:501) asks "within the discourse between art and science what is the connection between fieldwork and walking in the field?" Walking is a way to engage multiple senses and therefore multiple channels of engagement with the environment and the people present in that environment. Walking is a basic mode of transport that puts oneself within the landscape and strips away the barriers imposed by vehicles. Walking with video expands on the communicational facilitation of walking alone and can also produce "empathetic and sensory embodied understandings" (Pink 2007:250) recorded from a particular place and moment in time. Similarly, De Leon and Cohen (2005) use walking to prompt informant information through objects encountered on a walk. The combination of walking, talking and visual capture fuses to form a method for ethnographic research.

Walking also leads to a reflexivity within the researchers own mind as well as learning from others. As Galani-Moutafi (2000:205) describes

> *"The interlocking dimensions of time and space make the journey a potent metaphor that symbolizes the simultaneous discovery of self and the Other. It is precisely this capacity for mirroring the inner and outer dimensions that makes possible the 'inward voyage', whereby a movement through geographical space is transformed into an analogue for the process of introspection."*

This theme of internal reflexivity linked to the outside world is taken up by Solnit (2000:5) "Walking, ideally, is a state in which the mind, the body, and the world are aligned, as though they were three characters finally in conversation together." Walking and talking may be both an external and an internal process.

As Anderson (2004) sees walking as a way of formulating knowledge and Ingold and Vergunst (2008) use walking as a form of narrative or storytelling, I utilise both these modes in my research and writing to formulate, then relate, the stories behind the walks, both actually and metaphorically. However, there is a third practical dimension in making the walks a permanent entity to promote tourism and community development. Walking therefore offers a methodological framework for formulation, articulation and empirical forms of research.

Three walks were undertaken that form the framework for Chapters 5, 6 and 7. The TransRift Trail was a 140 kilometre walk across the Rift Valley that formed an environmental and cultural survey of the Tugen lands. It was walked in several stages and took a total of fourteen days. The Resource Trail was a walk through the ecosystems that make up Sandai location, fourteen kilometres in total length and took three days. The Women's Trail was seven kilometres from the River Waseges to the home of one of the women's focus group. All of the walks were filmed and tracked with a GPS. Walking and talking with my companions gave me many insights into tradition, values, the environment and livelihoods of the Tugen people.

3.3.5 Reflexivity and Voice

Walking was one of a series of reflective methods that were employed throughout fieldwork periods. A daily journal and a set of field notes were kept. The diary was a personal reflection on each day's events that accompanied a set of field notes that were more factual in content. The field notes recorded ethnographic observation of the participatory process with the community and the daily practices of the society and community members in relation to use of natural resources and space. They were also a record of meetings and information gathered from different NGOs and conservationists.

These were synthesised periodically in a reflective diary and as a web blog (Moore 2008a) although lack of reliable internet connection in Bogoria prevented the blog being updated on as regular a basis as desired.

As well as a method for data collection the reflective diary became part of the critical evaluation of the process of the study and the outcomes, particularly in the context of the Tugen Trail (Chapter 5).

The variety, content and scope of this research were at times challenging to structure and understand. I found a reflexive approach essential for handling this interdisciplinary work that incorporated a strong ethnographic component. The 'messiness' (Nagar 2002) of transnational research creates many questions pertaining to the identity, positionality and reflexivity of the researcher, and many dualities are created: male/female, white/black, colonial/postcolonial, Western/Indigenous, Northern/Southern, wealthy/poor, developing/developed, researcher/researched or participant/facilitator. These represent simplistic extremes of thought, action and behaviour. If the researcher dwells too heavily on these worries they become barriers to sharing ideas and knowledge. The need to identify a person, a researcher or a participant is ever-present but entirely subjective and dependent on time, place and context as well as biases and assumptions. I felt that my own identity within this research fluctuated widely in the eyes of those I studied. Consequently, in one sense, it was more productive to put aside 'the impasse' (Nagar and Geiger 2007:3) and to concentrate on the research rather than the vexed questions that encompass epistemological (the grounds of knowledge in representing others), ethical (basis of moral judgements in relationship with others) and ontological (reflexive understanding of the being of others) aspects of transnational fieldwork (Nagar 2002), whilst, conversely, using a reflexive approach which offered a way to understand my own self(ves) and positionality within the fieldwork context. This

also gave me scope to explore my own style of writing and to use it to effect in analysis and the writing of the final thesis. Using reflexivity and different voices was my way of asking: 'Who am I?' (Reinharz 1997:3). It was a way of bringing to and creating different selves in the field, and using them at different stages and in different circumstances within the research. For instance at one official meeting between community leaders, local authority and Kenya Wildlife Service officers I felt it both permissible, and indeed a way of being accepted, to introduce myself as Jeruto Jepyator, resident of Sandai, an intern to Lake Bogoria National Reserve, and Kate Moore from the University of Leicester. This process positioned me within the community, as a scientist and as an observer and recognised how my different identities intersected with institutional, geopolitical and material positionality (Nagar and Ali 2003). The use of reflexivity and voice is therefore not just a practice of writing but a form of being within one's research.

3.3.6 Ecosystem services assessments

The holistic nature of topics covered in the 2008 fieldwork season prompted a survey and analysis of the values attributed to ecosystem services by residents in Sandai in the 2009 fieldwork season. This seemed an ideal framework in which to address the environmental component of this study.

The analysis of ecosystem services is essentially a social and economic process for the objectives of understanding what value ecosystems have for human well-being. It is a holistic way of quantifying the value of the environment that contributes to human need and existence (see Chapter 2). To capture the essence of this debate, consideration was given to an appropriate method for collecting the 'values' attributed to ecosystem

services in this research particularly with consideration of day-to-day use and intrinsic values.

A questionnaire (Appendix 1) was formulated to assess the comparative importance, or 'values', attributed to ecosystem services for personal well-being in the study community of Sandai. The questionnaire was used to add a quantitative component for comparison with the qualitative elements of this research. The participatory work with the focus groups provided a qualitative understanding of the values of different ecosystem services but it was believed that a consensus approach would still omit the lack of heterogeneity within a society and the variability of intrinsic values. It was hypothesised that analysis of the variability in responses by different sectors of the community would highlight gendered and changing values. Also a non-economic method was preferred for valuation for a number of reasons. Firstly, there would be no ability to pay for use of natural resources in a community where a significant proportion of households live with an income below the poverty line. Secondly, economic costing of intrinsic values is problematic. Thirdly, it was felt that actually asking residents to put economic value to resources they used could raise unrealistic concerns that they may have to pay in the future. Finally, the researcher is not trained in economics. Therefore a method of comparative valuation was trialled from which the relative values of identifiable ecosystem services in the context of a Sub-Saharan African community could be assessed.

Discussion with LBNR staff and residents was used to compile appropriate terminology for the questionnaire including identification of ecosystem types and ecosystem services selected and modified from MEA (2001; 2005) categories to try to overcome the difficulties of semantic understanding (Comber et al 2008). This is further described in Chapter 5 Resource Trails.

To compare differences between sectors of the community, made up of men and women of different ages, several people were interviewed from the same household, although in practice this was not always possible due to household structure and timing of the interviews. Although a random sampling method would have been preferred, the chief of the village selected a cross-section of households to be surveyed as an even distribution between nine separate village units within Sandai location. A GPS location was recorded for each household for mapping purposes.

A team of ten assistants drawn from local residents and student interns working at LBNR, who could translate to and from Kalenjin, helped to distribute questionnaires and interview residents over a two week period. A training day was arranged prior to the survey to both train the interviewers and to test the questionnaire after which a few modifications were made to improve clarity. Each morning a short briefing was held to try to pick up on any irregularities occurring on the forms. However it should be noted that some interviewer bias was noticed when finally inputting the data into an Access database. Interviewers from the local community seemed to take more care in gathering valid values from the interviewees rather than interpreting values for speed in filling in the form which some of the student interns appear to have done. Nevertheless the majority of forms were considered useable for the analysis.

Sandai is split into eleven villages of which nine were surveyed, the other two were less accessible. A total of 225 questionnaires were completed in 100 households which is approximately 10% of the population of 2258 in 2009 (KNBS 1999) and 20% of the households respectively. 122 respondents were women, 103 respondents were men. Table 3.7 shows the social characteristics of the respondents in terms of gender and age and Table 3.8 by level of education. Significant is the lack or lower level of education in older age groups and women.

Table 3.7 Distribution of respondents by gender and age

Age	Total	Male	Female
Under 15	3		3
15 - 19	26	14	12
20 - 30	64	30	34
30 - 55	100	49	51
Over 55	32	10	22

Table 3.8 Distribution of respondents by gender, age group and education

Education level	Total	Age group <30	>30	Male	Age group <30	>30	Female	Age group <30	>30
None	**77**	1	76	**23**	1	22	**54**	0	54
Primary	**72**	27	45	**33**	11	22	**39**	18	21
Secondary	**80**	50	30	**65**	26	39	**25**	23	2
Certificate/Diploma	**13**	6	7	**10**	4	6	**3**	2	1
Degree	**3**	0	3	**3**		3	**0**		

The questionnaire was composed of several sections: a set of general questions about the household, a set of questions about the person, a grid or matrix in which the respondents indicated their utilitarian, spiritual and cultural values that they attached to different parts of the environment (Figure 3.5), a matrix of past and future values, and finally a set of questions concerning specific environmental issues in the Sandai location. The household questions gathered information about household composition: number of residents, age structure and relative 'wealth' of the household within the village. The personal questions gathered information about gender, age, level of education, sources of personal income and position in household.

Figure 3.5shows the matrix that was used to ascertain values of ecosystem services both comparative to each other and within each of the major ecosystems found within Sandai. This approach was adapted from participatory exercises to gather well-being ranking or scores described by Kumar (2002). Scores, rather than ranking, were considered preferable to enable more detailed analysis. To differentiate results, the product of the individual ecosystem services and the score for each ecosystem service by area, each scored on a scale of 1 to 5, was calculated for each interviewee to provide an index of values (Figure 3.6). A series of questions ranking uses of swamps allowed for triangulation of results. Although this exercise is designed for participatory discussion and consensus it was felt that it would adapt well to gather individual responses.

A second matrix, based on the first, was also designed to try to assess the change in values from the past and predicted values of the ecosystem services in the future. In this upward arrows represent more value than present and down arrows less value (Kumar 2002). This matrix was intended to assess trends rather than quantified change in values. In retrospect this matrix was overly complex but still provided a general indication of changing values.

The final section was concerned with specific environmental issues in the Sandai location. It included a series of questions ranking the value of selected ecosystems for particular purposes. This allowed triangulation with answers on ecosystem service values gathered in the matrix. There were also a series of open ended questions. Topics covered were the Chuine sanctuary, water, swamps, trees, medicine and wildlife. These questions were designed to assess knowledge of environmental issues, traditional and changing values attributed to resources and the means that individuals felt they needed to tackle environmental problems.

Figure 3.5 Matrix of ecosystems and ecosystem services used in the questionnaire.

		Give a score to the services from which you benefit for your well-being to the areas listed on the top line? (What you value the most in your life now and where does it comes from) Score on a scale of 1 (low value) to 5 (high value), leave blank if not used						
Firstly, Score on a scale 1-5 the importance of these services to your life ↓		Cultivated land	Kesubo Swamp	Loboi swamp	River Waseges	Chuine sanctuary	Scrub land / dry land	Lake Bogoria Reserve
	Grazing/ food for livestock							
	Food for humans							
	Water for irrigation							
	Drinking water							
	Timber, fuel, fibre e.g grass for roofing							
	Medicinal plants							
	Spiritual use							
	Cultural use							
	Biodiversity/ wildlife conservation							
	Good soil for crops							
	Good soil for building							
	Ecotourism							
	Science and education							

Figure 3.6 Calculation of ecosystem service value index

$$\frac{\sum(\text{Ecosystem services score} * \text{Ecosystem service by ecosystem area})}{\text{Number of interviews}}$$

Once collected, the questionnaires were initially input into an Access database to organise the complex data. It was subsequently output to Excel for analysis.

3.3.7 Acquisition of other spatial and ecological data

Secondary ecological data in the form of remotely sensed imagery and mapping was sourced through WWF, Survey of Kenya, WRI and the Global Land Cover Facility (GLCF) to build up a dataset suitable for background information and to use with local people. This took considerable time, negotiation and the data had to be reformatted to the same georeferencing system where possible. Although efforts were made to acquire high resolution satellite imagery the best imagery was Landsat ETM at 30m resolution (NASA 2000). This was barely adequate for detailed resource mapping in Sandai and eventually only a broad land classification of ecosystem areas was used (WRI 1999).

GPS tracks were recorded for all the walks discussed in this thesis: the TransRift Trail (Chapter 4), the resource trail across Sandai (Chapter 5) and the women's trail (Chapter 6). Key point locations were marked as appropriate.

A local Community Based Organisation (CBO) Friends of Nature Bogoria (FONB) participated in this research by collecting data on location, movement and behaviour of the Greater Kudu during the 2008-9 field work period. The study involved trained monitors undertaking a walked linear transect (Sutherland 1996) at ten locations once a month for twelve months in and around Lake Bogoria National Reserve including two

transects in the proposed Chuine Sanctuary. Location, group size, gender and age structure of any kudu sighted were recorded. This study extended a previous four month study (FONB 2007a) sponsored by Royal Netherlands Embassy, Nairobi. Danielsen et al (2009) recommend community-based participation in scientific monitoring and review different levels of involvement in the process. The commitment of FONB to undertake wildlife monitoring is stimulated by NGOs and government organisations however self-motivation from within the CBO and the desire to communicate more widely to the community makes this organisation appear sustainable (Hockley et al 2005) and they made a valuable contribution to my research.

Working with the CBO in this way also provided an opportunity for participant observation of these conservation volunteers, all from local Tugen communities, and a review of their values of wildlife.

3.4 Integrating and analysing qualitative and quantitative data

3.4.1 Mixing methods or integrated analysis?

Handling such a mixed range of data and integrating it effectively is probably one of the most difficult issues in interdisciplinary research, although it is also a strength, as "Using complementary methods enables researchers to consolidate strengths, and cross-check and triangulate any information that is central to the particular research questions concerned" (Mayoux 2006). Within the mix of qualitative, quantitative and participatory methods used, a visual bias was given to my research by purposely concentrating on mapping, film or photography. Analysis of spatial statistical data through visualisation is a well established practice in geographical information science but it is only recently that the conventional quantitative emphasis of GIS is being questioned.

> *"At the level of practice, an urgent need exists to go beyond the conventional understanding of GIS as a largely quantitative practice and to recognize the potential of such realization for disrupting the rigid distinction between quantitative and qualitative methods in geographic research." (Kwan 2002:656)*

The main analytical methods I have adapted use GIS to disrupt and challenge the distinctions between qualitative and quantitative approaches to valuation of ecosystem services for human well-being. This analytical approach is also a form of communication and distinctions blur as by presenting extracts from films and mapping to a wider audience, that audience is involved in an internal analysis of the issues. Table 3.9 compares data collection methods with analysis methods.

Table 3.9 Linking data collection method, data and analysis methodology

Method	Participant	Means of data capture	Analysis
Interviews	Local authority wardens NGO officials Community officials Community residents	Video/audio record and transcribe Field notes	Grounded theory analysis Reflective diary
Meetings	Community officials Local authority wardens	Audio record and transcribe Field notes	Grounded theory analysis Reflective diary
Questionnaire	Community members	Written questions	Grounded theory analysis Statistical analysis
Participatory sketch mapping	Focus groups	Field notes Sketch maps	Visualisation Visual analysis GIS Analysis
GPS mapping	Guides	GPS Field notes Video	Visualisation GIS Analysis
Participatory video	Focus groups	Field notes Video	Grounded theory analysis Visual analysis Multimedia mapping

3.4.2 Visual and textual analysis

The broad mix of visual, textual and reflective methods provided a rich collection of data for analysis; analysis where the purpose, "is not to translate visual evidence into verbal knowledge, but to explore the relationship between visual and other (including verbal) knowledge."(Pink 2007:119) and where analysis is "a creative, active, making

process" (Crang and Cook 2007:132). Craine (2007) sees linking of media to other material evidence in multiple and complex ways as imperative in order to generate meaning and stimulate visual literacy through critical geography.

There are many methods for analysing and working through themes in qualitative data (Ryan and Bernard 2003, Crang and Cook 2007) and analysing visual data (Rose 2001; Pink 2001; Prosser 2008). Rose (2001) places different methodologies within a methodological framework for interpretation of images that recognises three sites of meaning: production, the image itself and audience; each of which has three modalities: the technology, the composition and the social context (Table 3.10). For the purposes of this study the emphasis is on the social, and to a lesser extent, the compositional modalities of the site of production, however the visualization also requires analysis of the meaning imbued within the image and by the audience. Using this framework, an exploratory approach, drawing on grounded theory methods (Baxter and Eyles 1997; Bailey et al 1999; Crang and Cook 2007), was adopted in this study as this enabled hypotheses of meaning to be created alongside, and not *a priori* to, the analysis whilst also allowing the 'creativity' of qualitative research to work in conjunction with 'science' (Bailey et al 1999). Grounded theory is an inductive methodology that generates theory from empirical research (Grounded Theory Institute 2009). This was believed to be appropriate to analyse the rich mix of information contained in the videos made with the participants, recorded in the interview transcripts and written in my field journals in Kenya. Therefore the information was processed by chopping up and iteratively (re)ordering (re)contextualising and (re)assembling the data (Crang and Cook 2007:133).

Table 3.10 Visual analysis: analysis of the sites of meaning and modalities (after Rose 2001) as discussed in this report. Darker shading indicates greater contribution to the analysis.

		SITES OF MEANING		
		Production	Image	Audience
MODALITY	Technological			
	Compositional			
	Social			

Interviews and group discussion were transcribed for analysis. Concepts and themes, particularly those related to ecosystem services, biodiversity conservation, traditional knowledge, changing livelihoods, water and spatial awareness were identified; however because some transcripts required translation from Kalenjin to English some nuances were lost.

Cognitive mapping and video were analysed (Aitken and Craine 2005, Rose 2001, Pink 2001), particularly to identify 'counter' mapping themes, such as the importance to a particular social group of a specific natural resource or species. Interpretative approaches to cognitive mapping were followed as recommended by Rob Kitchin (2000) who sees these approaches as allowing understanding of "the connections between spatial cognition and value systems through the examination of spatial behaviour" (Kitchin 2000:19).

Quantitative data was incorporated into the analysis to triangulate other information. Summary statistical analyses procedures (Ebdon 1985; Kitchin and Tate 2000) were performed on the relevant sections of the household questionnaire. Mean, mode, standard deviation were calculated for the values in the ecosystem services matrices and histograms produced to get an initial visual understanding of the data distributions.

These gave an indication of the comparative values of different ecosystem services from aggregated values of the individual respondents and a broad summary of the values of ecosystem services to the community as a whole. Difference between social groups was also analysed to understand the variability due to gender and age on values using the t-test (Ebdon 1985). Data was then displayed in the form of tables, graphs, choropleth maps and spider diagrams.

The grounded theory approach was not without its difficulties in the realities of keeping control of the 'messy' (Schiellerup 2008) analysis process. Baxter and Eyles (1997 reported in Crang and Cook 2007:146) recommend that the validity and reliability of the analysis is established using a method where "credibility of the account, transferability of the material, dependability of the interpretation and confirmability of the study" come together to ensure a rigorous approach to the report. However the aim of the analysis here was not to provide a single definitive account but to attempt to understand the interconnectivities of different viewpoints (Crang and Cook 2007): the participants, respondents, interviewees and my own. This outlook seemed to fit well with the decolonising and feminist approaches taken to the methodology but the result is inevitably, at best, a critical interpretation of the wealth of data and experiences encountered during fieldwork.

3.4.3 Data visualisation

The complex and mixed methodology of data collection from this research required an adaptive approach to the analysis and display of that data. The main analysis was undertaken through visual methods of mapping, video and visualisation. Textual data from a variety of sources was analysed for positionality of 'voice' and representation of place. Linking qualitative data, in the form of georeferenced multimedia such as video, photographs and audio, to numerical, quantitative and measured data in the form of

maps provides a powerful method for linking concepts and values of place to mapping of space and landscape. This work follows on from previous research interests of the author in designing software for fieldwork teaching (Moore 1999, Moore et al 1999). It also further pushes the distinctions between filming as researching and video as representing the research (Pink 2006). Pink (2006:75) also assesses the integration of video within text using montage and hypermedia to represent "informants' stories, experiences and performances as they unfolded in the context of our collaborative video interviews."

A number of mechanisms were utilised in order to construct a suitable communication network for both analysing and disseminating information from this research. Video clips were uploaded to YouTube and then linked to maps using Google Earth (Google Earth 2009a) and a mediascape (Mscape 2009a) constructed to produce different forms of multimedia mapping and embodied experience of place. Google Earth is an interactive web-based interface to satellite imagery and spatial data that allows users to add spatially referenced maps, text, images and video to display over the internet. Mediascapes are a way to experience locations by walking through them with a hand-held mobile computer that gives access to multimedia triggered either by GPS position or by the user. These technologies were chosen based on considerations of appropriateness for communicating cognitive understanding of the environmental issues in my study area given the time and facilities available locally. Further discussion of the visualization methods used is presented in Chapter 7 Visualization Trails.

For the purpose of a standardised PhD thesis format, text inevitably took preference over other media but videos, Google Earth and mediascapes are available to view to gain a full flavour of the research (Appendix 3). Local knowledge and values can be compared with maps using these interfaces. This validation process is designed to

highlight discrepancies between 'outside and inside' knowledge and values particularly in the context of ecosystem service valuations taken at different scales. Evaluation of the research has partially been carried out within the academic community through conference presentations and discussion. Ideally, given funding, the developments will be evaluated within the community in Kenya in the future.

3.5 Ethics of fieldwork

Taking a practical decolonising stance for fieldwork inevitably leads to considerations of the ethics behind fieldwork practice and writing. Yet however 'ethical' the researcher endeavours to be there are many requirements from the research itself that can lead to difficulties particularly in ethnographic and participatory studies. An awareness of these is imperative. In general the research ethics framework as detailed by ESRC (2005) was followed as far as possible where ethics is composed of a range of institutional regulations and individual morals (Prosser et al 2008) (Figure 3.7).

Figure 3.7 Current forces shaping ethical decision making of a research project. (Source: Prosser et al 2008)
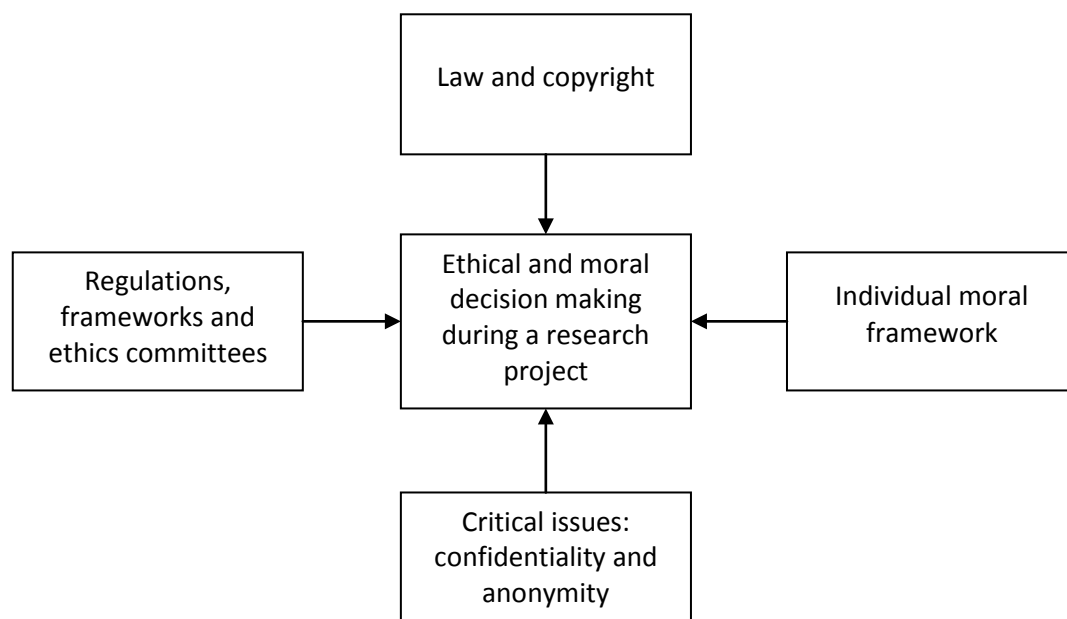
Undertaking research using participatory methods inevitably leads the conscientious researcher through a web of negotiation and compromise that requires reflection on the motivations and outcomes of any action. The current discussions on the ethics of visual methods (Prosser et al 2008), participatory video (High 2008), participatory mapping and PGIS (Rambaldi et al 2006b) forms a framework that is rigorous but that challenges the requirements imposed on the academic researcher. Critical writing on participatory methods is cautionary on the linkage between power and knowledge (Kapoor 2002; Kapoor 2005) yet in reality both researcher and community have to balance perceived benefits and disadvantages realistically to assess the outcomes of sharing knowledge. From a purist point of view participatory research should be led by local people but to pursue the aims of this research I inevitably had partially to steer the topics for film and mapping throughout the facilitation process. Nevertheless at times the pressing concerns of the community and sectors within that community took control. The focus of the research agenda was modified by the participants, who living within a semi-arid environment, had more pressing concerns of periodic drought, and the ensuing lack of food alongside pressures for development.

Participatory research required consideration of the people in the community in relationship to myself; a consideration of reflexivity and positionality in the international context (Sultana 2007). This required establishment of trust through openness and honesty and a respect for the culture and society in which I was working. Informed consent was obtained orally and verbally from interviewees, participants and questionnaire respondents. An explanatory cover sheet was used by interviewers to explain the purpose of the questionnaire (Appendix 1). The reasons for the research were outlined at meetings and to the focus groups and the 'jump in scale' (Cahill et al 2007) of use of the information they provide explained. At all times I explained that I

hoped to facilitate exchange of knowledge: as I was their student, they were mine and would receive training in mapping and video. I also explained that I could not guarantee to effect any profound changes in their livelihoods but hoped by publicising their challenges and concerns through my work small steps could be made. Several of the participants recognised and thanked me for the honesty. However, even at the end of my research I heard that there was a perception by some members of the community that I had wealth and there was unease that, yet again, their major problem of water supply had not been solved. These misunderstandings were disappointing although perhaps inevitable in areas of poverty.

Table 3.11 Summary of the main questions (after Rambaldi et al 2006b)

Stage I: planning	Who participates?
	Who identifies the problem?
Stage II: the mapping process	Whose voice counts?
	Who controls the process?
	Whose reality?
	And who understands?
Stage III: resulting information control, disclosure and disposal	Who owns the output?
	Whose analysis and use?
Ultimately	What has changed?
	Who benefits from the change?
	At whose cost?
	Who is empowered and who disempowered?

Rambaldi et al (2006b) provide a comprehensive guide to practical ethics for PGIS that is fundamental to participatory research when working with people through mapping practices. Maps are a particularly powerful tool in the political and cultural context and therefore PGIS practices need to be developed with a "critical clarity with respect to mapping based on a comprehensive understanding of our actions" (Fox et al 2006:105). It is important to understand the resulting implications of mapping local knowledge and ensure control of its use when making it available outside of the cultural context is an

imperative requirement in PGIS research (Abbot et al 1998). Care was taken that this was done as a sympathetic and not an acquisitive form of knowledge gaining. Laituri (2002:271) suggests that "strategies blending indigenous and scientific approaches need to be developed without privileging one culture over another". Pickerill (2009) recommends seeking commonalities or a 'common ground'. PGIS good practice therefore requires "attention to troubling dilemmas and overarching issues about empowerment, ownership and potential exploitation, leading to the 'Who?' and 'Whose?' questions" (Rambaldi et al 2006b) (Table 3.11).

Reflecting on the methods used I felt that there was a tension between meeting my own research objectives and enabling the community to maintain control of the process. Nagar (2002) challenges academics from 'Northern institutions' to "produce research agendas and knowledges that do not merely address what is theoretically exciting or trendy *here*, but also what is considered politically imperative by the communities we work with or are committed to over *there*." However I always provided opportunity for the participants to organise and steer the research. I endeavoured to follow good PGIS practice that is "flexible, adapts to different socio-cultural and bio-physical environments, depends on multi-disciplinary facilitation and skills and builds essentially on visual language" (Rambaldi et al 2006b:2). In practice the participants would seek guidance and direction so the participation became collaborative. This I felt to be satisfying to both myself and the participants. The enjoyment gained from the process and the fact that the participants were willing to learn was also evident. Ultimately all participants acknowledged that they had benefitted. Consent for use of the films, maps and interview transcripts within an academic context was acquired orally and verbally as in some cases interviewees and participants had little or no schooling. In the case of putting video extracts on the internet, permissions were verified by email

communication with my primary contacts in Sandai and the district. Using equipment such as video cameras and computers in areas with extremely limited access to technology was difficult. Ethical issues related to unequal access to technology had to be considered (Rambaldi et al 2006b).

As others have recently brought into the open, there are 'shadow sides to fieldwork' (McLean and Leibing 2007). These stem from the researcher's personal involvement with the people with whom she is working. Research within the social sciences can never be totally detached and objective, particularly in ethnographic approaches. Friendships are made and problems and difficulties that the researched experience inevitably have an influence on the researcher through a series of emotions (Widdowfield 2000; Bennett 2004) and feelings. Trying to express these through academic writing compounds the problem because they are normally written out of the 'scientific' account as it is constructed and reconstructed (Papageorgiou 2007). In this thesis I hope that the voices of my friends and associates in Kenya can still be heard.

The ethical and practical difficulties of leaving the field of research are an under reported issue although there are some documented reports of the process (Mistry et al 2009). It is at this final stage that understandings and sustainability of outcomes from the research come under question. For the researcher there are issues of completion. Has one done enough? There is the desire for more time to complete one more survey or verify one more piece of information. There are also the issues of showing appreciation for the participation, help and knowledge exchanged in a context of inequality between Western researcher and the colleagues and collaborators left behind and what effects the research has had on and for the community. There is a view from academia that the moral stance of the researcher has changed from detached observer to being able to make an active contribution towards social change (Fuller 1999; Mistry et al 2009) and

a 'new kind of productive engagement' (Jazeel 2009: 297). For my own part I found an on-going commitment to fund-raising for education and initial sponsorship of sustainable livelihood projects, particularly for the women film makers who shared their lives so vividly whilst they worked with me. For those left behind I believe there was a real sense of loss at my going, for me as a friend and for the variety of activities that I had introduced into their lives.

3.6 Concluding reflections on methodology

Crang and Cook (2007:17) ask 'How do researchers deal with surprises?' and critique the 'read-*then*-do-*then*-write' approach to ethnographic study. Relocating was just one of many 'surprises' and changes that I had to make to my research focus. Nevertheless, the fieldwork was eventually productive and the 'surprises' have created a more interesting and novel approach to the study. As, although there is a danger of conflating cultures, tribes and people, the shared similarity of semi-arid environments that characterises much of SubSaharan Africa brings a similarity of challenges faced by people trying to create a livelihood in these harsh environments. Working with a lesser known, less researched and less iconic people than, for instance, the Masaai, is, in itself, a novel approach and the surprises came to shake my own colonial preconceptions of life in a Kenyan village. The area was less abundant with enigmatic large mammals than other locations considered and, instead of depending on secondary survey of wildlife data to underpin the research, I had to re-evaluate the study to look at what was most important from the community perspective. In essence doing what I had set out to do: work using a decolonising participatory approach to the data collection. The methods used, particularly the approach taken to ecosystem service evaluation, were created to fit the circumstances. Therefore, by modifying my methodology, I was able to get a

greater insight into the 'common' problems, values and practices of rural people in semi-arid Kenya.

Despite set backs, the main fieldwork seasons were successful in terms of quantity and quality of the data which will be discussed in the following chapters. In all 11 in-depth interviews, over 50 focus group meetings, approximately 50 hours of video, 700 photographs, 18 field notebooks, 225 questionnaires, around 200 kilometres of walked and mapped trails and many hours of talk and discussion were undertaken during the eight months spent in Bogoria.

At the end of my research in Kenya many of the participants in the research from both the community and from local organisations expressed their appreciation of the work that they and I had undertaken. The success of the collaboration was due to their enthusiasm to try something new and to share knowledge, learning and understanding from different perspectives. Moseley (2007) comments on such fieldwork: "More often than not, outside researchers are able to offer little more than a different perspective or way of thinking about a local issue, which, I would argue, could be a very significant contribution to local development." My ethnographic approach endorsed his findings and as I left I was thanked by the village chiefs for opening their eyes to their own practices and challenges from a different perspective.

The decolonising and feminist stances that underpinned the participatory methods and the ethnographic practices of the research contributed to the acceptance of the research as a whole. Although the research was ultimately for my personal education and study, I felt that it must, in some way, contribute to raising the environmental awareness, knowledge and opportunities of the communities involved. Facilitation of this process was one of the primary aims of my work. Indeed, like many participatory activities, the process is also one of the main objectives.

The methods employed in the research: film-making, mapping, questionnaires and walking were educational for us all. It was the mutual exchange of ideas and skills, the resistance to allowing colonial or gendered instruments of power to differentiate between us that both steered and contributed to the value of the research. Evolution of the methods themselves was indicative of the transformative nature of this research.

Comparative valuation as a method for assessing the value of ecosystem services in a subsistence economy proved to give different insights into the relative and competing values attributed to ecosystem services. As the following chapters will show this sometimes matched and verified theoretical understandings of values and needs.

The interdisciplinary nature of the study meant that the complex mixed methodology could have become hard to manage and disjointed in the results. However, focusing primarily on participatory approaches and deeply involving community members as well as conservation officials in all aspects of the fieldwork gave the study a uniting strength. Underpinning this with the quantitative survey further included a greater number of people in the work and increased the willingness to collaborate. The community-centred approach helped me gain acceptance and trust within the community and initial curiosity turned to involvement. That so much detailed information was gathered is entirely through the cooperation of the participants. The close links between nature and society and the environmental challenges, that are also profoundly human ones, demand recognition by local communities and decision-makers so that sustainable solutions can be found.

The construction of a methodology to address the complex needs of interdisciplinary research is challenging. By focusing on the theoretical decolonising and feminist underpinnings of participatory research, a belief in the empirical knowledge of local people to inform through a mixed qualitative and quantitative approach and

technological interventions to capture knowledge and values a truly interdisciplinary study has been constructed. This holds together through the reflective discourse and the visual reinforcement of maps and video. This methodology builds bridges between social and natural science and attempts to point to solutions by linking environment and livelihoods.

This research, as most PhD studies, has been a personal journey of learning, discovery and friendships. Writing in an academic style can lose the senses of emotional involvement in the research process. Most of the following chapters are expressed in fluid, phenomenological terms and writing styles incorporating polyvocality (Crang 1992) so that the voices of the people with whom I conducted the research can be heard alongside my own as I follow trails through nature and society across the Rift Valley.

Chapter 4

Tugen Trails *

Go tell your master Mwanga that I have purchased the road to Uganda with my blood.

(Bishop James Hannington 1885)

We are not doing anything new here. We are just opening up the old trekking routes again, and, anyway, these routes are used by local people every day. We are calling them the Trans-Rift Trails, some of which will take you to a few of the most dramatic and spectacular sights in all of Africa.

(William Kimosop 2008)

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* The chapter is entitled Tugen Trails because of my studies with the Tugen tribe, although The TransRift Trail is the official name of the long distance route and is settled by other tribes as well as Tugens, particularly on the eastern edge and to the West of the Kerio River.

Chapter 4 Tugen Trails

4.1 Introduction

4.1.1 Decolonising the trail

My name is Jeruto Jepyator: 'the woman who travels' and 'the one who opens the way'. I was given these two Kalenjin names independently, by two different people on the same day of my walk across the Great Rift Valley. Such was the impact of being a white Western female 'footing' through this land. Tourists are rare; wzungu (white) people even more so, although on many stretches of my walk there were distant memories and recollections of one or another mzungu who had gone before. I was the first person this century to open the way yet I was following both the ghosts of others and the tangible real knowledge of my young Tugen guides. This was not just my journey but theirs as they opened up the way to a new future for themselves.

(Reflective Diary Moore 2008b)

The above is the opening extract from my reflective account of the TransRift Trail, a walk across the Rift Valley in Kenya during which I explored the connections between the Tugen people and nature, the way traditional knowledge contributes to the value of ecosystem services and how environment, livelihoods and values are changing. Although I wanted to take a decolonising approach to my research, I was seen as a pioneer walking through the Tugen lands and opening up a new tourist trail.

You, Kate, you are a pioneer for The Route. We have never seen a white person passing this route. Your journey, you Kate, will be a beginning

for us so that we can find something like even electricity.

(Jennifer, Kamar)

However the ghost trails of other 'mzungus' (white people) indicted that I was not really the first European walking here (Figure 4.1). Lake Bogoria, originally Lake Hannington, was named after Bishop Hannington on his fateful journey to Uganda in 1885, and later, in 1892, J.W. Gregory, a British geologist, considered Lake Bogoria "the most beautiful view I had seen in Africa" (Gregory 1896:110). 'Arap Leso' was the white Baringo District Officer who, in 1951, attempted to construct a road through to Radat but had been defeated by the difficult terrain and the River Molo. A 'mzungu' had reportedly launched himself from the Elgeyo escarpment near Choroget using a hang glider. Even Queen Elizabeth's name was part of the landscape although, because she heard the news that she had succeeded to the throne while on safari at Tree Tops in the Aberdares, she never got to her next stop - the Royal camp at Sacho on the Tugen Hills.

I felt the perception of me as a pioneer put pressure on me to report reflectively and although this thesis is written in my words it is based on the knowledge of those who live along the trail. Chapter 7 Visualisation Trails more fully explores the subjectivity of how knowledge is represented. The TransRift Trail was the vision of William Kimosop, Chief Warden for Baringo and Koibatek Districts, to create a walking route across the Rift Valley, to re-establish the old trails, used for centuries by colonial explorers, local African pastoral herders and wildlife, and to open his Tugen homelands (Figure 4.2) to tourism so bringing economic benefits. Most importantly he sees this as a means to create stronger cultural links between wildlife and people. I aspired to physically walk the 140 kilometre TransRift or Tugen Trail to 'open up the way' for my friend but with the realisation that the concept of trails held for me a broader meaning.

Figure 4.1 (Post)colonial views of the Trans Rift Trail

Hannington's View, Lake Bogoria

Following the route of 'Arap Leso' with donkeys near the Molo River

'Jump off' point on the Elgeyo escarpment near Chororget

Two Tugen guides admire the view at 'God's Window', Queen's Camp, Sacho.

Figure 4.2 Map of the study area in the Rift Valley. Tugens inhabit northern Koibatek and the southern part of Baringo Districts
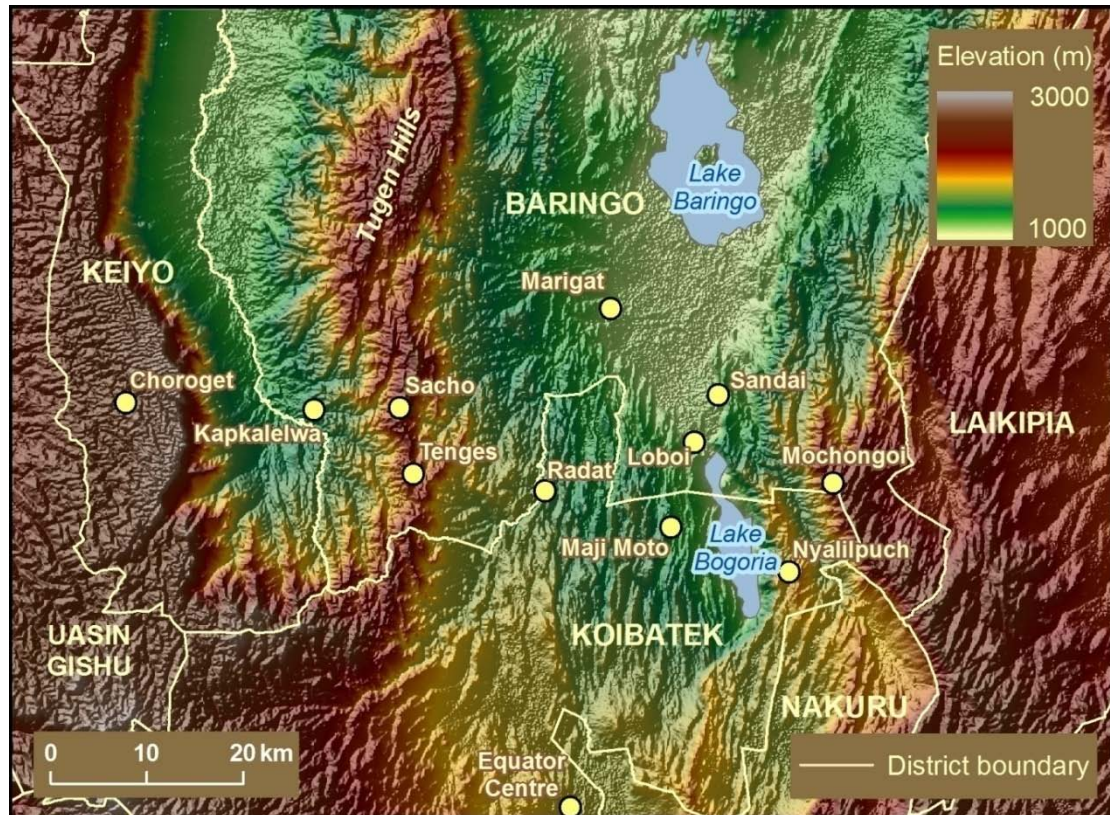
4.1.2 The purpose of the trail

This chapter fulfils a number of objectives. First, walking the TransRift Trail was an empirical trial of hodology (Turnbull 2007) (see Introduction) as a method for synthesising knowledge in a form of postcolonial ethnography. My own reflective diaries (Moore 2008a) are critically interpreted alongside films and interviews with local people and officials to create a rich picture of the emotive issues facing people and the environment in this region of Kenya. The trail was traced with a GPS and has the name of The TransRift Trail but there are many alternative routes and the essence is that The Trail is a transect across the Rift Valley. This chapter has been (re)written as an overview to highlight some encounters on the trail but in the process of putting it into

context with my research, to conform to academic structure and the limitations of word length, much of the storytelling has been lost. I would urge the reader to read the full account in my blog (Moore 2008) and the thesis is also supported by a video of the trail and Google Earth map, (Appendix 3), which uses contributions from many of the Tugen people who accompanied me or whom I met along the way. These autoethnographic approaches (Butz and Besio 2004) give a reflective voice to both myself as researcher and the people with whom I am researching. I subsequently link these ethnographic mappings to geospatial technologies as discussed in Chapter 7 Visualization Trials.

Second, after a description of the physical characteristics of the trail in section 4.2.1, a review is made of a selection of the many issues faced by people encountered across the Rift Valley (section 4.2.2). These are discussed in the context of traditional knowledge and ecosystem services with reference to the cultural and environmental changes that are taking place.

Third, the promotion of trails, specifically the TransRift Trail, as a form of ecotourism (respecting the environment) and pro-poor tourism (respecting local people and alleviating poverty) but also as an ecosystem service is discussed in section 4.3.1. I go on critically to review the effectiveness of trails as a means to develop livelihoods alongside a wider conservation strategy that mixes values from traditional culture and new income from pro-poor tourism in section 4.3.2.

Like the interweaving of physical trails through the landscape of the Mid Rift region, this chapter unashamedly takes the reader along several paths that appear at times to diverge but in the final summary (section 4.4) all are reunited. The aim of this chapter is to set out the links between tradition and change, conservation and development within the central Rift Valley that are conceptualised and materialised in the Tugen Trail.

4.2 Walking the TransRift Trail – a reflective diary

4.2.1 The Physical Trail

The 140 kilometre walk formed a cultural and environmental transect across the Tugen lands of the Mid Rift. The trails physically link the dramatic and diverse landscapes that are the Rift Valley but they also link wildlife, people and cultures through space and time. They form a network of paths that provide corridors of attachment and association and have the potential to form new bonds. As I walked I observed the changing landscapes and found similarities and differences in the highs and lows of the trail: both physical and metaphorical.

(Reflective diary Moore 2008b)

This extract illustrates that the walk was much more than a physical activity and as I bodily walked the Trans Rift Trail, I took mental and physical snapshots (Figure 4.3) of the people and environment and discussed with my guides the landscapes, ecosystems and environmental problems. The issues that people raised are common to most semi-arid areas in Kenya, indeed Africa, but in development or environmental reports they are so often reduced to impersonal statistics. This brief descriptive summary gives a flavour of the whole experience and highlights some of the interlinked issues encountered such as spatial distribution of resources, health, water, biodiversity and environmental change before deconstructing sections into the case study analysis in section 4.3.

Physically the landscape across this portion of the Rift Valley (Figure 4.4) starts at 2175m on the Laikipia plateau at Mochongoi, descends steeply to the Waseges river (1403m) and then again to Lake Bogoria (985m). Then there is undulating semi-arid

lowland through Radat to the Tugen Hills. The trail through the Tugen Hills rises steeply to 2198m at Sacho, although the hills rise elsewhere to over 3000m, and form a mix of forest and cultivated slopes. The land then descends on the other side to the Kerio Valley, again a semi-arid area. This is bounded on the far side by the almost vertical Elgeyo escarpment (Figure 4.5) where the Trail climbs steeply to Choroget at 2766m.

These rises and falls lead to landscape variations in rainfall, temperature, geology, soils and the overlying vegetation patterns and land use. William Kimosop had designated names for different portions of the trail revealing his strong personal and cultural links with wildlife in this naming system: The Kudu Trail from Mochongoi to Bogoria, the Flamingo Trail around Lake Bogoria, the Monkey Trail through Irong sanctuary to the Molo River at Sirimta and the Honey Trail through Radat, the Forest Trail across the Tugen Hills and the Colobus Trail up the Elgeyo Escarpment.

The vision for the TransRift Trail is to link a number of features and destinations in the rift Valley together (Table 4.1; Table 4.2) bringing new benefits to local people along the way from tourism whilst promoting conservation. The following section highlights some of the many issues encountered as I 'pioneered' the trail.

Figure 4.3 A selection of landscapes along the Tugen Trail

Lone trees, all that remain of forest , are replaced by maize farms in the resettlement scheme near Mochongoi.

Lake Bogoria from the Southern end. The lake is ringed by bubbling cauldrons of upwelling boiling water and geysers.

Natural hot baths amongst fig trees at Emsos. Buffalo drink here in the evening. There is a community campsite and nature trails set up by WWF.

Surrounding Lake Bogoria are semi-arid plains. There is scant grazing and dust storms are common, often preceding scattered storms and rainbows.

Gully erosion near Molok resulting from felling of trees for charcoal. The soil is then susceptible to wind and heavy rain.

Rapid encroachment by the invasive shrub, Tipilikwe (Kalenjin name) near Tinamoi.
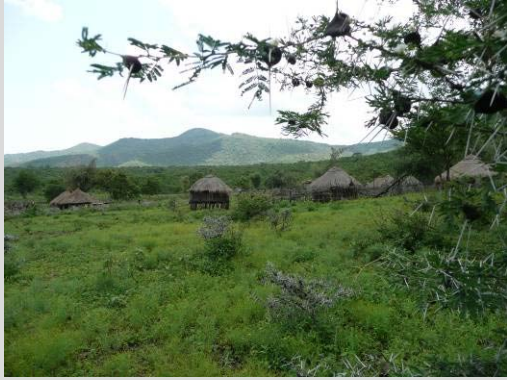
The Tugen Hills from Tinamoi. Traditional homes are built of mud, wood and grass; hot, but durable, tin houses are slowly replacing them.

Panoramic views across the Kerio Valley from the Tugen Hills. This is the birthplace of William Kimosop and inspired his life as a conservationist.

Cultivated steep terraces on the slopes of the Tugen Hills have led to soil erosion and siltation of lakes,

Chamloch gorge and Kerio River in the dry season. Site of tribal conflicts a century ago, now a proposed campsite.

Fluorspar mine in the Kerio Valley causes pollution in the river.

Rich soil and high rainfall on the Elgeyo escarpment creates good conditions for beans and new crops such as coffee.

Figure 4.4 Map of the TransRift Trail (Data source USGS 2004b)
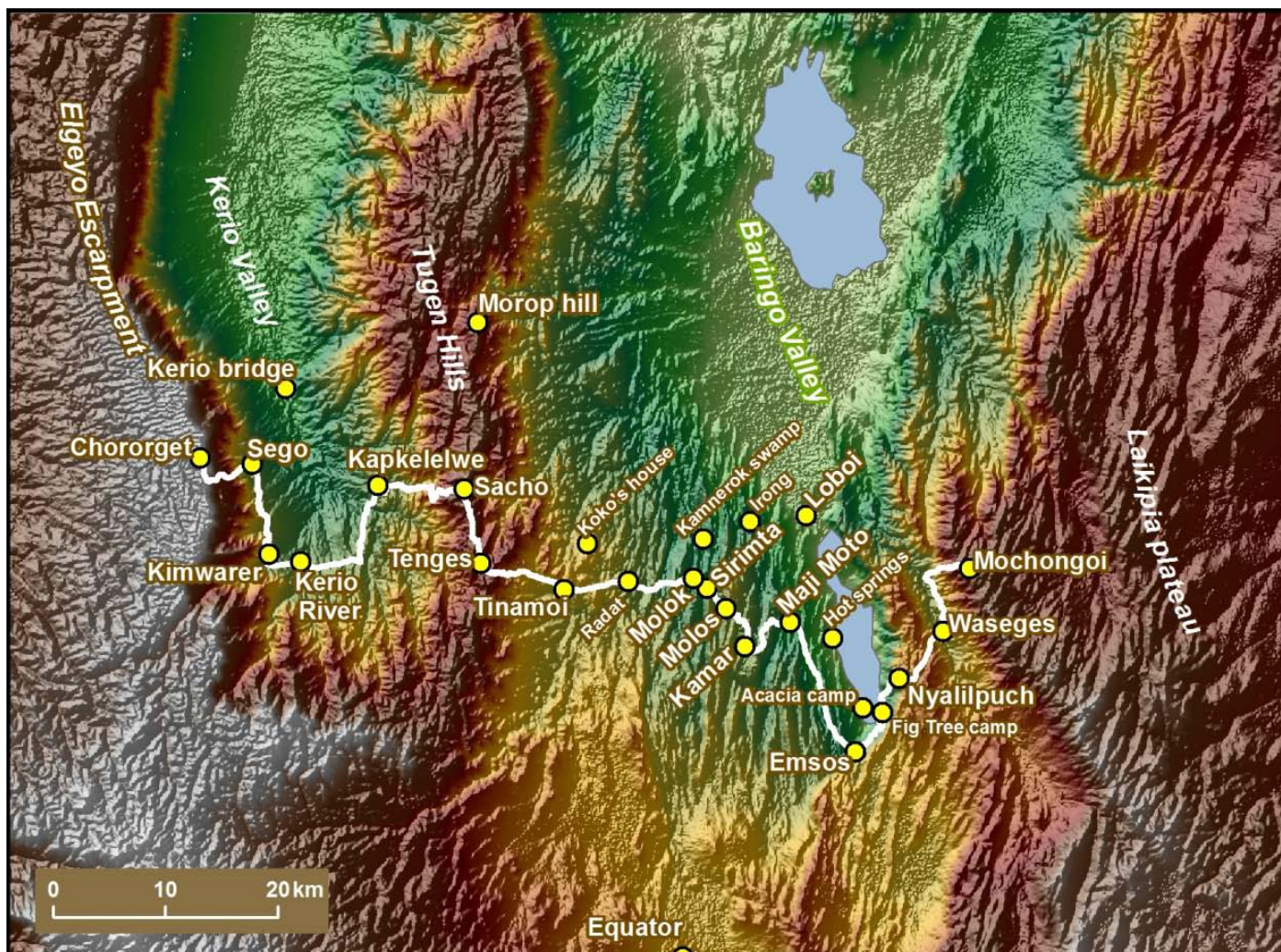
Figure 4.5 Cross section of the rift valley indicating campsites along the route and brief summary of the ecosystem and farming regimes
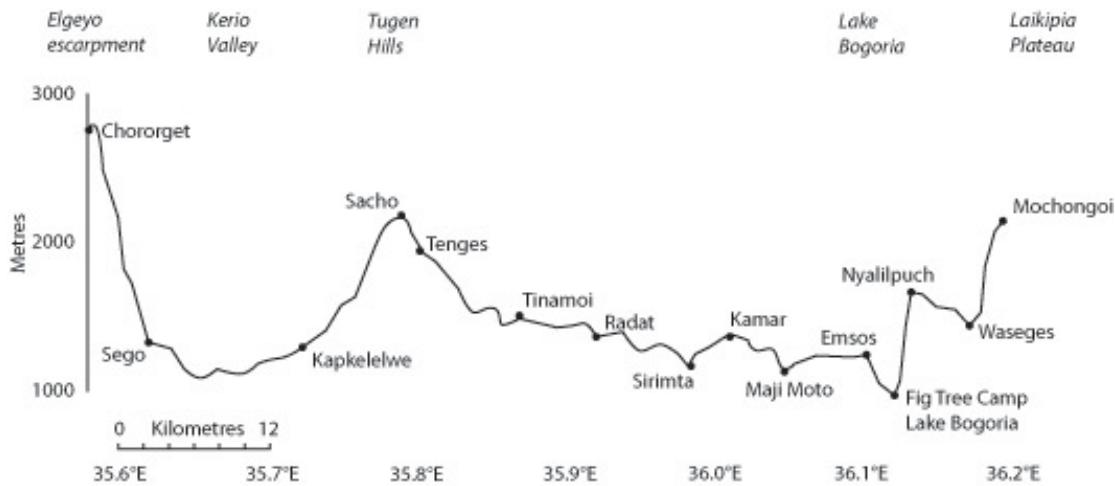
Plateau: Mixed farmland

Elgeyo escarpment. Three zones: lowland, mid level farms and high forested slopes

Kerio Valley. Land demarcation – mix of semi-arid range land, some subdivision into farms

Tugen Hills. Steep slopes of hills terraced cropping, mainly beans, maize, fruit. Forest reserves situated on hill tops – mix of endemic and exotic trees

Baringo Lowlands Semi-arid rangeland, acacia scrub, occasional swamps, rolling hills

Lake Bogoria National Reserve. Soda lake. Acacia thicket and riparian woodland

Laikipia Plateau. Resettlement scheme: mixed farmland. Recent forest clearance

Table 4.1 Location and elevation of campsites with distances walked.

Location	Grid Ref (decimal degrees)	Elevation	Kilometres walked from previous
Mochongoi	36.1945E 0.3098N	2175m	
Waseges	36.1714E 0.2582N	1403m	11.2km
Nyalilpuch	36.1367E 0.2199N	1642m	7.2km
Fig Tree, Lake Bogoria	36.124E 0.194N	985m	6.5km
Emsos	36.106E 0.1122N	1220m	6km
Netbon	36.047E 0.265N	1125m	14.5km
Maji Moto			17km by hot springs
Kamar	36.014E 0.246N	1333m	7km
Sirimta	35.984E 0.292N	1154m	9km
Molo River			
Radat	35.924E 0.297N	1357m	8.5km
Tinomoi	35.870E 0.2917N	1486m	9km
Tenges	35.804E 0.3131N	1923m	10km
Sacho	35.790E 0.3722N	2198m	8.5km
Kapkelelwe	35.722E 0.4583N	1300m	12.5km
Sego	35.622E 0.3922N	1303m	30km (via fluorspar)
Chororget	35.579E 0.3969N	2766m	8km
		Range: 1781m	**Total distance: 147.9km**

Table 4.2 Community conservation initiatives and environmental challenges at key locations along the trail

Location	Status	Conservation features	Environmental challenges
Mochongoi	Resettlement scheme	Remaining forest Protea spp	Forest destruction
Lake Bogoria	National Reserve, RAMSAR site, Important Bird Area (IBA)	Flamingos, Greater Kudu, Klipspringer Soda lake, Hot springs Avian diversity	*Prosopis* encroachment Lack of infrastructure – poor roads
Emsos	WWF funded Communal campsite and nature trails	Hot springs and pools Fig trees, vegetation Wildlife trails	Agricultural encroachment Human-wildlife conflicts Land degradation
Maji Moto	Community campsite	Hot springs	Land degradation
Kamar		Crocodiles Avian diversity	Water availability and quality Human-wildlife conflicts
Sirimta/ Molok		Avian diversity Riparian woodland	Land degradation Water
Irong	Community sanctuary	Kudu Landscapes Pattas Monkey	Water
Kamnerak swamp		Avian diversity	
Radat		Honey production	Charcoal burning
Bekibon	Proposed sanctuary	Erosion gullies (as landscape feature!) Greater Kudu	Erosion
Tugen Hills	Government and local forest reserves	Indigenous forest Landscapes Avian diversity	Agricultural encroachment Land slides Poaching
Kerio Valley		Gorge Crocodiles	Land degradation Gully erosion Pollution Poaching
Chororget		Forest on highland slopes Colobus monkeys Blue monkeys	

4.2.2 Time trails

Tugens descend from a group of Nilotic speaking tribes that migrated into the area around 1600 originally settling in the Tugen Hills. During the 19th and 20th centuries a series of droughts and famines along with colonial subdivision of land forced African pastoralists into the lowlands whilst colonial; settlers claimed the more agriculturally productive lands to the east and south (Anderson 2002) and competition for land in the southern Tugen Hills (Johansson and Svensson 2002). Under the Kenyan Land Commission in 1932 boundaries delineated African 'reserves' and cut tribal groups off from the benefits of spatial mobility. This disturbed traditional transhumance and tribal economic management of the lands which maximised the carrying capacity of their lands. Anderson (2002) estimates that there were around 10000 Tugens settled in the Baringo lowlands by 1920 and around 40000 head of cattle by 1911, around one animal per 10 acres of land. In 1999 the human population of Baringo district was recorded at 265,000 (KNBS 2010) and is estimated at over 336,000 in 2008. Livestock density is also significantly higher (Wasonga et al 2011) and often concentrated in key grazing areas such as the wetlands.

Rapid increases in population and livestock in Baringo District have been identified as factors driving land use and land cover change in Baringo District contributing to land degradation (Johansson and Svensson 2002; Kiage et al 2007; Wasonga et al 2011) although in other areas of Kenya population growth was deemed less significant than land privatisation and increase in monoculture in land degradation (Homewood 2004). Population growth appears rapid, for instance in Sandai many households have between three and ten children, the head of one household interviewed had two wives and eighteen children. Although the KNBS estimates population in Sandai at 2258 in 2008 using a 2.65% population rise from 1999, the chief in Sandai estimated the actual

population at nearer 3500. These large families give rise not only to pressures on food and water resources but for additional monetary income to pay for education. Increasing number of households has caused sub-division of land and expansion into marginal lands as well as agriculturally productive areas such as the wetlands. In both cases erosion and environmental degradation is seen to have escalated. In the foreseeable future, as the average age of Kenya's population continues to increase, children marry and new homesteads and farms be established, pressures on land, resources and ecosystem services will continue to escalate.

4.2.3 Encounters along the trail

In this section I draw on encounters from along the trail to illustrate the interconnectedness of issues surrounding ecosystem services that support human well-being and the role that traditional knowledge and values seems to play in supporting ecosystem services is illustrated. But the trail of Tugen culture is rapidly evolving, becoming a hybrid mixture of tradition and modernity and so cultural relationships with the environment are altering. These changing environmental and social pressures are also discussed. Agrawal and Redford (2006) criticise the generalisation of focus on particular aspects of poverty or biodiversity rather than the complex multiple components and the format of this section is designed in response to this criticism to show the complexity of issues facing people and ecosystems in this area. However, I start with an illustration of how different worldviews can alter cognitive understanding. This example is clear but reflects how epistemological approaches may influence decision making.

Issues of space and distance

The distances travelled each day varied from just seven kilometres to thirty kilometres (Table 4.1). My guides knew their own sections of the trail well and were familiar with roads to nearby towns, markets or schools but they were all eager to learn more about the trail outside of their own familiar space. Concepts of spatiality were difficult to resolve between myself and my companions and translation of cognitive concepts of how far we had to travel into distances (kilometres) or times (hours) that I could relate to was misleading for us all. In most instances the reality proved to be far less than the estimate; a day's walk that was estimated at around fifteen kilometres proved to be from seven to nine. The time that local people said they would take would inevitably be far less than I took due to their walking fitness. A distance of nine kilometres downhill would normally take one of my guides less than an hour, but then this is the breeding ground for Olympic athletes. This change in perceived and actual time needed to walk a section of the route also reflects on my own upbringing and familiarity with travel by vehicle as Amato describes, "the revolution", (away from walking) "alters conceptions of space, distance, motion, movement, and the amount of energy necessary to invest in travel." (Amato 2004:2). In places, where I had to duck and dive to avoid acacia thorns, I had to 'learn a new vocabulary for the body' (Tuck-Po 2008: 28) and could not follow my natural walking rhythms.

Travel distance has significance in valuing ecosystem services both directly and indirectly. Women particularly have physical and burdensome encounters with the distance between home and resources (see Chapter 6 Women's Trails) and these are linked to other issues such as health provision. In Molok I came across the impact of having to walk long distances as part of everyday life that is often overlooked within policy making.

We walked back to camp via the small village of Molok and I stopped at a local clinic to talk to the two male nurses. Raymond eloquently told me about the hardships of running a small medical centre in such a remote location. Patients would walk 15 kilometres or more to get treatment. Women with babies lined the benches outside the building and kept arriving as we talked, often dusty and tired from their trek. I compared their trek of necessity with my trek as research. Many of the people did not believe that a mzungu could walk so far and why would they want to? Where was my vehicle? One of Raymond's concerns was the lack of a fridge in which to keep vaccines and serum. This meant that ante-natal clinics had to be held on the day on which he received the vaccines. Snakebites are also relatively common in the area, yet victims have to travel another 20 kilometres to get treatment, and may not even make it. One day Raymond also dreamed of getting funding to build a maternity wing but at the moment they coped with two small rooms and scant medical supplies. Over $1billion is given annually to Kenya in aid from the 'developed' nations. As many have asked before, where does this go? Has anyone in USAID thought about giving Raymond a fridge?

(Reflective diary Moore 2008b)

This account highlights that not all ecosystem services are beneficial. Diseases, such as malaria, venomous creatures, and arid environments may be considered as ecosystem dis-services. The spatial component of these issues to ecosystem valuations is striking. The need to walk, access to facilities and transport was inter-connected with health care and implicitly linked to hazards of ecosystems at local scale. Even when local issues are identified, the suffocating layers of governance between the grass-roots need and the aid providers inhibit action where it is needed (Easterly 2006). Wildlife conflicts are exacerbated by both the inaccessibility of medical care and the lack of direct accountability. Payment for ecosystem services is one approach to protect beneficial services, perhaps assessment of the costs to human well-being from environmental dis-services may contribute to evaluation of aid payments and subsidies.

Issues of Biodiversity

Despite the day to day dangers of snakes and remoteness, there are numerous pockets of biodiversity across the Rift Valley. Biodiversity is an important ecosystem service for its direct value in supporting provisioning services, food, fuel, grazing but also for its value in tourism, by adding value to the route as a tourist trail. Wildlife havens ranged from the established national reserve of Lake Bogoria (LBJMC 2007) to local water sources that were used by wildlife and humans alike; from the 'natural' sight of over a million lesser flamingos on the soda lake to landscapes of human productivity such as the acacia woodland of honey producing areas that attracted diverse bird species; and from the inaccessible escarpments leading up to Choroget that were cloaked in lush primary forest and harboured monkeys, and probably other smaller creatures, to the parched eroded arid lands of the Baringo Valley where tracks of snakes and scorpions hinted to the life there. The Trail was full of unexpected surprises as the following extract from my diary illustrates.

Suddenly, as we climbed, someone whispered loudly, 'Colobus'. On the opposite slope of our winding path a group of four black and white colobus were feeding. I was delighted. These monkeys are increasingly rare, inhabiting the remnants of the Sub-Saharan forests. Their distinctive black and white fur has made them status symbols for tribal ceremonies although taboos on reckless killing have also helped preserve them. This small forested chasm climbing up to the plateau above was a haven for wildlife, yet had no statutory protection, nor, from what I could find out, had it been thought of as special. Again it was another pocket of nature that has gone unnoticed. (Reflective diary Moore 2008b)

Some wildlife, such as the Colobus Monkey and Greater Kudu, have ceremonial significance. Tugens, as many tribes, have clans, relational groups that identify through common heredity. Each clan has an associated symbolic totem taken from the environment and a personal link to animals is found through clan symbols (Table 4.3). This is used as a means of recognising relations from different clans to prevent intermarriage. Most people I met knew and related to their clan symbol. Early in my studies a family I was interviewing shared their totem with me and I was given the name of Kmoi – Buffalo. In oral histories animals possess certain traits and characteristics (Table 4.4). However, I found no evidence that these clan associations had any corresponding meaning relating to the character of a person or family.

Table 4.3 Clans with their associated totems. Source: Raphael Kimosop 2008

Clan	Verse (sub-group)	Totem (Tugen name)	Totem (English translation)
Tarkok	Kapchesum	Chechelei	Jackel
	Kapbarkute	Kiplewe	Wild dog
	Kapkerwa	Arawe	Moon
	Kapchelai	Terkek	Guinea fowl
Kabon	Kaplochuria	Mose	Baboon
	Kipyeken	Mose	Baboon
	Kipsiwe	Chelelei	Silver backed jackel
Teriki	Kiptoikeny	Belio	Elephant
	Kipkwony	Belio	Elephant
Sote	Kaparturo	Asis	Sun
	Kapmamer		
	Kapbarkinyo		
	Kapsangut	Kipchorise	Squirrel
	Kipcheret	Mechwe	Tortoise
Kobilo		Saptet	Porcupine
Tingo	Tingo	Chesinye	Hyena
Kimoi	Kapcherono	Soe	Buffalo
	Kapchepkilot	Soe	Buffalo
	Kapchepkech *	Soe	Buffalo
	Kapkurui	Soe/chebente	Buffalo/Gecko
Kipcheret		Mechwe	Tortoise
Talai		Mororoche	Frog
Sokome	Kapmoronoi	Chesirere	Hawk?
Saniako		Cherore	Monkey
Sote	Kipasiso	Asis	Sun
	Kapsangot	Kipnigute	Ant bear

Table 4.4 Traits or characteristics for a selection of animals as reported from oral histories (Chesaina 1991) and in my own discussions with Tugen people.

English	Tugen	Chracteristics
Hare	Kiplekwe	A trickster, a cheat, cunning
Elephant	Belion	Big and stupid
Lion	Ngetuny	King or chief; wise
Hyena	Chesinye	Greedy; destructive; one track mind; glutton
Monkey	Cherere	Versatile and cunning
Baboon	Mose	Ugly old man
Buffalo	So	Stubborn, unpredictable

Chameleon	Nyeret	Wise, but slow; makes silly mistakes
Crocodile	Kuikuye	Selfish; destructive; low intelligence
Owl	Sukuru	Bad omen
Greater Kudu	Saramee	Long horns, grey, Second largest Antelope
Ostrich	Kapsongolian	Benign

The Tugen relationship with wildlife is normally less spiritually based but more of a benign acceptance. Many older Tugens reported that they lived in harmony with wild animals, grazing their livestock alongside them, and said that wildlife was respected. In many places, I was enthused by the natural, cultural protection that creatures were given. For instance the Assistant Chief in Kamar told me:

The crocodiles have a problem when the water has finished. They go to those hills until the time of rains, so they have got a lot of problems. We would like to assist, to construct another dam because this one is a sealed dam. We see in this field now it is a public field, it is not somebody's land. So we would like to construct a dam around this area to get a lot of water.

In Kamar the solution of the conflicts arising from the resident crocodile population in the dam eating livestock was not to cull them but to request money and aid to build a third, enclosed dam just for wildlife. There is a clear ecosystem services connection here between biodiversity and human need and building on traditional values would benefit both wildlife and human need.

However, there were conflicting accounts about whether killing animals was actually taboo, just disapproved or governed by complex traditional laws. William Kimosop discussed some of the laws that governed hunting:

> *Hunting was a major pastime and source of food. And people had a management system that said 'look the animals have moved this way and it is the breeding season nobody should shoot a female you should only go for a big male'. They had rules. So when hunting the wild animal you were not allowed to kill two species in a day because you looked greedy. If I went to hunt kudu I should not come with an impala as well. It's a way of management.*

Several reports revealed that hunting parties could be arranged if an animal had been causing disturbance but that individual hunting was seen as unnecessary. For instance if baboons were causing a problem by raiding crops or if a predator was killing livestock a hunting party would join together to eliminate the problem but it was strictly controlled by tribal laws and an elder would establish when enough animals had been culled.

In general I found that the wazee had a respect for wildlife and the environment based on tradition, the educated youths had an understanding of traditional beliefs, conservation issues and the economic value of protected areas. However it was in the current middle age group, that there was the most contradiction. At barazas (village meetings), chiefs and leaders advocated protection of wildlife and environmental conservation. However many men carried bows and arrows when out in the bush. I was normally told that this was to protect their livestock but there was evident embarrassment and suspicion when I tried to talk to them. Antelope, particularly gazelle and dik dik, were referred to as 'sweet meat'. On two occasions while crossing the Kerio Valley and later climbing up the Elgeyo escarpment, eerie whoops and whistles

echoed around the lowland. I was told this was youths hunting baboons or hyena that were stealing their crops or killing their goats although the sight of ten men carrying one small dik dik to feed their families belied this statement. Personally, as a conservationist but also as a humanitarian, I found this sight profoundly difficult. Hunting animals for meat, now called poaching, is still practiced although not often openly acknowledged. How can conservation succeed and should it take priority when poverty and hunger demand use of natural food? Yet, to meet the needs of future generations, the depletion and eventual extinction of wildlife and other natural resources should be prevented. The need to hunt is illustrative of the trade-offs in ecosystem services in general. A combination of new, financial incentives to protect wildlife because of tourism combined with traditional values may be used to help protect biodiversity but poverty and hunger will hold greater value.

Issue of water supply and quality

The request for a new dam for crocodiles in Kamar is also instigated by the need for water. The Assistant Chief went on to talk about the problems of water supply.

> *This local community is facing a lot of problems. The first one is drought, there is insufficient rain throughout the year. At the same time, because of this environmental condition; always it is hotter and hotter. That is why water can evaporate easily. In addition to that there is not a permanent dam or rivers throughout this area. In the constructed dam the water is not clean for human consumption. On livestock, when the drought comes they go swiftly and we remain with no food. Generally we are suffering because we don't have sufficient for human needs.*

Because of the persistent drought people are running short of food completely. Now we are dependent on food aid programmes from either outside or from within the country. We tried planting our crops but it dried up because there was no rain, especially this year. We are expecting rain to start in March next year.

(Philip, Assistant Chief, Kamar, July 2008)

Lack of water adds to the austerity of the landscapes of the lowland which reflects the poverty and hardships of its residents. The global concerns of water security (Postel 2003) were illustrated in these lands; in almost every place that I stopped water and drought were discussed as prime issues. The Millennium Development Goal of ensuring environmental sustainability by, "halving, by 2015, the proportion of the population without sustainable access to safe drinking water and basic sanitation" (UN 2008a) seems a distant dream in this remote location of Sub-Saharan Africa. It even seems unlikely that any of the Millennium Development Goals will be fully met in Africa (Easterly 2009). When I edited my films I found that unintentionally we had filmed water almost everywhere it occurred which highlighted its significance as an ecosystem service in this semi-arid region.

Water quality as well as quantity is also significant as my diary shows.

I never failed to be amazed and slightly sickened at the sight of people drinking brown silted water wherever I went. I was always conscious of water and its purity and refused to drink anything but my own bottled water. My companions

often joked to me about the strength of their stomachs compared to mine and how this

water was fine for them to drink.

(Reflective diary Moore 2008b)

Later on the trail I crossed another important river, the Kerio River, which was the boundary between the Tugen and the Kaiyo people, both united as Kalenjin as they share similar language but, until recently, fighting over cattle. During these cattle wars one complete ageset of Tugen men, the Maina, was wiped out. (An ageset is a the grouping of men who go through initiation during a 10-15 year period. Women have their own agesets, if initiated which is now rare, but take on their husbands ageset when married.) The Kerio River is now a place of another conflict, serious environmental pollution caused by unregulated mining of fluorspar.

> *However this route via the fluorspar mines gave me the opportunity to*
> *see another aspect of life in the Rift Valley and the dangers of resource*
> *exploitation. I stopped to talk to two local men on the bridge. They*
> *complained that the company Kenya Fluorspar (EPZ) Ltd rarely*
> *employed local people except as occasional cheap labour. The damming*
> *of the river and use of the water in the processing plant had polluted the*
> *river and made it undrinkable for humans, and in some instances,*
> *livestock. There has been no compensation either from the company or*
> *the government.*

(Reflective diary Moore 2008b)

Despite my earlier arguments that purely valuing ecosystem services in economic terms is problematic here is a clear example where putting a monetary damage cost (King & Mazzotta 2000) on the use of water by the fluorspar company could mitigate for their

use of ecosystem services. The loss to local people of clean water supply through water extraction and pollution means they pay the opportunity costs of the company.

Issues of water supply and quality pervaded the concerns of all I met and ecosystem service values of water in a gendered context will be discussed in greater depth in Chapter 6 Women's Trails.

Issues of environmental change

As well as the pervading issue of water, more general changes to the environment were noted by older people. One constant theme was the remembrance of when the lowlands were covered in grass, there were few trees and rhinoceros, now rarely seen in this region, were plentiful as this mzee (old man) remembers.

> *This place was colder and we had taboos. The environment was good with heavy rains and tall grass, compared to how it is now, with bushes. There were rhino which were protected because of taboo. The place was not bare. Animals could graze well and feed faster especially the livestock.*

> (Chesiree Chebii, Kapkelelwe)

This illustrates a general change in vegetation as today many of the lowland areas are either covered with scrub such as Wait-a-bit thorn (*Acacia millifera*) or the ground is dry, lacking in suitable grazing for livestock and often severely eroded. In some areas, encroachment by invasive species, such as *Prosopis* around Bogoria, or Tipilikwe (Kalenjin name) around Bekibon as well as the abundant acacia scrub, has reduced available grazing for cattle. Replanting of grass in degraded areas using fenced plots, as being promoted around Lake Baringo by the Rehabilitation of Arid Environments

(RAE) Trust, has provided a sustainable income for people in that area but as so many development schemes its impact is localised.

Mature Acacia such as *Acacia tortilis* are valuable for shade, provide nectar for honey production and worthy of protection. Yet, the more mature acacia are used for charcoal burning, for use at home and for sale, and where poverty levels are greatest, this may be the only form of income. This practice is heavily criticised by conservationists for its destruction of tree cover which maintains soil moisture and stability and regulates climate. The drivers of change in ecosystem functioning are being affected by people's immediate needs for fuel and food for their livestock. Acacia woodland is also used for bee-keeping and the traditional hollowed out wooden hives are a common site. Encouragement of bee-keeping and the need to preserve the acacia woodland for pollen and nectar to create honey is used to dissuade people from charcoal burning and honey production is a growing industry that can alleviate poverty (Honey Care Africa Ltd 2010).

Other environmental change was noted in the Tugen Hills. In the highlands the natural forests have been depleted induced by increased cultivation of the steeply terraced slopes. Nationally, only 2-3% of Kenya's land is covered by forest and yet these forests provide wood and wood products to over 80% of households (Kenya Forests Working Group 2008). The rapid loss of natural forest is of great concern in Kenya due to a mix of government, commercial and local encroachment. On the fringes of the Tugen area colonial settlement saw the loss of forest around Chororget more than a century ago whilst in the last decade forest on the Eastern edge of the Rift Valley has been felled for a government resettlement scheme. However there is still 60% forest cover in Sacho division in the Tugen Hills with 35 designated Forest Reserves but these too, despite

traditional values that protect forest, are under threat as outlined by the District Officer in Sacho.

The Tugens actually have a big reverence for the trees and forests. They believed that the forests provided them with food, medicine and enabled them to practice their cultural activities such as weddings and circumcision. They also believe that their water and their livelihood depend on the forests and the trees. However at the moment changing livelihood systems are becoming a big threat to the conservation efforts of the forests in Sacho Division.

(District Officer, Sacho Division)

I saw evidence of 'poaching' of mature hardwood trees, particularly red cedar, in the area. Some of the most productive land is on hill slopes and the change in livelihoods is prompting forest clearance for cultivation. Traditional practices and knowledge may not support these changes; in a survey of hill farmers' knowledge Okaba and de Graff (2007) found that farmers understood soil fertility but their understanding of causes of degradation was 'contradictory to scientific evidence' (Okaba and de Graff 2007:486), thereby constraining their ability to mitigate for the causes of erosion, although this view of lack of 'scientific' knowledge may be questioned. The Agricultural Officer in Sacho sees the roots cause of environmental degradation being the level of poverty.

We have seen a correlation between the poverty levels around and the destruction of the environment in that people will start to destroy the environment to try to have a livelihood. This has gone to cutting the

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trees because they want to use the trees to buy food or pay school fees. If

we can address the root cause which is poverty we are going to maintain

the environment. The bottom line lies on poverty.

(Agricultural Officer, Sacho Division)

Once more the direct need for natural resources outweighs consideration of longer term ecosystem services supported by the trees. As traditional patterns of pastoralism are lost there are trade-offs in the use of ecosystem services to fulfil immediate needs against future sustainability. These anthropogenic-induced environmental changes have decreased the ecosystem service value of this land.

Issues of traditional medicine

One of the areas of knowledge imparted to me by my guides and others was that of medicinal trees and herbs. Traditional medicines are still a major part of the health care of Tugens.

In fact at the moment if anybody gets malaria 80% do not go to the

hospital, they go to the traditional healers who go to the forest and get

them the medicine. The medicine is so effective that in two days they get

healed. (District Officer, Sacho)

All my guides had knowledge of trees and medicines, even the sodaic deposits around

Lake Bogoria were collected. Table 4.5 is a small selection of some of the plants identified to me and their uses. One fascinating interview was with the koko (grandmother) of one of my

guides who was renowned as a medicine woman. She lived about seven kilometres away from our campsite and late one afternoon I set off with Rotich to meet her despite the pending storm. She was charming and insisted on putting on her best floral frock for the filming. She told me that she had learnt her trade through treating children and women. She showed me a sack full of pieces of wood which she identified through touch, taste and smell to supplement her failing eyesight. (Tugen Trails Video, Appendix 3) But there was one tree that she lamented that she could no longer find locally. It was a powerful traditional medicine but the mzungu had come and taken it all away. This was 'Murmorwo' or sandalwood. This is now a protected species in Kenya and it is illegal to cut and export it.

Table 4.5 A small selection of plants identified along the Trail that were commonly used for medicinal and other purposes.

	Tugen Name *Latin name in italics*	Description, Uses and Properties
	Likwonde	White barked tree Used for stomach problems Cures foot rot in cows Host tree for a saprophytic plant used to appease Evil spirits when people are sick.
	Muntur	Bright red saprophyte on acacia root Eaten by baboons and humans during the early rainy season The root boiled and drunk to treat stomach upsets.
	Kuryonde	Shrub. Long green leaves Boiled infusion used for skin diseases, rashes

	Uswe (live tree) Itee (cut stick) Gornista *Acacia brevispiza*	Flavours and preserves milk Used in making mersik (sour milk)
	Keteleswo	Tree with green peeling bark Branches are cut and used as an emergency source of drinking water and glucose
	Rorowe *Cissus rotundifolia*	Green succulent Cows eat dried leaves Food for tortoises
	Muiri (Swahili) *PrunusAfricana*	Cure for cancers, prostate cancer Cure for headaches
	Ushwo	Used for washing calabash as removes taste of milk Boiled and drunk to wash the stomach
	Murmorwo Sandalwood	A cure all now almost disappeared in the region Cure for cancers Water purifier
	Lelekwo	Shrub/tree with silvery leaves Boil with water to cure blocked nose/cold Used as firewood
	Cheramba *Lantana camera*	Good for improving soils Leaves dried and used to ill wounds(Boils) Frits used for cleansing stomach

	Seseye *Acacia tortillas*	Used as shade And for making charcoal Pollen producer Logs used for hives
	Kasubwa *Euphorbia calamiformis*	Succulent used to cure malaria
		Fig trees are often sites of spiritual meaning for Tugen people. The picture left was taken at Fig Tree camp by the side of Lake Bogoria
	Mokuiwe Grecian villas	Low growing herb. Soft slightly downy leaves Cure for amoebic dysentery

Similarly the Chief of Sacho Division, told me of many medicinal plants that occurred in the Tugen Hills and particularly *Prunus Africanus*, which is used pharmaceutically to cure prostate cancer but again has been poached and is now heavily protected. In global markets these trees have high economic value and, although the direct use value at a local level may appear low, the affects of bio piracy are very real for local communities who depend on traditional medicine. Imported drugs are often too expensive or just unavailable without a long trip to hospital.

Summary of issues encountered along the trail

The walk across the Rift Valley illustrates that traditional values still influence Tugen lifestyles. Yet, inevitably, because of poverty together with aspirations for development, comes change in culture and livelihoods. This further precipitates change in the environment which in itself alters local practices.

Also illustrated in this section are some of the significant issues, both environmental and social, that were encountered, summarised in Table 4.6. Many of these issues are often tackled separately yet taking a holistic overview illustrates the enormity of the challenges to be faced for both environmental conservation and development in Africa. The ecosystem service approach helps to categorise environmental issues and to relate them in more detail to human well-being although, it is argued, the commodification of nature may not always be appropriate in subsistence communities. Yet using appropriately phrased terms, ecosystem services may prove a useful way to communicate the value of the environment in maintaining livelihoods.

As I talked to teachers and children in schools along the trail I found that awareness of environmental issues seemed to deteriorate as I left the sphere of influence of the Lake Bogoria Reserve and its community and school outreach programmes. Possibly, there is now scope for a more focused educational policy reframed around ecosystem services, highlighting the benefits to human well-being (Ewel 2001). Ecosystem management across the Rift Valley is facing many obstacles. Education and awareness-raising is critical in the process of avoiding further degradation and improving the environment for humans and non-humans alike. One mechanism that could be improved is linking traditional values and incorporating them alongside science in mainstream education.

Another is strengthening the spatial links between highland and lowland governance. Development of the TransRift Trail as a tourist trail across the Rift Valley and Tugen lands may provide a means that will raise awareness of the interconnectedness of issues surrounding ecosystem services that support human needs. However, linking environmental conservation through using tourism as a development tool is not without its challenges, as the following section will discuss.

Table 4.6 Summary of the issues encountered across the Rift Valley.

Issue	Impact on ES ↑ Increase ↓ Decrease	Impact on local human well-being S - short term
Charcoal burning	↓Erosion regulation ↓Climate regulation	S ↔Basic materials
Poaching	↓Biodiversity	S↑ Basic materials ↓Social relations
Grazing	↓Erosion regulation	S↑ Basic materials
Deforestation	↓Erosion regulation ↓Climate regulation ↓Cultural	S↑ Basic materials
Biopiracy	↓Biodiversity ↓Cultural ↓Genetic resources	↓Health ↓Freedom of choice
Invasive non-native species	↓Biodiversity ↑Erosion regulation	↔Basic materials
Drought	↓Water supply ↓Food supply	↓Basic materials ↓Health ↓Freedom of choice
Mining	↓Water quality ↓Water regulation ↓Cultural	↓Basic materials ↓Health ↓Social relations
Lack of transport/facilities		↓Health ↓Freedom of choice
Bee keeping	↔Pollination ↔Food ↔ Cultural	↔Basic materials

4.3 Tourism Trails

This section critically assesses the TransRift Trail as a tourist route, and as a mechanism for linking ecosystem services and poverty alleviation. Although not about tourism *per se*, it is a useful case study for this research to review how the value of a service is constructed from combined traditional and market forces. Tourism may be used as an incentive to improve human well-being but also to support conservation of other ecosystem services, rather than simply being framed as a cultural service (Table 2.1).

4.3.1 Trails as a form of pro-poor tourism

Walking in rural areas in many developing countries is the normal means of travelling; indeed it is a necessity. In Western countries with a well developed transport infrastructure it is a leisure activity and increasingly a way to demonstrate environmental concern. Tourist trails are now being opened up to new travellers in Africa and introducing tourists to new regions. The effect is two-fold - it brings tourist income to new areas and relieves the pressure on popular destinations which are being damaged by their very popularity. In 'Nature's Benefits in Kenya' there is a warning that:

> *"To protect wildlife and ecosystems from serious damage caused by overly high visitor densities, tourism planners need to promote underutilized areas and spread visitor numbers more widely across destinations. This would also help to distribute tourism-related costs and benefits more evenly across the country."* (WRI 2007:93)

One of these new areas is the Mid Rift Valley.

The newly established Great Rift Tourism Forum (GRTF 2009), previously Mid Rift Wildlife and Tourism Forum (MRWTF), is a consortium of government organisations,

NGOs, private sector, academics and local organisations. This forum is endeavouring to open up this part of the Rift Valley region for greater levels of tourism but they face a difficult challenge. Lake Bogoria, Lake Baringo and the Kerio Valley have a population of 830,652 out of whom 361,503 (43%) live below $2 a day. Visitor arrivals in the area are reported at a mere 137,000 for 2007, a small proportion of Kenya's total tourist arrivals of over 2 million (Kiecha et al 2009). Low numbers of tourists to the region do little to alleviate the high poverty levels. The region does not have 'big game' and large expensive lodges that in other regions draw wealthy international and local tourists but it does have unique landforms, friendliness of cultures, rare species including Greater Kudu and potential for sporting activities. Yet its potential for tourism has not been tapped because of an unfavourable attitude to the region by the tourist industry, tribal conflicts, poor marketing, lack of social capital and few tourist facilities (Kiecha et al 2009).

The MRWTF was anxious to develop a form of tourism that would link communities more directly to benefits and were keen to promote both pro-poor tourism and ecotourism. Pro-poor tourism attempts to bring tourism closer to development (Ashley 2007); and ecotourism is defined as "Responsible travel to natural areas that conserves the environment and improves the well-being of local people." (International Ecotourism Society 2006:2). These approaches offer respect for local culture, minimal impact, building environmental awareness, financial benefits for conservation and local people, and supporting human rights as key ingredients (Honey 1999). New marketing strategies are being devised for the area, which take steps towards poverty alleviation and wealth creation (UNWTO 2008). Strategies include 'circuits', tourist routes between the prime locations and attractions such as the standard weekend 'circuit' for visitors incorporating Nakuru, Lake Baringo and Lake Bogoria; and concepts such as

home stays, community initiatives, adventure tourism and walking trails which create local opportunities are being discussed (MRWTF 2008:27). These concepts offer prospects for direct sales from locals, local employment and business ventures although there is a need to build capacity to support increased tourism.

In Kenya, the ambitions of the MRWTF and the potential for wide spread development of local livelihoods is a difficult proposition to meet. The Kenya Government's Vision 2030 is promoting Kenya as a more exclusive tourist venue and 'aims to be among the top 10 long-haul tourist destinations in the world offering a *high-end*, diverse, and distinctive visitor experience that few of her competitors can offer'. This seems at odds with development of low key pro-poor tourism ventures, although Vision 2030 does also seek to promote an initiative to support and upgrade under-utilised parks and to certify 1,000 home-stay sites. The MRWTF goal of developing alternative tourism requires both efforts from many stakeholders within the region and recognition and support by ecotourism promoters from outside.

The benefits of long-distance trails in the African context are difficult to assess. There is an issue of who would form the client base for such a trail. The domestic tourist market in Kenya does not appear to be attuned to adventure travel and hiking holidays; wealthy Kenyans prefer comfort vacations. The tradition of wilderness and adventure travel is a Western concern (Amato 2004). The international market currently focuses on challenge trails such as Mount Kenya or Kilimanjaro. Yet, hiking trails used as conservation strategies can be identified in other regions of the world. In South Africa the Rim of Africa Trail is advertised as a 'Conservation Mega Trail' (Rim of Africa 2008). In Britain and America there are many long distance trails mostly through 'wilderness' areas where the attractions are the landscape and sense of 'aloneness' as well as wildlife. The attractions of the TransRift Trail of landscapes, environment and

culture leave it well placed to become an important and appealing alternative to some of the other great trails of the world.

Features of benefit to tourism and challenges on the Tugen Trail, are identified in Table 4.7, after the work of Cook (2008) who uses a benefit transfer procedure to estimate the economic value of establishing a new long-distance walking trail in Australia. There she found a clearly comparable trail locally, in north Queensland, from which to estimate the transfer costs to the new trail being designed. In the TransRift context there are no such comparable tracks so the true economic benefits of the Tugen Trail cannot easily be assessed which makes it a unique venture but with unknown outcome.

Table 4.7 Attractions and challenges of the TransRift Trail (adapted from Cook 2008)

	Physical features	**Aesthetic features**
Attractions	Linear walking trails	Wildlife viewing
	Distance (140km)	Adventure travel
	Wilderness camping	Landscapes
	Tropical climate	Off the beaten track
	Rivers	Cultural interest
	Highland and lowland habitats	Landscape, wildlife
Challenges	Flooding in rainy season	Limited facilities
	Heat in dry season	Limited access to drinking water
	Access difficulties	
	Health and safety	

Hill et al (2006) report on the new Mehloding Hiking and Adventure Trail, in South Africa, which in concept reflects the aspirations of the TransRift Trail. Here the initiative was led by a local NGO and a private consultancy, with financial support from local and national government, although the initiative is driven entirely by local communities. Like the TransRift Trail it was designed to utilise the natural (and

historic) environment to address issues of poverty and provide diversification of livelihoods in an area of subsistence farming and livestock keeping. The most positive benefits seen along the Mehloding Trail are skills development, community involvement, employment opportunities and stimulating new economic activity. However, as with many pro-poor tourism ventures, there have been a number of concerns from the Mehloding Trail that may well offer advice in moderating the expectations from the development of the TransRift Trail. The number of jobs offered are limited, and there are dangers from unwanted changes and influences due to 'cultural intrusion' (Hill et al 2006). Hill et al (2006) raise concerns about the scale of effectiveness of nature-based tourism as part of a wider rural development strategy. Kamuaro (2009) critiques the cultural and environmental degradation that can be caused through over-exploitation of the ecotourism industry in the name of 'sustainable, nature-based, environmentally friendly ecotourism ventures'. The TransRift Trail has to address these issues and expectations in order to succeed.

The vision for the TransRift Trail is to network together the many pockets of lesser interest, which individually cannot be seen as having a powerful enough draw to attract more than occasional visits, with the added adventure of exploring a new destination on foot so creating a more substantial tourist experience. Within the scheme for ecotourism development in the MidRift the Tugen Trail would offer a form of alternative tourism in that hikers are exposed not only to the romanticized image of beautiful African landscapes (Neumann 1998; Wels 2004) but to arid areas with extreme degradation, to dried up water sources, and the underlying hardships of people along the way. Perhaps this is not the idyllic glossy spread of the tourist brochure but it is a more decolonising attitude to tourism and even ecotourism.

However, this immersion in the 'realities' of African life in itself may be problematic for both the local people and tourists.

As we entered Chororget, two old wazee, approached in their Sunday suits, on the way back from church. They welcomed me and I explained to them about my walk. They were delighted and asked if I would return to meet their chief more formally. One of the men was of the Maina ageset of the Keiyo and he was probably about 90 years old yet still strong and upright and an advertisement of the healthy lifestyle here. He remembered going to serve in the second world war with the British. However, just as they had agreed to talk to me on film, a group of younger men who had been drinking came up and started to demand money. I found it a sad reflection on the changing values of respect and hospitality that all the tribes in the region show.

(Reflective diary Moore 2008b)

Wherever I walked I met the welcoming nature of the traditional culture yet as I walked I was repeatedly asked for personal financial aid, particularly for education, or to acquire aid towards community development. For researcher or tourist this can leave a burden of guilt as to the disparities between wealthy and poorer nations and peoples but it is also a reflection of the 'dependency syndrome' that pervades postcolonial Africa (Maathai 2009). Increased ecotourism, even when developed for philanthropic reasons, has to mitigate for the negative aspects of increased cultural mingling (Sindiga 1996).

The growth of eco-tourism has given rise to discussions of authenticity, identity and hegemony within the tourist industry (Fürsich & Robins 2004). For instance, Hall and Tucker (2004) question the growth of ecotourism in the developing world from a postcolonial viewpoint. Within the Tugen areas where the culture is apparently hybridised, traditional practices and lifestyles are not always evident. But in manifestations produced for the tourist market there is evidence of commoditisation (Cohen 1977) to create a cultural product. The Lake Bogoria dancers use traditional songs in choreographed routines with a red 'uniform' that adheres to the tourist view of tribal Kenya that is depicted by the red shukas of the Maasai. This is a re-creating of a culture pampering to western ideas. The traditional dress less than half a century ago was animal skins but dancing in skins brings other 'primitive' connotations to both tourist and Tugen.

There is also a danger that pro-poor tourism will minimise the environmental conservation emphasis embedded in the concept of ecotourism in favour of community gain even though this is essential to maintain tourist interest. The reality of increasing tourism in the region, particularly bringing income at grass roots level, must be viewed cautiously (Kamuaro 2009). In terms of ecosystem services, tourism offers some potential to offset the direct value that people get from ecosystems, such as wild meat, but requires a realistic assessment of income potential and strength from building capacity to support trails as a new tourist venture in the region.

4.3.2 Trails as a conservation strategy

Another key motivation for the development of the Trail is that it offers a strategy to build environmental conservation awareness in this region. The following section looks at how this may be brought about.

It is envisaged that tourist trails can not only give financial incentives, but act for ecosystem conservation through aesthetic and cultural means, such as re-establishing cultural connections between people, wildlife and environment in a landscape scale strategy. The arguments for conservation grow stronger when individual initiatives are not perceived in isolation. Networks of trails both human and non-human, 'human' corridors alongside 'wildlife' corridors, entwine and support individual initiatives and attractions. The changing and diverse landscapes across the TransRift Trail are environmentally connected. This can be seen particularly clearly from the ridge that is the Tugen Hills in the centre of the Rift Valley. William Kimosop, describing how he took to conservation, drew inspiration from these heights and landscapes.

> *I was born in the Tugen Hills. Kitipsogon. It is one of the highest villages in the mountains. And it is probably where one of my inspirations to work with nature came from. Because we lived high up in a ridge that overlooks both the Baringo and Kerio basins so I used to look at the two ends of the escarpments. I could see all the lakes, all the swamps and the dry country below me. It used to be very fascinating for me.*   (William Kimosop)

Similarly the Agricultural Officer in Sacho considered that one means to improve conservation in the area is by generating an appreciation of the Tugen landscapes amongst the Tugens themselves as this extract suggests:

> *The scenic beauty of this area is good. You look at the mountains. This can be used as tourist attractions whereby people can come and see the beauty of nature. That is why we are urging our people, 'Can you conserve this beauty?'*   (Agricultural Officer, Sacho)

As well as aesthetic value, the Trail also offers the right of access across lands that otherwise may be fenced so that local people can "celebrate it because it was passed down to us by our forefathers" (William Kimosop 2009) thus reinstating traditional values for the landscape. Similarly, environmental conservation may be seen to be rooted in the material, spiritual and aesthetic values that communities themselves still hold. Cultural associations, values and protection of wildlife that are seen as protected or benign, as described in section 4.2, plus the traditional values of spiritual locations and medicinal plants are a means for maintaining and raising the awareness of local people that they need to protect environmental resources. Therefore one means for trails to make an impact on maintaining ecosystem services in this area of Kenya is for local communities to appreciate both the direct and indirect benefits of conservation. Improving local income from tourism with its associated links to wildlife conservation could offset the direct benefits of charcoal burning and bush meat; sanctuaries on or near tourist routes should then be in a better position to warrant deterrence from poaching. William Kimosop advocates this community centred approach:

> *The question the Community would pose is what brings people to our village? In other words let them sell the natural and cultural attributes of their own backyard. Our Irong wildlife Sanctuary, our colobus monkey laden forest, the Tabagon tower ridge.......the list is endless, coupled with folklore tales, songs, poems and not so much art but crafts. It is against this backdrop that they can easily assign an aesthetic value to their resources. Working from this everyday outlook of issues I think home grown conservation approaches can be designed to suit their own aspirations while taking care of any imposed/prescribed course.*

> (William Kimosop, email communication, October 2008)

Raising awareness would generate an understanding that hunting depletes the wildlife on which tourism depends and lessens the income and other material benefits, in terms of water and health facilities, of increased tourism that will benefit tourists and local people alike. As William Kimosop describes further:

> *So if people are hunting down some endangered species of wildlife they would be able to think a bit and say look if we kill them all what will we show. And as a conservationist it would be a major achievement if the people can take it upon themselves. Of course development like this will need associated services, health, water which not only the visitors need but it is also the need for the local people as well so it is part of development of such services.* (William Kimosop 2008)

Income generation through passing tourist trade may provide an economic incentive to preserve and protect land but this is heavily dependent on the level of income generated and it is important not to raise local economic hopes too high. The level of poverty in this area means that local people are inclined to over estimate the income that will be derived from any change. If the economic income from passing tourism is proved to be less than the value of farming or use of the natural resources in the area then over time conservation measures will be abandoned and fail.

The importance of the trail as an environmental education tool is significant. Trail guides selected from the local communities are establishing a forum for managing the trail and also to provide a network of information and to generate training and development opportunities. Several of the guides I met were former poachers. Development of greater opportunities for tour guiding will redirect their activities for the benefit of the environment and their knowledge will be used to inform their communities.

Therefore, walking trails for tourists offer a means for additional income and benefits to local communities, although the amount and distribution of those benefits may be questioned. However, more importantly, tourist trails may offer a way to improve local conservation measures and understanding through encouragement of traditional knowledge and practices. Under the ecosystem service regime productive landscapes, agricultural and pastoral, are more valued than in classic wildlife conservation (Goldman & Tallis 2009). Trails through these pastoral landscapes may increase the value of tourism as an ecosystem service that supports other ecosystem services such as biodiversity.

4.5 Summary

This chapter has discussed three main issues: tourist trails as a means to encourage conservation and to develop local livelihoods; a summary of many of the main issues connecting people and ecosystems as encountered along the Tugen Trail; and the trail as a practical example of hodology.

The Mid Rift Valley is under-rated for tourism but there is potential to develop different types of tourist income such as adventure tourism in the form of walking trails. Trails may be an ultimate form of pro-poor tourism in that inevitably contacts are made between trekkers and communities en route. Walking trails may potentially help to sensitise communities to the importance of environmental and wildlife conservation by developing a network of understanding of cultural heritage and bringing economic diversification and growth through ecotourism. However, aspirations have to be moderated, as there are synergies and trade-offs in the material benefits of developing a tourist trail which has drawbacks as well as advantages to local communities. As a form

of community sensitization for the conservation of ecosystem services trails may bring a mixed response when set against the backdrop of poverty and food insecurity.

The act of walking physical trails through a landscape provides a powerful methodology for this interdisciplinary research. Not only are bodily connections made with tangible locations but intellectual links are inevitably forged between people and place; associations are drawn between social, cultural and natural phenomena. Mapping such a walk becomes an action through which social and environmental knowledge is laid out. The walk was both a personal and social act: an "experience that bound narrative to acquisition of personal knowledge" (Legat 2008:35), and a process of thinking and feeling as I made my way *through* a world-information resonant with the movement of others around me (Ingold and Vergunst 2008). These experiences of walking the TransRift Trail have then been transformed into new narratives or trails in the form of maps, video, diary and thesis, as discussed in Chapter 7 Visualisation Trails. One of the difficulties of analysis of the reflective diary and writing up linear trails is that this process extracts themes so the critique is no longer linear. Deconstruction of the walk loses the momentum and changes the relationship between people, events and places and is in danger of losing the emotive nature of the issue. However, the analysis makes more complex links between themes and significant issues, such as biopiracy and medicinal plants, which are discussed here more fully in the context of traditional knowledge and ecosystem services.

Inner reflections have to be transformed into practical realism. Essential to the realities of living in this area are the profound connections between ecosystem services and poverty alleviation that must be addressed for sustainability of development in the future. At global and national levels the Millennium Development Goals seek to improve livelihoods for all through a variety of targets and goals and maintaining

ecosystem services are crucial to this development. Three things appear lacking. Firstly, a real appreciation of the need for 'joined-up thinking'. Although some of the MDGs may be achievable in isolation they are not independent. Formulating a mental trail through knowledge and interlinked ideas will connect and strengthen the goals through an holistic approach. Secondly, issues around sustainability of the environment and poverty alleviation through consideration of ecosystem services are not fully addressed as a necessity in the dialogue surrounding development. Particularly in rural areas in the developing world dependence on sustainability of ever dwindling resources is paramount. Unless ecosystem services are considered in their own right development of human well-being will suffer. Finally, an appreciation of the connections between ecosystem services and human well-being and the needs of local people can only truly be gathered through ethnographic research undertaken, I would argue, with a decolonising approach. Quantitative analyses generalise reality so the struggles of individuals are lost; for instance, mothers carrying babies to a clinic fifteen kilometres from their home to find when they get there that there is no fridge for the vaccine, or that water supply at Kamar is a necessity for humans, livestock and wildlife. Some of the solutions may be found at grass roots level and if development agencies work with people on the ground sustainable solutions may materialise.

Trails are multi-purpose, multi-sensual and multi-scalar. Every community and every sector of that community has its own trails walked daily for collecting and utilising natural resources. The next chapter will investigate the more local trails formed by one Tugen community and the values that they attribute to the ecosystems along the way.

Chapter 5

Resource Trails

Conservation must also become more strongly integrated with concerns about wider ecosystem health and human well-being. We need to base our work in what people see nature doing for them, for example providing food, products, a safe and clean environment, beauty and wonder, and of course livelihoods and jobs.

(Adams 2008:470)

Chapter 5 Resource Trails

5.1 Introduction

In the dark before dawn, Kiptai herds his four thin cows up the rocky trail to the sparse grazing land on the escarpment four kilometres from his home and an area proposed as a community wildlife sanctuary. The thorny acacia scrub snatches at his shawl draped around his shoulders to keep out the night air. As he and his cattle approach the muddy pan dam, Kiptai smiles in appreciation as the large silhouetted shapes of two male kudu with twisted horns rising high above their heads slip quietly into the shadows; as a wildlife monitor for Friends of Nature Bogoria he would be recording kudu numbers later in the week in a scientific study. Other striped shapes of zebra appear, snort at the disturbance and, fearful of poachers, noisily stampede away.

Leaving his livestock for the day, Kiptai walks back down the steep hill towards his shamba (farm) in the early light. On his way he finds and collects a few sections of milky stemmed Kasubwa (*Euphorbia calamiformis*) to treat his son's malaria and looks out below him at the arid brown Baringo plains stretching away to the East. Large patches of green indicate the swamps where other men and women of his community are grazing their cattle and goats. The edges of these swamps are ringed by cultivated land growing tomatoes and melons for sale. Other patches of irrigated land are being planted with maize. In a few places tall columns of smoke rise from charcoal kilns, where tall over-shading acacias have been felled to make room for planting. The charcoal will be sold to buy rice or to pay the high school fees for educating children.

Nearer to home he passes women and children at the river collecting water in large yellow jerry cans. Later the women will walk the same trail he has just descended to fetch heavy loads of wood for fuel or thatching grass to repair their homes. When Kiptai reaches his homestead, which is surrounded by an acacia branch stockade to keep out predators at night, his wife welcomes him with his breakfast, a flask of sweet hot milky tea, cooked in the traditional circular kitchen, built of mud, wood and grass. This is the start of daily life in Sandai.

This cameo represents the morning life of one of my key informants in Sandai, in the semi-arid lowlands of the Rift Valley, and is typical of many agro-pastoral people throughout Africa who subsist on the direct, indirect and intrinsic use of natural resources. It illustrates just a few of the wide range of ecosystem services integrated into personal livelihoods in this semi-arid area. It also indicates influences from education and cultural change and that, although many aspects of tradition are being lost as the relentless march of modernity subsumes cultures and lifestyles, rural lives still intertwine with nature. Without the ecosystem services that the environment provides freely, humans could not survive here. Even with these resources they live on the edge of poverty; struggling to feed their children and find a little extra money to educate them. Each year is slightly harder as pressure on the communal grazing areas, expansion of cultivated land and use of water resources increases due to population rise, increasing extraction of water for irrigation, the pressures for development and climate change. In the memories of the old men life was easier, their livestock fatter and the plains covered in lush grass rather than the scrubby trees of today. Their wealth was in cattle, wives and children, not money. Despite the move to a more agricultural and monetary economy, the wealth accrued from nature and its functions are unaccounted, yet their value is essential for human life.

This chapter looks at the 'values' attributed to ecosystem services for human-well being within the context of a single location (a location is an administrative area in Kenya). Following on from the previous chapter, I argue that the dialogue around ecosystem services is useful for raising awareness of the hidden contributions that the environment and biodiversity make, understanding conflicting priorities, and the imperative need for conservation and sustainable use. However, three other lines of argument are presented. First, giving a purely monetary value to these services is not applicable across all societies, at all scales, or in all circumstances, particularly in the South. Second, localised essential, and often conflicting, needs, such as the common use of wetlands for grazing, are being lost in global and national mappings. Third, local values may be mediated by 'outside' values. These arguments give rise to the questions 'Whose value counts?' and 'Who pays the price for those values?'

The chapter starts in Section 5.2 with a brief summary of the resource trail across Sandai set against the broad results from the household questionnaire and draws links between the values of ecosystem services to human needs. Two in-depth case studies are then explored. The first, in Section 5.3, critically assesses the value attributed to biodiversity and tourism in the context of a proposed community conservation area, Chuine. It argues that, set against the agendas and hopes of community conservation (Barrow et al 2000), raising concepts of future economic value creates unrealistic expectations and can distort realistic understandings of the value of such areas. The second case study, in Section 5.4, analyses the conflicting use of ecosystem services in wetlands and how there are trade-offs between traditional values for livestock, the economic income gained from cropping and future value from biodiversity. Section 5.5 summarises with a critique of the structures of power and knowledge that commodify

nature; a process that may be problematic in local communities living subsistence lifestyles and in areas of high poverty.

Accompanying this chapter are participatory videos, made with members of the Sandai community, of a walked transect across the different ecosystem areas from Kesubo swamp to Chuine sanctuary (Figure 5.1), in part following the route of Kiptai above, then back across the main cultivated areas to Loboi swamp (Figure 5.2). This trail provides a qualitative understanding behind the mapped valuations collected in the household questionnaire (Appendix 1). There is also a presentation of the ecosystem service values of different areas in Sandai using an interactive trail in Google Earth which is discussed further in Chapter 7 Visualisation Trails.

Figure 5.1 Video clips from the resource trail starting at Kesubo swamp to Chuine, along the Waseges River, across cultivated land and dryland to Loboi swamp and Lake Bogoria.

5.2 Evaluating ecosystem services in Sandai

5.2.1 Context

This section concentrates on how livelihoods and human needs are directly dependent on ecosystem services and the spatial variation of ecosystem service values. It presents quantitative results from the questionnaire set against a summary of the video encounters made on the resource trail across Sandai (Figure 5.1).

Table 5.1 Main forms of livelihood of 225 Sandai residents from 100 households

Livelihood	Number of responses
Subsistence crops	159
Livestock	145
Poultry	60
Cash crops	26
Selling produce	24
Bee keeping	18
Employment	12
Shop	8
Other business	5

Sandai location covers a total area of 18,600 hectares (Figure 5.2) and, as agro-pastoralists, livelihoods for the majority of residents are primarily based on livestock and subsistence cultivation (Table 5.1). Although customary tenure (Waiganjo and Ngugi 2001) of land is recognised within the location as an acknowledgement of long term use, most has not been officially demarcated by government and no title deeds issued. Much land also remains as communal grazing. The major land cover areas are cropland, swamp, and acacia scrub or dry land. However, large areas are under shifting cultivation, so that what may appear as barren scrubland may be at times under cultivation or used as grazing after rain. Cash crops significantly boost the income of some land owners and others through seasonal paid labour. Few people having

alternative employment, although this may be under represented because of the timing of the interviews. Poultry and bee keeping are subsidiary forms of income generation, and women may sell vegetables in excess of domestic needs. Small scale co-operatives are seasonal such as tree nurseries but the success of these schemes is limited. Natural resources are freely accessible and direct use of ecosystem services is necessary to maintain livelihoods. They are the 'GDP of the poor' (Gundimeda & Sukhdev 2008 cited in European Communities 2008).

The resource trail crossed six ecosystem zones (Figure 5.3): Kesubo swamp (Figure 5.4c), cultivated (irrigated) land (Figure 5.4a), Chuine sanctuary (Figure 5.4e) which is mainly acacia scrub, River Waseges (Figure 5.4f) other dryland (Figure 5.4b) and Leboi swamp (Figure 5.4d). Lake Bogoria National Reserve (Figure 5.4g & Figure 5.4h) was added to the survey as a seventh zone as, although not actually adjoining Sandai location, Sandai is part of the greater catchment and people use resources from the reserve. Thirteen ecosystem services relevant to local use were identified, with advice from LBNR staff, for inclusion in the questionnaire: grazing for livestock; food for humans; drinking water; water for irrigation; timber, fuel, fibre; medicinal plants; spiritual use; cultural use; biodiversity; good soil for crops; good soil for building; ecotourism; science and education. (see Chapter 3 Methodology Trail).

Figure 5.2 Sandai location, ecosystem areas and walked trail (Data adapted from WRI 1999)
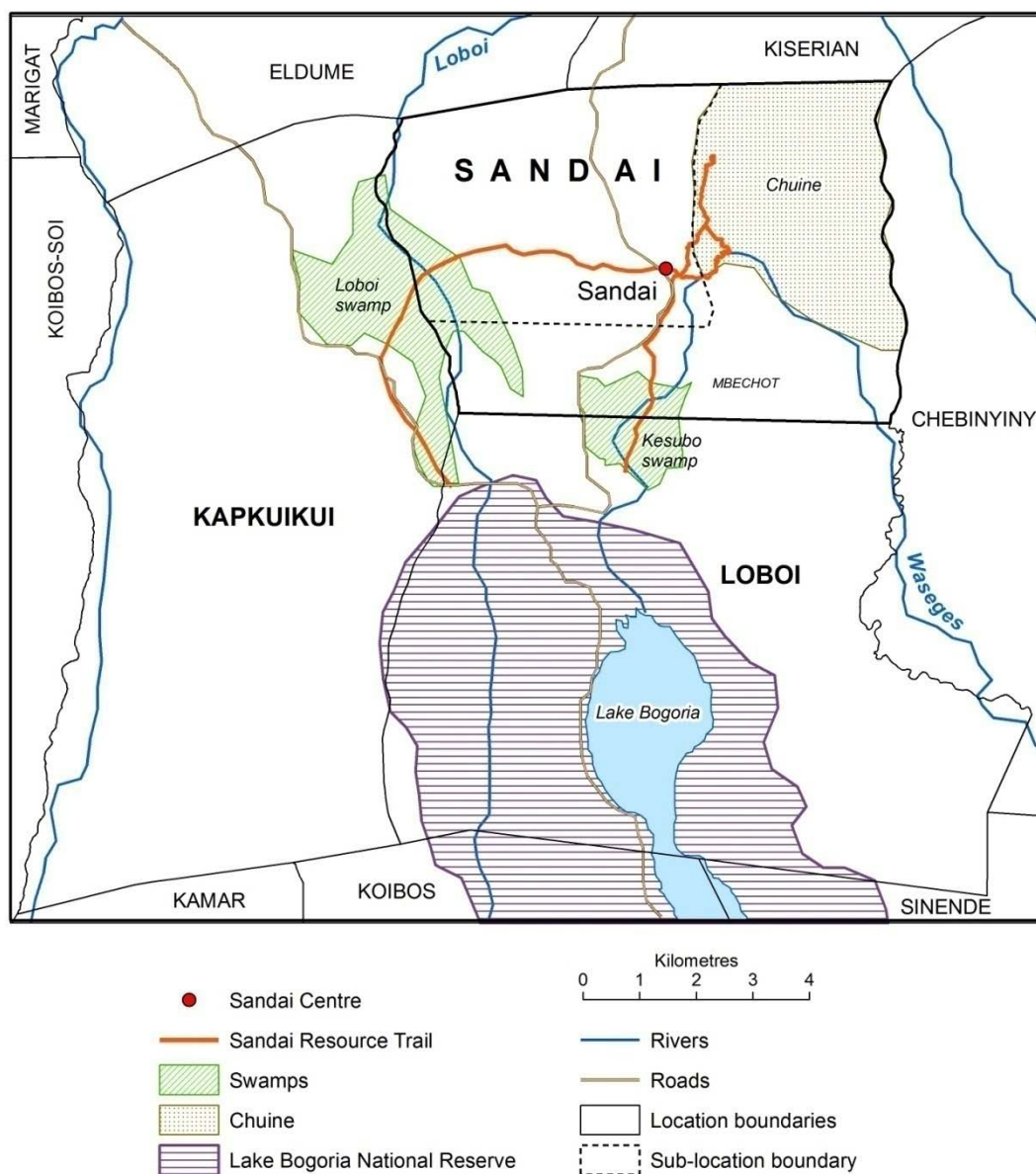
Figure 5.3 Ecosystem zones as used in the ecosystem service questionnaire in Sandai.(Data adapted from WRI 1999)
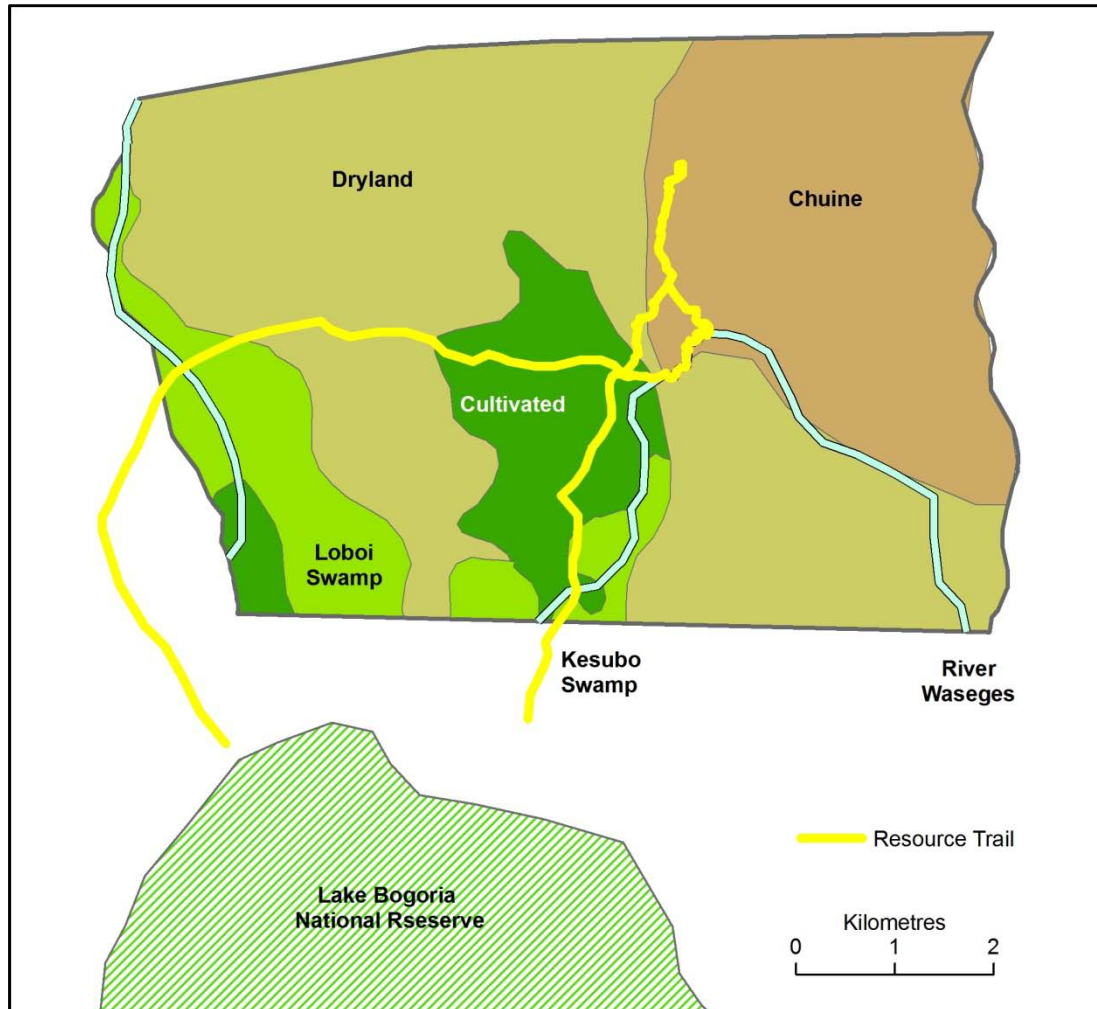
Figure 5.4 Ecosystem zones

(a) Planting cash crop maize seed on cultivated land with sparse tree cover

(b) Dryland with sparse scrub. In some years with plentiful rainfall this has patches of seasonal cultivation.

(c) Grazing cattle on Kesubo swamp, gully erosion in the foreground

(d) Papyrus and wildlife, Loboi swamp

(e) View over the proposed Chuine sanctuary

(f) Constructing a dam on the Waseges River to divert water for irrigation

(g) Flamingos at Lake Bogoria National
    Reserve

(h) Collecting salt from LBNR

5.2.2 Ecosystem services and human needs

Previous studies have evaluated ecosystem services for human well-being (Table 2.2) (WRI 2007b; MA 2005a), although the term is vague. ICSU-UNESCO-UNU (2008:8) argue "There is not sufficient understanding of what constitutes human well-being and poverty and how this is linked to ecosystem services". It is suggested that, particularly in areas of high poverty, the human well-being factor of 'basic materials for a good life' (MA 2005a) relates to direct human needs, such as food and water, which are fundamental to existence let alone well-being. Analysing the value of ecosystem services in Sandai (Table 5.2), see Chapter 3 Methodology, shows a clear hierarchy of values relating to individual and social aspects of welfare that align closely to the levels of human needs: body, mind and society, suggested by Kamenetzky (Figure 5.5 after Kamenetzky 1992 in Edwards-Jones et al 2000). Direct services supplying basic human biological needs are all prioritised most highly: food for humans (4.38) and livestock (4.34), water for drinking (4.07) and irrigation (4.43) and the earth processes that support these (3.9). Water and food in this area are at times in short supply and when this occurs their value is truly recognised. Timber, fuel and fibre for shelter (3.26) most

closely equates to Kamenetsky's definition of bio-physiological needs but these are of less value than food and water as they persist even through drought. Spiritual (2.42) and science and educational services (3.14) support the mind.

Table 5.2 Mean scores for ecosystem services

	Mean for ecosystem service (0-5)	Rank
Grazing for livestock	4.34	3
Food for humans	4.38	2
Drinking water	4.07	4
Water for irrigation	4.43	1
Timber, fuel, fibre	3.26	8
Medicinal plants	2.98	10
Spiritual use	2.42	12
Cultural use	2.39	13
Biodiversity	3.56	6
Good soil for crops	3.89	5
Good soil for building	2.48	11
Ecotourism	3.43	7
Science and education	3.14	9

Figure 5.5 Linking responses of ecosystem service values to Kamenetzky's four levels of needs (after Kamenetzky 1992 in Edwards-Jones et al 2000).
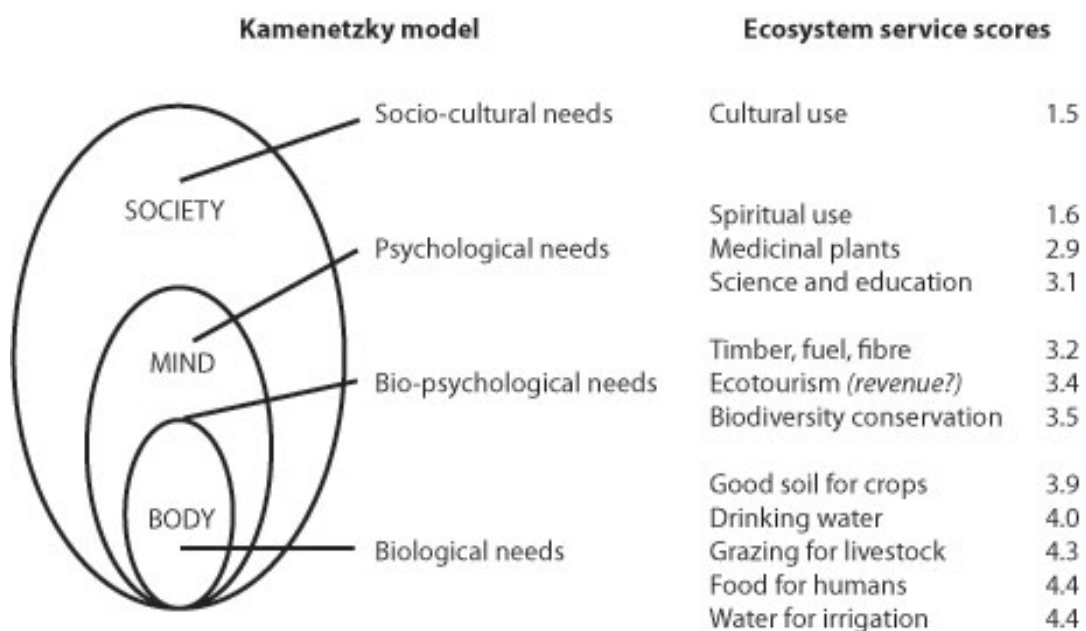
Natural medicinal remedies are still used widely in the community: 52% respondents indicated that they primarily use traditional medicine. Manufactured drugs are also widely available but medicinal plants and trees are an important resource as manufactured drugs are expensive and nearly all adults have some knowledge of herbal remedies, with a few more knowledgeable medicine women and men still within the community. The swamps, river and the hills in the Chuine area are all used regularly to collect medicine. The value of plants, and some animals, for some medicines may also influence the scoring for biodiversity in general. On comparing the mean value for medicine within different age groups, the valuing of natural medicinal plants did not vary with the age of the respondent, but the older people appear to use less natural medicine (Table 5.3).

Table 5.3 Relationship between age and use of natural medicine

Age group	Mean score for traditional medicine	Percentage using traditional medicine
30 and under	3.02	57
31-55	2.92	53
Over 55	3.09	35
Total		52

Cultural needs (2.39) were valued least; although these societal values are important they are less immediately essential but maintain the identity and cohesion of the community. The relatively high values attributed to biodiversity are thought to stem from a mix of cultural acceptance of wildlife as benign, raised conservation awareness from schools and conservation activities in the area and job opportunities which bring in revenue and enhance the value of ecotourism. It will be argued in Section 5.3 that

these values may be overly exaggerated by projected aspirations of local community conservation initiatives as will be discussed.

There are no significant variations in mean scores for ecosystem services when respondents were separated by gender, education or age so these are not illustrated. However, the lack of variation in value scores masks the distinct hierarchy in governance and gendered differences in how resources are managed, as shown in Chapter 6 Women's Trails. Decision making that relies on this type of survey may overlook differences within communities that have impact on ecosystem service valuation.

5.2.3 Spatial variation in value of ecosystem services

Examination of the spatial variability of these values reveals that ecosystem zones influence which services are valued and where conflicts may occur. Table 5.4 shows in tabular form the matrix of scores for ecosystem services against ecosystem zones and, although a useful representation of absolute numerical values, spatial patterns are difficult to identify. Figure 5.6 illustrates the similarities and difference in ecosystem services between ecosystems zones. Cultivated land clearly has high values for food for humans and good soil for crops but low value for other services, shown by the spikiness of the star; whereas, the swamps are comparable in ecosystem service values, having similar star patterns, and show an even distribution of values. The multiple choropleth maps, in Figure 5.7, illustrate and compare spatial distribution of ecosystem service values across Sandai. For instance, the even shading across the maps of timber and fuel and medical values show these are collected in all zones; whereas the darker shading of Chuine and LBNR for biodiversity and ecotourism highlight their value in these areas. However, the walked trails and videos made of the different ecosystem zones introduce more context and clarity into how some of these values were formed.

Table 5.4 Mean score indices for ecosystem services by ecosystem zone, darker shading indicates higher value.

	Cultivated land	Kesubo Swamp/	Leboi swamp	River Waseges	Chuine sanctuary	Dryland	Lake Bogoria Reserve
Grazing for livestock	7.39	16.46	16.96	8.79	9.66	5.97	3.95
Food for humans	18.28	11.38	10.95	6.77	3.16	1.61	1.31
Drinking water	2.68	5.95	11.05	19.61	2.59	0.92	2.43
Water for irrigation	5.02	6.48	9.93	17.55	1.79	0.68	1.47
Timber, fuel, fibre	4.21	9.77	10.84	7.24	8.69	5.35	3.28
Medicinal plants	2.97	8.64	7.46	9.23	9.64	4.58	5.52
Spiritual use	1.58	6.63	5.86	7.73	4.90	2.47	5.43
Cultural use	1.54	7.51	6.4	6.73	5.15	2.12	5.97
Biodiversity	2.34	9.49	10.20	7.33	14.27	4.08	15.93
Good soil for crops	15.18	11.77	10.39	5.83	3.40	1.65	1.37
Good soil for building	4.47	4.02	5.27	3.90	1.53	1.97	5.037
Ecotourism	1.97	8.39	8.38	6.36	12.75	2.78	15.27
Science and education	2.21	5.57	5.87	5.24	9.07	2.44	13.73

Figure 5.6 Spider diagrams comparing ecosystem service value by area.

Cultivated land

Kesubo Swamp

Loboi Swamp

River Waseges

Chuine

Dry scrubland

Lake Bogoria National Reserve
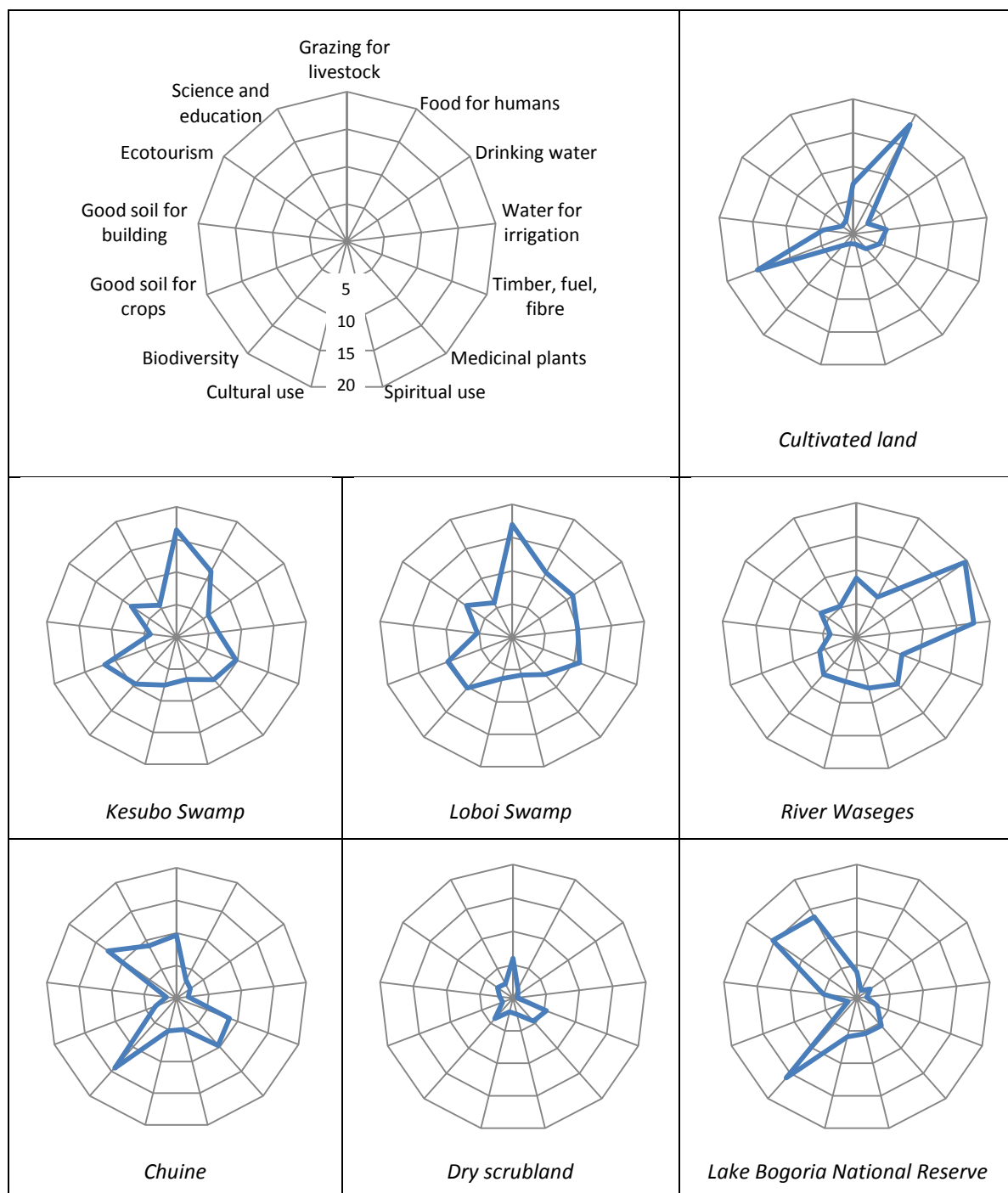
Figure 5.7 Small multiple choropleth maps showing comparative values of ecosystem services by survey area

Grazing

Food

Drinking water

Irrigation water

Timber, fuel

Medical

Spiritual

Cultural

Biodiversity

Soil for crops

Soil for building

Ecotourism

Education

< 4.000000

4.000001 - 8.000000

8.000001 - 12.000000

> 12.00000

Kilometres
0 1 2 3 4

Dryland

Chuine

Cultivated

Swamps

River Waseges

LBNR
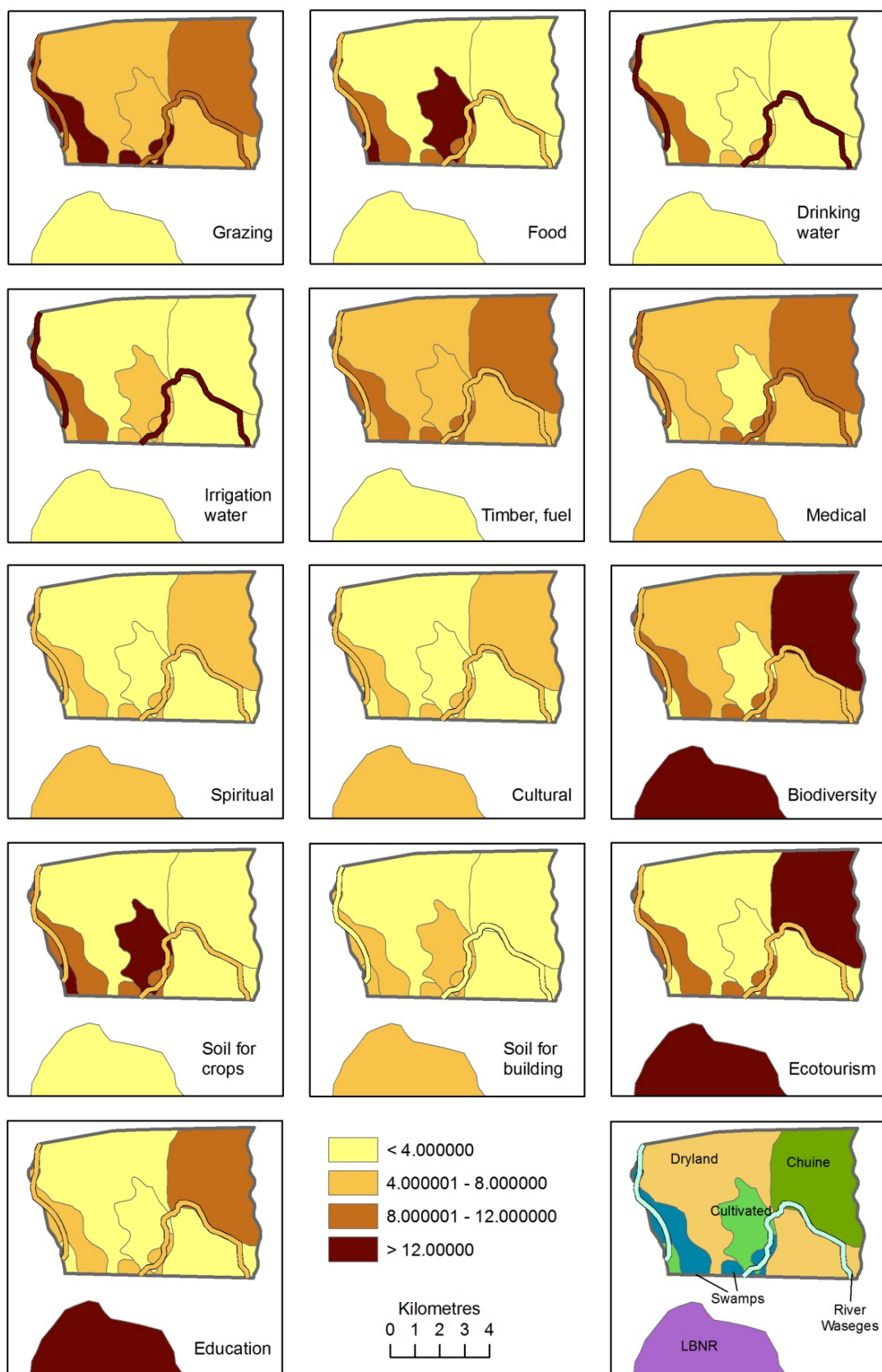
Starting the resources trail in Kesubo swamp and ending it in Loboi swamp illustrated the important, varied and conflicting uses of these wetlands. Encroaching fields of crops surround eroded grazing land where numerous livestock and wildlife intermix. The swamps are valued most highly for grazing for livestock yet high value is also attributed to them for food for humans, fuel and fibre, as well as medicine, cultural and spiritual values. This complete mix of services is fundamental to human well-being, but the pressure that this is causing is severely degrading these important areas, as discussed more fully in Section 5.4.

Nearing Sandai centre the swamps give way to longer established cultivated land making use of the fertility of the soil. Unsurprisingly, 'cultivated land' scored highly for food for human consumption alongside the dependent variable 'good soil for crops'. Along with water, the men were keen to film the agricultural use of land early on in the research, proudly showing the large irrigated fields of cash crops including water melon and maize, although it was the smaller shambas worked by women and men that regularly fed the households. A few successful land owners believed that their income had been boosted considerably (up to 700%) through planting of cash crops which also provided occasional labour, paid or communal, for other residents. Maize seed was subsidised by the Kenya Seed Company (KSC 2009) who bought back the crop but with a deferred payment. The promotion and extensive planting of hybrid seed adapted for growth in arid areas seemed to limit availability of subsistence crops, causing food shortages later in the season and giving rise to questions surrounding the sustainability of this practice. Here ecosystem services values are not totally derived from direct use and there are inequities in payments and benefits throughout the community.

Some of the poorer villages were further from Sandai Centre where the land was classified as dryland zone and scored relatively lowly on all accounts. This is deceptive

as what may appear as 'dryland' uses rain-fed irrigation and may be under cultivation after rain. In terms of ecosystem services the value of a particular piece of land may vary dependent on the seasonal rainfall and shifting cultivation is common.

> *In this area they were using what is called shifting cultivation because there was a lot of water twenty years ago. Nowadays they are not cultivating because there is no water.*   (Magdelaine Kipsang)

The zones used in mapping in Figure 5.3 do not illustrate how cultivated land and dryland are interspersed. The subtle gradation of land use between zones is illustrated most effectively by the map of grazing. Goats in particular are ubiquitous, grazing in dry areas, on the wetlands and on crop remains in the fields. Lack of pastoral mobility has caused additional pressures on cultivated land and wetlands as livestock remain nearer the home.

The resource trail followed a steep path taken by herders to Chuine which is probably the largest zone of uncultivated dryland in Sandai. This land is overgrown with acacia scrub, the ground is dry, rocky and currently would be difficult for tourists to explore. Yet, the prospect of revenue from tourism has elevated the values of this scrubland area on the higher escarpment for tourism and biodiversity. Wildlife conservation is promoted through education and the proximity of the Lake Bogoria National Reserve has significant influence on expectations of income from Chuine. Walking there, the occasional fleeting sight of a greater kudu adds to expectations but for the most part only their footprints are seen. Section 5.3 will review whose values have influenced the community values for this land.

From Chuine, the trail follows the Waseges river gorge back down to the plain, a trail that is easy in the dry season when there is no water in the river. Water supply for

drinking and irrigation from the Waseges River is of prime importance although residents living on the western side of Sandai, use the Loboi River for water, as do other residents in the dry season when the Waseges has dried up. Issues of water will also be discussed in greater depth in Chapter 6 Women's Trails.

Spiritual and cultural uses were scored evenly for the different zones although they are more associated with specific places, particularly along the river, in the swamps and on hill tops. A strong Christian presence has lessened some of the significance of traditional spiritual places but both still exist in tandem. When I filmed with the Lake Bogoria Dancers they insisted on dancing at culturally important locations such as in Loboi swamp, on Parakiat Hill, overlooking the three locations, and at the hot springs and on the Segomo Island in Lake Bogoria. Two of the most culturally significant ceremonies in the area, male and female circumcision, also have their places, although, because of the illegality of the act, the women now perform the ceremony in a homestead instead of a natural place.

The spatial variation in ecosystem service values gives rise to two particular concerns. First, how have the comparatively high values attributed to biodiversity and ecotourism in Chuine been constructed when currently little economic revenue is being received from the sanctuary? It is argued that cultural values combined with the conservation influences of LBNR have induced high values but through idealised aspirations. Particular reference is made to the flagship species the Greater Kudu which has placed an 'iconic' value on the sanctuary. Second, what are the trade-offs made through competing values attributed to the swamps and how is this affecting the sustainability of the ecosystem services that they provide? It is argued that moderating the values through raising awareness of the conservation value of the swamps may be the best course of action. The trail across these areas will be used to support these views.

This section has been intentionally brief but has started to illustrate how valuation of different ecosystem services from different spatial zones may mask the spatial and temporal variability of those values. It also demonstrates how some zones are highly valued for a number of services giving rise to competing land use and how other zones are of less immediate value that may promote aspirations of 'future' values. These two themes are exposed in greater detail in the next parts of this chapter.

5. 3 The Chuine Trail

5.3.1 Background to the Chuine sanctuary

The Chuine trail in one respect starts at Lake Bogoria and follows the tracks of the Greater Kudu as it migrates out of the reserve into the surrounding community lands. It is also the illusive trail that follows the influences that have seen the concept of the community sanctuary grow so that local values for biodiversity are enhanced by the prospect of new income from ecotourism. This section will assess the value of ecosystem services of Chuine and critically review the values attributed to the area by local residents in the context of traditional heritage, conservation and tourism potential and how the conservation goals of the neighbouring LBNR mediate those values particularly through the symbolic links of the Greater Kudu.

Community conservation in Kenya is seen both as a way for communities to set up their own eco-tourism projects to capitalise on the wildlife tourism industry and the means by which conservation can take a wider ecosystem approach in order to protect Kenya's diminishing wildlife that migrates over the boundary of parks (Western et al 2006).

Figure 5.8 Video clips from Chuine Community Sanctuary: The walk shows wide vistas with the Laikipia plateau in the background and dense acacia scrub in the foreground, the Chuine Committee, biodiversity, livestock grazing, tourist camp site and medicinal plants.
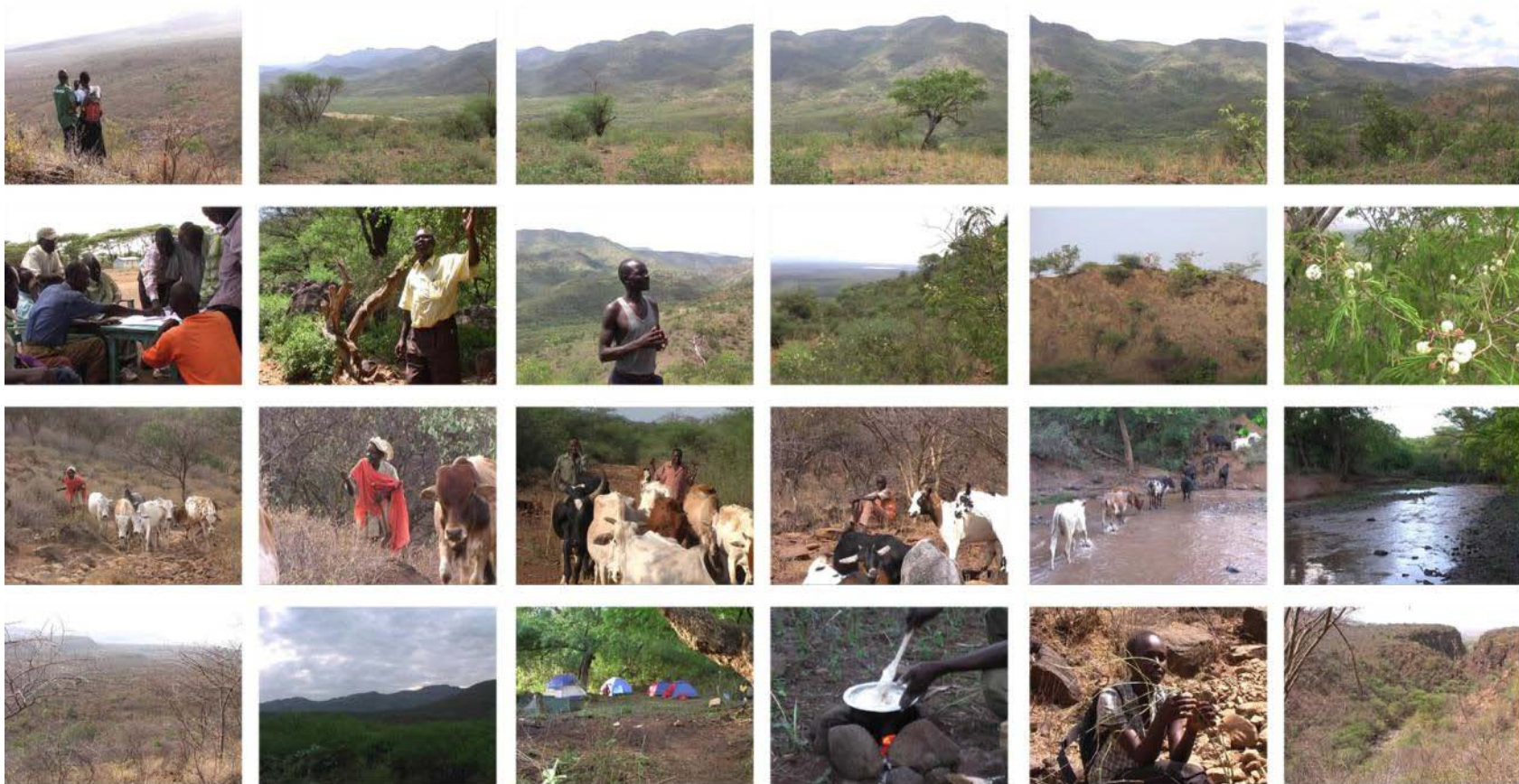
Community conservation may be subdivided into three broad types: protected area outreach with communities informed of decisions being made by park management, collaborative management where protected area managers and communities join in decision-making, and community-based conservation where communities plan and control the initiative, subject to national legislation (Barrow et al 2000). Lake Bogoria National Reserve administration tends towards collaborative governance with a management committee formed from a consortium of governmental organisations (local authorities and KWS), NGOs and local community leaders (LBJMC 2005) but is instrumental in supporting community-based initiatives.

A number of such initiatives can be found in the LBNR catchment including: community wildlife sanctuaries; a wildlife monitoring and educational organisation Friends of Nature Bogoria (FONB); community campsites and small enterprises such as tree nurseries and fish farms. Most are initiated and supported by governmental and non-governmental organisations with the duel objectives of promoting conservation as well as livelihoods. The formation of Chuine sanctuary receives substantial steering and external support by WWF and LBNR. Although this *collaborative* conservation approach is seen as the way forward as farmers (agro-pastoralists) in Kenya move to a market economy (Norton-Griffiths 2007) it seems to need continual encouragement, often without material financial backing.

Chuine community sanctuary is an area of approximately 10,000 hectares situated on the low escarpment bordering the Laikipia plateau and about ten kilometres north east of LBNR. The area has panoramic views over the Baringo basin (Figure 5.4e) and a rich biodiversity. A short ecological survey undertaken in 2005 (WWF 2005) identified 19 species of mammals and 73 species of bird within Chuine although given the proximity to Lake Bogoria reserve this is likely to be substantially higher. Videoing the

trail through Chuine showed that the trails through the thick acacia scrub are best explored on foot (Figure 5.8) giving rise to difficulties in encouraging tourist development in competition with reserves where big game can easily be seen. The area was settled in the past but due to human and livestock diseases; conflict with wildlife such as leopard, lion and hyena; and lack of good roads residents moved away to the lower area of Sandai village. Today Chuine is primarily valued for grazing livestock, particularly in the dry season, and for collecting resources such as grass and timber for building and natural medicine. A few small farms owned by Sandai residents remain near the river in Chuine. The land is held in a customary tenure system (Waiganjo and Ngugi 2001) with communal grazing rights, however certain members of the community claim land tenure rights from settlement before the land was abandoned. This is recognised by the community but not officially by the state and these residents are the main local stakeholders in development of the Chuine sanctuary (Figure 5.9).

The challenges for establishing Chuine as a sanctuary are substantial. Material problems include lack of infrastructure, such as access roads and paths, although roads, a camp site and cultural centre are planned (Figure 5.11a and Figure 5.11b); scarcity of adequate water supply; and lack of funds or benefactor. Social issues include disagreement in the community over the sanctuary, identification of stakeholders with land claims and clashes with neighbouring tribal groups. Armed poachers from other tribes, Pokot and Njemps, who border the land in the north, occasionally raid the area to take antelope and steal cattle and, because of its current lack of use, this land is seeing increasing settlement by members of these other tribes. Chuine is therefore affected by a number of competing influences (Figure 5.10).

Figure 5.9 Major stakeholders in Chuine sanctuary
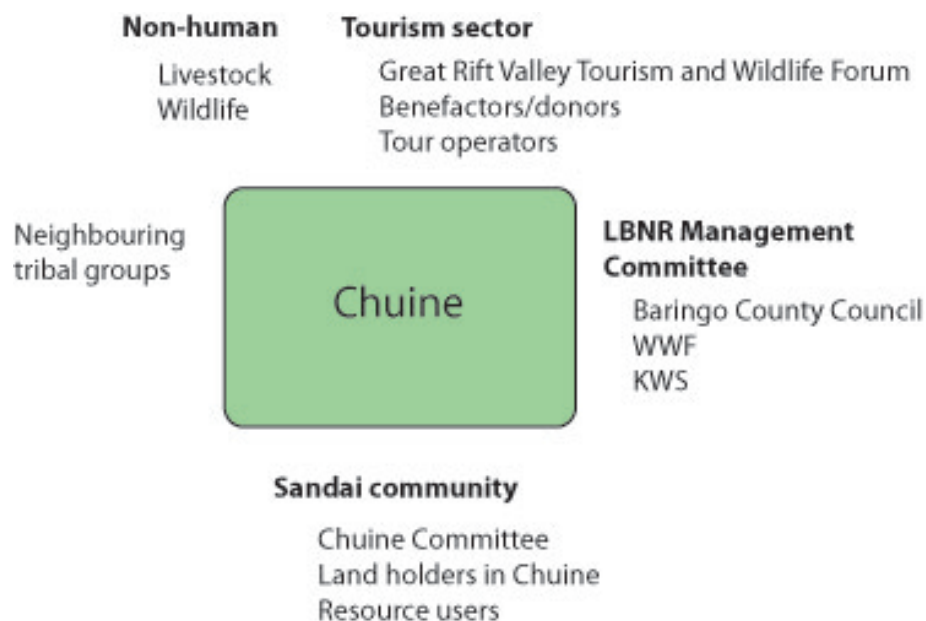
Figure 5.10 Sketch diagram of the influences affecting Chuine as a sanctuary for biodiversity conservation
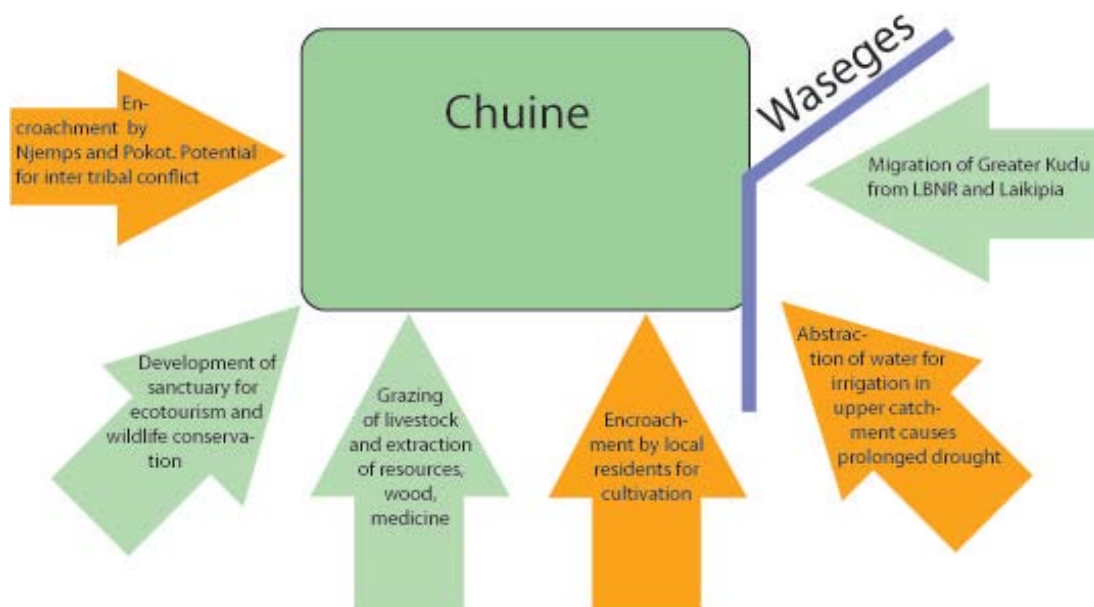
Figure 5.11 Maps of Chuine

(a) Sketch map of Chuine showing proposed infrastructure produced by WWF/LBNR staff. Some symbols are unidentified.
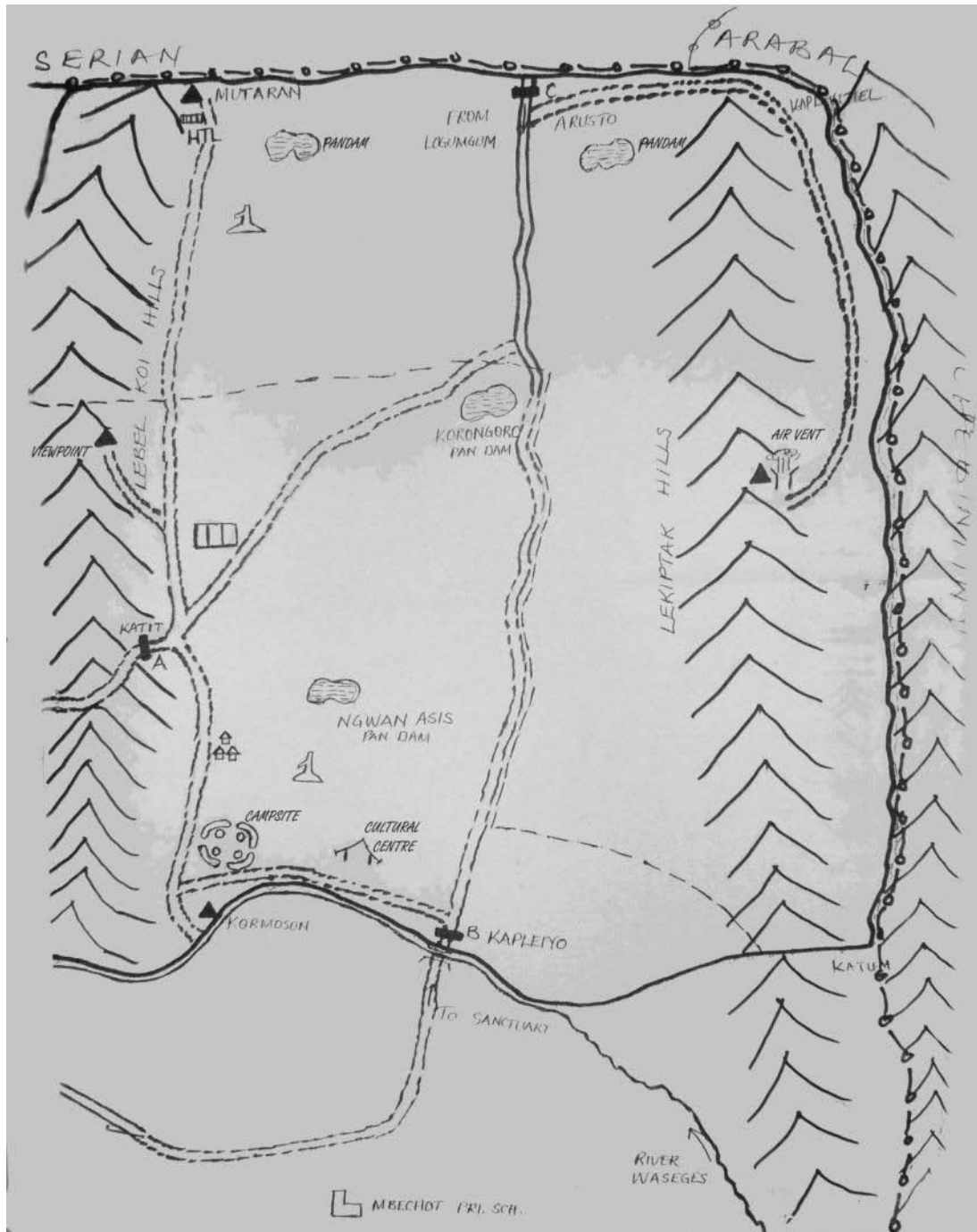
(b) Sketch map by Chuine committee
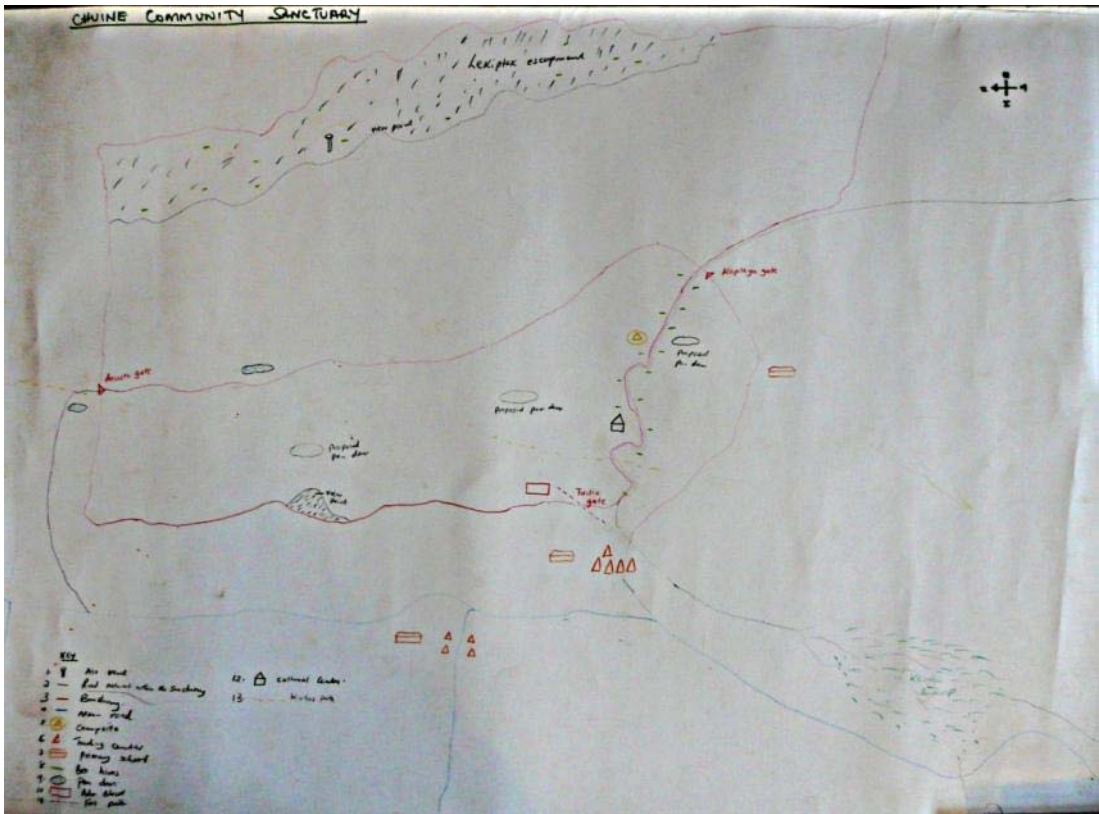
(c) Redrawn map from original by Chuine Committee
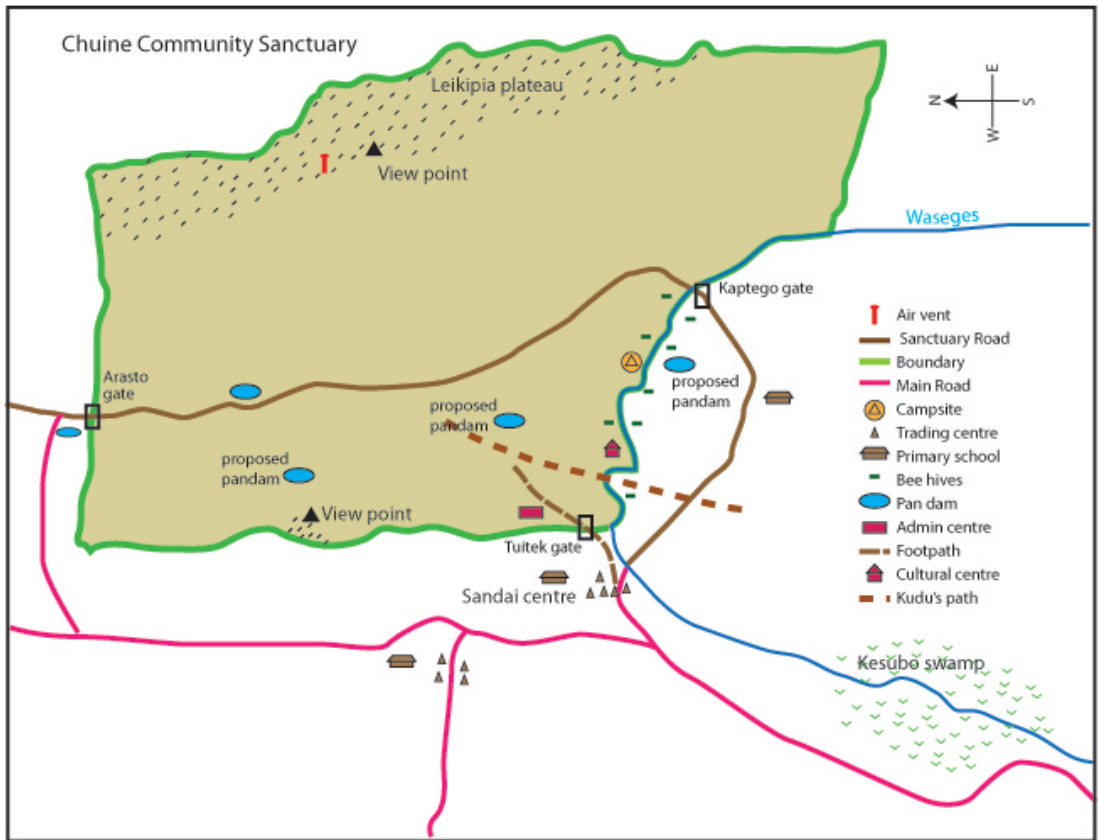
Despite the problems, Sandai residents have proposed that Chuine be set aside as a community ecotourism project and wildlife sanctuary. This proposal has been influenced by WWF and LBNR, with community leaders being taken to visit established community sanctuaries, such as Lewa and Shompole, and informed of their success, giving rise to hopes for poverty alleviation through development of ecotourism and employment.

> *We have seen other areas that have developed their areas that resemble this [Chuine] like the areas of the Maasai land. The animals that are there are the same animals here so we have seen that it is better for us to make something out of this area. So we have preserved it so the tours can come and see the animals. It is better for us to make it profitable to this generation.*
>
> *The community have seen that it should be preserved for the younger generation to create various jobs, to create employment for the youths and others.* (Nelson, Sandai)

The younger people in particular see Chuine as a means for employment. Although at present this is unregulated and the occasional tour group passing through the area may face demands for money for guides to take them through the sanctuary; misunderstandings of wealth and 'fair' pricing of services are easily generated. A common difficulty when introducing ecotourism in a new area is meeting the expectations of different stakeholders, as "Communities must realise that ecotourism is not a panacea to their aspirations" (Watkin 2003:18).

However not all were in favour of the sanctuary, as this email in response to my blog entry implies, although I understand there were other personal reasons involved:

Chuine sanctuary will never see the light of the day. Why? poor consultation and facilitation by WWF and other self seeking personalities. (Farmer, Sandai)

The MidRift Wildlife and Tourism Forum added incentive by proposing joint marketing between LBNR and the Chuine and Irong sanctuaries plus the creation of new tourist circuits and trails. Similarly, the rapid registration and success of the nearby Rugus sanctuary, which was in part established as a peace initiative between two neighbouring tribes, has demonstrated another benefit applicable to Chuine. Yet the process of registration of the sanctuary has been slow (Table 5.5) and, although the initial proposal was first raised in 2002, it is still unregistered. Patience is required as the process is slow as "inclusive community-based tourism is a long-term and complicated process" (Watkin 2003:7). Community conservation depends on the ability of local communities to organise their own governance arrangements and to share revenues equitably; it is not just a matter of changing policy and redistributing benefits (Barrow et al (2000). It can also be argued that community conservation may not work unless the true social and economic future values are realistically understood, benefits are realised and that the ecosystem service value of biodiversity is weighed against delivery of human well-being.

Table 5.5 Timeline of formation and registration of Chuine as a community sanctuary

2001/2	WWF propose development of conservancy. Representatives from Sandai taken on exploratory visits to other sanctuaries: Shompole and Lumo to raise awareness of the economic prospects of setting aside land for wildlife whilst maintaining grazing for livestock and employment for the future. Proposal accepted by the community.
2002	Chuine Committee established. Chuine (local name for *Acacia Seyal)* chosen as neutral name for future inclusion of neighbouring locations. Proposal for the sanctuary drafted with financial estimate of 34m Ksh.
2002-2005	Obtaining permits and letters of acceptance from other stakeholders, internal disagreements, land claim disputes and constitution, caused delays.
2005	LBNR Chief Warden intervened, proposal finally taken to KWS. Inventory of flora and fauna obtained (WWF 2005). Lack of funds for registration caused further delays.
2007	A benefactor was approached but withdrew. National election politics intervened.
2008/9	A new Senior Warden at LBNR, tourist interest and opening of nearby sanctuary renewed interest. Registration completed with KWS

5.3.2 Ecosystem service values of Chuine

The sanctuary represents a range of ecosystem services for Sandai residents and conservationists. Identifying the relative importance of these may be a way to overcoming disagreement within the community and understand the true incentives behind the sanctuary and this section firstly identifies the comparative values of ecosystem services of Chuine to residents using data from the questionnaire and interviews.

Despite the fact that the area has still not been officially registered as a sanctuary and is not as yet generating any income from tourism, wildlife conservation and ecotourism scored most highly in the ecosystem services valuation (Figure 5.12 and Figure 5.13). This implies that, rather than reporting current values, respondents seemed to give projected future values for ecotourism in Chuine which may have influenced the biodiversity score although cultural values for wildlife also play a part. Value for medicinal plants and fuel/fibre resources were also significant in both scores and ranking (Figure 5.14). The importance of Chuine for supplying medicinal plants is a reflection of the fact that biodiversity is important for local consumption. Grazing received an even distribution of scores in value and was ranked less highly than biodiversity, natural resources and ecotourism as only residents living nearer the sanctuary or with customary grazing rights use the sanctuary for grazing their cattle. Chuine as a sanctuary would still be available for grazing and non-exploitative use of resources.

Figure 5.12 Value scores for ecosystem services from Chuine sanctuary (1 is low, 5 is high*)*
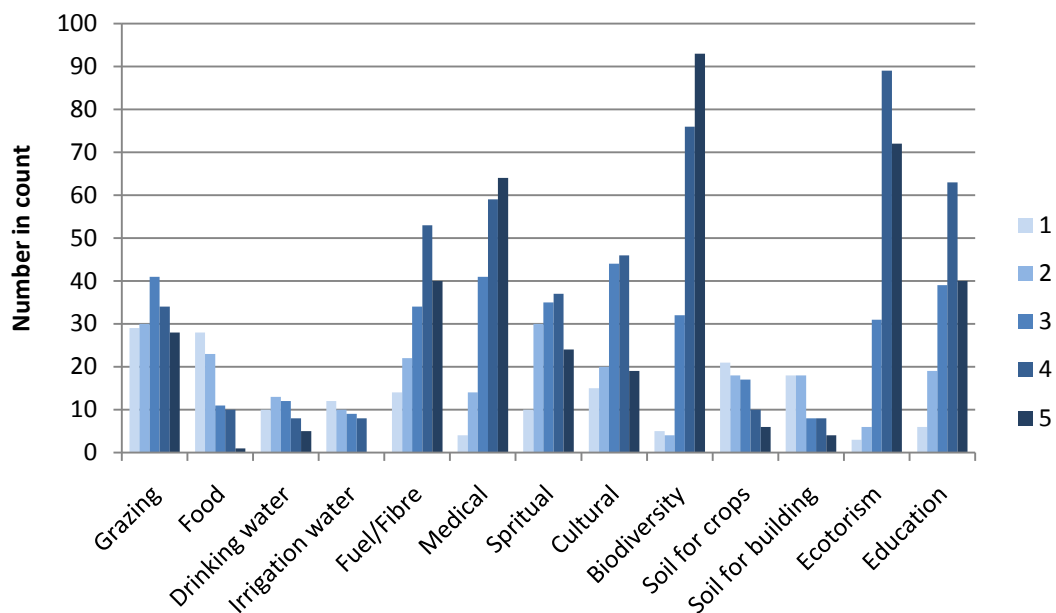
Figure 5.13 Mean and mode value of ecosystem services from Chuine
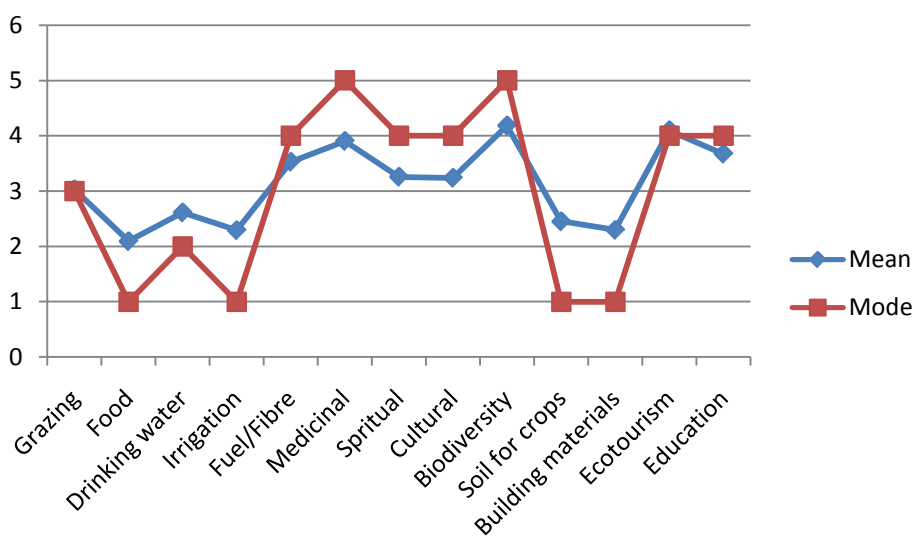
Figure 5.14 Ranking of uses of Chuine
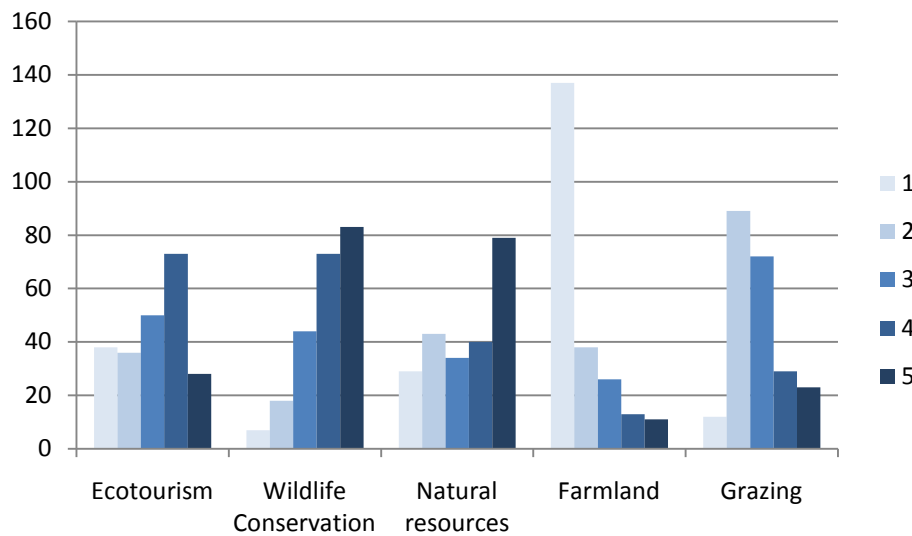
A majority of residents thought that Chuine should become a wildlife sanctuary, 190 responded positively with 32 (14%) against. The main reasons supporting the sanctuary were 'wildlife conservation' (66) and direct economic benefits for the community (85 respondents), particularly the 'youths'. Tourism was mentioned by 53 respondents, 2 specifically recognised benefits from tourism as school bursaries, and future heritage was given as a reason by 16. Only 8 respondents identified protecting the area for grazing of livestock. The responses mirror the expectations and aspirations of the community members for developing the site as a tourist attraction that would generate income, particularly for the younger people. Financial gain is therefore one of the main incentives for conservation of wildlife as it attracts tourists.

Interviews drew out other reasons in favour of the sanctuary including provisioning water, avoidance of wildlife conflict and as a means to safeguard the area from tribal encroachment.

We should dig pandams for water for wildlife and grazing our animals, or else move our wild animals in Sandai and translocate them to Chuine, and people living there come back to Sandai. Then wildlife and people have a place. (Reuben Sandai)

We could go to Chuine and demarcate the area and tell all these people [other tribes] to go. But instead of us doing what Menotano said and settle there why don't we sell the area for wildlife conservation as a sanctuary? When we heard that it was a sanctuary we felt happy and we thought we had the best option. It is beneficial to us and wildlife and is sustainable as it is closed pasture for our livestock in drought.

(Reuben, Sandai)

I am for that agreement but only if the animals are secure. If nothing is done for security it is no use setting a sanctuary for others to kill the animals. (Menotano, Sandai)

These views are expressed by other community members as well as conservation officials. Creation of the sanctuary would strengthen legal sanctions to protect encroachment from other tribes and is also seen as a place for wildlife that, in cultivated land, is a problem. This quotation also shows the traditional acceptance of wildlife rather than a wish to kill.

The main initiative behind the sanctuary from the conservationist perspective is wildlife conservation but a prime incentive for the community is revenue from tourism, in part inspired by the biodiversity potential of Chuine. The aspirations for poverty alleviation via ecotourism are high in the community, but are biodiversity values enough to generate income from tourism or are they over influenced by conservation objectives?

The next section more deeply investigates whether the Greater Kudu, as a symbolic flagship species, has been used to manipulate values for biodiversity or whether it has enhanced traditional values as motivators for conservation.

5.3.3 Biodiversity values of Chuine and the Greater Kudu.

The importance of a single species, both ecologically and culturally, is thought to be one of the main influences that are moderating the value of biodiversity as an ecosystem service within Chuine. The proposed sanctuary is perceived by conservationists and local farmers to be an important migratory area for Greater Kudu from LBNR and a wildlife corridor between Bogoria and the Laikipia plateau. This is based on general knowledge but without regular ecological surveys in support yet this was used as one of the prime motivators for the sanctuary.

> *So initially we introduced the idea to the community and they saw the reasons. They saw the National Reserve and the tourists that pay and the community thought that it would be a good idea for them to get something by conserving Chuine. But the reason that is behind the conservation of Chuine and, which is also well understood by the community, is that it is the breeding ground for the kudu. So our involvement in the development of Chuine was for the community to continue conserving one of the very important habitats for this species while benefitting from it. So we have had several meetings recently with the members of the community and they are very keen to identify an investor who can take on the conservation of Chuine while at the same time the community benefits.*

> (Daniel Koros, WWF)

The Greater Kudu *(Tragelaphus strepsiceros)* is a large antelope; the males weigh between 190-315kg and the females between 120-215kg (Kingdon 1997). The males are distinguished by their large spiral horns averaging 120cm in length (Figure 5.15a); the females are hornless (Figure 5.15b). A series of white stripes across its back and face act as a camouflage in their preferred habitat of thick bush. There are large populations in Southern Africa where they are hunted as a trophy animal and where most scientific research has been undertaken (Owen-Smith 1998; Owen-Smith and Mason 2005; Perrin 1999). In East Africa their survival is precarious and depends on effective protection and management. There are only two small populations in Kenya (Estes 1991) one being at Bogoria with an estimated population of over 300 kudu, a significant increase since the reserve was gazetted in 1973 although this may be due to an increase of observers. Within the Bogoria region they calve during the rainy season between February and June, when browsing food is abundant, and mate at the end of the rains.

Figure 5.15 Male (left) and female Greater Kudu (*Tragelaphus strepsiceros*)

In the past the Greater Kudu, or 'Saramee', was hunted by the Tugen as a source of meat. Its hide was tanned and used for mattresses or bags but its horns were the most important feature. The horns are still used as a musical instrument in traditional

ceremonies and by tourist dance groups and give a resonant base note to songs (Figure 5.16).

> *In sacrifice offerings and initiation ceremonies it is blown to show that*
>
> *the special ceremony is starting. It is necessary for the ceremony but it is*
>
> *only for men.*   (Reuben, Kapkuikui)

Figure 5.16 Cultural use of the kudu horn

In the questionnaire the Greater Kudu was the animal most often mentioned as having traditional values (66 respondents) and should be protected (70), particularly for bringing tourism, because it was harmless or benign and also for the cultural use of its horn.

The Greater Kudu is at the forefront of community conservation initiatives. It is in the interests of LBNR to promote wildlife conservation in the wider catchment and at the same time the community have an interest in preserving natural resources and cultural heritage. Within these dual aims the Greater Kudu is a commonality as a valued flagship species (Williams et al 2000; Caro et al 2004) for LBNR. Educational workshops, revenues from gate entrance fees and development of community based

activities have informed local residents of the advantages of conserving wildlife. A Community Based Organisation (CBO), Friends of Nature Bogoria (FONB) has been established whose vision is "to see the Lake Bogoria community actively conserve and derive sustained benefits from nature" (FONB 2007a) by spreading environmental awareness around Lake Bogoria. This community group value wildlife conservation for intrinsic values but also look to generating revenue through this means.

Investigations of the ecology of the kudu and its cultural connections were made to identify how values of biodiversity are formed with reference to the Chuine sanctuary. FONB collaborated on a twelve month survey to monitor the distribution of kudu at ten locations in and around the reserve (Figure 5.17), including the proposed sanctuary of Chuine, to establish annual records of kudu distribution and to begin to verify seasonal migration patterns. This extended a previous four month monitoring programme, with funding from Royal Netherlands Embassy (FONB 2007b), the main objectives of which were sensitisation of the community on kudu conservation and training and capacity building of the FONB (2007c).

Figure 5.17 Location of kudu transects (Base data USGS 2004b; WRI 1999)
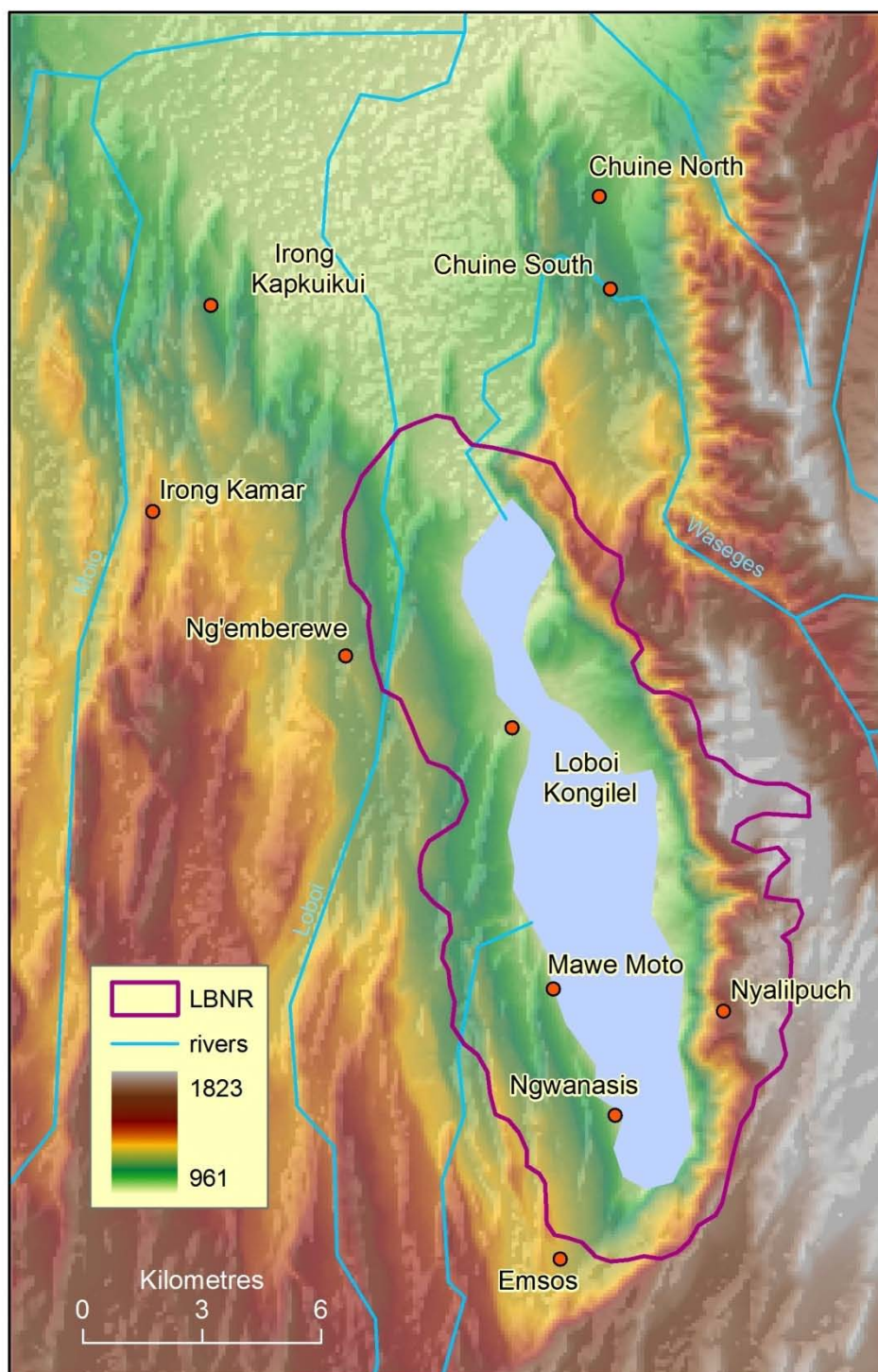
Figure 5.18 Greater Kudu counts for other transects

(a) Greater Kudu counts for the Chuine transects July 2008 – June 2009
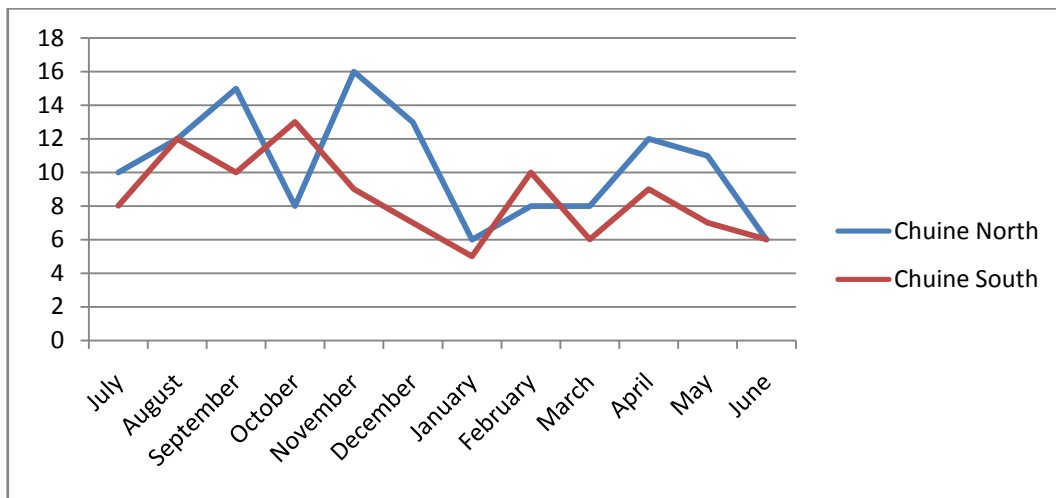
(b) Greater Kudu counts for the LBNR transects July 2008 – June 2009
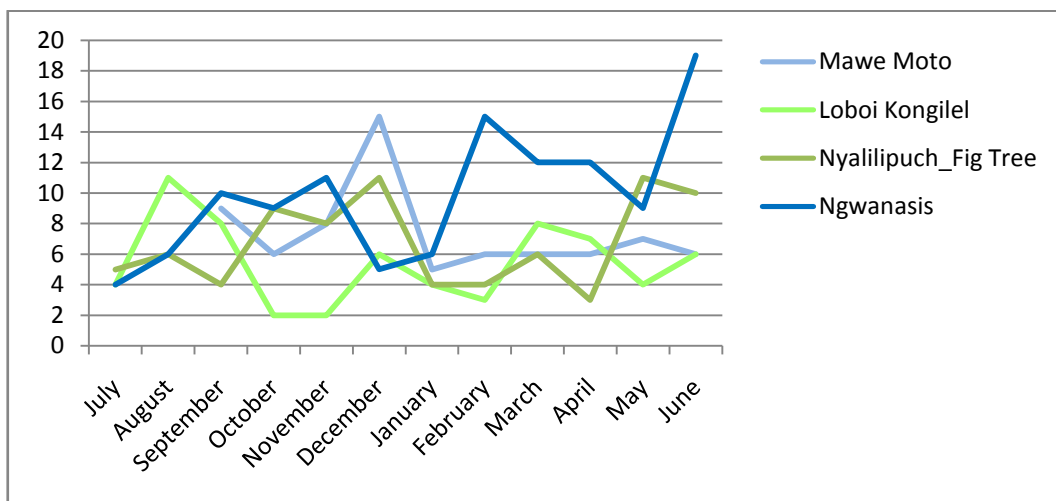
(c) Greater Kudu counts for other transects July 2008 – June 2009
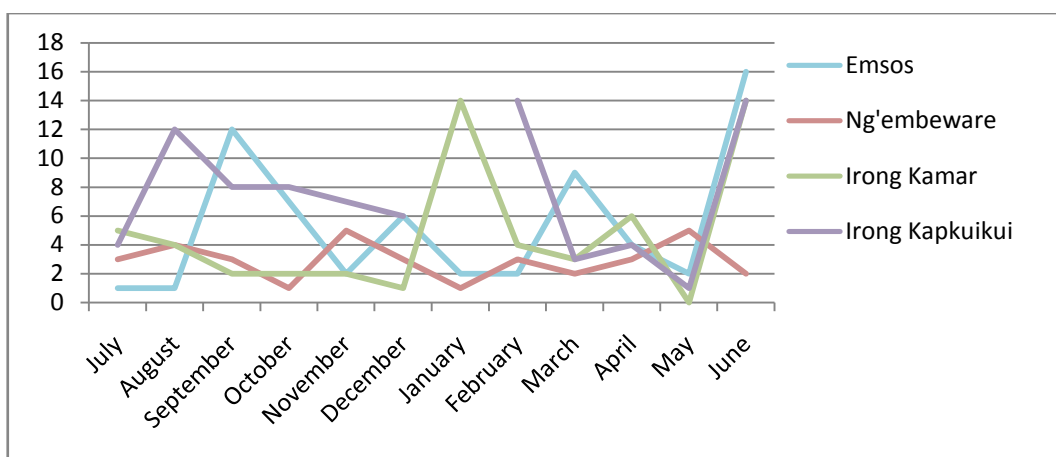
The 2008/9 survey (Figure 5.18) showed that the number of Greater Kudu sighted on the two Chuine transects are generally higher than those in other areas from July until September with numbers dropping significantly in January during the drought, although there is a high degree of fluctuation in numbers throughout the year. However, it must be stressed that no definite inferences can be established from the count data of a single year and from relatively sparse data and severe climatic conditions, with total lack of rainfall in 2009, may have altered normal behaviour patterns.

Important evidence for kudu migration comes from local knowledge of Kudu distribution and behaviour. Farmers who regularly herd their cattle in the Chuine sanctuary report regular sighting of Greater Kudu, buffalo, and eland. Farmers' reports indicate that the kudu migrate from LBNR to Chuine, and the Irong sanctuary to the north east of LBNR, during the rainy season when the females give birth to young, although this is not supported by the survey results for 2008/9. However it tallies with South African studies of the kudu where the spatial range for herds of breeding females has been reported at 4 square kilometres and for adult males at 11 square kilometres (Owen-Smith 1984) and it is likely that migration between LBNR and surrounding areas occurs under normal conditions. Propagating the theory of wildlife corridors as one of the incentives for establishing neighbouring sanctuaries adds value to the community sanctuary.

Through the training and work of FONB in particular, the greater kudu has been used as a focal symbol to connect LBNR and the wider area for the protection of species which has placed additional emphasis on its cultural significance. In the wider community its cultural importance has been enhanced to support conservation agendas and give backing to establishment of the Chuine sanctuary.

5.3.4 Whose values count and who gains?

The Chuine trail and the case study of the Greater Kudu illustrate how the local value of an ecosystem service such as biodiversity may be enhanced by other actors. Chuine has comparatively little ecosystem service value for direct uses but has important biodiversity value for the neighbouring reserve. Local values for biodiversity seem to have been directly enhanced through the outreach work of LBNR and WWF and through the general high profile of wildlife conservation and tourism that contributes to Kenyan economy. Two motivating factors have been used: nurturing the aspirations for future income from ecotourism and enhanced cultural importance of a flagship species that promotes wildlife conservation. These have resulted in raising the value of Chuine for biodiversity and ecotourism despite the project being beset by delays and lack of external financial support on which the sanctuary relies.

Recommendations from previous case studies (Rutten 2002; Coupe et al 2002) warn against the values of biodiversity being steered from conservation organisations rather than the community. As Honey (2009:55) points out "Although there are many local ecotourism ventures, usually labelled as 'joint ventures' or 'community-based' and situated on community lands, little is known about real economic returns from these projects." There are problems for actualising potential benefits from ecotourism against a backdrop of raised and possibly unrealistic expectations. As conservation organisations support community conservation ventures there is "the need to recognize the unequal power relations, deal with unrealistic expectations, build trust, ensure transparency, and improve communications." (Campbell et al 2010:16). A full assessment of social and financial gains and benefits as well as trade-offs would be needed to establish the potential income for the community if Chuine is established as a sanctuary. Certainly without support the sanctuary is unlikely to materialise due to

barriers to full operation of Chuine as a tourist attraction including finding financial backing, which immediately brings other stakeholders into the governance structure, constructing the infrastructure to make the sanctuary operational, building capacity through training and awareness in the community and ensuring benefits are shared equitably.

Yet, although influenced greatly by wildlife conservation goals, the value of biodiversity is also supported by community traditions and cultural values that are often ignored as motivations for conservation. Medicinal plants, timber and fibre resources as well as grazing livestock are complements to biodiversity conservation at their current level of use. Strengthening and promoting traditional values through awareness raising programmes may sustain the less financially tangible benefits of biodiversity from the area such as cultural heritage.

Although community conservation can be seen as a political construction in the name of biodiversity conservation, there appear to be intrinsic values that support establishing the sanctuary, whether or not it brings financial benefits to the local community, provided expectations are realistic. The ecosystem services approach helps understand the aspirations of future values from conservation initiatives and assess the value of traditional forms of land management. The process may offer a more holistic method for understanding the trade offs of using biodiversity conservation initiatives for poverty alleviation (Agrawal and Redford 2006; Kepe et al 2004) but it is also important to assess whose value counts and who benefits.

5.4 The Swamp Trail

5.4.1 Eroding the Commons*

Proposals have also been put forward by conservationists from WWF and LBNR to convert Kesubo and Loboi swamps, much more contested and valuable areas of land, into conservation sanctuaries, to protect their value to LBNR and to make their existence sustainable. The effective functioning of the swamps is essential to fulfil many human needs in agro-pastoral communities including livestock grazing, cultivation, extraction of wood products and medicines as well as biodiversity but this puts intense pressure on this fragile ecosystem. Currently there are trade-offs between the use and value of ecosystem services in these wetlands, highlighting conflicts of interest. This second case study compares the values of ecosystem services and assesses who wins or loses under different future management scenarios.

The video of the walk across the swamps (Figure 5.19; Figure 5.20), clearly illustrates the multiple utilisation of the swamps. It shows how essential these areas are for maintaining agro-pastoral lifestyles in this semi-arid region particularly in the dry season when other grazing fails. Both swamps contain large numbers of grazing livestock. Wildlife, particularly birds, is abundant. The soil is fertile and many fields ring the swamp including water loving cash crops such as water melon. When I was invited to film the local dance group Lake Bogoria Dancers they requested the performance to be partly on the swamps as they have a high cultural significance. Less evident but equally important are the filtration functions of the swamps that prevent silt flowing into Lake Bogoria. Yet severe erosion and degradation of the swamps is also evident because of the intensity of anthropogenic activities.

* (Anderson 2002)

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The importance attributed to different services is highlighted in the responses to the questionnaire. Table 5.4 shows that although grazing (Figure 21c) is the most valued service for the two swamps many other services are also highly scored including food for humans (Figure 5.21b), soil for crops, natural resources such as fuel wood and fibre, biodiversity (Figure 5.21a), and their cultural (Figure 5.21d) and spiritual significance. Ranking ecosystem services highlights the prime importance of swamps for grazing (Figure 5.22) but the even distribution of mean scores (Figure 5.23) exposes the intensity of other competing uses.

Figure 5.19 Video clips from Kesubo swamp. The walk showed the cultivated area in Loboi, erosion, grazing of livestock, cultural uses, the dry Waseges river bed, biodiversity including ostrich nests, tree felling and the older settlement on the Sandai edge of the swamp.
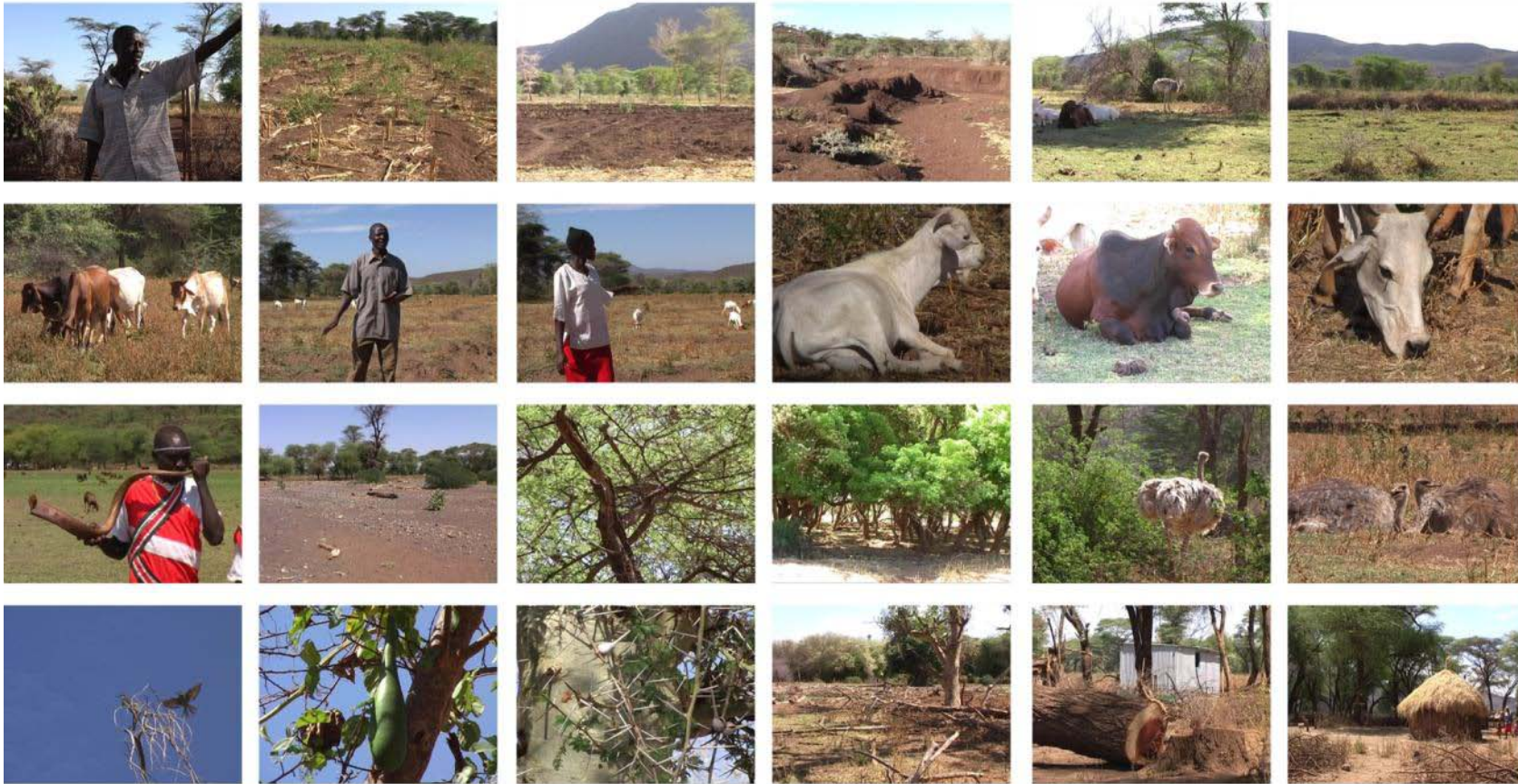
Figure 5.20 Video Clips from Loboi Swamp show grazing for livestock and wildlife, papyrus beds, rich soil for farming with crop diversification such as mangoes

Figure 5.21 Ecosystem services provided by the swamps

(a) Biodiversity: Ostriches are common in Sandai. Traditionally seen as benign by residents they have more recently attracted an illegal trade in eggs to introduce greater genetic variability in Kenyan ostrich farming industry.

(b) Cultivated land reclaimed from the swamps provides fertile soil for cash crops such as water melon.

(c) Swamps provide communal grazing for livestock, which is essential particularly in the dry season when other pasture has dried out.

(d) Cultural dancers above Loboi swamp. Swamps hold significant cultural and spiritual meaning.

Figure 5.22 Mean scores and modal values of Kesubo and Loboi swamps
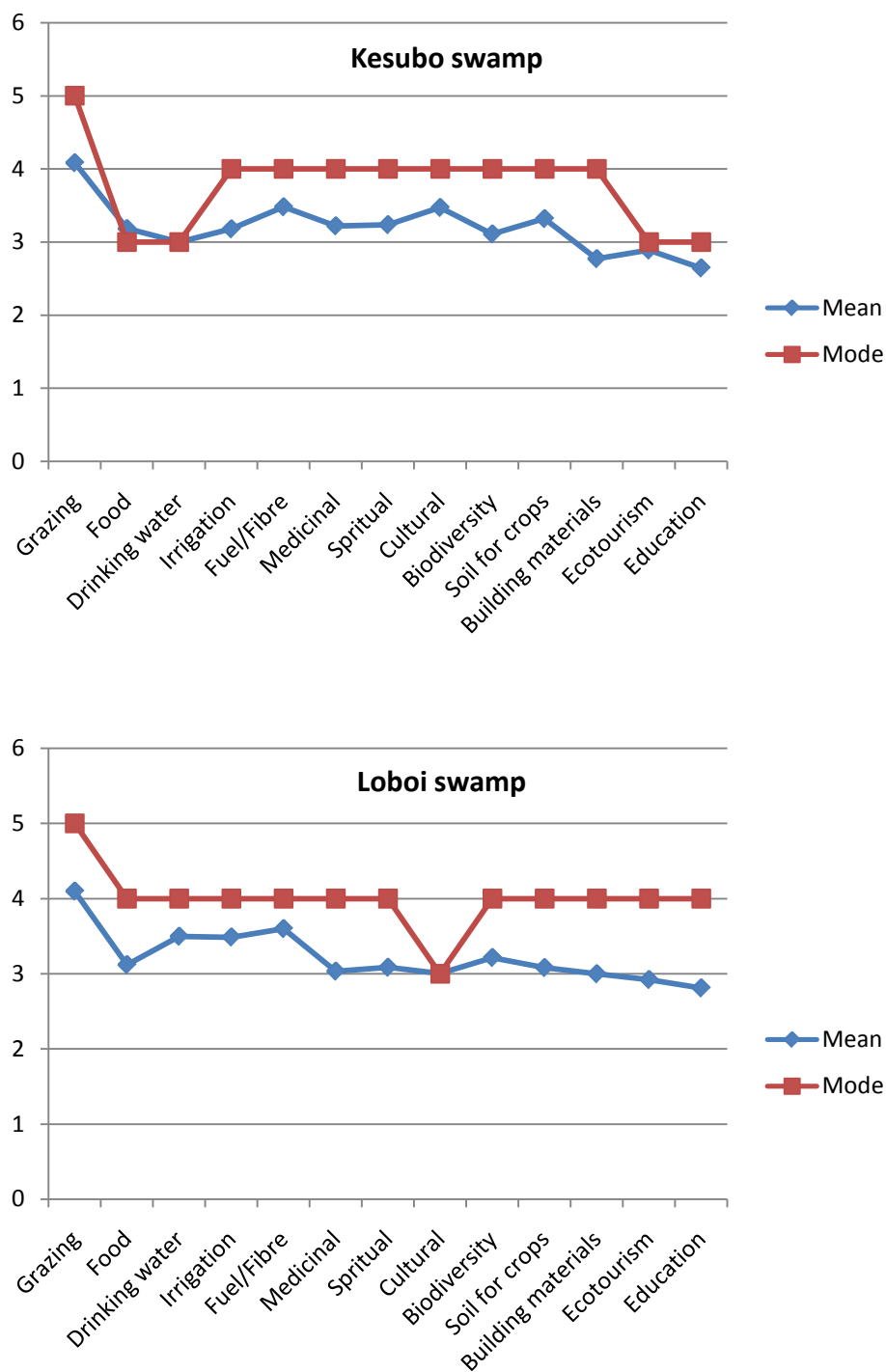
Figure 5.23 Ranking of uses of Kesubo and Loboi swamps
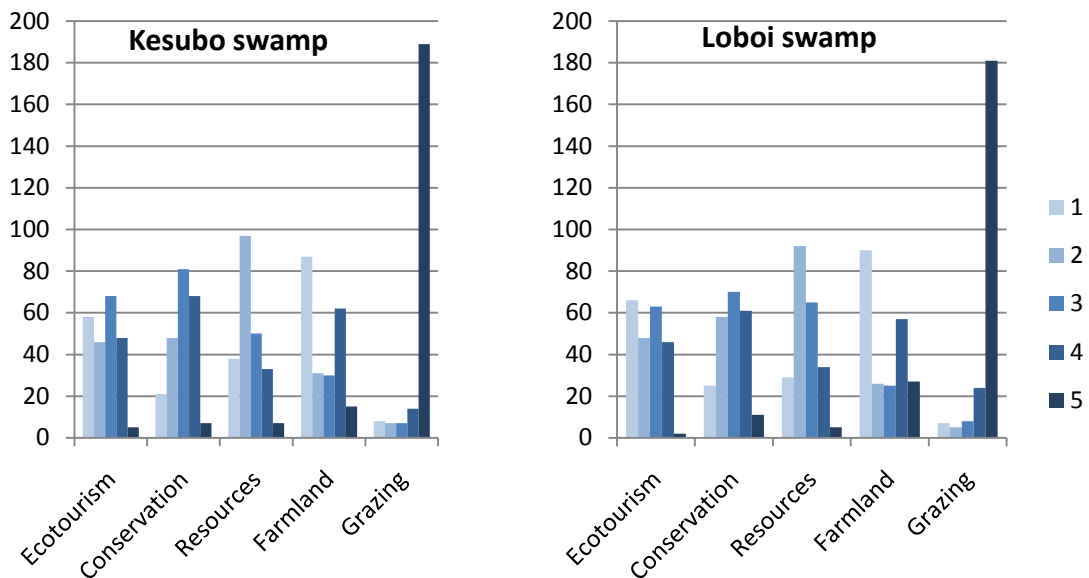
Because of the intense use of the swamps, the sustainability of the ecosystem services that they provide is becoming increasingly untenable. In contrast to Chuine where resource utilisation is less intensive and the impact of misuse less obvious, the swamps hold a greater value for many different uses but with greater evident consequences (Figure 5.24 and Figure 5.25). As communal grazing areas the two swamps provide an essential service to the traditional pastoralist element of the lifestyle of communities around it. Cattle are still an important measure of wealth in Sandai. Despite efforts by WWF to introduce improved breeds of cattle, higher milk production and more resilient to drought, traditional breeds still dominate. A single aerial count from Parakiat Hill of livestock on the two swamps during the dry season in February 2009 reported 2030 goats and 1440 cattle on Kesubo swamp (Figure 5.26) and 15,550 goats and 13,150 cattle on Loboi swamp (Figure 5.27). This is likely to be an underestimate because of tree cover. Hardins' Tragedy of the Commons is playing out in this area.

Figure 5.24 Sketch map showing influences on Kesubo swamp
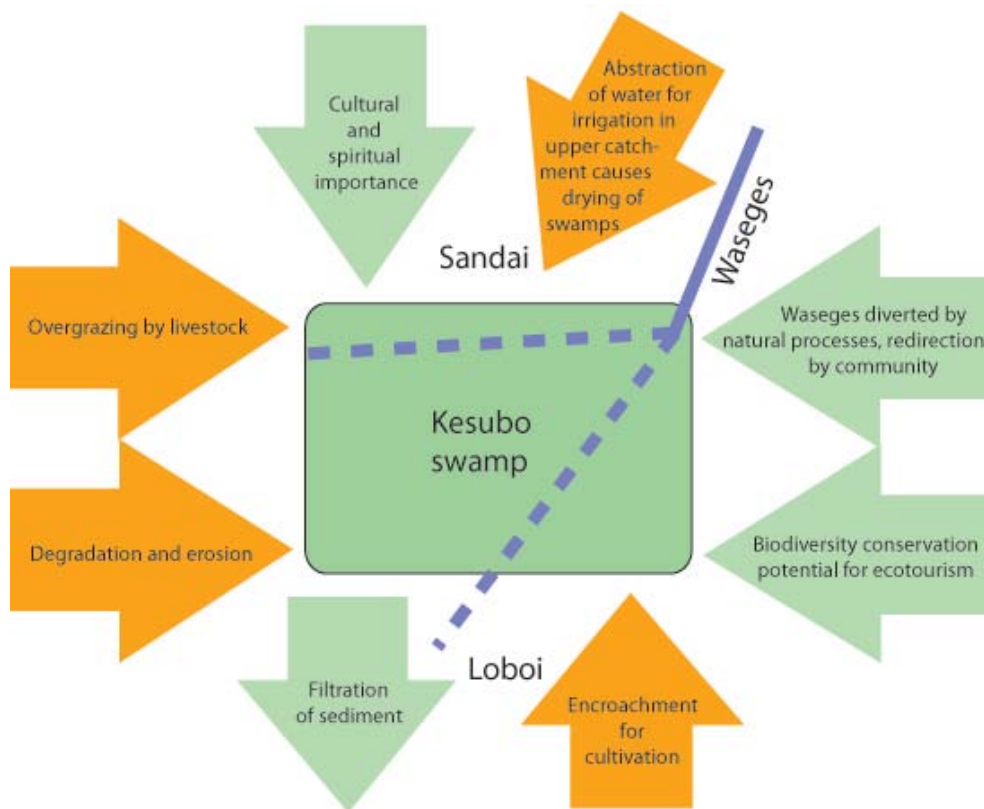
Figure 5.25 Sketch map showing influences on Loboi swamp
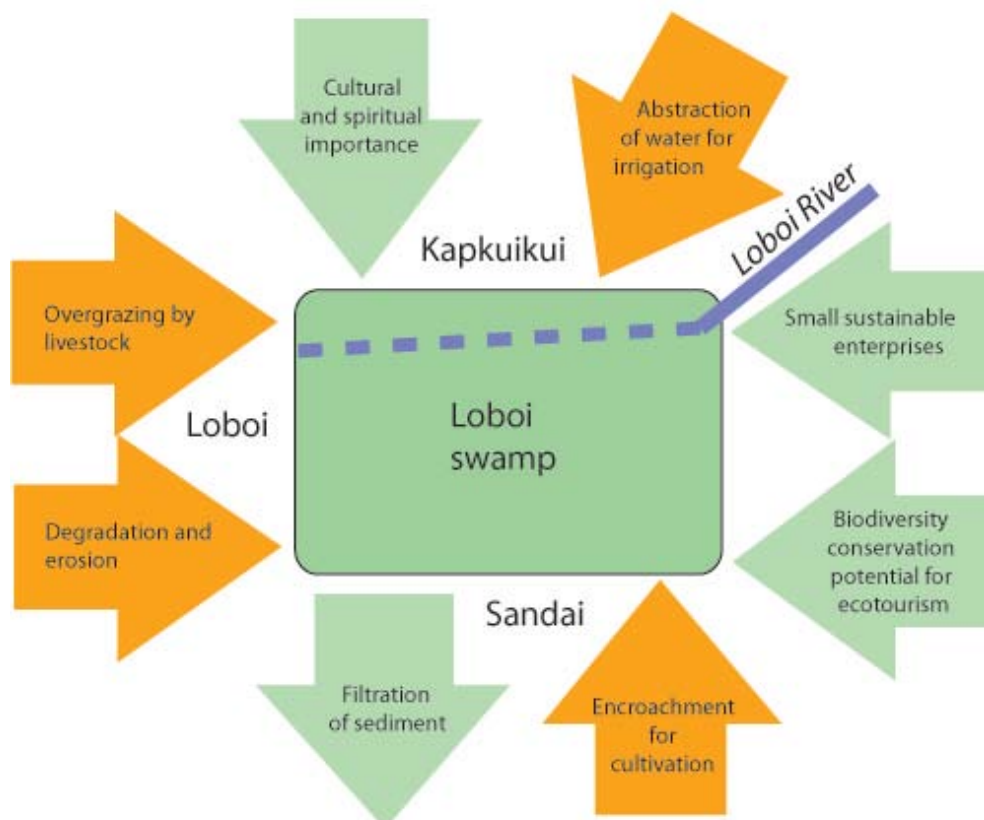
Figure 5.26 Sketch map of Kesubo swamp
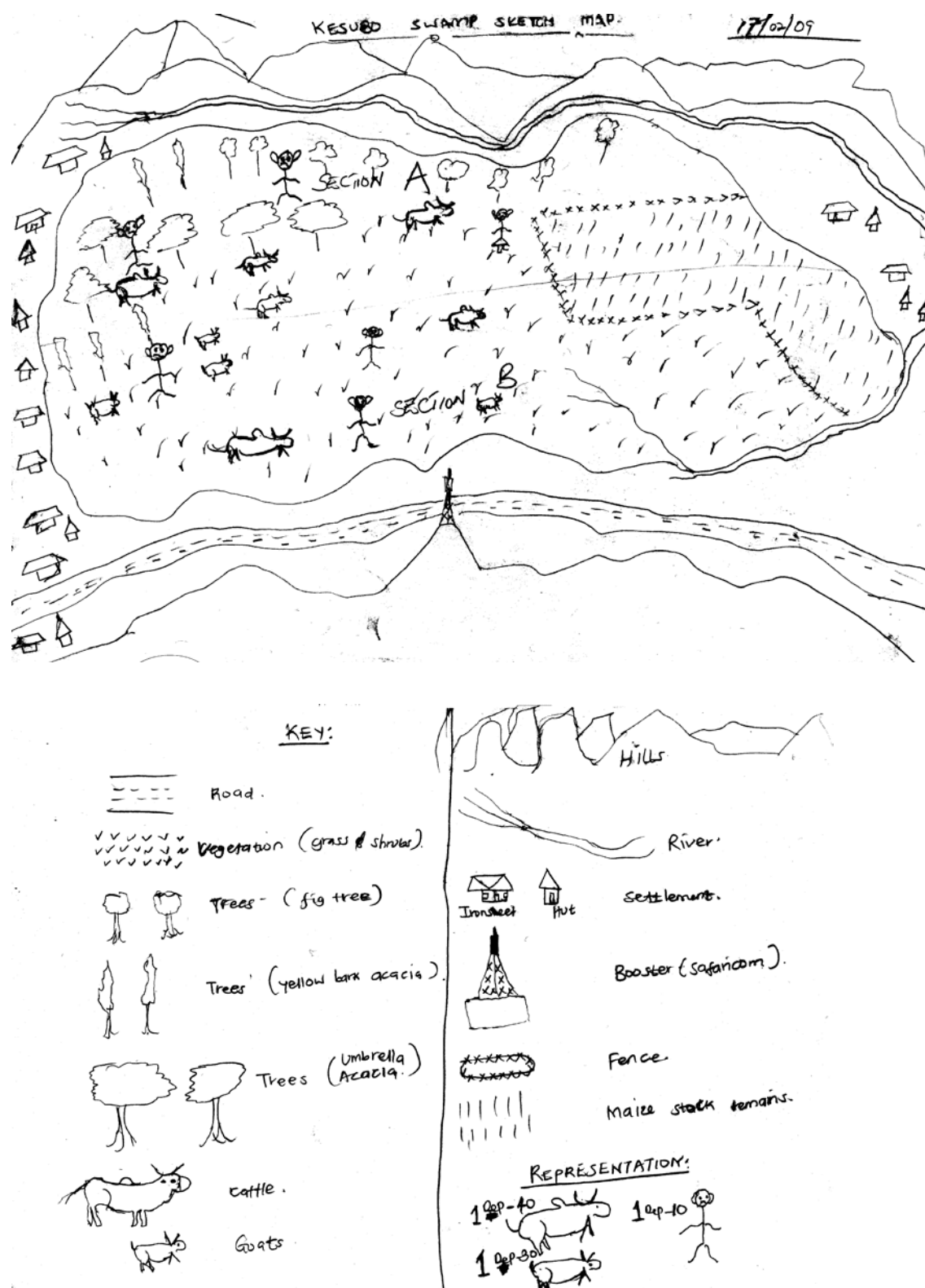
Figure 5.27 Sketch map of Loboi swamp
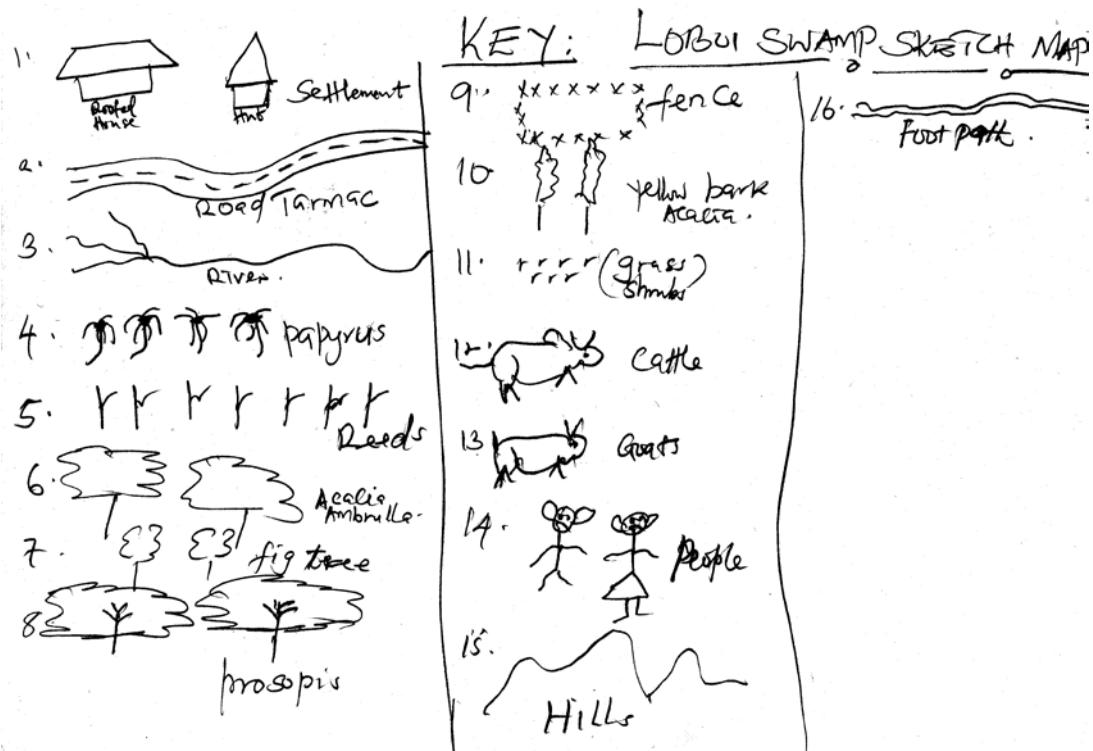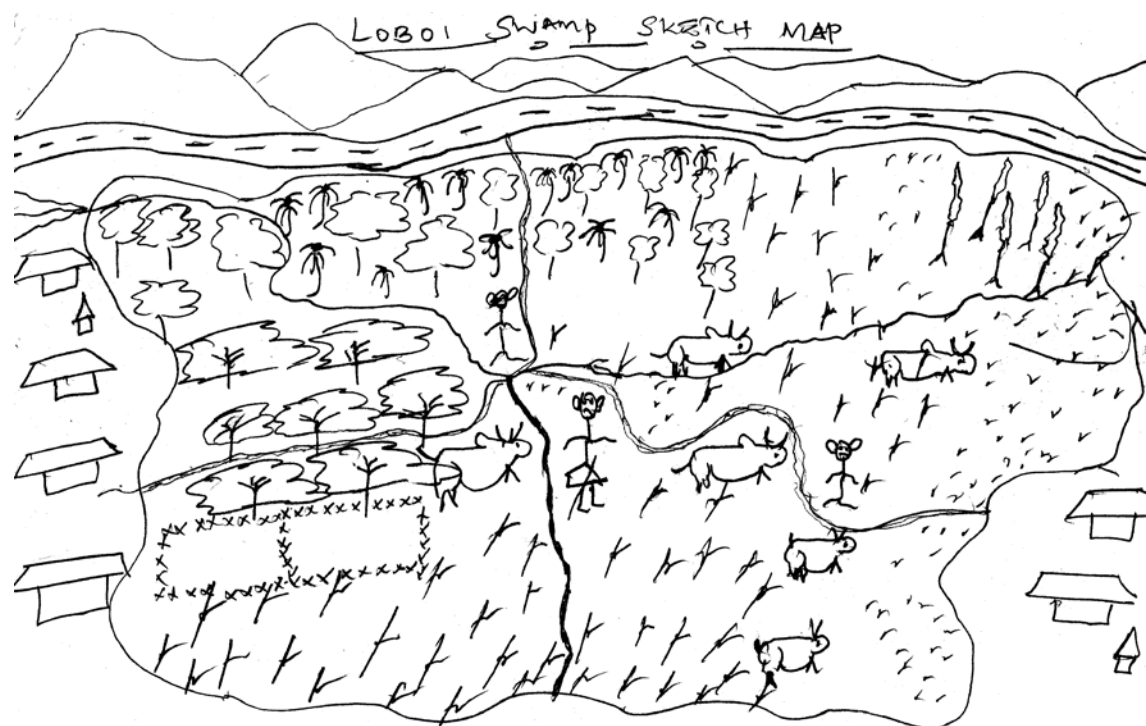
The wetlands are decreasing in size at an alarming rate (Loboi swamp by about 60% since 1969) mainly due to anthropogenic impacts of land use change (Ashley et al 2004); agricultural encroachment and settlement is continuing rapidly. The Kesubo swamp on the Loboi side of the boundary is now almost entirely cultivated for crops such as tomatoes and water melons.

One farmer living on the Loboi side of Kesubo swamp outlined the reasons for change to cultivation being because of erosion, not acknowledging the cause of the erosion being livestock overgrazing:

> *This was a swamp before but because of erosion we decided to cultivate. Before this was grazing land for goats, sheep and cattle then in 1997 we decided to demarcate it because of erosion. So every person who was here was given a piece of land. So that piece of land is not permanent land. We used to cultivate shifting type cultivation. We practice that because we are pastoralists. We are practicing nomadism because we used to shift those cattle from here to that mountain, those hills, from here to Lake Bogoria, and then because of desertification erosion came. Then this type of desertification came because of these buildings. We cut these trees for building and then erosion came. The type of erosion here is animal type erosion, wind erosion, rain erosion. All of them came. So an earthquake came in 1992. That was a very wonderful kind of erosion. So we decided to cultivate.*

> (Farmer, Loboi)

In Sandai however the swamps remain as communal grazing land with no demarcation. Change in the quality of Kesubo swamp is noted for different reasons by a Sandai farmer:

> *This is Kesubo swamp. We call it Kapindasum. But it is not like in the first time. In the first time there was long grass, it was so bushy. Goats were not allowed to enter the swamp because the bushes were there. Now we see the goats are grazing because the swamp is so open. There are no wild animals that will attack the goats so they are free now to graze all over but a long time ago cows were grazing in this swamp because it was so bushy. There were a lot of wild animals but cows were able to graze. Because recently there were a lot of river changes, it goes to the other side. That is why this swamp became dry like this. So that is why there is no grass in this Kesubo swamp. So now people have started cultivating even along the swamps because there is no water, a shortage of water. And that is why people are starting cultivating the swamp.*

> (Samson Kiptai, Farmer, Sandai)

In response to the drying out of the swamp, Sandai residents have attempted to divert the river away from the Loboi swamp and into Kesubo swamp to maintain good conditions for livestock grazing but this itself is hampered by extraction of water upstream.

This scenario of irreversible loss of wetlands through a combination of overgrazing, encroachment and depletion in water supply is being played out throughout the developing world in many small communities such as Sandai. It is believed that conflicting uses and population pressures make sustainable use of swamps untenable

(Hutton and Leader-Williams 2003). At the moment the very existence of the swamps is on the brink of disappearance. At this local level the conflicting priorities for using the swamps is severely affecting the sustainability of the essential services that they provide. Other studies (Everard and Harper 2002) analyse the sustainability of use (or lack of it) of ecosystem services in Kenyan wetlands. They note the urgency with which the challenge of sustainable development should be addressed because "the potential for loss of unique ecosystems, global market share, and social wellbeing and stability is so great" (Everard and Harper 2002:202). This urgent need for sustainability will intensify in the future through the desire for a better quality of life and growing population yet decreasing capacity of the environment to support this growth. "The challenge of achieving their sustainable development is therefore pressing, ensuring that the ecological productivity and diversity of natural systems – soil formation, biogeochemical processing, wildlife, etc. – continue to be sustained and to underpin the economy in the longer term" (Everard and Harper 2002:202).

This situation is worrying given the proximity of the LBNR which is classified as a RAMSAR site and Important Bird Area (IBA), and thus of particular importance to avian life. Surrounding wetlands such as Loboi and Kesubo swamp are important supporting areas within the wider catchment. RAMSAR conventions state: "Wise use of wetlands implies the sustainable use of wetland ecosystem goods and services, including especially water, for the benefit of biological diversity and human well-being through maintenance of their ecological character by implementing an ecosystem approach" (cited in Bridgewater 2008:101). But, whilst the text of the convention reflects the human space and time dimensions of ecological change, the resolutions do not take into account the anthropocentric interventions causing this rapid unpredictable change (Bridgewater 2008). The efficient functioning of services given by wetlands is

vulnerable to over exploitation of resources and this may result in unacceptable change in ecological character (Davis and Brock 2008) that cannot be remediated. The high values attributed to wetland resources by local communities are no longer sustainable as population and pressure for farmland increases and the resulting over exploitation of resources is causing unintentional but irreparable damage.

Therefore there are conflicts between current overuse of swamps for grazing based on traditional values for livestock as wealth, rapid encroachment of the fertile areas for crops, particularly cash crops that provide substantially improved income in the short term although the sustainability of cultivation in these fragile areas may be questioned and maintaining the wetlands both as a buffer for the neighbouring reserve and for biodiversity in their own right. These give rise to different plausible scenarios for the future viability of the swamps.

5.4.2 Future scenarios

Ecosystem services of the swamps may be assessed for different scenarios, a technique used by the MA (2005) and other ecosystem service assessments (Carpenter 2006b). A simple cost-benefit analysis by the IUCN (2004a) outlines three different futures resulting from different priorities in managing swamps. In these scenarios biodiversity conservation, grazing and conversion to farmland each take preference and the consequences for a number of ecosystem services is projected (Table 5.6). The results imply that both grazing and cultivation result in heavy loss of other ecosystem services. The most successful way to preserve a wide range of ecosystem services is through biodiversity conservation but with losses in grazing and cultivation. There are significant trade-offs to achieve a sustainable future.

Table 5.6 Scenarios for swamp use after IUCN (2004a)

	Conservation	Grazing	Convert to farm land
Biodiversity	Gain	Loss	Loss
Water supply	Neutral	Loss	Loss
Water purification	Gain	Neutral	Loss
Food grazing	Loss	Gain (short term)	Loss
Food cash crops	Loss	Loss	Gain
Soil retention	Neutral	Loss	Neutral
Products – reeds, grass	Neutral	Loss	Loss
Cultural	Gain	Neutral	Loss

Table 5.7 Perceived future change in value of ecosystem services for Kesubo and Loboi swamps based on majority of responses for each category in the questionnaire.

	Kesubo swamp	Loboi Swamp
Grazing for livestock	↓	↓
Food for humans	↑	↓
Drinking water	↔	↔
Water for irrigation	↔	↑
Timber, fuel, fibre	↓	↓
Medicinal plants	↓	↓
Spiritual use	↓	↓
Cultural use	↓	↓
Biodiversity	↑	↑
Good soil for crops	↔	↓
Good soil for building	↔	↔
Ecotourism	↑	↑
Science and education	↑	↑

Residents of Sandai identified a future increase in the value of the swamps for biodiversity, ecotourism and food and a decrease in value for grazing (Table 5.7). This may indicate that there are aspirations for improved income which could arise from

both cash crops and ecotourism but it seems doubtful that the various scenarios of loss or gain are fully recognised as cultural values of cattle remain high whilst problems of overgrazing are simultaneously understood but there is resistance to act on this recognition.

Livestock first

The pastoralist value of cattle and the fear of individual loss currently promotes high livestock numbers.

> *Because the one who has a lot of animals will get richer and the one*
> *with two animals when the dry season comes all those two will die but*
> *the one with more will lose fifty and remain with fifty. The richer will*
> *get richer and the poor they will get poorer.*

(John Kiptek, Sandai)

Table 5.8 Perceived threats to the swamps

Threat	Responses
Overgrazing / overstocking	236
Cultivation	69
Lack of water	59
Erosion	27
Deforestation	14
Climate change	10

Yet, respondents to the questionnaire (Table 5.8) see the greatest threat to the health of the swamps as being overgrazing (236) followed by cultivation, farming and encroachment (69) plus lack of water or dryness of the river (59). Despite the understanding of the major threat to the very survival of the most important grazing

areas, the value of livestock grazing remains high because of tradition. Some local leaders together with WWF are working to change that view and it is hoped that younger generations will more readily recognise alternative livestock practices.

> *We are putting a lot of animals inside the swamp. We don't understand the acreage of the swamp so that we calculate how much the animals are going to eat, we are going to overstock, That is why we are getting a lot of problems every year.*
>
> *Say there are one hundred people but the swamp can hold two hundred animals, so then we divide and then everyone should have two cows. And our old men cannot agree with that issue. I will try to tell them that to have a lot of animals is not good we better have few and we get a profit. So we are going to fight on that issue. And I think we shall win because the old men now are few.*
>
> (John Kiptek, Sandai)

The scenario of favouring large numbers of livestock is slowly being changed as awareness of the effects of overstocking is raised. Breaking with traditional values takes time and the swamps are already severely stressed so slow change may see the swamps disappear rapidly with consequences for both livelihoods and the neighbouring reserve.

Cultivation first

Encroachment of the swamps for cultivation currently appears to be taking place more extensively on the Loboi and Kapkuikui sides of the swamps rather than in Sandai.

> *My income has increased since I enclosed this land five years ago for cultivation. Mostly for maize but also melon and now we are trying to plant squash.* (Farmer, Loboi)

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This causes conflicts when livestock wander.

> *Now when people entered inside the swamp when this conflict between this side of Sandai and that side of Loboi. People cultivate there when everyone is taking their animals to the swamp. The animals eat maize and those people put maize poison and animals die. If that was harmonised at first or if the swamp was preserved at first this problem would go.* (John Kiptek, Sandai)

Deep concern is expressed that the common resources within the swamps are seemingly unregulated and also contested between neighbouring locations. Residents near the Loboi swamp are extracting water for irrigation and the incentives of cash cropping puts a lot of pressure on the land for short term gain. However, people in Sandai are currently maintaining their parts of the swamps for communal grazing.

Cultivation of the swamps offers substantial increase in income to residents but possibly only in the short term. In areas of high poverty these immediate returns offer hope and future sustainability may be disregarded. Local conservationists suggest that cultivation would see the regulatory services of the swamps diminish, causing downstream deterioration in ecosystem functioning and possible increased siltation of Lake Bogoria.

Biodiversity first

Conservationists concerns are set not only on the health of the swamps themselves but protection and preservation of the neighbouring Lake Bogoria. Daniel Koros, Officer with WWF Freshwater Programme highlighted the concern over the swamps in the context of the biodiversity of the wider Bogoria catchment but also as a basic necessity for the community and sees problems stemming from lack of understanding of traditional environmental stewardship.

I always say that WWF is about some forest upstream, a river, quite a number of users and a lake at the end of it because at the end of the day the water is flowing down Waseges to the end at Lake Bogoria. That is where we have the animals, we have the flamingos and that is tourism. And we are interested in a situation where everybody benefits, including the wildlife. So we are interested in livelihoods so that everybody can function. That is the reason why we do quite a bit to protect the swamps, not only as WWF, but by building capacity among the communities who benefit from the swamps to be able to look after the swamps on their own. Not using any scientific methods but using the traditional methods that they stopped using a long time ago. There are still quite a few old people left – they have this knowledge. But the young people, who I would say are to blame for the destruction that is going on in the swamps, do not have this information. So we have created forums where the old people can talk to the young people and make them understand that there is a good reason to protect the swamp. Mainly as a dry season grazing ground and that if they want to continue in keeping livestock then it is necessary. Then we also want to bring in the idea of wildlife; that when the areas around the lake are dry and there is no pasture then there is always a fall back position for even the animals. We hope that everyone else will at least understand this and we see the swamp behaving like a swamp again. Right now it is not doing very well. It is not doing very well at all. (Daniel Koros WWF)

This conservationist's view expresses the need to facilitate learning of the value of biodiversity amongst younger generations that brings traditional knowledge to the fore

but only certain knowledge and practices. WWF and LBNR management are encouraging the community to register the swamps as conservation sanctuaries alongside Chuine which would go some way to protecting these areas but also requires changing the pastoralist value of livestock.

Using the IUCN model (Table 5.6) would require a curb on cultivation and reduction in livestock numbers, although moderate levels of livestock would complement traditional management regimes of the swamps. Some local community officials appear in agreement expressing opinions that the swamps should be created into sanctuaries to simultaneously protect biodiversity, promote sustainable use of resources and for the development of ecotourism.

> *So now I am saying that the swamps could be preserved and we have a lot of animals inside and birds. We could have preserved it for tourism. We could have built a hotel there. We are going to get jobs, at the same time we are going to get money.*

> (John Kiptek, Sandai)

One of the complex challenges of wetland conservation is seen as balancing traditional knowledge and practices, ecological science, national concerns and environmental change (Sithole 2004). Using small scale seasonal water sources is essential for many rural communities. However, traditional practices in these cases rarely recognise the rapidly changing catchment level priorities, and there is a case for top-down involvement to regulate use over a wider area. In the long term it seems advantageous for the LBNR and the community to give biodiversity conservation a preference over other exploitative uses of these wetlands. The value of the swamps for local livelihoods may then be enhanced indirectly through ecotourism. Nevertheless, there may be an

argument for more direct compensation for long term stewardship of the wetlands (Ramsar Convention Secretariat 2007) by establishing a Payment for Ecosystem Services (PES) (UNEP/IUCN 2007; Milder et al 2010) scheme. The motivation for conservation of the swamps stemming from the need to buffer the functioning of the Lake Bogoria reserve comes with some local understanding of the important relationship between the wetlands and the lake.

> *This swamp is doing a lot of things, it is like a filter. When a woman is cooking tea you don't pour everything in the kettle you put a filter so that the tea leaves remain. Like our swamps God put these swamps there for filtration. People don't understand that that is so important because if water pours straight to Lake Bogoria it will fill with silt.*

> (John Kiptek, Sandai)

However, without radical change and better management the services that these wetland areas provide for human well-being, let alone biodiversity, will soon be gone. The immediate problem belongs with the community but a solution from within is unlikely to be adopted because of traditional value of livestock and political disagreements. This is no different to many places the world over. Yet the possibilities for mitigation in areas such as this that are on the edge of poverty are few. The sustainability of reliance on natural systems is not just a matter of putting an economic value to them. Perhaps the question is not 'Whose values count?' but 'Who pays the price for those values?'

5.5 Summary – Whose value counts?

On walking the resource trails through Sandai I was made profoundly aware of the conflicting values and issues surrounding use of ecosystem services at this local level. Kesubo swamp is depleted in size and function through encroachment, erosion and

overgrazing, yet maintains the vestiges of a rich biodiversity. The steep trail to the proposed Chuine sanctuary, that follows the kudu path to a former spiritual site at the top of the escarpment, now a proposed tourist viewpoint, is also the daily trail of the Tugen pastoralists to grazing area for their livestock. The trail along the dry river Waseges reveals a new concrete dam to drain water for irrigation that contributes to the depleted stock of drinking water. The long hot trudge through the cultivated land of seasonally fertile shambas (farms) revealed evidence of tree-felling and charcoal burning to clear more land for cash crops, and former cultivated areas abandoned by shifting cultivation. Finally the cattle track across Loboi swamp crossed the fertile edges irrigated from the river Loboi whilst the central area is being extensively used by the livestock from three surrounding locations as well as ever dwindling numbers of zebra and other wildlife that migrate from the neighbouring Lake Bogoria reserve.

Many areas show ominous signs of overuse or misuse where traditional management patterns can no longer suffice. People here are trapped by fulfilling basic needs so that sustainability of resources for the future is in question. Traditional practices and values, however applicable when the pressures on resources were less, to some extent exacerbate the problems, yet may hold some of the solutions given the right support and encouragement.

This research has taken a novel approach to understanding the comparative values attributed to ecosystem services and gone some way into dissecting the conflicting values of ecosystem services within one rural community in Kenya. Ecosystem service valuations offer a framework for decision-making and choice as well as a way of raising awareness within communities of the values they themselves attribute to their lands and resources. It is a means to understand what the trade offs are in conservation and development arenas and to raise awareness of where conflicts may occur. It is also a

framework in which to communicate issues at the micro-scale that may not be fully appreciated within global and national governance.

The complex dynamics and trade-offs between ecosystem services is not fully understood (Balmford and Bond 2005) so there is limited appreciation of the issues faced by local people within global and national governance policies. Global values do not see the direct nature of the problems but local communities often living to fulfil their immediate needs do not have adequate capacity to value and therefore preserve resources for the future in the hope of future revenue. Priorities of survival may over ride other values particularly in areas of hardship. Short-termism is inevitable as Githiru (2007:119) describes "The rural poor generally regard environmental problems as something to worry about only when one can afford to do so" although, more optimistically he believes that there is "a great deal of resilience in Africa, and there is also real hope for the environment because many people directly rely on it." (Githiru 2007:120). What needs to be clearly understood by both local people and decision makers regionally, nationally and globally are the varied and complex values attributed to ecosystem services, not necessarily in a purely economic sense but with an understanding of the relative scale of values but also why these values are held and what influences them, whose values are being accounted and what are the motivations.

The values attributed to ecosystem services in subsistence communities such as Sandai have been shown to be directly related to models of human needs such as those highlighted in the Kamenetsky model. Highest values are attributed to 'basic materials for a good life' such as food, water and grazing for livestock, which are fundamental to agro-pastoral and subsistence livelihoods. This gives weight to the argument that purely economic valuation of ecosystem services is not meaningful to subsistence economies

when the ability to pay is hypothetical. The use of ecosystem services is fundamental to many rural people in the developing world, a basic necessity and human right.

Sandai is not atypical of many villages throughout sub-Saharan Africa. It is not an area of any extremes: high levels of biodiversity or cultural diversity, tradition or development; it is 'Middle Africa' if such a thing can be said to exist. As such it may be viewed as a yard stick by which to understand the values motivating people in rural Kenya. Yet, this place also has its identifiable traditions and cultural attachments, and its specific environmental concerns that mould attitudes and values. It is easy to lose identity in apparent normalisation of values in ecosystem service assessments at regional, national and international scales. This sets out a challenge at the local level but is equally of importance in global terms. As Adams (2004:238-9) reflects: "The ways people micro-manage areas such as African farmlands therefore has a global conservation importance, not for huge rare species, but for the survival of the wider local living connections that comprise the biosphere." and he goes on, "A concern for nature comes first from wildlife close to home, not from remote biodiversity hotspots. The conservation and enhancement of the biodiversity of ordinary landscapes in the developing world is a vitally important challenge for conservation in the 21st century." Although the values of biodiversity and perceived future values from ecotourism have been promoted through the work of WWF and LBNR in Sandai there is a justification for this approach. Biodiversity already sustains local livelihoods and unless ecosystem services are managed effectively then the environment and human well-being will deteriorate.

Traditional knowledge and practices contribute to form local values for ecosystem services but these may be moderated by external actors. Local values may be mediated by 'outside' values. The case study of the Chuine community sanctuary has illustrated

that where a community area is valuable for conservation within the context of a wider ecosystem the value of biodiversity may be enhanced through the prospect of future income from tourism and can increase the current value ecosystem service value of biodiversity. Care has to be taken that this does not unduly raise expectations but it is beneficial as it raises awareness of the need to conserve biodiversity and to sustainably manage natural resources. A similar process of raising values of biodiversity in the wetlands of Sandai is also in process but here there are conflicting uses of ecosystem services that are essential to the current livelihoods of local people. The importance of these sites to the neighbouring Ramsar site at Lake Bogoria suggests that a PES scheme, for responsible stewardship of these lands and to off-set other benefits, should be sought. It is not necessarily a case of 'Whose values count?' but 'What values should be given priority?' and 'Who pays the price?'

The next chapter will continue this theme to show how impacts of free use of a highly-valued common resource, water, can severely affect other communities and particularly sectors of a community. In the first case there may be a strong argument for payment for the service as a form of regulation, in the second there is an argument that different sub-community values, and the gendered nature of impacts, should be considered. Nevertheless, valuation and payment does not imply that overuse can continue; sustainability is still an essential requirement for the health of the planet. As the MA (2001) acknowledged at its outset, "the mere act of quantifying the value of ecosystem services cannot by itself change the incentives affecting their use or misuse".

Chapter 6

Women's Trails

Throughout my life I have never stopped to strategize about my next steps. I often just keep walking along, through whatever door opens. I have been on a journey and this journey has never stopped. When the journey is acknowledged and sustained by those I work with, they are a source of inspiration, energy, and encouragement. They are the reasons I kept walking, and will keep walking, as long as my knees hold out.

(Wangari Maathai 2008a:286)

Chapter 6 Women's trails

6.1 Introduction – A woman's daily life in Africa

A colourful group of chattering women crouched by the bank of the flowing river filling their bright yellow, twenty litre jerry cans with liquid. Esther laughingly discussed her forthcoming fundraising to raise school fees for her fifteen year old daughter as she tightly tied her scarf to the can, raised it deftly onto her bent back and adjusted the scarf that tied it across her forehead. Shrugging once more to adjust the heavy load she picked up another smaller can of water and strode off towards her home seven kilometres away.

On the way, the trail wound around other homes where the women were sorting beans to feed their children at lunchtime or were sweeping the red dirt out of their mud and wood built houses with handheld grass brooms. She crossed through farmland planted with rustling maize; she passed through a dust cloud raised by a young girl herding a large group of clattering-hoofed goats to the swamp; and called a greeting to an old woman bent double under a load of green leaved branches that she was taking to feed the young calves.

As she walked further, the ground became bare, dusty and barren, stripped of all grazing, by the voracious goats. A few sparse acacia gave a little shade from the blazing sun. An occasional irrigation channel showed a vestige of green along its edge, but this would not last much longer as the river level dropped quickly in the dry season and ended in drought. Then, for several months, fetching water would be even harder as she queued with other women for hours for the few drops of precious liquid percolating up into holes in the rock filled river bed.

At last she reached the end of her trail and entered through the rough gateway in the fencing, scattering a few scrawny chickens and a stray ostrich that she saw as a benign creature. She lowered the load from her back to the ground and, with a brief pause for a mouthful of water, set about preparing a lunch of maize and beans for her husband and children. This afternoon she would work in her small shamba which earned her a few shillings from the sale of vegetables. This money she put aside to educate her daughter who she hoped one day would go to college and live a different, more prosperous life.

This cameo of Esther's life illustrates the typical life of an African woman living in semi-arid lands that illustrates her use of natural resources linked to her domestic responsibilities and her aspirations and sets the scene for the following review.

Previous chapters have discussed ecosystem services at international, national, regional and local scales. This chapter introduces sub-community differences by concentrating on the roles of women and their dealings with ecosystem services. Communities are far from homogenous (Leach et al 1997; Agrawal & Gibson 1999) and include groups distinguished by many factors such as gender, ageset, wealth, influence and level of education. African pastoral societies, such as in Sandai, remain patriarchal and the head of the household is normally male and may still have more than one wife in different households. Men are the main decision makers in the home and village. All the chiefs and officials in Sandai were men. Therefore, when local values are assessed important issues in terms of equity of impact and benefits may be missed. This aspect of my research, which reviews ecosystem services from the point of view of women, came about partly by academic design but also, as a mature woman, I was seen as akin to, and empathetic with, women by the community so was guided to spend a lot of time

working and walking with them. Through this process, a new perspective on valuation of ecosystem services was gained.

The aim of this chapter is to illustrate how women play an important role in the use of ecosystem services yet they are often restricted in real governance and decision-making in the patriarchal society in which they live; consequently and, it is argued, their values are not fully considered within either environmental or development arenas. The theme of women and the environment has been debated within feminist environmental literature (see Mies & Shiva 1993; Sachs 1997; Rocheleau et al 1996; Agarwal 1997; Leach 2007; Momsen 2004 amongst others) but there seems to be little consideration as yet within the ecosystem services arena. Water scarcity in particular affects the shape of women's lives and may be seen as an important women's issue. This is shown through the films created by the women of Sandai of which the video and mediascape 'Walking with water' is particularly poignant (see Chapter 7 Visualisation Trails). Water is used to exemplify the argument that women's values and roles are essential to the management of ecosystem services.

The chapter starts with a critique of the equity of global and national environment and development policies on women living in rural Kenya (Section 6.2) with water as a discussion focus. I then present an overview of the lives and livelihoods of Tugen women in Section 6.3 which gives context to the gendered differences in values, practices, and management connected to the use of ecosystem services. I highlight their aspirations for change and the barriers to development such as the unequal opportunity for education, partly exacerbated by their responsibilities in ecosystem service management. Water, particularly domestic water, is used as a case study (Section 6.4) and it is argued that women's time and work is poorly evaluated within water management. In the summary (Section6.5), the research adds strength to the appeal to

conservation and development agencies to recognise that 'communities' are not homogenous, to recognise difference and to include women more fully in research and decision-making (Banerjee and Bell 2007; Buckingham 2004).

6.2 Poetics and politics of women and water

6.2.1 Women and environment

Understanding the social and power relations that regulate use, practices and ultimately values surrounding ecosystem services is an important consideration at all scales of governance. This may be exhibited in decision making by awareness of community heterogeneity and their relationship with nature, the explicit regard shown to issues of gender equity within policies and practice and exposed partly by empirical studies arising from feminist and environmental theories. Yet only slowly are women's knowledge, values and rights being considered within policy making. This section critically assesses the marginalisation of women within environmental policy making and policy impact and sets the scene for the ethnographic study connecting women and ecosystem services, particularly water.

A body of feminist environmental thinking, variously branded ecofeminism (Sachs 1997; Sturgeon 1997); feminist environmentalism (Agarwal 1997); feminist political ecology (Rocheleau 1995; Rocheleau et al 1996); gender, environment development (GED) (Leach 1995 et al; Momsen 2000; Momsen 2004), discusses aspects of women, gender, environment and development from linked but divergent philosophical standpoints. Ecofeminists and their critics contend with three issues: the essentialist or close biological relationships between women and nature (Mies and Shiva 1993; Shiva 1988), the connections between societies' domination of both women and nature (Shiva 1988), and the role of women in dealing with environmental problems (Sachs 1997).

Leach (2007) sees the essentialist view as counterproductive and others also critique the images of women and gender 'myths' that pervade development studies but show that they also motivate actions inspiring political convictions for re-establishing gender within development policy (Cornwall et al 2007; Moore 2008). Critics have highlighted the universal assumptions of gender difference that ecofeminist theories make, which may also be set against diversity of class, race, ethnicity as well as geographical location (Agarwal 1997; Banerjee and Bell 2007) and the local context (Rocheleau et al 1996). However, there is concern that environment and development policies are now 'gender-blind' (Leach 2007) and the effects of gender-neutrality must also be considered (Kameri-Mbote 2006) as that can inadvertently disempower women and dilute 'women's equality' under the gender banner (Buckingham 2004). Particularly in patriarchal societies, where customary law allows differentiated use of land and access to common resources (Agarwal 1994), so called gender-neutral land laws may allocate ownership of that land to the senior head of a household, usually male, so disenfranchising others in the community. The limitations for women within patriarchal governance systems found at global, national and local scales are of immediate concern to this research. Both the lack of women in environmental policy-making and the lack of consideration of gender issues within policy may result in unplanned consequences for women.

Gender provisions are to a limited extent found in international development and environment debates. For instance, the UN (1993:145) recognises "the vital role that women play in the conservation and sustainable use of biological diversity and affirming the need for the full participation of women at all levels of policy-making and implementation for biological diversity conservation"; and the MA (2005) acknowledges that women in many societies are more vulnerable to environmental

change because of the variation of roles and rights between genders, suggesting that "Response policies need to be gender-sensitive … based on a systematic analysis of gender dynamics and explicit consideration of relationships between gender and food and water security" (MA 2005:13). However, there is a distinct lack of linkage between international policy and local and regional implementation and "there is no smooth cascade from the macro-scale international announcements of the UN or EU through national government legislation, to local and regional policy-making and enactment, nor are there mechanisms to evaluate how these macro-pronouncements find or lose their way to policy" (Buckingham (2004:153). Similarly, Deda and Rubian (2004:203) call for "governments and development organisations to treat gender as a cross-cutting issue, … and to incorporate gender concerns into national biodiversity strategies and action plans" through full-participation in decision-making and equal access to opportunities. Inefficiencies and inequalities are likely to arise if women are not involved in actions which have implications for long term sustainability of projects (Agarwal 2000), but the gap between having a stake in environmental actions and the ability to make changes needs to be recognised because of the gendered difference in land and resource rights.

Shiva (1988) draws links with Western and colonial development policies and the negative power relations this imposes on both women and nature. Wirf et al (2008:515) argue for "women's rights to water and participation in natural resource management on the basis of their specific knowledge, cultural values and roles rather than only as a concession to western notions of gender equity and fairness". In countries such as Kenya colonial powers perpetuated their own and local patriarchal governance regimes and favoured men, such as land rights being given to male heads of households, which was then perpetuated in the postcolonial era (Kevane 2004). The patriarchal nature of

traditional societies in Kenya has meant that women are under-represented in government and in decision making positions. Until 2010, the Constitution of Kenya, although appearing gender neutral, did not provide for gender as a basis for discrimination (Mucai-Kattambo 1995). There is polarisation between a few women, through education and opportunity, having a voice within global, national and local environmental governance, and at the other extreme, women maintaining the traditional role for whom the environment is their livelihood but who have little decision making capacity within patriarchal society. (I was informally told by one male Kenyan academic that there are two sorts of women, the educated politician and the woman at home). Women are underrepresented in university education (Onsongo 2006). The disparity or "long journey from users to policy makers" (Deda and Rubian 2004:201) is illustrated by the under-representation of women at higher levels of environmental management and decision-making despite acknowledgements that women's knowledge is imperative for the sustainability of natural resources. Women's involvement in grass-roots movements, for instance The Green Belt Movement (Maathai 2003), is widely celebrated and should not be overlooked (Rocheleau et al 1996), but is perhaps limited in its impact.

Specific strategies for women in Kenya's Vision 2030 (GK 2007) are aimed at increasing the participation of women in all economic, social and political decision-making processes. This aspiration has not yet been realised; in the 2007 elections the number of women in Parliament increased from ten to only fifteen out of 222 seats. Nevertheless, Kenyan national government departments are addressing gender in many of their programmes and mainstreaming gender in their activities (DEWA 2007). For instance, in processes of environmental change gender is seen as a cross-cutting issue as men and women participate both in development and the degradation of the

environment, although women, because of their responsibilities, have a particularly important role in improving environmental efficiency.

In patriarchal societies women are active in environmental resource use but less central to governance and policy making structures. Women's involvement in decision making is limited and tends to be through influence within the home. Often women are the producers of food, yet men control turning resources into cash, giving women little power within the local economy. Women often do not have control or ownership of land and have more limited access to finance. Environmental policies often focus on information from the male head of household who may have different priorities. "Virtually nowhere in Africa have decision-makers made the policy linkage between women's roles as food producers, women's roles in managing the environment and natural food security, thereby enabling women to achieve effective participation and performance in national development" (Thomas-Slater et al 1995). Also, although women's knowledge and practice is essential for in situ resource conservation and management, they often do not have power to manage their resources and may be adversely affected by development and conservation strategies and environmental change. This is important as gendered differences in knowledge are related to the divisions of labour and women often hold much of the local knowledge of agrobiodiversity in the form of plants for food and medicine (Deda and Rubian 2004). Yet their traditional knowledge has often been marginalised or subsumed into community knowledge (Kiplagat 1995). Women are now finding that their marginalization is being exacerbated by environmental change as "the impact of ecosystem changes on poor people, women, and indigenous peoples … has not been adequately taken into account in management decisions" (MA 2005: 62). One example

is in the impact of water scarcity where women's responsibilities mean they face the biggest impact from changes to water supply as an ecosystem service.

6.2.2 Women and water

Water scarcity is of great concern throughout Sub-Saharan Africa. There have been repeated and increasing droughts in Kenya; over the last decade there have been severe droughts in 2000, 2004-5 and again 2009. These have been devastating in many areas and have worsened poverty of communities in semi-arid regions (UNEP and the GK 2006). However, water is an essential component of development, "Water is the most important natural resource, indispensable for life and at the same time the backbone of

Figure 6.1 Links between ecosystem services of water flow and human well-being (after Forslund et al. 2009:14)
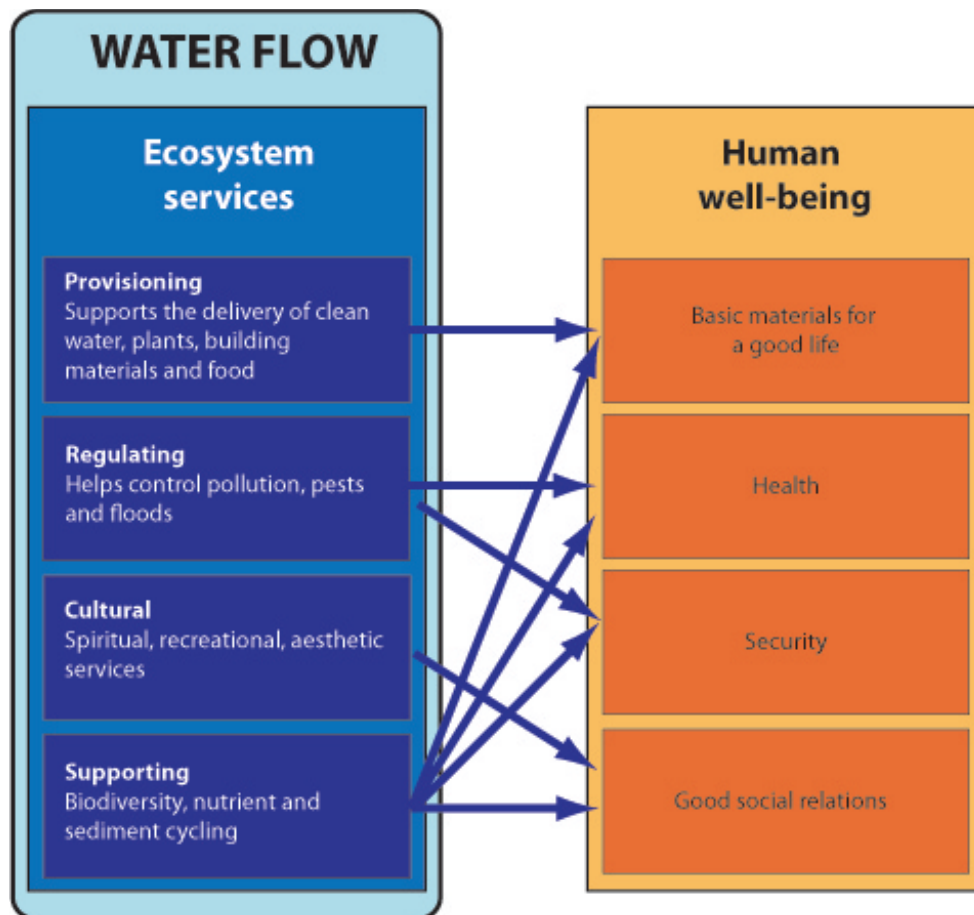
growth and prosperity for mankind" (Govt of Kenya 2002:1). The MDGs are set to reduce by half the number of people without clean water by 2015 yet implementation of this is unlikely to be achieved in Africa where over 50% of the people face water stress or scarcity, the baseline water access is low and greater financial, political and material resources are needed (UNDP 2005). The uses of water are varied and often conflicting, and good management of water and watersheds are vital for water security which has an impact on provision of food, health, climate and biodiversity. Water underpins many ecosystem services, performs many functions and supports human well-being (Figure 6.1).

Poverty and shortages of water and other natural resources disproportionately affect the lives and livelihoods of women and children throughout rural Sub-Saharan Africa (Figure 6.2) (UN 2008b). Women are central to the management of these resources and ecosystem services, yet are marginalised within patriarchal societies. Maathai (2008b), for example, identifies the importance of raising the capacity of women in relation to achieving the MDGs:

> *As we pass the halfway mark to reaching the United Nations' Millennium Development Goals and celebrate the third year in the UN Decade for Action: Water for Life, it is a key moment to redouble our effort to reaching these important targets. A key strategy to meeting these goals will be raising the capacity of women in water management and safe water supply. We are living in a time when women's voices must be heard, considered and respected at every level of water resource management. Recognizing women's vital role in water supply and community health is essential for a future of security and peace.*

<div align="right">(Maathai 2008b)</div>

In this one short statement she links women, water, peace and health and the necessity of involving women in management of all these concerns at every level, every scale. This statement also highlights the role of women in water management and the implications of water scarcity on the lives of women. The primary role of many women and girl children is seen as provisioning the home with resources such as water leaving them limited time for education and therefore less chance of becoming decision makers outside the home.

Figure 6.2 Global percentage of women in a household who have the burden of collecting water (Source: UN 2008b:42)
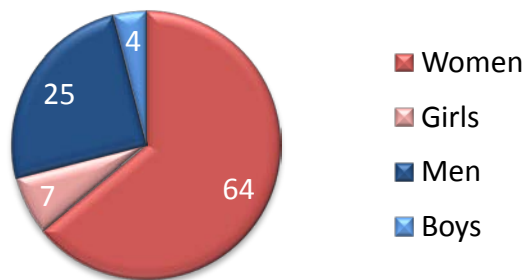
Within Vision 2030 (GK 2007) improvements in water supply and management are seen as paramount and include action to conserve water sources and develop new ways of water harvesting. However, in the short term, the document concentrates on large scale flagship projects to be achieved by 2012, rather than facilitating small scale local solutions to water supply. A strong correlation has been found between improved water supply and sanitation and economic status; 29% of households rely on open water sources, mostly in rural areas, and 32% of households on groundwater with 71% of Kenya's piped water supply going to urban households (WRI 2007a). National policies (GK 2002) are devolving water management to local, river basin scale, schemes and Water Resource Users Associations (WRUA) and private companies (Ngigi & Macharia 2006) but these are slow in taking effect through lack of funds and expertise. It is also

unclear to what extent or proportion women are involved within water management. The Water Act 2002 illustrates the lack of national recognition of this in the use of masculine possessives 'his' and 'he' in terms of land ownership and governance throughout the document. However, the newly appointed Minister for Water and Irrigation is a woman, Charity Kaluki Ngilu. In a speech on World Water Day 2010, she highlighted the significance of women's responsibilities for water in the home.

> *As you are all aware, women head one third of the world's families and often are the family's financial mainstay and principal water providers. Women are responsible for half of the world's food production, and produce between 60 and 80% of food in developing countries. In Kenya, women invest many hours per day finding, collecting, purifying water, and if no clean water is available, it is women who often pay the exorbitant prices for water or have to use contaminated water. Women's water needs are however, ignored or undervalued by male decision makers, leading to women being among the poorest of the poor in most parts of the world. In Kenya, like in most other developing countries, when water is in shortage, it is women who suffer the most. Conscious of this burden, my Ministry with support from our Development partners, and working through the Water Service Trust Fund (WSTF) is providing financial resources to both the urban and rural water poor communities to increase their access to water.*

> (Charity Kaluki Ngilu 2010)

Ngilu focuses on the inequities of time and labour that women spend collecting water, offering to provide financial resources to increase access to water. With the election of a women as Minister for Water in Kenya there is hope for other women to aspire to roles

in governance but also for issues of water as an ecosystem service to be considered as a pressing and gendered issue that will alleviate the restrictions that time consuming water collection imposes on their lives. However, as Mehta (2005) discusses in her account of the politics and poetics of water, "water scarcity cannot be merely viewed as a 'natural' phenomenon – instead its embeddedness in the social and power relations shaping water use and practices as well as local culture and history must be made explicit" (Mehta 2005:ix). This chapter continues by investigating at grass roots why women's involvement in managing resources and ecosystem services requires more attention, particularly focusing on water supply as an ecosystem service.

6.3 Women's daily lives and ecosystem services

This section describes the lives and livelihoods of rural Tugen women: the spaces they use, the places and ecosystem services that they value, the transient places of the trails they walk daily, and their place within the community itself. It illustrates the generic aspects of women in ecosystem management and highlights the importance of women in influencing change. The most important place for women in many traditional African patriarchal societies is situated in the home and farm. They rarely have the opportunity to be involved in village decision-making directly, although they have their own networks and groups that function to coordinate communal help and activities. Because of this division in the communities, they may easily be overlooked within environmental research. Therefore this section explores the everyday lives of rural Tugen women to put the use of ecosystem services in context.

6.3.1 Women in the study

The women with whom I worked were intelligent, enthusiastic and actively participated in the study although most had little or no formal education. The filming group consisted of five women, four older women who were all married with children of varying ages and a younger woman to translate. Each of the older women respected her husband as the head of the household who controlled money earned from livestock and cash crops on their farms. When it came to working with me, or making changes in their home they always deferred to their husbands for permission. Table 6.1 provides short profiles of the most influential women in my research.

Table 6.1 Profiles of the key female informants for this chapter

Name *location* age, education, children	Profile
Jacqueline *Sandai* early 20s Secondary education One child	Jacqueline spoke English so initially acted as interpreter for the other women in the film group. She had a small baby and lived with her husband's family in Sandai. She aspired to go to university and was keen and adept at using the video camera although she often 'took control' over the rest of the group, who became frustrated by this. She left her husband and the village abruptly in July 2008, seeking independence from a restricting father-in-law, who would not support her to university.
Magdelaine *Sandai* 18 years Secondary education	Magdelaine spoke English and replaced Jacqueline as interpreter. She lived with her mother and father who had a second wife and eighteen children. Magdelaine was bright and always positive. She was the eldest girl and assumed some of the responsibility in the home and on the farm. Despite this she felt that she was seen as surplus in the home and worried that her father would arrange a marriage for her. This posed the threat of traditional initiation and circumcision and she was prepared to run away if she had to.
Lenah *Sandai* early fifties Grown children	Lenah's children were grown up and had children of their own. Her husband was of good standing in the village. Her house was on the northern edge of Sandai location and bordered on Djemps land, another tribe that were more closely related to Maasai.

Susan *Sandai* Forties 4 children	Unusually for a woman, Susan was a member of several village committees, not just women's groups. She seemed to have the highest standing amongst the women. She had two grown children with their own homes but was still supporting two at secondary school.
Esther *Sandai* Forties 4 children	Esther lived furthest away from Sandai centre. Her children were still in school and she was always concerned about raising funds to support them. Much of her day was spent fetching water or selling small quantities of vegetables in the centre to raise a few extra shillings.
Dorcas *Sandai* mid-late thirties 5 young children	Dorcas was enterprising and as well as looking after her own home, goats and chickens she would look after a neighbour's goats. She also had her own hairdressing business and earned a little money by tightly plaiting women's hair in different designs.
Jennifer *Kamar* Teaching certificate thirties 2 children	Jennifer was an outspoken yet friendly young woman living in Kamar on the route of the TransRift Trail. She spoke good English and was trained as a teacher but was struggling to find a teaching post within a government school. Instead she was making tea and chapattis to sell to other villagers to support her children and her unemployed husband.
Sheila *Loboi* Certificate Thirties 3 young children	Sheila is a conservation and development worker with WWF living in Loboi. Sheila is actively involved in promoting improved farming practices at a local level and was well respected in the area. She provided an in-depth interview that gave a counterpoint view of the influence of women within local decision-making.

The overall impression that they gave was one of normally happy, hard working women. They acted out their daily lives with a fortitude to all the hardships with which they were only too familiar. Their concerns were immediate 'survival tasks' (Dankelman & Davidson 1988), a daily round of work, farming, animal husbandry, domestic chores, collecting resources of wood, water and fodder and child care (Figure 6.3). The sometimes harsh environment in which they lived was just a backdrop, and what in Western or colonial eyes are seen as huge environmental issues are to these women their everyday concerns.

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Figure 6.3 Duties of women in Sandai

Carrying firewood.

Stirring ugali, a maize paste like polenta

Thatching the roof of a house with grass

Using mud to plaster the walls of the house.

Hoeing the ground (men use tractors)

Looking after sick animals

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Sorting stones out of the maize

Planting cash crop maize seed

6.3.2 Women, land and home

Walking through Sandai with the women highlighted how their lives and livelihoods depended on ecosystem services and the roles they play in collecting and using resources within the domestic context and farming activities.

The map that the women drew (Figure 6.4) shows the features and places of importance in their everyday lives. It illustrates the villages within Sandai location, cultivated land and the main crops of maize, swamps, the river, and the schools. The map shows areas of diversification such as watermelon plantations and the area for traditional bee-keeping. The river is dotted to denote its seasonality, and trees are sketched scattered over the landscape, providing essential shade, food for livestock and fuel. The maps are discussed further in Chapter 7 Visualization Trails.

Figure 6.4 Women's sketch map of Sandai.

(a) The original sketch map. North is to the left.

(b) Detail from bottom left of Temberewe village, Esther's home.

(c) Area shown in Figure 6.4(a) (Source: ©GK 1975) North is to the top.
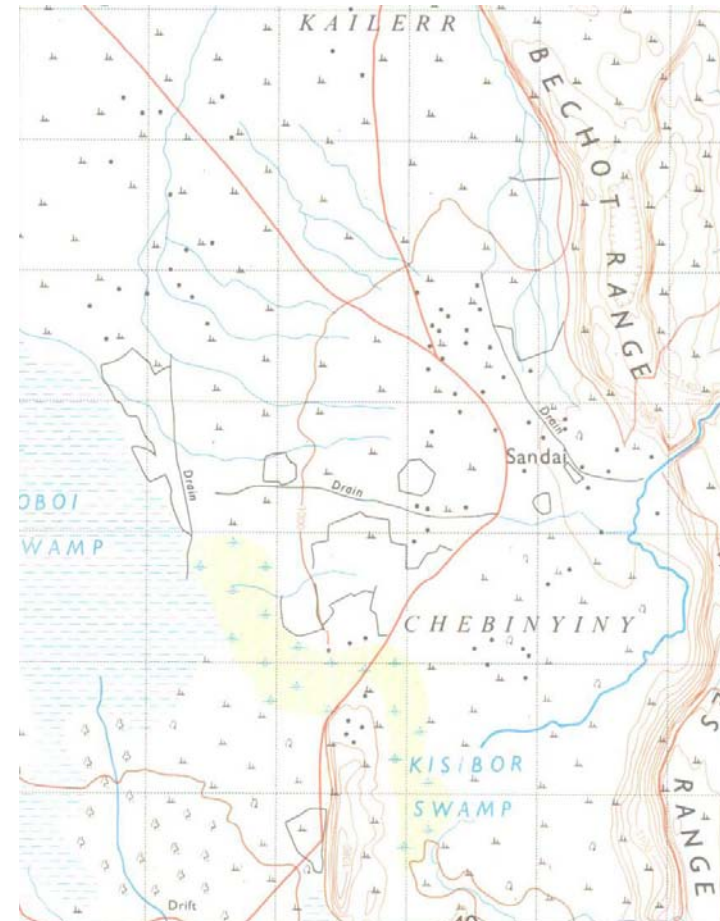
(d) **Women's map redrawn for clarity. North is to the left.**
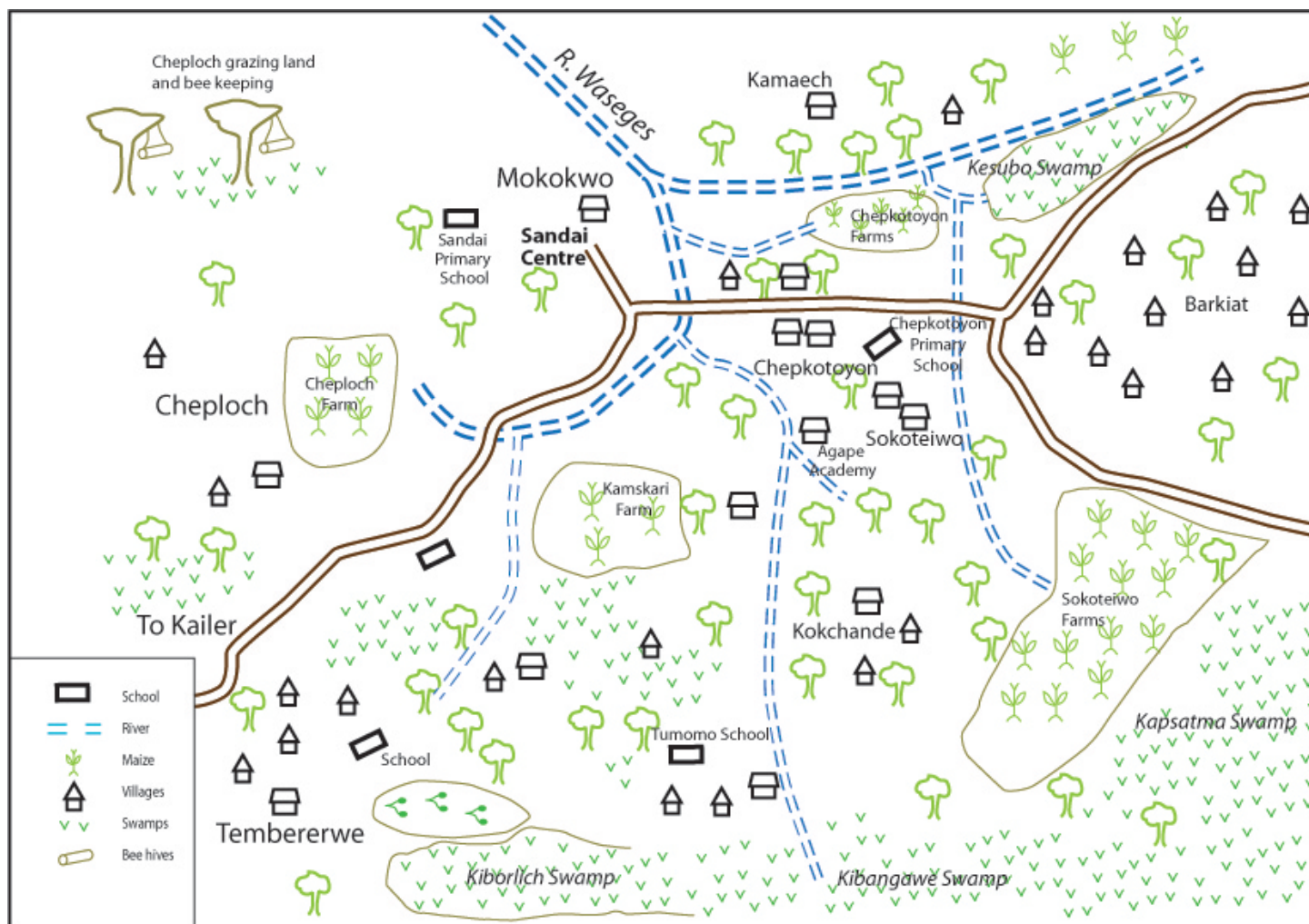
The women's subjects for video were their domestic responsibilities such as the walk from the river carrying water, fetching fuel wood and grass, building the house and cooking and their workplaces on their farms all requiring direct resources from the environment. The everyday trails that women use, their lives and interactions with the environment became a focus. The filmed trails showed sharp gendered differences in labour and practices associated with everyday life. Through filmed interviews they also described their aspirations for change. The mediascape 'Walking with water' embodies the everyday walks from river to home and highlights ecosystem services encountered on the way. Film, maps and mediascape are more fully evaluated in Chapter 7 Visualization Trails and the discussion of women and water expanded in section 6.4.

Livelihoods

In this agro-pastoral community the most important livelihoods are livestock and crops (Table 6.2) for both men and women, although there is variation in ownership and level of labour and management.

Table 6.2 Gendered differences in livelihoods.

	Male (103)	Female (122)
Crops	71	88
Livestock	63	82
Poultry	0	38
Shop	3	5
Selling produce	11	13
Cash crops	13	12
Other business	2	3
Employment	8	4

There are also other activities that generate a personal income for women as the following dialogue illustrates.

> **Susan:** *I like cultivation, education and looking after the animals. We*
> *have to fence a small area of land then plant vegetables and fruit, keep*

hens for eggs and help my family to reduce our poverty as in this area goats are destroying property. The main important thing is to look after the shamba. You find friends to assist you and ask them to help you. Then you look after the farm and help care for the farm. You spray fruits to get rid of termites.

We also have chickens. Say 50 chickens. When you get eggs you have money for school fees. You build a chicken house and care for the chickens by giving them food and so get eggs. Another problem is that we don't have a place to sell eggs. The children want pocket money so we have to find a place to sell the eggs.

Dorcas: *On my side I like looking after animals and keeping chickens. We have cows but as ladies we cannot sell them. We keep chickens so that we can sell them. The main thing is the chickens and vegetables so we can assist children at any time when they want clothes.*

I have a talent for hairdressing and that is assisting me and I am earning money. I lack a place to work and help people and earn money. I lack a sponsor to start this.

We are planting maize but we don't have a right to sell this maize because my husband is strict. We can eat it but can't sell it for fees. For maize I have to sit down with my husband and if he agrees to give me a portion I will sell it for school fees and clothes for the children. As ladies, because we don't have rights from our husbands we have to join hands together to keep chickens. There is no right for women but we can work together to assist each other.

The most important thing for Susan is the shamba (farm) but women cannot sell cattle or cash crops as they belong to the man. Men are nominally the owners of livestock, although women and girls often look after the herds of cattle and goats, on top of domestic responsibilities. Because of the patriarchal nature of households women find other means to earn money for themselves such as poultry. Poultry keeping and selling vegetables are both viewed primarily as women's activities. Women work hard to further their aspirations and the money they earn goes to help their children to a better life particularly through education. Some of the older people would bemoan the arrival of both money and education as previously they had fewer financial worries.

The dialogue between Susan and Dorcas also highlights their communal approaches to 'working together', further illustrated by the women's approach to the participatory mapping task as well as planting seed (Figure 6.5). Agarwal (2000) shows that lack of recognition of these informal social groups causes opportunities for development to be missed. "Women often have a long history, relatively distinct from men's, of cooperative functioning within traditional social networks characterised by reciprocity and mutual dependency, especially in the rural communities of developing countries" (Agarwal 2000:305).

Figure 6.5 Many hands share the work of drawing the map and planting seed.

Men laboured more often on the heavier work such as digging irrigation channels or building the framework for the house. Men are more likely to have other employment for which they may travel out of the location although women may take on casual labour to earn an extra few shillings. A few women have other small businesses such as hairdressing or dressmaking and one ran the local posho (maize flour) mill. There were also new cooperative enterprises such as a tree nursery and a group making tourist items. In general, women are farmers, home keepers and resource providers; men are farmers and the decision makers. During the day it was noticeable that after lunch men would sit and debate village affairs whilst the women were still working. Such divisions in labour, equity and power may be masked if communities are treated as homogenous entities.

The homestead

The centre of a woman's life in Sandai is her home. Settlement structures are relatively clear around homesteads where boundaries have been constructed with living fences, acacia stockades or modern fencing to keep livestock in and predators out. The traditional fenced compound is around 10-20 metres in diameter, in which are located the main home; a more loosely constructed separate kitchen that allows smoke to percolate out; raised stores for maize and chickens, and a series of pens for livestock such as goats, calves and cattle round wooden framed structure, plastered in mud and cow dung with a grass roof; more modern homes are made from corrugated tin with wooden frames which, although hotter in the sun, last longer as they are not eaten away by termites (Figure 6.6). Living space in the home is often sitting space in the day and bed space at night. Except in the rainy season, people are outside in the day and may sit in the shade of a tree in the homestead if not working. There is often a small plot connected to the main compound that is managed by the women to grow vegetables for

the home, such as sukumawiki (a green vegetable), spinach and millet. The rest of the farmland associated with the household may be distributed further away.

Figure 6.6 Layout of a typical homestead

House, chicken pen and kitchen

Goat pen and store

Plan of a typical homestead
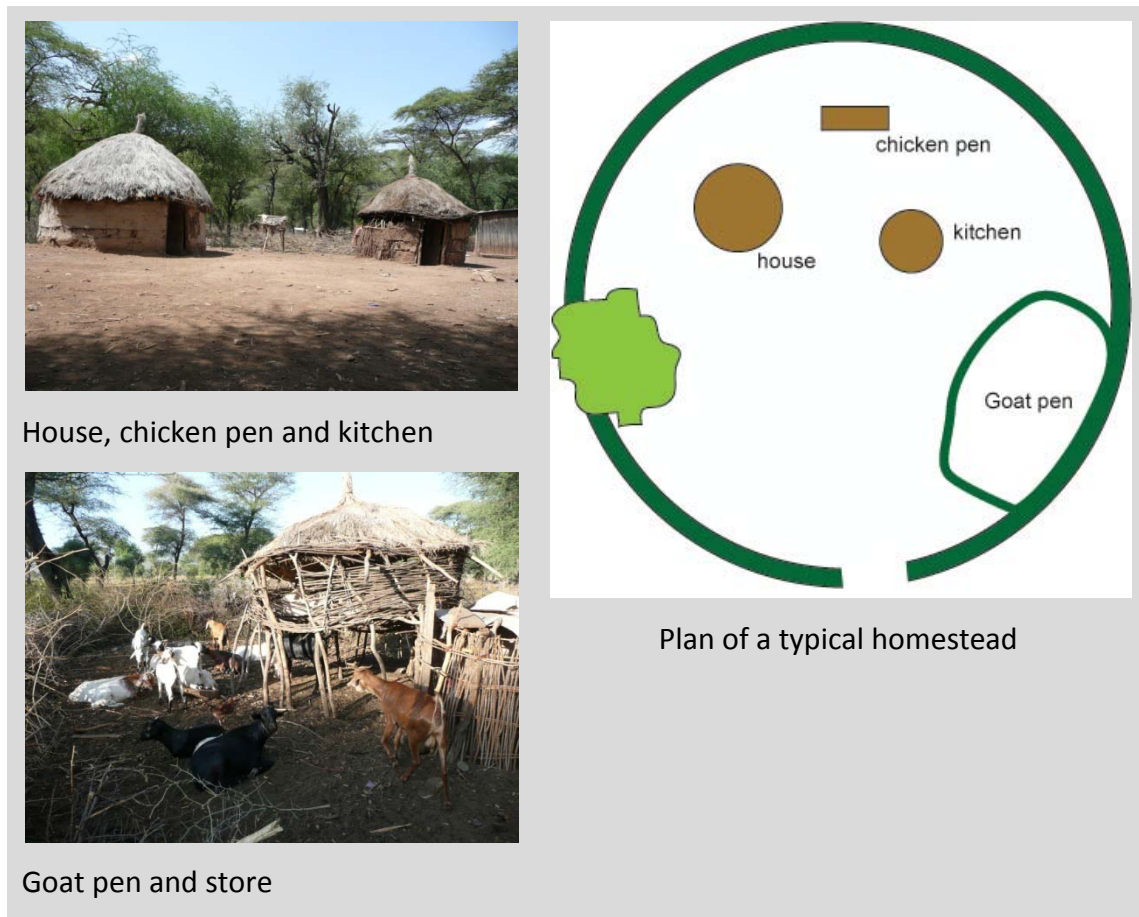
Traditional mud and grass homes have to be continually repaired using mud for the walls and, grass for the roofs. Women fetch these and other supplies such as firewood, fodder and natural medicines from the surrounding areas, and so support the labour and immediate management of these resources. Although some fodder trees are grown near the homesteads they are used sparingly and, as the dry season intensifies and livestock struggle to find grazing, women may climb to Chuine, and load themselves with branches of greenery to carry back to feed the calves and weaker livestock. Although they rarely contribute to environmental decision making, women are more than capable

of understanding how they manage resources within the context of their own lives. They are also in a position to value appropriately the ecosystem services that support their community, as scarcity of these resources has a direct impact on their workload. This gives variability to the value of a resource that is complex to incorporate into economic assessments of ecosystem services.

Land ownership

Women often talked about 'their' farms. However in practice they would always have to defer to their husbands in dealings with land. Currently men take the final decision concerning land, land use and resources despite the women taking a major part in the labour. The Laws of Kenya are seen as gender neutral (Kameri-Mbote 2006) but currently exclude 'customary rights' whereby male heads of households are the registered land holders giving them sole power over land. Gendered allocation of rights and responsibilities connected to land and resources disempower women in Kenya in four ways (Kameri-Mbote 2006): the social construct of gender which differentiates entitlements to resources, lack of legal equality, the patriarchal social order and technological developments which side-line women's traditional practices and schemes for resources management. The draft National Land Policy (cited in Mulama 2008), acknowledges "gross disparities in land ownership as well as discrimination in succession, transfer of land and exclusion of women in land decision making processes". The proposed policy is being debated by the Kenya Government and, after many years, addresses the right of women to be included in the allocation of land rights (Mulama 2009; Wamai 2008; Kameri-Mbote 2006). However, at present, women in Kenya, hold 1% of registered land titles as sole named owner and 5-6% are held in joint names (Federation of Women Lawyers 2007).

It seems unlikely even when the policy is adopted that women will be acknowledged as joint owners of land. In Sandai the patriarchal nature of the society precludes married women from having the right to make their own decisions over land although women talked about having the ability to influence decisions by discussion at home. When the women's group wanted a piece of land on which to fence a grass plot, Esther asked her husband if they could use one of his 'fields', to which he agreed. The consequences from male ownership of land give rise to lack of decision-making power for women when it comes to ecosystem service management.

Aspirations for change

The four older women in Sandai: Susan, Lenah, Esther and Dorcas, were generally happy in their lives as farmers and wives of farmers. Yet, despite their reliance on their husbands, they were aware of other opportunities and they were resourceful themselves. They were often more open to new changes and developments that could make their lives easier as well as improve sustainability of farming practices.

Many women encountered through this research appeared eager to try new activities, to learn and be involved in development. But as Sharp et al (2003) discuss, women sometimes are inclined to stay with established gender structures with associated subordination rather than breaking free on more liberal paths of development. They see greater advantages in collusion with 'patriarchal bargains' (Kandiyoti 1988 cited in Sharp et al 2003) than in challenging this for economic empowerment. The "apparently universal appeal [of empowerment] is due to the vagueness of the concept: it is one that common sense insists is a good thing, but quite what the term 'empowerment' means, or how it is achieved, is more complex and contested" (Sharp et al 2003:281-2). Providing women with a means for income generation misses the point that women often do not have the time. Earning an income as 'empowerment' may just increase the burden of a

woman's daily life. However, Sharp et al (2003) challenges the view that Third World women are often seen as 'victims of male control' (Mohanty 1998 reported in Sharp et al 2003:283) by Western feminist concepts. More important is to confront the self-perceptions of women and increase their belief in their own ability to make decisions and to realise that alternatives to current conditions are even possible. The role of men is also important in both identifying their identities and their will to change. There are alternative ways of recognising different roles within a society or community; the status of women's roles needs to be recognised and strengthened. This will help them become more centrally involved in sustainably using natural resources whilst developing livelihoods.

Women are capable of instigating change from within the home even if they have little power within normal governance structures. Sheila, a WWF worker in Loboi, discussed how the influence of women within the community was changing. For her it was an advantage to be a woman working with women in the community as she could work with both women and men to effect change and improvement in farming practices that ultimately would be of benefit to the environment.

> *Because you know men are not fully committed to some things. And as I know in a family, change comes from women and when I try to educate women, most of them, all the time, I expect more changes because I know they have to change. And I know men can go to where men are or they can go just to assess what they are going to do and forget, but to me I know when I change a women I will change that family. And maybe, if change comes from one house, changes will come from many houses in that village.* (Sheila WWF)

She believes that, although it will take time for women to play a greater part in decision-making, they are still capable of looking for alternative livelihoods and recognise improvements such as the introduction of improved breeds of cattle. Through this, less livestock are required, one cow will give as much milk as five of the traditional breeds and will grow faster and more healthily. Therefore there is less pressure on land, particularly the swamps, for grazing.

> *Some women can see the issues .. maybe by killing these local breeds. They are a great problem to them because they are the ones who are taking them for pastures. All those problems and men don't see. So women are for this modern or improved breed, to make work easier and all those issues. But culture does not allow, because those men just have herds of livestock; because when you don't have many livestock here you are a useless man. You see a man when he has so many livestock, so many cows, so many goats, is not minding about productivity, output from these livestock. These women they have adapted. They have mobilised their spouses to have these improved cows. Because they know the importance of these improved cows rather than these ones, the ones they had before.* (Sheila WWF)

The widening awareness of improved farming methods and diversification of livelihood and willingness to try new ideas was evident, even amongst the older women with no formal education. They are keen to improve their lives and they are acutely aware of the pressures on the environment.

> *The land is becoming small. We have to find another solution. Set aside land for Napier grazing to feed our cattle to get more milk to sell and divide the land for serial grazing. If now we do that we will get milk and*

our children won't have a problem [of education] and we will get a lot

of money to assist us. After keeping this dairy breed, we can keep merino

sheep for the fleece and we will get money for meat and wool! It is good

because we get wool and Masaai sheep only give meat. Every season we

will get wool from the sheep. We will have to manage it. We have to

work to plant Napier. If we talk we won't get this as we have to work

hard. Because the land is small we will have to buy food in the dry

season for these animals. We have to care for them with injections so we

can get a lot of milk.   (Susan, Sandai)

On a visit to the Rehabilitation of Arid Environments (RAE) Trust (RAE 2009) in Baringo the women's film group immediately saw both the environmental and income potential of developing grass plots in Sandai. RAE is an NGO who supply grass seed, at a small cost to encourage attachment to the project, to women's groups so they can establish grass plots. The women are responsible for fencing the plots and ensuring that goats do not graze inside the plots. After three months the land is transformed from bare brown earth to a sea of grass. The women then get a loan to buy cows which they graze on the plot. At the end of the season the cows are fattened and sold at a profit and straw is sold for roofing material. This simple concept is working well, proving sustainable income and empowerment for women and the land is slowly being transformed. The Sandai women quickly set about finding a suitable plot of land on one of their farms in agreement with Esther's husband. They saw one of the main benefits being that this was 'easy work' compared to the labour involved in herding many goats or cattle, or searching further afield for thatching grass.

Younger women, such as Magdelaine and Jacqueline, were torn between their cultural heritage and expectations of their community against aspirations for a different future.

Education is seen as essential to change their lives and this is harder for a girl child. Cultural expectations place women in the home and provide less opportunity for girls through lack of time, as they are expected to help their mothers with domestic supplies of resources, and financial constraints. Yet, the expectation is that girls will marry rather than receive a full education as this extract from a discussion with Magdelaine shows.

> *As girls what we are happy about is education for both boys and girls. I encourage girls to study because if we are not educated then we will not be given land like boys. As girls we will be married so we have to learn so we can be independent. No one will help you. I encourage ladies to study and struggle to go to university. You have to struggle and work hard for yourself as no one will consider you in the family.*
>
> *Even as young girls we have to be close to our mothers as they will assist us. If we don't they will send you to circumcision. We have to struggle hard as we are girls.* (Magdelaine Kipsang, Sandai)

There was therefore evidence in Sandai that women are under valued yet are motivators of change. They understand how change in farming practices will improve the environment but will also act as labour saving opportunities. But because women are rarely included fully in decision making, yet often face longer and harder hours of work, may result in lack of real motivation for change. In any form of ecosystem assessment the value of time a women spends on farm and resource management should therefore be accounted. The case study of women's labour with water is particularly poignant and highlights the constraints that management of ecosystem services can place on their lives.

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6.4 Walking with water

There was a pronounced physicality within the women's everyday world marked by the constant movement of women between river and their home as they carried barrels of water essential for domestic use. My research focus on wildlife conservation was transposed by the women's group into a film about water; a reflection on the fundamental value that people place on this unpredictable yet essential element. Water and rivers were a recurrent theme of interest within the collection of video footage, both surprising and inevitable in such an arid environment. Its very scarcity made it a subject for the camera's lens as when you give people a camera they will record their concerns. This section therefore analyses in-depth the relationship between women's lives and water availability and management. It shows how water, and the lack of it, has a significant impact on women's daily lives and life opportunities, yet they have minimal input on decision making regarding water management. Water security is the overarching issue for the whole community, yet the gendered work load and impacts of water shortage are accepted. It is argued that, given this imbalance in labour, account should be taken of the gendered implications of assessing the value of water as an ecosystem service.

Results from the questionnaire indicated that water is equally 'valued' by men and women in the community for drinking and irrigation (Figure 6.7). This has been identified by other researchers such as Momsen (2004) who found that there are no firm conclusions as to gender differences in perception of the environment although Leach et al (1997) found that although gendered differences on environmental priorities is modest there are strong links between environmental attributes, entitlements and gender. This is evident in Sandai, where water is highly gendered in the division of

labour associated with its management; women fetch domestic water, whilst men construct irrigation channels for watering crops.

Figure 6.7 Ecosystem service values of the River Waseges
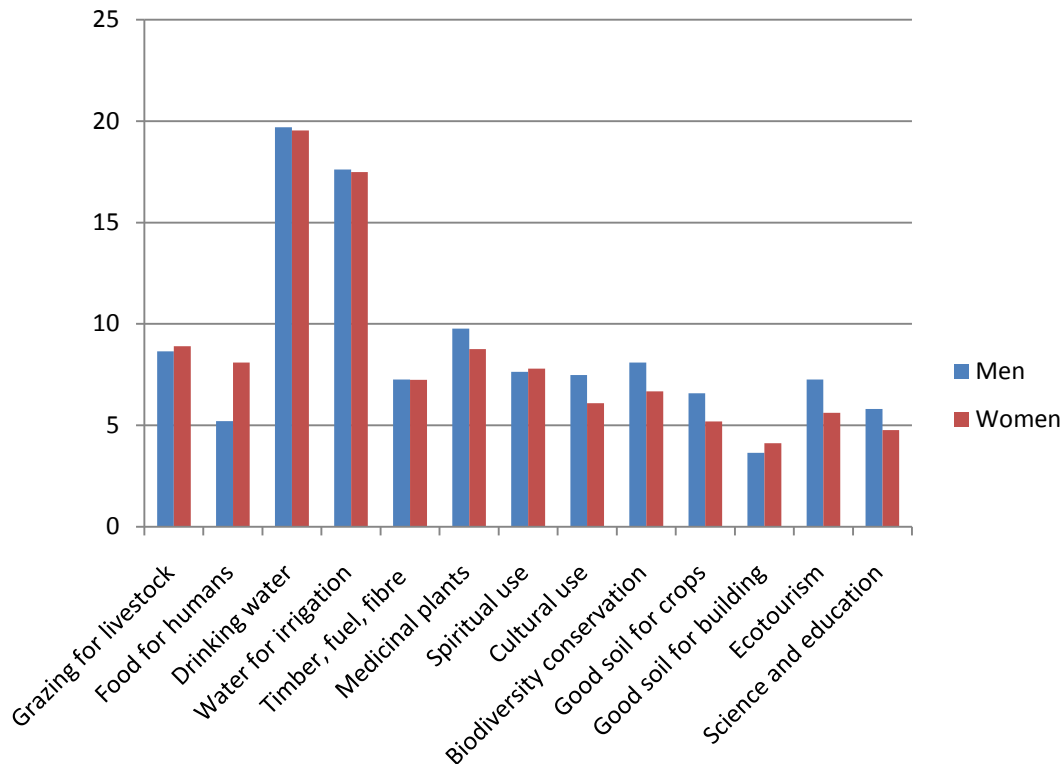
For many African women much of their work is collecting resources both from their farms and from the wider landscape. Men may travel further in general, taking livestock, particularly cattle for grazing and conducting business in local markets, but it is the women who feel the daily effects of distance. Walking, often many kilometres, increases the already heavy burden of carrying loads, is a drain on their energy and time, and has a profound effect on their well-being. In rural Kenya only 43.1 percent of the population has access to clean water within a 15 minute walk (UNEP & IISD 2005). In times of drought, when people and animals are already struggling to exist, water, wood and fodder have to be sought and carried from further afield. The sight of women and girls carrying twenty litre barrels of water (Figure 6.12a) from the river to their

homes was for them a feat of endurance that I could not comprehend. I agreed to walk with them one day, carrying water to my strength and capacity for five kilometres across an arid plain, in the heat of midday, from the Waseges River to the home of Esther, one of my film-makers (see video Walking with Water) (Figure 6.8). That I was prepared to do this was a novelty for the women and gave me an intimate appreciation of how easy life is when one can turn on a tap in the home and receive clean water. This daily expenditure of energy and time results in lost opportunity for developing other livelihoods for women and lack of time for study for many girls.

In Kamar, Jennifer discussed the wearying effect of distance in the context of fetching water. Normally the local dam next to the village would provide water for all purposes, washing, drinking, cooking and for livestock, despite the fact that it was muddy and brown and, to Western sensibilities, unsuitable for drinking. In times of drought they would have to walk much further to fill their heavy containers of water.

> *When there is no rain, it takes long. You know that water gets, that small dam of ours, gets dry. So we go to Maji Moto, where you started from. That is where we go to get our water, and maybe another the same distance this side. Maybe we go to the river – the same river you will see tomorrow that is where we get our water, a distance that maybe you go at 5 in the morning, you come back at 12 noon. And maybe you come with only 20 litres, to be used for cooking for washing, for drinking, for giving those small goats there, and everything, Then tomorrow you start the same journey. That is why you saw some of us women there we are a bit thin, we are a bit rough because we don't get time to rest. We don't rest. Our resting time is so minimal. Those are the difficulties we get when there is a lot of drought. Those are the major problems that we get.*

The major problems are water, going for a long distance to get medicine, and maybe shortage of food.

(Jennifer, Kamar)

In the context of valuations and payment for ecosystem services, the development of a reliable water infrastructure with water points close to all villages would generate greater opportunity for women to develop other occupations. Time spent fetching water is a considerable barrier to education and opportunity. The combination of food and water shortages, poor water quality and labour needed to maintain the domestic supply of goods from the environment has severe consequences to women's health. Realisation and ultimately offsetting these hidden costs should be a priority within valuations of ecosystem services. Yet many ecosystem service reports fail to do so. For instance, in the IUCN report on water and ecosystems, titled 'Value' (Emerton & Bos 2004), women are mentioned once, almost as an after thought, "Wetland resources have a particularly high value, both in absolute terms and relative to other sources of livelihood, for poorer and more vulnerable sectors of the population and for women." This report does nothing to address the equity of valuation.

The daily labours to maintain the domestic water supply are multiplied in the dry season and at times of drought. Water scarcity in Bogoria is perennial. National scale maps (WRI 2007a) (Figure 6.9) seem to mask the reality of the difference between apparently ample rainfall as implied in the annual averages (700 mm, read from the map) and the dry season rainfall. Local rainfall figures from Sandai for 2008 (annual total 294.8 mm) (Figure 6.10) and 2009 (annual total 0 mm) shows the reality of drought.

Figure 6.8 Film strip from 'Walking with Water', a three minute film illustrating the uses of water, the hardships when the river runs dry the distances walked across the landscape carrying water.

Figure 6.9 Rainfall in Kenya (source of data: WRI 1999)
   (a) Average annual rainfall.

(mm)

	173 - 200
	200 - 400
	400 - 600
	600.1 - 800
	800.1 - 1,200
	1,200.1 - 1,600
	1,600.1 - 2,000
	2,000.1 - 2,625
	District boundaries
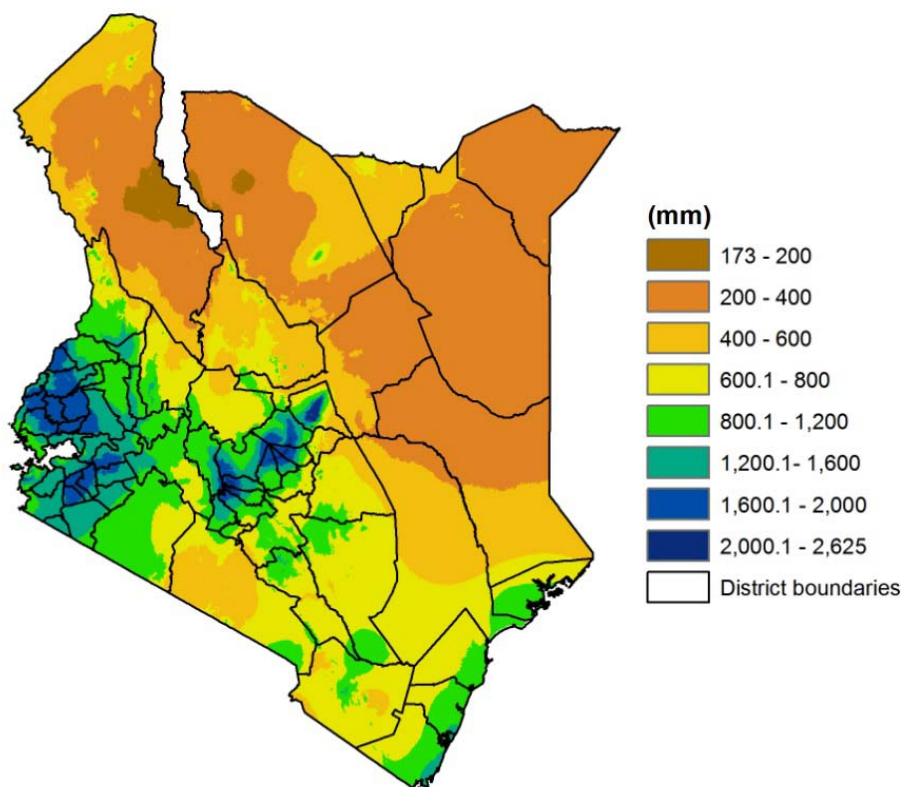
(b) Average monthly rainfall for February

(mm)

	0 - 25
	25.1 - 50
	50.1 - 100
	100.1 - 150
	District boundaries
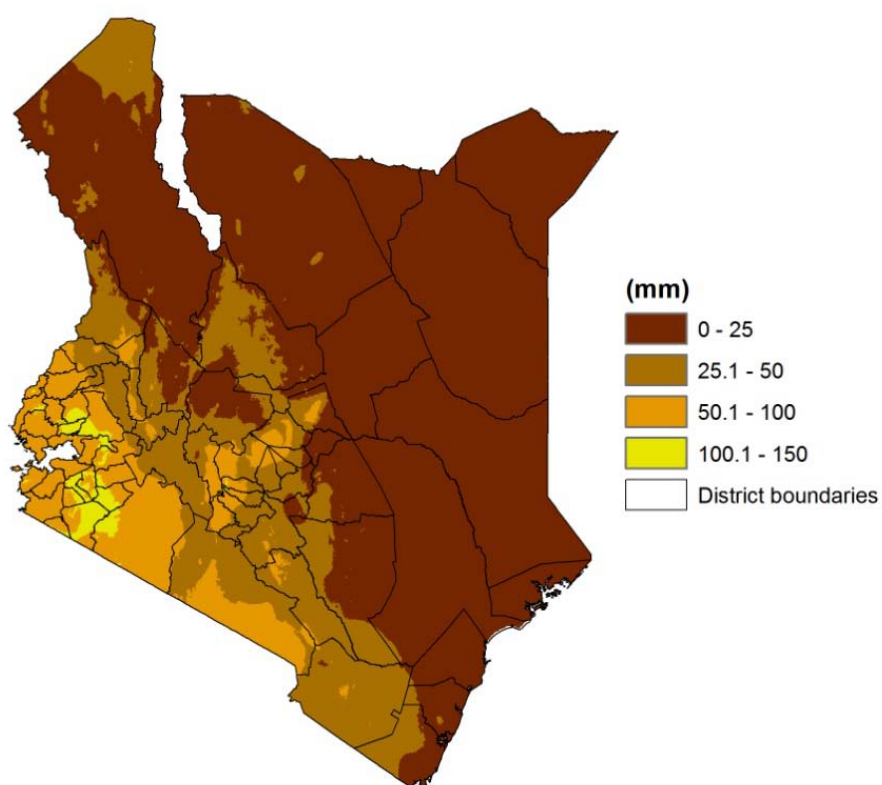
Figure 6.11 illustrates the difference in the water level of the River Waseges in July 2008 and February 2009 from rushing water to a dry river bed. Even these images are misleading as much of the rainfall feeding the river fell in the upper catchment as rainstorms are extremely localised and unpredictable in location.

Figure 6.10 Monthly rainfall (mm) at Sandai, 2008-2009
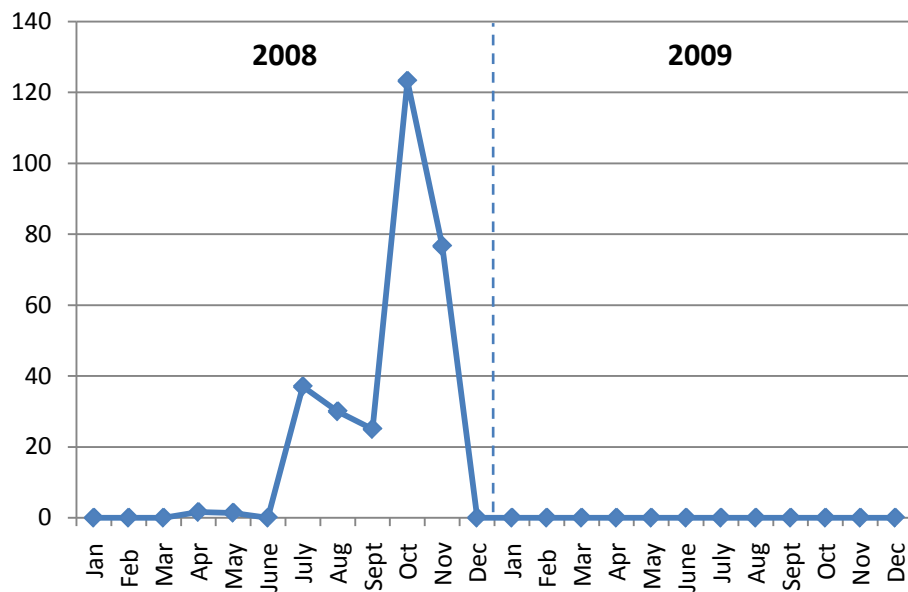
Figure 6.11 The River Waseges in July 2008 and February 2009

The effect of the river drying up is to increase the time spent by women collecting water. Although, it should be noted that some men do contribute and help it is normally only when they have access to a bicycle (Figure 6.12e) or donkeys to actually carry the water. Men rarely carry water as the women do. For many of the women lack of water in the drought meant sitting for hours in the dry river bed, queuing and waiting for water to percolate up into small springs dug in the rocky ground (Figure 6.12d). Early in the drought, when water was near the surface, men were involved in constructing larger water holes shaded with coarse wooden structures to restrict evaporation (Figure 6.12b). Livestock would be bought to the water and rationed to water poured into traditional troughs made from hollowed out trees. The very availability of water, however little, was seen as a blessing from God.

Variation in water level is not just a result of climate. In recent years the length of time when the lower catchment in Sandai has been without a reliable water supply has increased due to extraction of water for irrigation in the upper catchment around Subukia. This is not uncommon, for instance, development, such as irrigation schemes, can trigger environmental and socio-economic impacts downstream and so be unsustainable (Adams 2001). This also leaves a conundrum as to the best approach to valuation of water as an ecosystem service. Payment for extraction of water is plausible as a disincentive to overuse water, yet charges for water supply as a natural resource and fundamental to human well-being becomes problematic in areas of high poverty. How and why should people pay for water which is a basic human right? The MA (2005:11) recognises this separation of costs and benefits.

> *Both the inertia in ecological systems and the temporal and spatial*
> *separation of costs and benefits of ecosystem changes often result in*

situations where the individuals experiencing harm from ecosystem changes (future generations, say, or downstream landowners) are not the same as the individuals gaining the benefits. These temporal and spatial patterns make it extremely difficult to fully assess costs and benefits associated with ecosystem changes or to attribute costs and benefits to different stakeholders. Moreover, the institutional arrangements now in place to manage ecosystems are poorly designed to cope with these challenges.

In 2005 WWF was instrumental in supporting a Water Resources Association (WRUA) for the Lake Bogoria Catchment in order to look at catchment scale management of water supply after increasing extraction for irrigation in the upper catchment was causing drought lower down the catchment in Sandai. One initiative supported creation of pandams in the upper catchment so that water could be stored for at least 90 days for use in the dry season (Mumba 2008). Only after these had been created were permits for water extraction issued. A WWF report (Mumba 2008) describes success and the continuous flow of the River Waseges. However, from February to May 2009 there was still no water flowing in the Waseges in Sandai due to continued excessive and illegal extraction upstream. Daniel Koros from WWF describes the conflicting priorities of people living in the upper and lower catchments:

There are some for example who use water for irrigation. Irrigation is what, understandably, takes away more than 70% of the water. And we also understand that the people must eat, so irrigation is not something that is going to go away very soon. So we then put into place measures to ensure that irrigation is done in a more responsible way. That people understand that there are other people who need to use water for other

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things as well. Like for example in the upper catchment most people are farmers there, most of the farmers they do quite a bit of irrigation. Down here like in Sandai for example though people are doing bits of agriculture a lot of them also keep livestock so you will find that there comes a time like this when water becomes very scarce when we need to prioritise between tomatoes and onions and animals and then to which do we give priority? So at the moment I think water for domestic use is a priority but that is not very well understood by those who depend completely on irrigation like commercial irrigation. So that is a challenge for the moment. That they don't only think about their own farms and their irrigation schemes, we want them to think about the other people, maybe 100miles downstream, who also wait for the same water.

(Daniel Koros, WWF)

This clearly shows the difficulties in prioritising values and conflicts of interest in ecosystem services between communities. The immediate direct use needs of the lower catchment for drinking water had to be given priority over irrigation for commercial cropping in the upper catchment but regulating use of this common resource was difficult. During the drought in February 2009 a meeting was arranged by WWF and representatives from the upper catchment of the Waseges came to look at the situation in Sandai. It was a poignant meeting as the councillors and officials from both locations walked along the dry river, although I only saw one woman from Subukia go as far as to meet the women from Sandai sitting extracting water from the holes in the river. The rest held a two hour meeting with many speeches under a hot sun and the people from Subukia were obviously shocked by the state of the river and the total absence of water.

An agreement was made that extraction of water upstream would be halted for three days each week to allow water to flow, but a months later, this still had not occurred.

For the women in Sandai there was a constant struggle to counter the activities upstream. Another consequence of finding water for livestock are that fields are left vulnerable to wildlife stealing the crops.

> *Yes it is dry September to January. So we have to keep goats and chickens. If it is dry we have to use any means to feed our family. We have to go to Loboi where water is permanent so we can plant vegetables when the Waseges is dry.*
>
> *We heard this water is used by other people at the source. It is used by other people in Waseges. They use generators to irrigate their farms and the Waseges becomes dry in Sandai. We take goats to find water then the monkeys eat the maize and baboons take the goats.*
>
> *It is better to take care of trees as trees bring rain. We have to plant trees in the shambas so that we can plant maize. These fig trees are important as in dry season we cut leaves for cows so they can survive. If we plant trees it will rain early and there will be no problem. It is good to be careful and plant trees as they help us very much.*
>
> (Susan Mbele, Sandai)

Susan recognises other forms of environmental management that may alleviate the problem such as the value of trees to moderate climate. This knowledge of the effects of forests on climate is general knowledge in the area due to awareness-raising by conservation organisations but it is also underpinned by traditional values and practices such as the reverence for fig trees.

The minority of women in positions of governance gives rise to decisions regarding resources having little regard to the effects on women's workload. During drought, when women have to spend more time searching or queuing for water, they have less time for other domestic tasks. Previous studies in developing countries show that, "women and girls benefit most from the installation of water supplies such as wells and pumps. They have more time for education and obtaining alternative income" (Momsen 2004). In Sandai, at the time of drought, work on the shambas is also less intense as the soil is also too dry to plant seed or grow crops. Nevertheless the pointless time spent sitting in a hot river bed could be better spent developing other enterprises, although other incentives are needed to help women out of poverty and inertia. However, as long as the disparity in labour connected with water supply continues, women bear the greater burden of maintaining the supply of domestic water, yet have minimal impact on policy at all levels, then the realisation of the MDG to provide secure water to all will not have the urgency that reality demands.

Figure 6.12 Gendered activities connected with water management

(a) Women and young girls carry heavy barrels of water from river to home

(b) As the water disappears from the River Waseges men dig large water holes in the river bed and cover them with timber to reduce evaporation.

(c) As water reduces further women dig individual holes in the river bed to find water.

(d) In the worst of the drought women spend long hours queuing for water. The woman with the green jug waited for ten minutes to scoop one jug full as it percolates up through the gravel.

(e) Donkeys are sometimes employed to help carry water. A few enterprising women charge their neighbours for their use.

(f) Men will fetch water from the local town but usually with the aid of a bicycle. Again this becomes a business.

Provision and sustainability of water in this area is one of the primary concerns of all residents. However the solution to this problem is problematic because of environmental change, intra-catchment disputes and lack of funding. Postel (2003) considers that securing water for people, crops and ecosystems needs a combination of public trust and ethics to govern water management, diplomacy, legal recognition of community rights and formation of effective citizen watershed groups. In Sandai the latter is in place but the others still need to be built before water supply is secure and sustained. For instance, pressure to meet the MDGs has given rise to concern that the rush for development of boreholes will not lead to water security because rapid development of ground water storage systems may not give due emphasis to hydrogeology, community involvement or preservation of water quality, and systems will fail through neglect or contamination (MacDonald and Calow 2009). Scattered across the landscape throughout Sandai are unconnected water pipes and waterpoints from a failed scheme to deliver pumped water to villages throughout Sandai location. Informants reported the disappearance of donor money from the project through corruption of members of the then water committee. Daniel Koros, WWF Officer, believed that a large government funded dam would be the only workable solution to provide water supply in the village as the hydrogeology was not suitable for bore holes and small self-built pandams would not be maintained by the community.

Finding a solution to the problems of water security is an on going issue in many locations such as Sandai where there are trade-offs in supply of ecosystem services and conflicts of interest. In the interim the impacts of loss of time and energy expended by women are not accounted for in policy making. It is hard to see how the impact of access to and management of water, and the way in which this one ecosystem service restricts the life options of women, can be valued.

6.5 Rise up and walk*

The long journey of equity for woman in Africa has not ended although there are a few signs that opportunities are slowly being improved. A few women are making changes and reaching positions of power such as Wangari Maathai, Charity Ngilu and a woman chief in Bekibon who told me that her main task was to act as a role model for other women. New governance structures in Kenya are recognising the need to include women equally in addressing issues such as access to water if Kenya Vision 2030 is to be achieved (World Bank 2010a). Yet women still lack full recognition in environmental governance and policy making, both as policy makers themselves and through the impacts of policy on women's labour and use of ecosystem services.

As has been shown, women's opportunities are more restricted than men's in the rural community of Sandai. Changes are occurring slowly but women are inhibited by both institutional barriers within patriarchal governance systems and environmental barriers that impose burdens of work and restrict time for education and diversification of income. It is essential that women's knowledge is recognised in order that they can contribute to maintaining a healthy environment, which in turn will help lift people out of poverty. It is against this backdrop that women's values are important for future development. They should have greater involvement in governance to assure that their voice is heard directly rather than filtered through the family home. There is some evidence to suggest that empowerment of women to be more involved in strategic planning and decision making will give a greater resilience to communities facing environmental change, such as the introduction of improved breeds of cattle. Women have more practical day-to-day labour and knowledge of direct use of ecosystem services and should have greater direct involvement in decision making, certainly at

* Wangari Maathai 2008a:287 inspired by Acts3:1-10

local level. Women are still rarely involved in planning for the future or asked to discuss valuation of the essential ecosystem services which they use in their daily lives. Raising women's awareness of conservation practices is under-utilised in making transitions to meet future environmental and development needs, and unless they are consulted then any form of ecosystem service valuations are partial and may not reflect the actual costs of ecosystem services for the well-being of all sectors of humanity. It is still difficult for women within patriarchal societies to gain equivalent levels of education as men. This too needs to be evaluated within ecosystem service valuations if women are to achieve greater equity in benefits from development.

Unlike the detached stance taken by the global view of ecosystem services, the value women in Africa place on the ecosystem services needs to be understood as an integral product of their immediate needs, the constraints of their environment and also societal norms whereby their values may not reflect their own labour. Without this understanding any attempt at valuation is flawed in a society where economic income is outweighed by the direct use of resources (Bawa and Gadgil 1997). Although there is evidence of the benefits of economic valuation of ecosystem services its implementation in subsistence societies is influenced by overtones of Western ways of thinking, such as the way that communities and community values are treated as homogenous when in reality there are pronounced gendered differences in labour and opportunities in developing countries. Divisions of labour in the community result in women being most affected in changes of environmental conditions. Increasing occurrences and severity of drought have a major impact on the daily lives of women as they spend increasing amounts of time searching for water leaving their other domestic tasks aside. In times of scarcity the hardships women face are inflated by the distances involved in collecting resources. Ecosystem service valuations should take into account the differences in

gendered use and temporal variation of resource availability (Koch et al 2009) and the impact that has on women. Yet I would question how often the cost in women's time and effort is ever included within valuation criteria.

There are ensuing concerns of the gendered equity of ecosystem service assessments, particularly in the context of economic markets which should "recognize the competing views and diversity of actors in environmental decision making" (Corbera et al 2007:608) as the "involvement of the market in biodiversity tends to lead to poor people's views and needs, especially those of poor women, being ignored" (Momsen 2007:151). In economic markets international trade has gendered impacts on the ground; for instance, changes from subsistence farming to cash crops may dis-empower women as they lose their control over the domestic production of food.

The valuation of the ecosystem services of water supply and water quality in these semi-arid lands faces fundamental challenges, with numerous logistical and ethical issues and hindrances through lack of knowledge. Added to these challenges is the essential need to redress inequities resulting from the burden of responsibility of women to collect, transport and supply the domestic household with water (Tignino 2007). Ecosystem service valuations are in danger of overlooking the gendered nature of value in terms of time spent collecting resources, such as the women from Sandai waiting hours for water in the Waseges river bed. There is a particular danger that water scarcity may be exaggerated by placing monetary values on 'public' or 'common' resources, which may be a precursor to private companies being awarded contracts by state governments to provide regulated supply. This green neoliberalism, promoted by the World Bank, has been criticised as analysing the ''problem'' of water scarcity as a matter of public sector failure and so open a door for private sector solutions to promote development and economic modernisation through transnational networks, that is

Northern companies administering Southern water supply (Goldman 2007). This is a deep concern as the concept of ecosystem services is adopted. Despite large international investments in water, there are questions as to whether investments in water are going to the right people in the right places "who will ensure clean and adequate water, and sustainable livelihoods, for all" (Emerton and Bos, 2004:13). Lack of knowledge and understanding of the role of ecosystems in water supply has lead to calls for more informed economic valuation of ecosystem services within water calculations. Sustainable use of natural ecosystems to maintain water quality and supply is often more equitable and cost–effective than artificial alternatives yet there are criticisms of the lack of accounting and investment in natural ecosystems within the water business (Emerton and Bos 2004).

Commodification of water and ecosystems may face ethical and cultural arguments, particularly in the face of poverty and equity of access and some believe that sustainability of water and human life is achieved by recognising "that water by its very nature is a public good" (Shiva 2008:506). Yet this view is flawed when communities compete for the same supply of water. In this case there is a case for payment for water for commercial extraction and the need for enforced regulation of communal use. It is again a question of 'Whose values count? and 'Who pays the price? There are many obstacles that interfere with the promise of valuing nature and its services for the benefit of human well-being. The concept is clear but the application needs greater consideration so that benefits and payments are received where they are most deserved and most needed.

The main issues that this chapter has highlighted are the lack of equity of women in the governance of ecosystem services; the need for adequate valuation of the contributions of women's labour in costing ecosystem services and the need to appreciate the variable

temporal effects of ecosystem service provision and the impact this has on women's workload particularly in the case of water. Until women themselves have a more widespread 'voice' in policy making they must rely on the few who are expressing their interests or other means for communicating what it means to fetch water every day to meet their family's needs. The next chapter will explore methods for visualisation of the values of ecosystem services and the trails people take through their environment.

Chapter 7

Visualization Trails

Maps speak to us not only through what they display but also in their silence.

(Carolan 2009:284)

Chapter 7 Visualization trails

7.1 Introduction

7.1.1 The visualization trail

This chapter sets out to illustrate and critically assess how different forms of representation may be used to visualize, and give 'voice' to, personal expressions of place in order to understand the subjective, localised values attributed to ecosystem services. Through this it also aims to show that appreciating a multiplicity of world views and different epistemologies is necessary in ecosystem service valuations to facilitate equity of use and governance (Wilkinson and Eidinow 2008). This is more than just another methodology chapter and is placed at the end of the thesis in order to 'zoom out' from the local scale to identify ways to communicate values held locally to a more global audience. This chapter also represents one of the main outcomes of my academic journey and was influenced by research with the Virtual Field Course project and teaching a workshop on multimedia GIS at ITC in April 2007, after which the mapping emphasis of this research changed from PGIS to PGIS with multimedia.

The chapter begins by presenting a discussion of what visualization means in the context of this thesis through a brief review of literature in Section 7.1.2 and a look at the process of creating the visualisation of place in Section 7.1.3. In Section 7.2, five means of geographical representation are then described, examined and compared; each supporting visualization of community values of space and place in a different way. First, written forms of communication in which my own reflective diaries are compared to accounts by European explorers of their journeys, tourist advertising and local opinions. This is used to compare colonial ways of seeing with decolonising approaches for communicating local values; a theme continued as other representations are

explored. Second, maps generated from published data and sketched by local community members are used to illustrate how maps may mislead or mask practices and values. Third, participatory videos are discussed as a way for communities to communicate their needs and values. Fourth, the visualization of trails within Google Earth, a web-based GIS platform, is demonstrated to illustrate how local values may be communicated using media in conjunction with maps. Fifth, the use of a 'mediascape' on a handheld device that provides the ability to simulate a trail through the Kenyan bush via a walk through a park in England, or elsewhere, is illustrated. Text, maps, and video, as well as being discussed alone, are embedded in the latter two forms of communication. This chapter uses these examples to argue, in Section 7.3, that using different forms of visualization provides scope for cross-cultural exchange of cognition and spatial understanding of the importance of ecosystem services for subsistence lifestyles, as standard mapping practices alone do not fully convey the subjectivity embedded in the valuation of ecosystem services and multiplicity of alternatives. Time limitations preclude an exhaustive evaluation of the methods used but these will form the basis of future work.

7.1.2 Why visualization trails?

Geographical visualization is commonly defined in the context of cartography and maps, which "exploit the mind's ability to more readily see complex relationships in images" (Dodge et al 2008). Although a valid and proven powerful mode of analysing geographical information, this definition puts limitations on other senses and modes of thought that can contribute both to understanding spatial phenomena and the awareness of place. Hettner (cited in W.L.G.J. 1913:921) says "[Geographic] visualization is of two kinds: sensual and mental. The one is gained directly through the senses, the other through the coordination of concepts in the mind." It is in this broader context that

visualisation is approached here, as ideas are merged from literature in GIS, critical mapping (Crampton and Krygier 2006) and cognitive mapping (see Chapter 2 Literary Trails). The theme of hodology also adds to the sensual/mental focus; not only are the trails walked in the first instance but recreated to induce meaning to others.

It is proposed that using this broader approach facilitates visualization of not only one's own concepts but opens up other worldviews. Each person constructs a different worldview drawing on previous experience, knowledge, beliefs and familiarity with the environment. For instance, Castree (2005:230) identifies a worldview "that does not separate knowing (epistemology) from that which is known (ontology). …a non-representative approach that focuses on a world in which we are dwellers not observers, multi-sensual participants not detached spectators". This 'worldview' has been linked to understanding of nature in the context of many indigenous and subsistence communities (Berkes 1999) (see Chapter 2).

Kitchin and Dodge (2007) consider that maps will normally be drawn from a particular way of thinking, using a distinct ontology and semantics, and, it can be argued, are subject to the worldview of the cartographer. Global mapping practices are criticised as favouring Western constructions of space that transform spatial conceptualisations into Cartesian frameworks (Rundstrom 1995). Recent developments in GIS have seen the emergence of strategies to incorporate different ways of thinking and representation of multiple epistemologies (Schuurman 2006) within mapping. Although there have been many successes in the social liberalisation of maps through participatory GIS (Craig et al 2002; iapad 2010), this is only partial, as GIS still focuses primarily on the technical (Andrienko et al 2007) rather than the social (Dunn 2007). GIS has been criticised as a poor medium for representing values (Kyem 2004) and that most qualitative mapping has quantitative limits (Leszczynski 2009). Methods for mapping qualitative

understanding of place from different perspectives have only recently gained momentum through indigenous (Johnson et al 2006) and feminist (Kwan 2002) critiques of GIS and cartography as discussed in Chapter 2 Literary Trails. There is room for further research into communication of values of place alongside spatial context.

As this study unfolded, it was considered that maps enabled representation of material components of the landscape within a particular worldview, but that the spaces tended to become 'a realm without meaning' (Cresswell 2006:10). Hence using maps alone did not capture the meaning of place; where place is a "way of understanding the world" (Cresswell 2006:11) giving meaning to space. The power of maps is seen by Peterson (1999:32) to be the fundamental belief in cartography that "abstraction is the ultimate goal" which tends to distil certain information from the complexity of the world but loses other information and, maybe, context. There is also concern that "if we cannot map them, our places may have no being." (Painter 2006:346). Maps tend to highlight features of importance and extremes, and the commonplace, whether in terms of human livelihoods or biodiversity, become 'silences' (Carolan 2009). Other silences may include the voice of women (see Chapter 6 Women's Trails) and local communities within international policy. There are also silences in maps that convey embodied experiences of place; not just being there but being someone else – stepping into their shoes or their place. This research employs alternative, complementary representations using different types of media in an attempt to fill these silences in the context of expressing the values of ecosystem services.

7.1.3 Creating visualizations of place

Surprisingly for someone whose career has been primarily in cartography and mapping, I found the construction of qualitative maps and visualization trails one of the most challenging tasks of this thesis. The multiple voices and representations that could be incorporated and storylines that could be developed from the visual data raised many ethical and practical dilemmas. Crang (1992) seeks to embrace such a politics of polyphony; suggesting that there is is a need to allow different viewpoints to be heard (see Chapter 1). Likewise, Gibson (2006:283) uses multiple voices, representations and interventions to adjust the 'politics of the researcher/subject binary'. The approach taken in this research was to create a number of complementary visualizations with the objective of highlighting how different voices can value the same spatial areas in different ways, as an illustration of the subjective nature of ecosystem service valuations.

In order to capture, process and communicate the value of ecosystem services for human well-being in the Rift Valley, different forms of 'surrogate walks' (Cartwright 2008) or visualization trails were created. Cartwright et al (2007) describe a geographical knowledge base that supports the 'Literate Traveller' with multimedia information of places to visit. The surrogate trails expanded this via information presented in a number of 'worldviews'. Multimedia mapping evolved as an interactive way to present geographic information in a more intuitive manner (Cartwright 1997; Peterson 1999; Cartwright and Peterson 1999). This work emphasises multimedia as an information interface by enhancing geographic information (Cartwright and Hunter 1999), although Cartwright (1999) also highlights the storytelling metaphor of multimedia cartography that gives a sense of place and helps to confer knowledge. As Dransch (2000) discusses, there is an essential need to consider the cognitive suitability

of different types of media for spatial representation. For visual communication, information should be presented so that the user can create 'step-by-step knowledge' using a vivid and realistic manner (Dransch 2000:8). She identifies four functions of media that are necessary for visio-spatial communication: demonstration of the phenomenon, putting information into context, construction of complex mental models, and motivation or the arousal of interest. These functions seem in essence to go partway to instilling both a sense of space and, more importantly, encouraging a cognitive and emotional understanding of place.

The theme of trails that runs as a pervasive thread through this thesis adopts the notion of place as envisioned by Doreen Massey in her seminal paper 'A Global Sense of Place' (Massey 1997) in which place is described as a process, a flow, filled with different experiences of the time-space compression. Place is viewed as not static and may not have boundaries. Place also does not have unique identities but rather a distinct mix of wider and more local social relations (Massey 1994). This seems to match neatly with the premise that places grow into knowledge by people walking along paths (Ingold 2004). In the portrayal of the virtual trails that accompany this thesis my own reflections mingle with local understanding to give meaning to space at both landscape (Chapter 4 Tugen Trails) and local scales (Chapter 5 Resources Trails and Chapter 6 Women's Trails). These are based on the physical trails walked in Kenya and combine the images and words of participants, interviewees and myself, as researcher together with maps derived from a number of sources. However, it must be acknowledged that these 'surrogate walks' are constructed using my own interpretations although I endeavour to convey the values and sense of place that Tugen people endow to their environment and landscapes. Knowledge and understanding of values was generated in three interwoven phases: the process of creating 'visualizations' (see Chapter 3

Methodology Trail); the analysis of both the process and the product, where the researcher looks for synergies and discrepancies between the different accounts; and visualization of values as a communication process where the integrated representations are used to share local values with a wider audience and contribute to cross-cultural understanding (Harris 2009).

The process of geographical visualization not only expresses knowledge it also creates it (Dodge et al 2008). This knowledge has been shown to be valuable in establishing a basis for discussion as well as communication, but should be handled with care as misuse has political and ethical implications (see Chapter 3). However, recreating local people's values of ecosystem service in different forms of visualization led to a demonstration of the things that are normally omitted or avoided through mapping - the silences (Barnett 1997).

7.2 Communicating ecosystem service values

7.2.1 Visualization of place through words

Turchi (2004:11) considers that "To ask for a map is to say 'Tell me a story.'" He goes on to liken writing to map making, with both being composed of two parts: exploration and presentation that lead the reader on a journey. So, as many explorers, geographers and authors have found, the written word can effectively create, describe and visualize paths of movement and places along those paths (Ingold 2004; Wylie 2005).

In this first example of visualization, it is interesting to consider a number of written or oral accounts by different individuals representing different social groups. The voices are those of colonial explorers, tourist guides, an anthropologist, local women, local Endorois activists, conservationists, as well as my own accounts. This is a brief review

of discourses surrounding Lake Bogoria National Reserve and the communication value of example texts presented here to compare voices. The perceptions of place and the values of ecosystem services, although none would have called them such, embedded in that place differ.

The Colonial Voice

> *Suddenly, without the slightest warning, I found myself on the edge of a precipice, 1900 feet in height. For some hundreds of feet the cliff was almost vertical. ... When the porters came along they were as surprised as I had been and we all stood along the edge of the cliff and admired the extraordinary view before us. At our feet, the base of the precipice, lay a long narrow lake, in the shape of something like Windermere. ... The view is certainly the most beautiful I had seen in Africa. As a rule, except at sunrise and sunset, the colours were disappointing; but here the lake itself was of an exquisite blue, broken by the green of dense growths of algae, or by pink where vast flocks of flamingos floated on the surface. The colour effects on the shore and on the islets were as striking by the contrasts as by the brilliancy of their tints: here and there a glittering tract of sand, or a dazzlingly white deposit of sinter around a hot spring, interrupted the sombre brown hue of the acacia scrub.*
>
> (Gregory 1896: 110)

Gregory (1896), a geologist and explorer, admires the beauty of the view, perhaps bordering on the 'sublime' (Kant 2007), and the 'exquisite blue' of the lake and compares Lake Bogoria to Windermere, linking the aesthetics of the unknown with memories of something more familiar. Textual analysis of colonial texts has been one

of the fundamental methods to build postcolonial arguments. This passage by Gregory shows his wonder and delight in the landscape. In isolation, through a postcolonial critique, this could be seen as purely exposing the 'exotic' nature of the landscape, characteristic of many colonial writers, particularly male explorers (Mills 1991) and this 'elevated gaze' (Sharp 2009:39) looking down on the landscape is typical of the explorer or 'heroic individual' (Ryan 1996 cited by Sharp 2009). However, elsewhere Gregory discusses the difficulties of travel and the terrain and the helpfulness of local people. In terms of ecosystem services, aesthetic values for land and wildlife are shown clearly in the above extract.

In researching the colonial view of Bogoria, I searched through Bishop Hannington's published diary of his last missionary journey to Uganda in 1885, during which he was supposed to have 'discovered' Lake Bogoria, subsequent to his discovery named Lake Hannington. Note, nearly all tourist literature attributes the 'discovery' of the lake to Hannington but I could not find an original source. Today there is a tourist viewpoint overlooking the lake called Hannington's View (Figure 4.1). Strangely, I could find no account of sighting the lake in his last diary (Hannington 1885), nor in a history of his life (Dawson 1887). Rather there was a long description of getting lost amongst dry volcanic ridges which I think can be located on the edge of the Laikipia Hills to the East of Bogoria. His diary reads:

> *Saturday, September 19th - We then found ourselves upon a wide-stretching lava field with water nowhere to be seen; and, as we had been crossing the river so frequently and left it quite unexpectedly, nobody had carried water, and the heat on the black lava was terrific. Views of Baringo and the Njemps plain, and Lykipia hills were very beautiful. We made our way down another terribly stony lava field, where I shot an*

eland bull. We then came to another escarpment, and had to circumnavigate for ever so far to find a track to descend. At the foot was a beautiful stream. I think I never had a harder's day's march, and was dreadfully exhausted.

(Hannington 1885:194)

In this extract, the brave colonial explorer suffering hardships. Hannington enacts two colonial discourses, one of disembodied colonist and the other of anti-hero (Mills 1991). The stream described may well be where the Waseges descends to the plain at Sandai, so missing Lake Bogoria to the south (Figure 5.2; Figure 7.3). He subsequently describes his march through Njemps country, across the hot Baringo plains, through the forests of Kamasia (Tugen Hills) and the climb of the Elgeyo escarpment on the eastern side of the Kerio Valley (Figure 4.4). Nowhere does he mention the soda lake near Baringo. Is this a silence of non-discovery?

The Tourism Voice

At the beginning of Kenya's great Northern Wilderness lies Lake Bogoria. The lake is the heart of an arid landscape, in the shadow of the dramatic walls of the Siracho Range.

The soda waters of the lake attract massive flocks of Flamingo, and the lake is often carpeted with pink. The 32 sq km lake is still volcanically active, and the Western shore is lined with spouting geysers, spurting steam and bubbling geothermal pools. Fresh water springs at the lake edge attract an abundance of birds and wildlife.

There are many Fish Eagles, which often prey on the local flamingos. The shores are always lined with Gazelle, Zebra, Baboons and this is one of the best places to see Greater Kudu. (Magical Kenya 2010)

Typical of many tourism articles, the above description of Lake Bogoria highlights the hot springs, flamingos and wildlife as the major attractions of Bogoria. In contrast, the text below from Lonely Planet (Parkinson et al 2006) seems to invoke the mysterious, almost threatening 'inhospitable' nature of Lake Bogoria.

Backed by the bleak Siracho escarpment, moss-green waves roll down Lake Bogoria's rocky, barren shores, while nearby hot springs and geysers spew boiling fluids from the Earth's inside - keep your distance! Amazingly, this inhospitable alien environment is a haven for bird life and at Kesubo Swamp just north of the park, more than 200 species have been recorded. One lucky soul spotted 96 species in one hour – a Kenyan record.

The lack of dense brush around Lake Bogoria also makes this one of the best places in Kenya to see greater kudu. The isolated wooded area at the lake's southern end is also home to klipspringers, gazelles, caracals and buffaloes. Oh, and you'll see your fair share of donkeys and cattle too.

While the odd Kenyan tourist visit the springs, few people venture further south, meaning you may well have the place to yourself. You now have the bonus of being able to explore on foot or bicycle, though stay clear of the small buffalo population.

Lonely Planet – Kenya (Parkinson et al 2006:246)

This threatening representation may be seen as an unexpected given that it is trying to encourage tourists; instead it attempts to draw on the reader's sense of exclusivity, 'the Tourist Gaze' (Urry 2002). The draw to see the diversity of wildlife illustrates the ecosystem service values of biodiversity. The sense of offering isolation to Western tourists is clear. Yet, despite local people daily using the park and following the road south, they are ignored or not 'seen', although their livestock are and are seen as a distraction from wildlife.

The Conservation Voice

Lake Bogoria National Reserve is an important conservation area in Kenya holding regionally and nationally endangered species. The reserve has unique physiographic features and geothermal manifestations due to its geological history. The combination of landforms, biodiversity content, availability of water and forage makes this site important at community, national and global levels. It was designated as a national reserve in 1974 and in 2001 it was listed as a wetland of international importance under the Ramsar convention. Revenue from tourism, related activities and other natural resources in the reserve can play an important role in the socioeconomic development of the area.

The National reserve is at risk from environmental degradation arising from unsustainable resource exploitation and ecologically negative catchment-wide processes. The root causes of these problems are poverty, poor land use, overstocking and unsustainable farming systems. These socioeconomic circumstances of the populace and the

environmental impacts are threatening Lake Bogoria National Reserve

and its wider catchment.

Lake Bogoria National Reserve Management Plan (2007:vii)

The LBNR management at first seem more managerial in their account. They stress the importance of the landscapes and biodiversity for tourism but that they are 'at risk' from 'exploitation', the root causes being 'poverty, poor land use, overstocking and unsustainable farming systems". Provisioning services of water and forage are also mentioned. There is an accusatory tone that the human population and their practices are the root drivers of detrimental environmental change rather than the harsh environment being a root cause of poverty. The use of language is an 'articulation of power' (Pickerill 2008:96) articulating local people and their circumstances as a problem.

This antagonism between nature and people, in this case tourist visitors, is reflected in this second conservation view of Lake Bogoria referring to its designation as an UNESCO World Heritage Site.

Lake Bogoria National Reserve covers 107km² within a catchment basin

that forms the arid and semiarid areas of northern Kenya. Although the

area is protected, it is vulnerable to siltation and pollution. The lake has

only one major river that feeds it. ... At the lower zones before it enters

the northern part of the lake the river goes through a very dry area

dominated by bush and scrubland. The hot springs on the western edge

of the lake attract a large number of visitors creating problems (solid

wastes pollution, and destruction of fragile rocks at the hot-springs).

The lake's biodiversity is seriously threatened by siltation and tourism is

also expanding rapidly in the area. There are also local initiatives of rehabilitating the land and improving availability of pasture through sowing of grass and cover crops.

UNESCO (2010)

Anthropogenic activities, whether tourist generated or local land use, are seen as problems as they conflict with conservation objectives although positive land management activities, sowing of grass and crops, are also identified. In general, the full LBNR (2007) and UNESCO (2010) reports are pragmatic about involvement of local communities in biodiversity and ecosystem management. Tourists are necessary but result in pollution and destruction. One difficulty of the ecosystem services approach is that it both positions people as adversaries of the environment but also places ecosystem services for the service of human well-being.

The Anthropologist's Voice

These extracts concerning the Lake Bogoria area are taken from David Anderson's book "Eroding the Commons" (2002) written as a political ecology and anthropological account of the development of the Baringo District in general. Little of Anderson's account features Bogoria directly, as most of the early settlement and conflicts were elsewhere because of the lack of reliable ecosystem services.

The second area of Il Chamus* expansion was at Kailerr, to the south of the old 'Njemps' villages and adjacent to the swampy area around Loboi and Sandai. This area provided good grazing after the rains, but seems to have been less popular due to the brackish nature of the water near to the sulphurous Lake Bogoria and the unpalatability of some of the salty grass types in the swamp area. (Anderson 2002:58)

* Sub-tribe of Njemps who border Tugen lands to the north of Sandai.

Sandai, the area of my study location is now heavily populated and with extensive utilisation of resources including the salty grasses of the swamps. The following extract also suggests that the area around Sandai is unsuitable for agro-pastoral settlers.

> *Tugen crossed the Molo and moved into the lands around Maji Moto, along the western shores of Lake Bogoria. The Loboi and Sandai Rivers watering this area are both prone to run dry during the dry season. It is an area therefore long recognised by Tugen herders as being poor cattle country, and few herders care to linger long in this unfavourable zone. Two gathering points, one to the east and the other to the west of this zone can be identified. Movement eastwards from here brought people to the River Molo, and then south to the southern end of Lake Bogoria, around the seasonal River Emsos. Vegetation in this area is salty in character, and the Tugen recall that their goat flocks did especially well here.* (Anderson 2002:59)

This account seems to imply that salty vegetation, in a different location near Emsos, was good for livestock as opposed to the view in the first quotation. Both quotations interpret the 'quality' of the ecosystem services being provided at a local scale. The history of European settlement and land demarcation in Baringo District described by Anderson seems to demonstrate the colonial preference for the more agriculturally productive lands of the southern part of the region, rather than Bogoria which was free from white settlers. African use of resources in the Bogoria area seems to have waxed and waned although their transhumant traditional lifestyle meant that their use of any one area was not necessarily continuous. Anderson's analysis of tribal migration patterns is at odds with the Endorois strategic claims to living in the area for millennia.

The Endorois Voice

The Endorois are a sub-tribe of the Tugen (although this is disputed) who are claiming dispossession of land around Lake Bogoria (Makoloo 2005). The following extracts are different views of representatives of the Enderois indigenous people. The first, like the quote from David Anderson above recognises the salty characteristics of the grazing. But their main concern is their eviction from their lands by the side of Lake Bogoria. Since completing my fieldwork the Enderois have been successful in their land claims at Lake Bogoria (Breen 2010).

> *Seventeen people lived here and were evicted. And if you look across there, people lived all over and looked after their livestock. Our parents tell us that in the past when they lived round Lake Bogoria, there was plenty of grass for grazing. The cattle used to lick natural salt to help their calves grow and fatten.* (Richard Arap Yegon 2007, CEMIRIDE 2007)

The visualization here is a place of plenty and rich grazing; in contrast to current poverty and hardship. This was also expressed in an interview with some old men from Emsos.

> *We were living in Lake Bogoria, close to the lake and we were taking our cattle there. We were looking after cows, goats and sheep. We had no schooling at that time. Our living was only looking after animals and they were eating meat and drinking milk. When we were looking after our cows at Lake Bogoria we didn't have so many problems. After that, in 1973, we were chased out from the lake. That is the year these people*

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were told they must go away from the lake. Now the place is a government area, a national park now.

Before that these people were having irrigation. The animals were well fed. Also at that time we had no animals like zebras, buffalos, hyenas and warthog. We only had animals like antelope, impala, dik dik and very few baboons. So when we came out, from 1973, we just found buffalos coming, zebras walking in. When the buffalos and zebras came it seems that they brought the tsetse fly.

When we came out of Lake Bogoria we found out we had no shambas. When we came out of that place we had no place to dig and no place to keep our cattle, so our cattle became very few because there was not enough grass. People now they have no food, they are just selling cows. Tsetse fly are there now and biting the cows and goats so they become sick. These people at that time did not know about treatment for their cows. They became sick and die because they did not have medicine.

This view seems to indicate both a loss of resources after eviction from the lake but also deterioration in the environment. Another old man said, "Almost everywhere now is very bushy, very dark bush", and also suggested other changes in the biodiversity of the area such as more zebra bringing tsetse fly. Loss of the productive land nearer the lake and the direct ecosystem services that it provided is not compensated for by revenue from tourist visitors to the park, little of which goes to the community that were evicted.

The Tugen Woman's Voice

It was clear, however, from my research that not all local people shared this feeling of disempowerment and ejection from resources. The following extracts are taken from the

video that the Sandai women, also Endorois, made at Lake Bogoria. They seem to understand particularly the future value of biodiversity for their children.

> ***Esther:*** *I am happy as it is the first time that I have been here. I have seen mongoose, flamingos and it is a good place to enjoy. Thank you to the game reserve for what they have done. Our children can come and see the lake.*

> ***Lenah:*** *I am happy today as it has taken me a long time to return here. When Jomo Kenyatta was alive I used to come here to dance. Now it is very different to when I was young.*

> ***Susan:*** *When I came here before it was not like this. I have seen wild animals like gazelles, kudu, baboons and monkeys. I am happy to have seen a lot of things I have not seen before. I came to see the flamingos lay their eggs. There are many more hot springs; there were two, now there are many. It is good to bring children, they will see a lot of animals. We have the reserve to thank for that.*

> ***Dorcas:*** *I am glad to be here now, it is better than before, even the grass has grown. I have seen baboons eating flamingos. The flamingos are good for tourism so how can we stop that? Our children will see they can't be killed and take care of them. I have seen the hot springs and they are beautiful. It is good what the reserve is doing here. At home the baboons and monkeys eat our crops but here they have a place too.*

They all express delight at visiting the park, a delight for the wildlife, memories of cultural dances and an appreciation that this was a place that their children would

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inherit. All these may be identified as 'intrinsic' values of biodiversity as an ecosystem service fulfilling cultural and aesthetic needs.

The Reflective Researcher's Voice

I come finally to my own reflective account.

Nyalilpuch is also the edge of the Soracho escarpment and provides wonderful views over Lake Bogoria and to the Tugen Hills beyond. This is Hannington's View and I had the sense of following in colonial footsteps.

This part of Kenya has some of the most spectacular and varied scenery within a small area but most importantly for tourism people can get out of their cars and walk. Other National Parks and Reserves have dangers from large wildlife, lions, buffalo, hippos, etc and tourists are confined to their vehicles. In this area the lack of large mammals has meant that the area has held less appeal for tourists, however this is now being turned to its advantage by the Mid Rift Tourism and Wildlife Forum. The area still has wildlife, some such as the flamingos holding spectacular appeal, but it also has landscapes and welcoming people.

Lake Bogoria is one of the gems of the Mid Rift and receives a regular trickle of local and international tourists. The main draws are the flamingos and hot springs that ring the lake. This is an area of intense volcanic activity. The hot springs have a medicinal value for Tugens and other Kenyans. The sodaic quality of the water and the deposits on the rocks are used to cure a variety of ills including skin complaints and for mothers in childbirth. The legends that go with the lake are also hybrid

between local cultural religion and Christianity. They are still performed in dance and story telling but the audience is now likely to be tourists. (Reflective diary Moore 2008b)

Set against the previous descriptions, my own diaries seemed to link appreciation of my own heritage with the 'welcoming' nature of local people and with an understanding of local values for provisioning and cultural ecosystem services supplied by the park. My reflective diaries were designed for a blog, a form of communication in which I could share my thoughts and experience with a global audience, echoing the personalised accounts of earlier female travel writers (Mills 1991). Throughout my writing I was conscious of letting the subaltern speak (Spivak 1988), although inevitably interpreted through my words. This was at once a dichotomy but also enabling representation of those normally unable to speak to a global audience. At the time of writing I was not fully aware of the depth of feeling of the Endorois to their loss of land around Lake Bogoria and my writing depicts an idealist view of the area without understanding, at that stage, of other underlying issues.

Most importantly from this comparison of texts can be drawn the different mental images, the visualizations that are invoked by the different accounts. It is not just images that paint pictures of a place but also the written or spoken word, and as shown in later audio accounts, words are a means of stimulating cognitive visualization. The different worldviews clearly come through from these accounts: the exploratory nature of the colonial impressions; the contested ownership of land by Endorois and Lake Bogoria management; and the equally contested understanding of the quality of resources by Endorois versus anthropologist. Different ecosystem services are highlighted through the diverse voices; an indication of how values are related to the knowledge and understanding of various social groups. This holds a warning of the

danger of distilling and reducing values down to purely economic terms, gathered in the main from people in decision-making roles. If ecosystem services are to be used as a central paradigm for conservation and human well-being, a more holistic interpretation of values from a number of sources is essential.

Mindful of these textual accounts of place which illustrate varied ways in which nature is valued, this chapter reviews how spatial knowledge and its communication could be achieved, starting with maps as a standard means of communicating geographical information.

7.2.2 Communicating ecosystem services through maps

The landscapes across the central Rift Valley are heterogeneous semi-arid lands with an integrated mix of ecosystems largely modified through human intervention. Linear maps were produced along all the trails to illustrate a cross-section of these heterogeneous landscapes. Trying to quantify the values of ecosystem services from any area is difficult as farming practices are constantly shifting and depend on local microclimates together with local economic and political conditions. This section interprets maps made by local participants, mapping organisations and myself. In doing this, the many benefits which maps provide to spatial understanding are acknowledged (MacEachren 1995), but they are also recognised as having the power to persuade and mislead (Wood 1992; Monmonier 1996). The cartographic mappings that were produced are critically reviewed to address the accusation that "Often maps seem to be unreconstructed objects, merrily aiding colonial projects" (Akerman 2009 cited in Crampton 2009).

The TransRift Trail

Mapping the TransRift Trail using GPS contributed to the visualisation of it as a tourist feature. The route of the trail was subsequently plotted on background images of Landsat ETM satellite data and elevation data (Figure 7.1) but it was the map combining elevation and hill shading (Figure 4.4) that give the best impression of the highs and lows of the trail. By coincidence, the plan of the route across the terrain mirrored the topography of the landscape (Figure 4.5). The participatory map drawn by the trail guides was essentially a linear map and useful for contributing the points of interest that we had encountered along the trail as we walked (Figure 7.2) and was also used as an exchange of knowledge amongst themselves as it was drawn. The process of tracking the route with GPS was to establish an 'official' trail and seemed to give legitimacy to the TransRift Trail that I walked, yet even as I walked my guides would discuss, different, better routes so making my route 'A' version of 'The' TransRift Trail.

The map of the trail was also incorporated into the backdrop to a research poster (Moore 2009) endowing the poster with the metaphor of a linear storytelling (Appendix 2) as it was used in conjunction with photographs. Mapping the trail therefore gave validity and structure to the previously disconnected route. The writings, photographs and video seemed to endow more understanding of local context and give meaning to the trail. The maps are silent on issues of poverty related to physical features and to the long walks taken in the heat of the day that seem just a few millimetres on the map. The map may promote the route tourists take through the region but at this scale portray a 'wilderness' rather than the environment in which Tugen people live.

Figure 7.1 The TransRift Trail plotted on Landsat ETM bands 3 red, 2 green, 1 blue (NASA 2000) (above) and SRTM elevation data (USGS 2004b) (below).

Figure 7.2 Participatory sketch map of the TransRift Trail by the trail guides
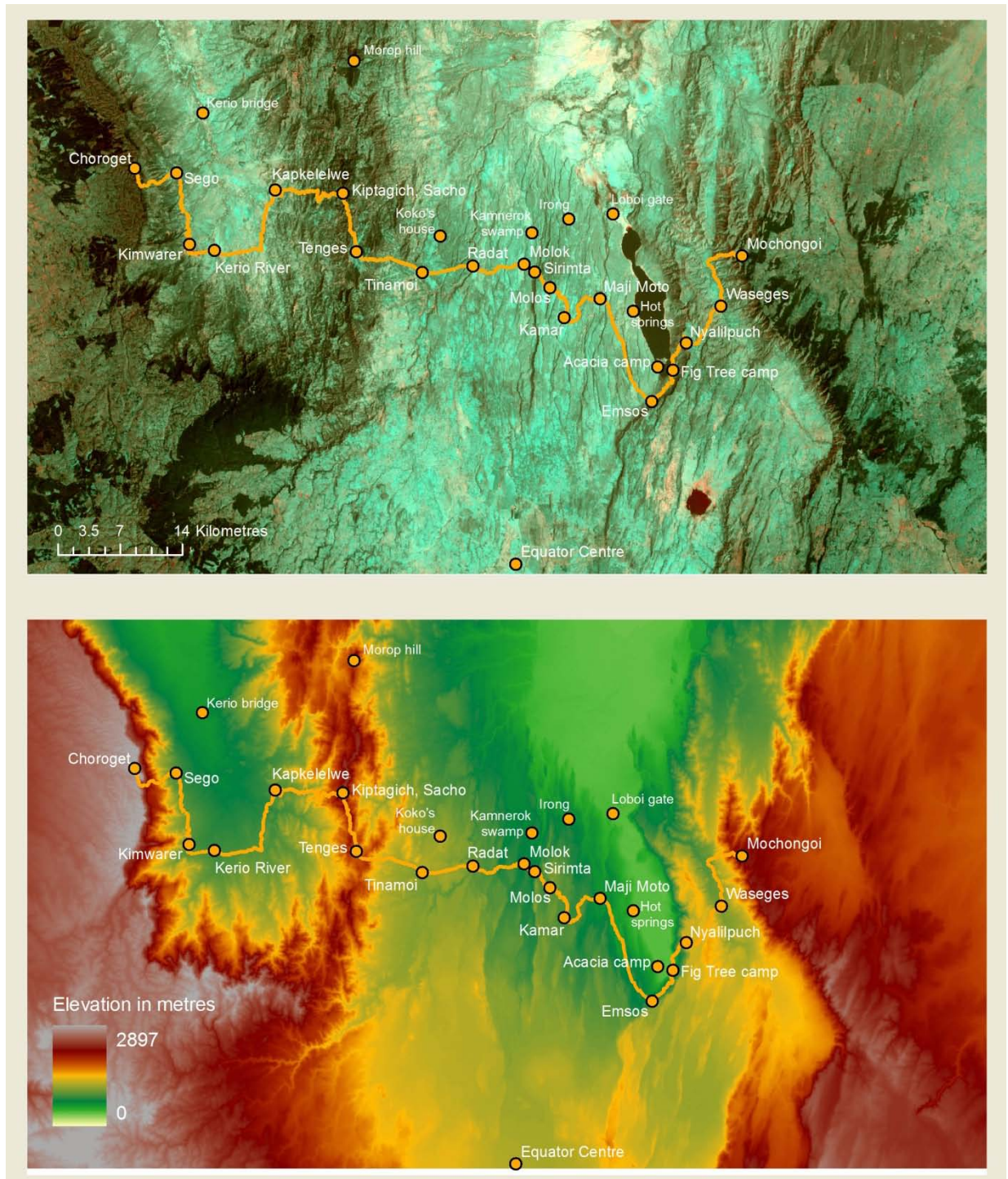
    (a) The original map

(b) Participatory trail map redrawn for clarity.
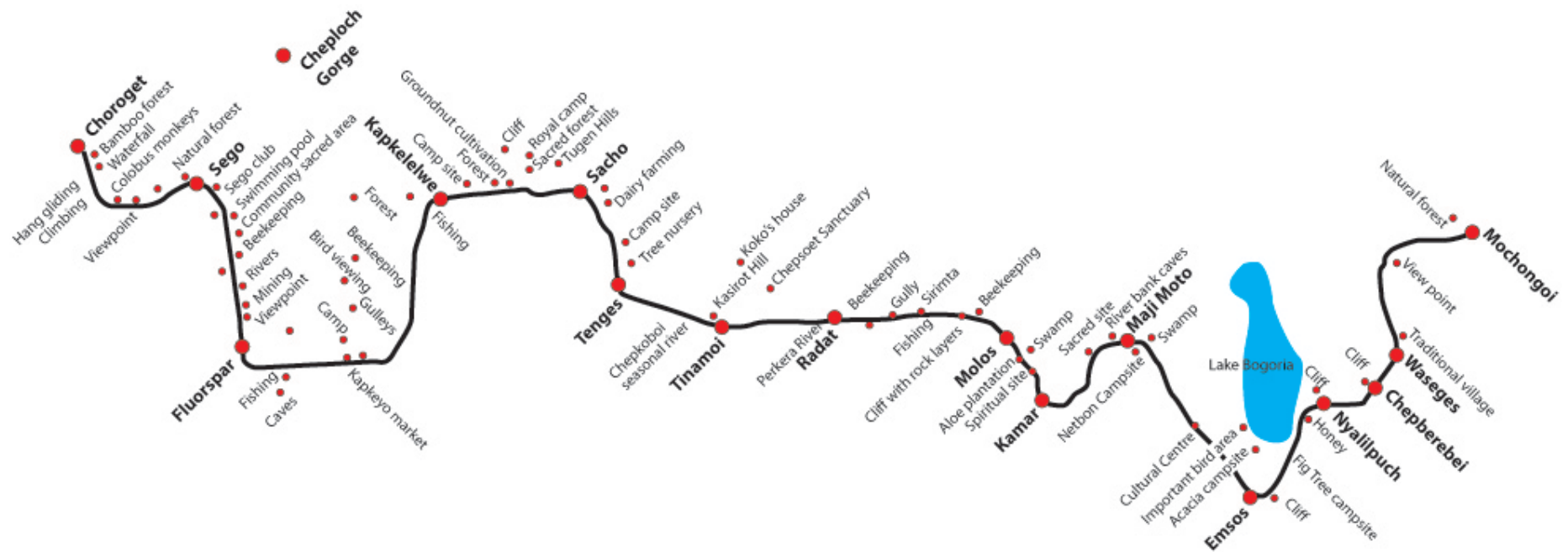
Sandai

At the local level in Sandai, emphasis was placed on understanding the basis for ecosystem service values by mapping comparative values that local people hold for different land use areas. Practical aspects of map availability, so common across Africa, made the process difficult. High resolution aerial imagery for Sandai location was unavailable to provide adequate base information capable of dealing with local variability. The 1:50000 map (Figure 7.3) illustrates the broad topographic structure but in the context of understanding the sense of place the map contains many 'silences' and lacks intimations of the value of features.

Figure 7.3 Extract from 1:50000 Survey of Kenya sheet 105_1 (Source: © GK 1975) Grid lines are at 1km spacing. See Figure 5.2 for reference.
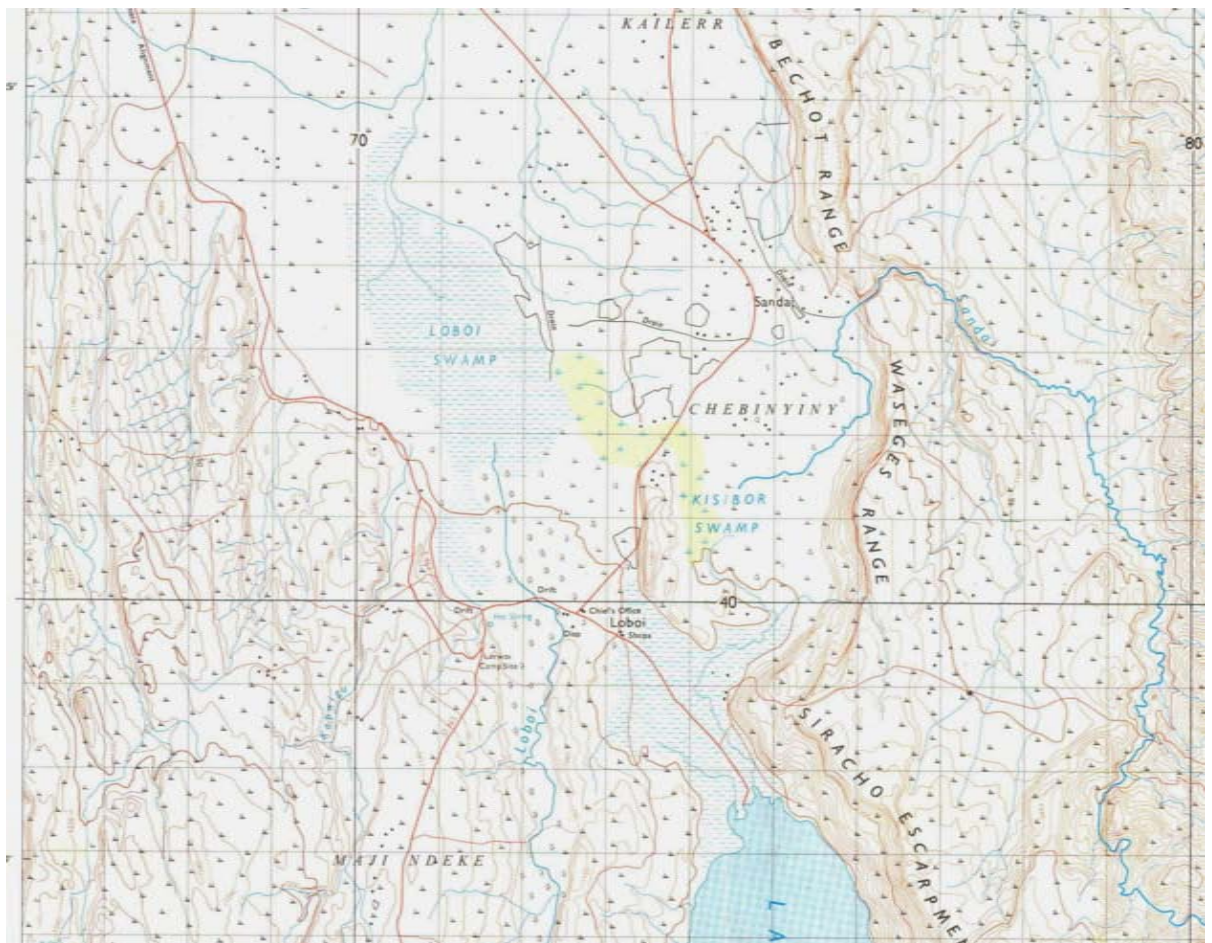
Figure 7.4 Land cover map of Sandai (Data source: WRI 1999)
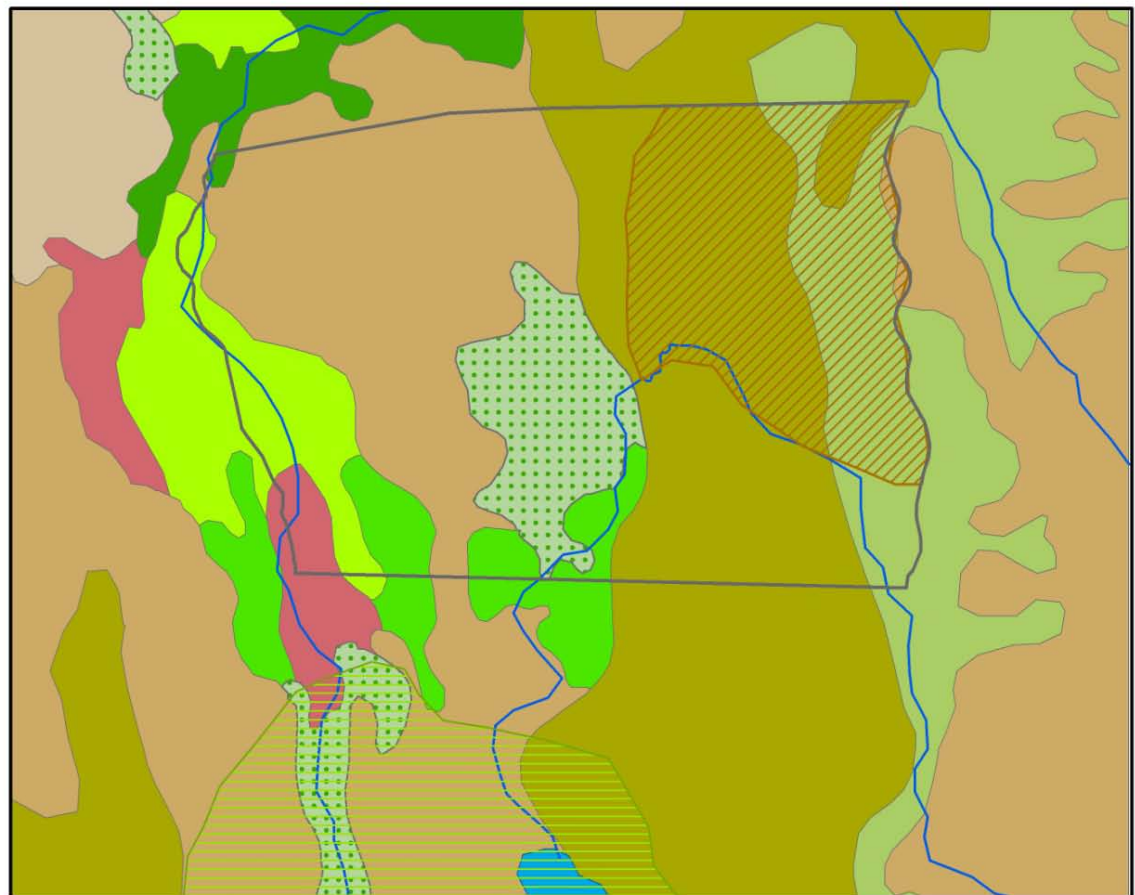
Sandai Sub-location boundary
Chuine Sanctuary
Lake Bogoria National Reserve
Lake Bogoria
Rivers

Kilometres
0 1 2 3 4

AGRICULTURE
Scattered (in natural vegetation or other) Rainfed herbaceous crop (field density 20-40% of polygon area)

FOREST
Closed to open woody vegetation (thicket)
Open low shrubs (65-40% crown cover)
Open shrubs (45-40% crown cover)
Open trees (65-40% crown cover)

RANGELAND
Closed herbaceous vegetation on permanently flooded land
Open to closed herbaceous vegetation on temporarily flooded
Shrub savannah
Trees and shrubs savannah

Published maps may be misleading if they falsely convey an impression of 'truth' to decision-makers when inaccuracies may have impacts at a local scale. For instance, Figure 7.4 shows a large scale land cover map (WRI 1999) in which the major area for cultivation in Sandai has been classified as 'Open trees (65-40% crown cover)'. Open acacia tree cover masks the reality of settlement, shifting agricultural patterns and seasonal planting. To supplement WRI data, an attempt was made to map the current extent of the swamps with GPS (Figure 5.2). The GPS mapping process was useful to understand the variability in vegetation in the swamps and the intensive use of the area for grazing. However, a more intensive mapping of the biophysical components of ecosystem services provided by these wetlands is recommended. The data raises a criticism of reliance on mapping at national and regional scale for decision making at local scale as detail is omitted.

In contrast to 'official' maps the women's sketch map of Sandai (Figure 6.4) pays great attention to detail of the settlements and main land use patterns that are essential for their immediate daily lives. The map has a graphic quality that adds personal feeling to the representation. It fills in the silences labelled 'open trees' on the WRI map with features such as schools, farms and bee hives. The women even symbolised the rivers with a dashed line indicating the seasonal nature of the water supply; on the Survey of Kenya map (Figure 7.3) rivers and streams are solid blue falsely implying an abundance of water. 'Official' mapping seems to homogenise the environment and misses issues of importance. One of the current debates in critical GIS research is addressing the problem of "representation of the spatial realm [which] must take the next step of representing social concerns including power relations, gender inequities, social control through numerical representation, and social marginalization" (Schuurman 2006:736). Gilbert and Masucci (2006) call for new ways to represent women geographically and

to focus on the subjectivities of their daily lives to understand the multiple relationships of power and inequality, and I would add relationships, with environmental issues. There may be an argument that the topographic maps and WRI data are drawn from the colonial and masculine gaze (Mills 1991) with their lack of detail and their silences.

The men in the village seemed reluctant to produce a map of Sandai as a location, maybe not understanding the purpose, although readily producing a map of livestock on each of the swamps (Figure 5.24 and Figure 5.25) and Chuine (Figure 5.11), possibly emphasising their concerns of land issues and livestock as well as for purposes of this research. The maps of the swamps particularly illustrate the contested nature of these wetlands, as cultivation and settlement are graphically depicted encroaching on the central area from the margins. These iconic images are in contrast to the official maps that reduce the life in these areas to polygons or dotted blue symbols. When the older men (wazee) were asked to sketch out a map of Sandai they concentrated on religious and cultural sites as focal points for discussion although their unfamiliarity with drawing meant they described the locations rather than drew them.

This discussion of maps is drawn to a close by reviewing two complementary sets of maps produced to illustrate the surveyed values of ecosystem services in Sandai: spider diagrams (Figure 5.6; Figure 7.5) which compare multivariate composition of services in and between zones, and choropleth mapping (Figure 5.7) which compares the spatial distribution of values for individual ecosystem services. Choropleth mapping is useful as an indicator of the importance of different zones for different services and a useful summary of relative values between zones. They are deceptive as the zones did not always have well defined boundaries and they generalise and simplify the aggregate value of land use zones. Choropleth mapping has been used by other researchers mapping local values and sense of place from the understanding "that human beings are

agents in the landscape and attribute meaning and value to biophysical features which are not solely instrumental and monetary in nature" (Raymond et al 2009:1314). These maps are strong indicators of summary values but still tend to homogenise community values without realisation of the impacts on equity.

The spider diagrams clearly show the similarities and differences in the supply of ecosystem services from different zones and the relative importance of the range of services within each area. The swamps are distinguishable as being most important for grazing, but the openness of the shapes formed by connecting the axes illustrates the even distribution of values across services. From the spikiness of the shape in Chuine, it is easily seen that Chuine is of low importance for almost everything which helps promote biodiversity and tourism values; similarly the spikiness in cultivated land shows the major use as cultivation dependent on good soils. However the temporal nature of the values is not shown, such as the lack of water in times of drought. These maps seem to imply permanence in values. The underlying inequity of use and conflicts are also missed.

Quantitative maps, such as choropleth maps or spider diagrams support the criticisms that can be levered against reliance on mapping or national and regional decision making which omits local detail as discussed in Chapter 5 Resources Trails. Maps are useful tools if used as a basis for discussions to prompt questions rather than necessarily present facts. Maps are less effective at demonstrating the findings from ethnographic research where understanding the local sense of place may be required. For instance, critics of GIS question the data structures on which GIS and maps are normally based as "transforming indigenous geo-spatial knowledge into meaningless bits and features" (Sieber and Wellen 2006:1) as maps do not adequately represent indigenous epistemologies (Rundstrom 1995). Shaw et al (2006) criticise colonial boundary-based

mapping that reifies a particular view of land and that often shows indigenous places as 'emptiness'. The challenge for PGIS practitioners is to integrate mapping into alternative worldviews, "to fit the technology to the knowledge instead of the converse" (Sieber and Wellen 2006:2). My argument is that if knowledge, in its different representations, is shown side-by-side in a non-hierarchical relationship, then none will be put into a position of power and superiority. This may acknowledge the value of maps but provide alternative and more appropriate representations of local knowledge in its different forms.

Wood (1992:6-7) argues, "Ultimately, the map presents us with information that we *know* as differentiated with the reality we see, hear and feel. The map doesn't let us *see* anything but it does let us know what others have seen, found out or discovered." Although, as researcher, I do not want to conflate knowing with looking (Rose 1993), I would argue that a map presents the reader with information but the seeing, hearing and, ultimately, feeling is equally important for knowing and understanding and much of this was achieved in conjunction with other means than mapping at all the scales of the study. The 'silences' of the maps needed to be filled to more adequately communicate and visualize relationships between ecosystem services and human well-being.

Figure 7.5 Spider diagram showing relative values of different land zones
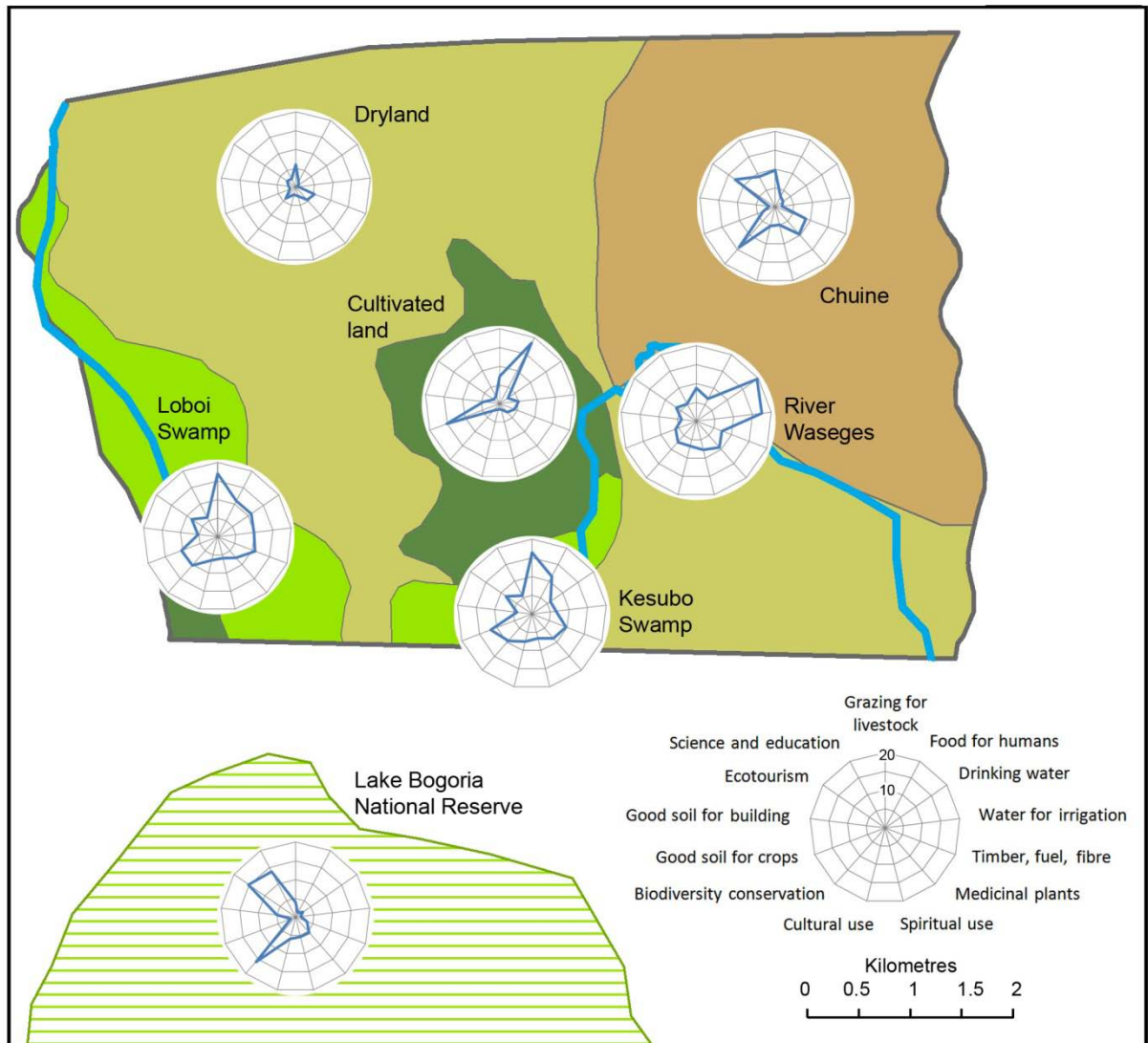
7.2.3 Video as maps of place

Visual methods, particularly video, are a central part of this study, as discussed in Chapter. Video is used as a form of participatory data gathering (High 2008) as well as for visual analysis (Pink 2001; Rose 2001; Pink 2006). As a form of geographical visualization, video can create the sense of a journey through place. A mixture of landscapes and interviews were initially used to illustrate the journey across the Rift Valley. Selective choice of clips and editing produced the impression of the journey that I took with local companions and the challenges faced by people along the trail. This

was used to communicate the personal journey that I made using my own voice in the captions with the real voices of my companions and people that we met. It is a film punctuated with the places that we stayed. The identification of actual geographical location within video is less spatially explicit than with a map but the embodied nature of the journey and the places visited is more fully communicated. Prioritising the film with the map embedded within the film seems to favour this sense of place over location so that the nature of objects found at a place is more important than spatially locating the objects. Through video, the feelings generated within a place may be readily communicated and, following Tim Ingold's metaphor, the paths themselves become places and the video readily communicates feelings along the journey. Particularly in the case of the Tugen Trail, there is a sense of place-making through walking along the paths. However, by their nature, video is composed of clips of time juxtaposed in order so that spatial distance between clips is hard to determine.

The mainstreaming of visual anthropology has influenced further development in participatory video as "it employs the visual as a method of research and representation, thus rendering anthropological knowledge more widely accessible and influential outside academia and making such knowledge available through a range of media" (Pink 2004:6). Sarah Pink (2007) also emphasises the place making potential of video, particularly walking with video, centralising this method as "a catalyst for creating ethnographic understandings of other people's experiences, and representing these experiences to a wider audience" (Pink 2007:240). This also follows from Gillian's Rose (2001) arguments, that visual methodologies are relevant to interpreting culture, as culture is not objects and things but processes and practices; I would argue that place may be akin to culture in this context and video, particularly participatory video appropriate for developing an understanding of local values of place. This supports the

context of video as a visualization method, particularly in conjunction with maps as an important component of this research.

The production of the content of the videos helped both the Chuine group and the women's group express their dependence on resources in the context of their wider lives (see Chapter 6 Women's Trails). The process helped cross-cultural understanding between myself and the community as they framed what was important to them, not necessarily what I would have noticed. Making films about water seemed to hold profound significance to the participants. Despite little training, filming all aspects of water, at the river when it was flowing and in the dry season instilled the importance of water as a resource to the lives of all residents in Sandai. The men's film focused on the practical uses of water, irrigation and channel building. Women were creative in producing the content for 'Walking with water'; they used pan and zoom techniques to instil the sense of the expanse of dryland through which they walked (Figure 6.8). When the river was flowing one of the women expressively mimed the domestic uses of water in the home. When the river was dry they used humour as a means to express the frictions, mock fights between the women that developed as they waited endless hours in the dry stony river bed for a trickle of water. Soon this theme became the basis for the short film 'Walking with Water' that was later also recreated in a mediascape described in Section 7.2.5. There was a real sense that all the film makers were not just shooting pictures but they were trying to communicate their lives and the ecosystem services on which they relied. The communicative power of video produced collaboratively as a participatory process has been shown not to be just about transmitting a message but to improve the communicative ability of a community (Harris 2009).

At the editing stage when I worked through translating the film footage, I was often torn between translating and transcribing purely what was said, with the discussion and explanation given by the translators who embellished what was meant. Ensuring accuracy of meaning, rather than direct translation, and visualising from an insider, rather than research, perspective was always challenging because of the many possible 'voices' that may be induced through selective editing and representation. Construction of the final films and selection of the content enabled me to draw out the most poignant shots and create a montage of imagery that I found to be compelling by keeping many of the films brief. Although additional narrative could have been added I felt the films were expressive in their brevity and simplicity. They also slotted appropriately into multimedia visualizations because they expressed the 'voice' of the participants.

Video is a useful tool for communicating messages of environmental conservation. Much work has been done in environmental film-making in this context and films designed for the Western market abound. However, more recently, a new emphasis has been made on film production by and for local people such as the work by David Brock and David Harper through the Darwin Initiative Community-based Biodiversity Conservation Films, Kenya & Tanzania, 2007-2010 (Lakes of the Rift Valley Project 2010; Brock Initiative 2010). These films emphasise the science behind and the potential for conservation by local people for sustainability and include training of students in film-making. My own work differs in the handing of the camera directly to local residents in a participatory process and the output emphasising a sense of place within a spatial context. However, in all cases understanding of issues of environmental management, biodiversity conservation and ecosystem services may be well captured and communicated through the medium of video.

In summary so far, text, maps and visual imagery all contribute in different ways to understanding both spatial relationships and the sense of place on this research journey. However this chapter argues that combined use of maps and media, where one reinforces the other, is more powerful as a communication tool. Presenting a doctoral thesis, inevitably favours the written word over visual communication methods. Nevertheless, as discussed in Chapter 3, this may tend to reduce visual evidence, particularly dynamic evidence such as video or interactive mapping, down to words rather than exploring relationships (Pink 2007) in the analysis. Yet, communicating knowledge is strengthened by exploring relationships between different forms of visual and written information. Therefore the remainder of this chapter explores two methods by which such communication may be achieved.

7.2.4 Google Earth

Google Earth is 'a global information landscape' (Jones 2007:8), an interactive web-based interface to satellite imagery and spatial data that allows users to add spatially referenced maps, text, images and video to display over the internet. There has been a swift uptake of spatial web technologies such as Google Earth to share spatially located information and collaborate within easily accessible 3D worlds; providing "benefits in accessibility, interactivity, and engagement in landscape visualization" (Sheppard and Cizek 2009:2115). Since its inception in 2005, Google Earth has provided a freely accessible GIS facility and gained a global following able to communicate geographically located information widely. Google Earth Outreach helps charitable and non-profit organisations with training for outreach and advocacy purposes to 'bring their causes to life' (Google Earth 2009b). It has been utilised for a wide range of applications, such as highlighting the effects of conflict in Darfur to 3D modelling of global CO_2 emission by country. It has been used in participatory mapping to showcase

grass roots issues on a global network (Butler 2006) and to publicise the concerns of indigenous and local communities, such as the Surui in Brazil (Harman 2009). Global mapping solutions, such as Google Earth, offer the potential to alleviate concerns on the social and political connotations of mapping by critical scholars (Harley 1990; Pickles 1995) and equity in the power that maps have to influence and persuade by providing an accessible mechanism for communication of spatially located information to a global audience from a wide range of users. Google Earth has gone some way to fulfil the vision of a 'magic carpet ride' through a 'Digital Earth' (Gore 1998 cited in Goodchild 2008).

Nevertheless, Google Earth, despite its global reach, remains unavailable to many communities with little or no access to technology and internet communication potentially giving rise to criticisms of inequity and moral dilemmas of using it to broadcast information when the subjects of concern cannot view it easily themselves. In the case of this research, permission was sought to produce interactive trails using Google Earth in order to publicise the conditions and needs of the community. Other criticisms related to Google Earth include the dangers of inexperience leading to poor decisions based on the scientific data placed in the more realistic, and therefore, emotive perspectives of the 3D landscape (Sheppard and Cizek 2009), technical limitations, such as accuracy and reliability of data presented in Google Earth (Goodchild 2008) and political persuasiveness that gives rise to geopolitical dispute (Gravois 2010). It is precisely the subjective nature of the virtual worlds that can help to convey decolonising, indigenous or feminist understandings of place possibly through the development of 'indigital' GIS that favours the use of multimedia in GIS "to counter the dominant, standardized GIS structures" (Palmer 2009:39). Therefore, Google Earth has the potential to portray social and aesthetic values of ecosystem

services alongside quantitative values, relating them to the spatial distribution of the ecosystems on which they are based.

Google Earth enables dynamic landscape visualisation and the integration of custom spatial data (Wood et al 2007) using KML, a file format used to display geographic data in Google Earth. Dynamic trails were developed for Google Earth that allowed viewers to fly through the landscapes of Sandai and the Rift Valley. Locations on the trail are tagged to pop up interfaces that contain text and images and links to videos on YouTube. These were designed to create greater understanding of local values of ecosystem services. The technique of spatially embedded multimedia in itself is not new being used as a form of 'ground truthing' (Cartwright 1997) and as the basis for 'Virtual Field Courses' (Moore 1999; Moore et al 1999) but has not previously been demonstrated in the context of valuing ecosystem services.

The TransRift Trail was represented through a Google Earth path that can be run automatically (Figure 7.6). Along this path are a number of placemarks (Figure 7.7). When the user arrives at a placemark a 'balloon' interface is automatically opened to display photographs and text at that place (Figure 7.8). Google Earth had a few usability issues such as the landscape view being obscured by the balloons containing the media files, controlling the speed of the virtual tour and the length of time available for users to read the text was difficult but this may be resolved by further programming. Nevertheless, this reconstruction of the walked trail is successful in giving the user an appreciation of the varying character of the walk and an overview of ecosystem services across the Rift Valley.

A similar trail was designed through the ecosystem regions within Sandai location. However this trail is more successfully run as a self guided tour to allow the user to read the information at each placemark. The WRI land cover map is available as an

overlay for the terrain. The balloon interface contains graphs of the results from the questionnaire, alongside photographs and text (Figure 7.9). Links to video clips of local people from the participatory videos are also embedded. This exploration of ecosystem services through a Google Earth interface adds a deeper sense of place to the data whilst communicating the spatial nature of the issues.

A number of such different Google Earth representations may be produced that communicate the Tugen lands using different voices: local voices to decolonise the reading of landscape; my own reflections and images as researcher; quantitative valuations of ecosystem services; and a parody of a tourist representation accentuating the exotic nature of the landscapes. This ability to communicate the same journey through different perspectives highlights the subjective nature of experience of place. The analysis in section 7.2.1 of words that illustrate a sense of place may be extended through the use of multimedia and creation of Google Earth trails. Visual imagery, like words may be constructed into a meaning, but more importantly may be constructed to endeavour to communicate localised understandings of what it feels like to rely directly on ecosystem services.

Google Earth is successful in communicating the spatial context of the trails used to record environmental issues and how local people related to the ecosystem services that they used. Recreating the walked trails is a novel way of communicating the issues to a wide audience. Capable of illustrating place through 'more-than-just-maps', Google Earth can fill in some of the silences in those maps. Those silences may be filled using different 'voices'. In the case illustrated it is through the voice of ecosystem services.

Figure 7.6 Google Earth view of the TransRift Trail. By serendipity, the profile of the trail mirrors the height of the terrain.
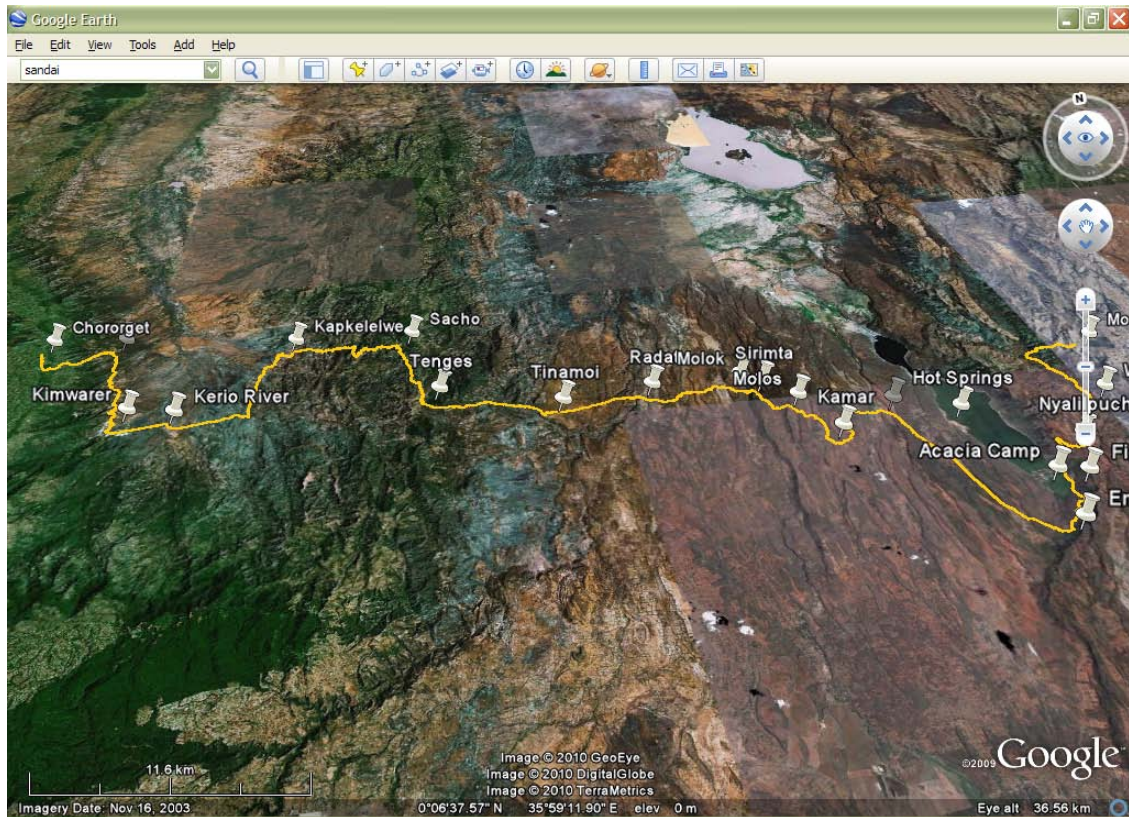
Figure 7.7 View from Emsos towards Lake Bogoria
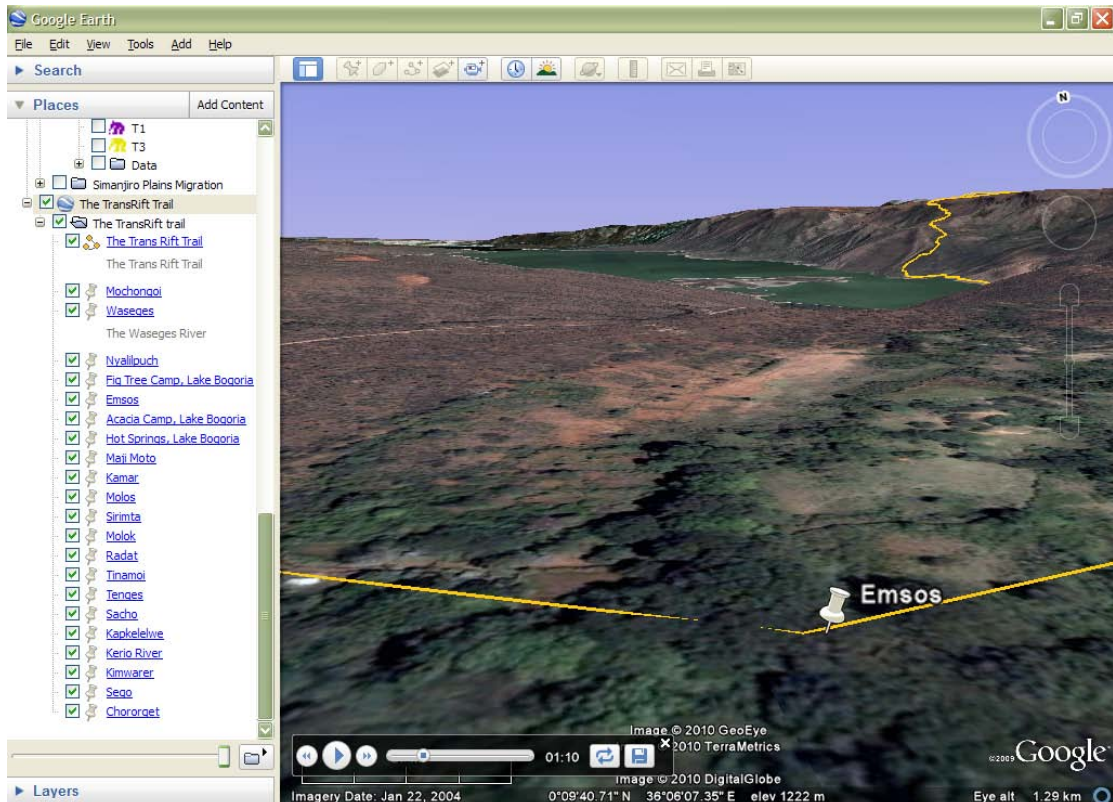
Figure 7.8 Supplementary images of Emsos and environment in the TransRift Trail
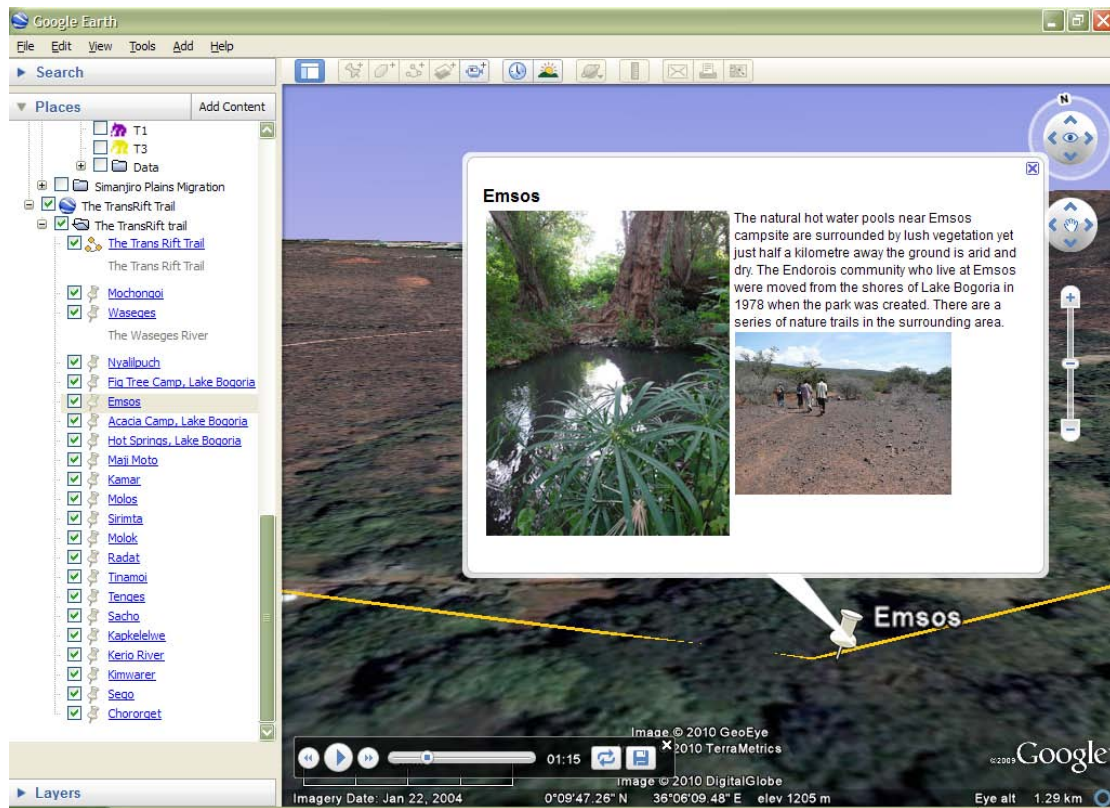
Figure 7.9 Kesubo Swamp ecosystem services in Google Earth
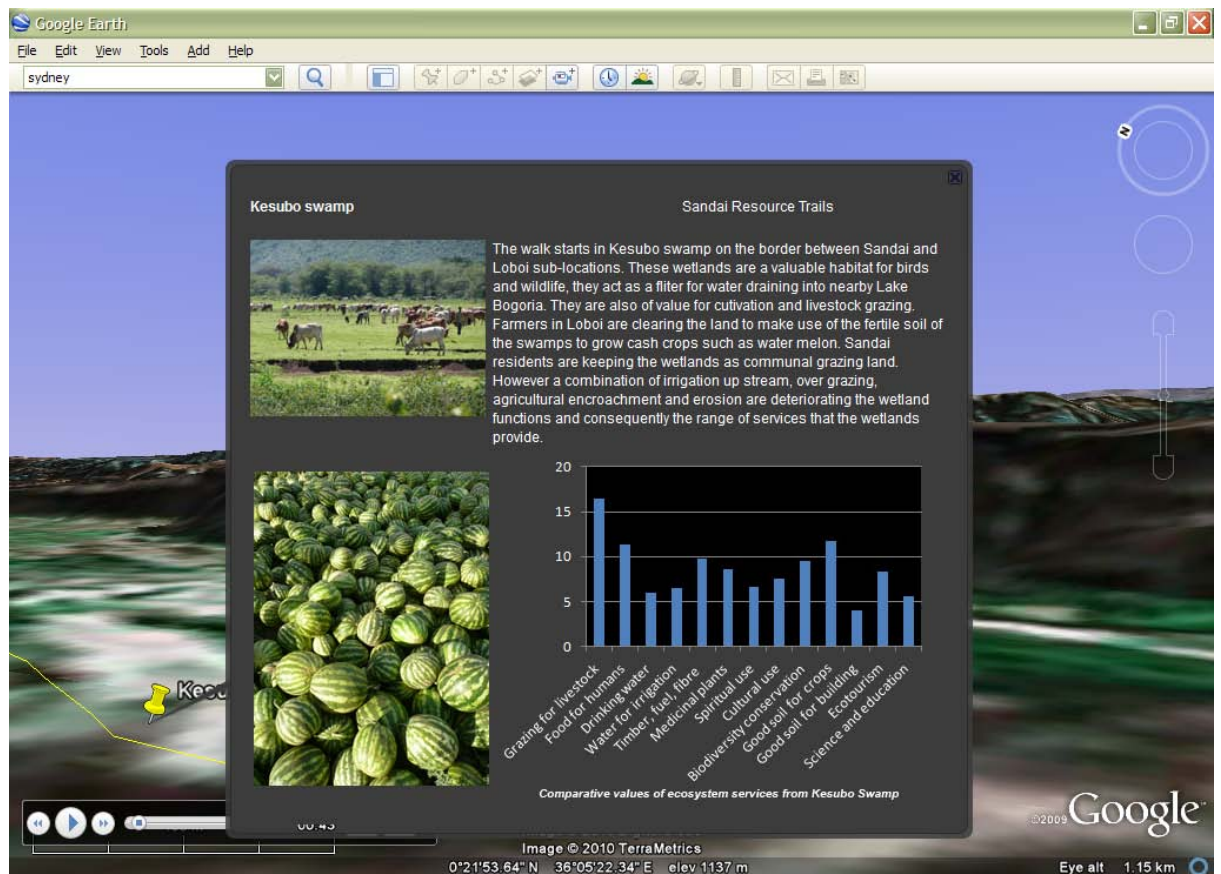
Although Google Earth can be used to present values of place, responses to virtual environments are not the same as the real environment (Bishop and Rohrmann 2003). Google Earth cannot achieve the embodied understandings that are an integral part of walking trails, of hodology and cognitive linking of thoughts and bodily experience. The walk becomes an imagining, or a cold viewing that is disengaged from the actual experience. Another mechanism, mediascape, was therefore sought that would allow physical movement and embodied experience to be incorporated in the visualization.

7.2.5 Mediascape trails

Mediascapes, trade name Mscape (HP 2009), provided a mechanism for designing an embodied experience of the trails across and within the Rift Valley. Mediascapes operate through recording GPS coordinates which the user may follow using a GPS enabled hand held computer. At certain locations audio, video or image files are triggered and played (Stenton et al 2007). In this way the user gets an 'immersive' experience that enhances the understanding of the place being described. Applications are commonly historical and geographical trails for instance a walk in Yosemite Park (Mscape 2009b). Veronesi and Gemeinboeck (2009) have used GPS located sound to produce 'augmented storied landscapes' for visitors to walk an aboriginal heritage site, which they experience through spatially located oral histories. Mediascapes provide a semi-immersive environment that enables the user to identify with place (Reid 2007).

Applications are normally anchored to the location for which they are designed, although there is a facility to create portable mediascapes which can be used in any location and walked relative to a starting anchor point. This was used for the Kenyan mediascapes so that the process of visualizing these remote trails is made real by the act of walking them elsewhere. Just as walking the trails engages multiple senses,

recreating walks and engaging with the real and virtual worlds in juxtaposition accesses the mind's non-mechanistic framework and connects memories and meanings of place buried in knowledge (Anderson 2004). This performs a function reminiscent of augmented reality but imposing alternatively located meaning to objects in the user's world. Much as Gregory likens Lake Bogoria to Windermere, it establishes a familiar anchor by which to grasp the unfamiliar.

There is a difference between 'authoring' and 'audiencing' of mediascapes (Loveless et al 2008) that almost certainly creates a sense of place that is not what the audience would feel if in the real location. Nevertheless, the argument for using augmented reality trails is that the audience would not normally have an opportunity to visit that area so the trail helps to confer a closer appreciation of the environment in the Rift Valley. Also, "the experience of someone else's mediascape has the potential to support an empathic response: an opportunity to walk in other shoes and to see a place through other eyes" (Loveless et al 2008:351). In this case, the experience of an African woman walking from river to home carrying water is mediated through my own experiences but it is believed that an empathetic response is more likely than purely watching a video or flying through the Google Earth environment.

Provision of water is an essential ecosystem service yet, as shown in Chapter 6 Women's Trails, it is unpredictable and this has severe implications particularly in the daily lives of women. There is a large gap between listening to reports of drought on the media, seeing photographs of women in developing countries carrying heavy loads and actually being with those women as they endeavour to provide essential water to their families, walking with them and experiencing their daily lives. Ethnographic research is experiential and the sense of bodily understanding outweighs reading a book or seeing a video. Consequently recreating, at least in part, the experience helps to communicate

more fully the basis for the values attributed to provisioning such resources. In the first instance, mediascape was identified as a tool for recreating the TransRift Trail, but on reflection it was decided to use the women's walk to illustrate 'sensescapes' and to highlight that vision and mind are not the only means of communication.

To develop an appropriate mediascape that could be used anywhere it had to be 'portable' to be used in any location. Many mediascapes are 'anchored' to the location that they describe and the maps are registered to real world coordinates so that the GPS location is used to prompt playback of the media files and to 'augment' the users experience of the place. The purpose of 'Walking with water' was to allow people worldwide to have a surrogate experience that recreated the connection with water experienced by the women in Sandai, without the need to travel to the Kenyan Rift Valley but also as a direct comparison with the user's own place. The work '*always something somewhere else*' by Duncan Speakman was used as a basis for some of the functional code but also as a conceptual basis for the mediascape. This enables the user to 'connect to remote locations around the world'; so they can compare and contrast the actual and the sensed place, highlighting differences and, in some cases, disrupting the comfort the user has in their own space. Similarly, the GPS gaming environment '*Ere be dragons*' (Boyd Davis et al 2006:160) where the user's heart rate is monitored and visualized, encourages the user to see "a perhaps mundane walk as an exploration". With 'Walking with Water', as well as connecting with faraway locations, I wanted the user to associate with the daily experience of the women themselves, to imagine the heat of the day and the weight of the load and ultimately to engage emotionally with the walk. The instructions encourage the user to carry a moderate load in a small rucksack, not too heavy for safety reasons, but to imagine the weight increasing as the distance and heat take effect.

An internal map is drawn in mediascape using symbols taken from the map drawn by the women themselves (Figure 7.10) which highlighted those features of importance, including settlements, trees, beehives and maize fields. The sketch was thought to highlight the sense of place more easily transposed to a different geographical context. The walk becomes symbolic rather than actual and associations and differences are invoked between Africa and the walker's environment. As the user walks through their own location they are asked to stop and these places are used to symbolise each place on the route in Sandai. At each of these places a different association is made with ecosystem services in Sandai and the value they have in the lives and livelihoods of the women. Symbols are placed dynamically from GPS locations as the mediascape is walked, so the user creates and traces their own route, creates their own mental and physical map of the spaces and places in Africa. This takes literally the report from Crampton (2009:840): "some authors suggest that cartography be understood as existence (becoming) rather than essence (fixed ontology)".

The starting point is the river, created in the mind of the user through use of audio and imagination (Figure 7.11). Other locations are trees, meeting a friend herding goats, maize plantations and the homestead (Figure 7.12). At each location the user taps the screen to record the geographical coordinates in their own place. At the end of the walk the user retraces their steps ending back at the river during the drought so that they experience changes in the environment and the consequences for the women (Figure 7.13).

Figure 7.10 MScape Maker developer interface showing women's map used as a cognitive model of the surrogate walk. Red pins show places visited.
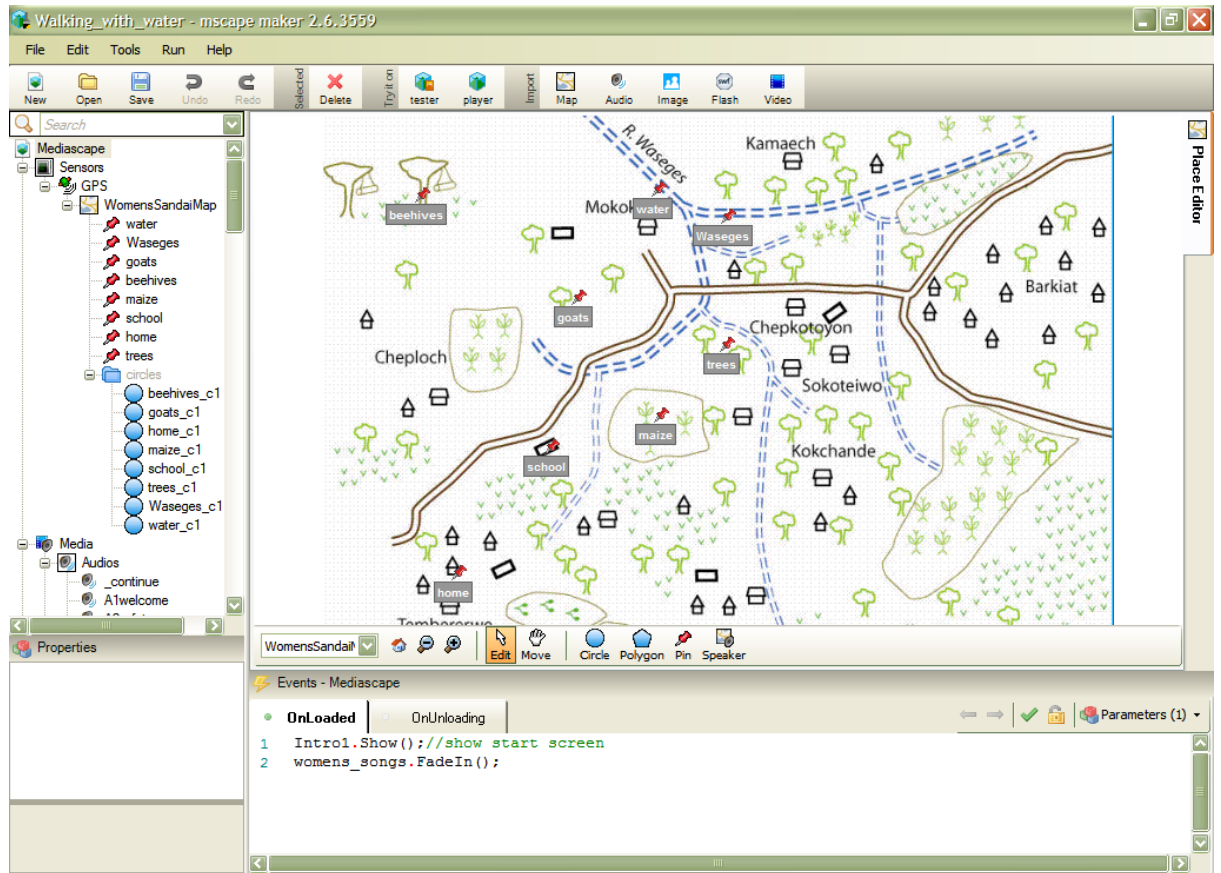
Figure 7.11 Introduction and instruction interface screen shots from the mediascape 'Walking with water'

"Welcome to 'Walking with Water' a mediascape produced by Kate Moore in conjunction with women from Sandai, a small village in the Rift Valley of Kenya. I recommend that you find an open space, such as a park for this walk. If possible, start near a stream, or even a pond, but you should have a clear view of the sky so that the GPS can calculate your position. Once you have found a place to start then tap the screen of the device in your hand."

"OK we have a signal and are ready to start.

You are standing by a river. It is flowing over stones so you can hear the sound of water rushing by. Watch the screen of the device. Imagine you are by this river in Africa."

Sound of running water

"When you are ready tap the screen to record the location of this place."

Figure 7.12 A selection of images and transcripts of accompanying audio from 'Walking with water'

"To fully appreciate this walk you will have to make connections between your world and the village in Kenya. Imagine a hot semi-arid country. The daytime temperature sometimes reaches 40 degrees and above. The earth is brown and dusty and the sun overhead is shining bright and hot. Can you feel the heat? "

"This is the story of the daily life of women living here in Sandai. The presence and absence of water particularly affects the lives of women in Africa. We will follow one of them, Esther, as she fetches water from the river to her home which is five kilometres away."

"Acacia trees in Africa serve many purposes: shelter from the sun, a shady place for meetings, spiritual places, food for livestock, wood for cooking and nectar for bees to make honey. Can you hear the sound of bees at the bee hives hung in the tree?"

sound of bees

"However, trees are of value for many purposes. Trees are felled for timber, or to make charcoal. This causes the soil beneath to dry and erosion is started. Trees create microclimates, as they are cleared climate changes and become hotter and dryer. If trees are felled along the river banks evaporation is increased and may reduce the supply of water for drinking and irrigation."

sound of goats

Esther has met a friend, a young girl herding goats to find sparse grazing from the dry areas around the land used for cultivation. As the goats trot by the dust is kicked up high all around you clouding the dawn light. Stop for a moment and watch.

video of goats

Figure 7.13 Return to the river, but the river is dry. The end of the mediascape trail

"OK. Now you are back where you started at the river and the seasons have changed. There has been no rain now for eight months and even then it was not enough so the river has run dry. No longer can you hear the water on the stones or the women laughing. They are still there, at the river, but are exhausted from lack of water and waiting in the sun. They take it in turn to collect what little water percolates through the river bed. You join them sitting amongst the dry stones to wait your turn to scoop out a few drops of water and to slowly fill your container. Maybe you will have to queue till night fall and hope that the snakes do not come out from their rocks. Or maybe you will have to travel even further to buy water from the nearest town. Water, normally free, now comes at a price but you have no money to pay."

Play water song

"Look around you at the place where you live, how does it compare to a village in Africa? Do you take water from the river or can you turn a tap on in your home? How would you feel if you had to carry water? What would you do if there were none?"

Play water song with credits.

The 'Walking with Water' mediascape was a practical exercise to develop an alternative way of understanding the values of ecosystem services and the place that they fill in the lives of the women of Sandai. One of the strengths of mediascape is in the use of audio to describe place. Audio is an underused spatial communication tool and with the exception of car-navigation systems is not used widely (Winter 2004), although a topic for current spatial communication research (Caquard et al 2008). Audio has proven use as a way-finding tool but it is also has potential to conjure greater emotional, cultural and political engagement with a place rather than just the spatial arrangement of that place and it "can contribute to improve our understanding of places by enriching our multi-sensorial reading of space" (Caquard et al 2008:1227). Sound is believed to intensify mental images as it 'carries with it visions that are more beautiful than images could ever be' (Chion 1994:137 cited in Caquard et al 2008). In this way it helps convey emotions surrounding a place and the people living in that place (Caquard

et al 2008). The song that the women sang praising God for the water is used as background atmospheric sound to maintain the sense of a place in Africa and commentary is used to induce bodily understanding of the physical reality of the places described. An improvement to the audio would be to use the voice of a local Kenyan woman rather than my own but I hope that the words suffice for this experiment.

The arguments above do not advocate purely communicating by such embodied means as in a counter argument "direct sensual visualization will profit the majority little and some practically none, if it is not supplemented by mental visualization, which is based on the synthesis of facts seen, heard or read" (Hettner cited in W.L.G.J. 1913:921) but it is the combined sensual and mental visualization that makes mediascapes meaningful. The user is encouraged to use the power of their mind to step into someone else's place and allow cognition to develop.

Evaluation of the 'Walking with Water' experience is still needed to assess the potential impact of this method of visualizing 'values' of local people and communicating those values. Creating the mediascapes after the fieldwork, rather than with forward planning, there were many limitations. If a further visit were possible other audio files, in particular, would be recorded to supplement the experience and a Kenyan voice used for the narrative rather than my own. However, constructing and experimenting with mediascape in this context is evidence of the concept, offering a personalised way for understanding ecosystem services from a local perspective. There is a potential for further research using mediascape in other contexts such as through development of future scenarios of ecosystems service change. Also, further research is envisaged that analyses the mediascape trails formed by the user in a form of 'geo-narrative' (Kwan and Ding 2008). With appropriate permissions tracking the daily trails of women over a

longer period of time and plotting them in Google Earth and as a mediscape could give further insights into the values of places and resources to women in Africa.

7.3 Summary

The visualization trails set out to fill the 'silences' of maps and understanding. In this study geographical visualization in the form of maps and video was valuable both as a process and a communication mechanism, and interactive multimedia has been used to develop a 'communication space' (Aguierre Smith 1996) between local people and policy makers for development and with global mapping technologies steadily becoming more available in developing countries there are more and more opportunities for sharing understanding. In a workshop on Knowledge Exchange organised jointly by the UK ESRC and NERC, it was stated that policy makers only have time to absorb any message through 4-5 bullet points of text. Such a reductionist approach to communicating information must surely limit authentic, in-depth cognition of a situation. Visio-spatial communication of knowledge requires more than text; the phenomenon, its context, mental model and interest (Dransch 2000) will be achieved more readily through multiple representation. For local communities such as those in Sandai, raising the awareness of policy-makers, at many levels, of their fundamental needs and the hardships they face in maintaining ecosystem services on which they rely is imperative. Opening up new channels of communication and breaking down reliance solely on the limited methods of communication currently used is important to create new and fresh forms of dialogue between people at different scales of governance.

There is a well documented argument that maps should be understood in their role of power and the social embeddedness in which they are produced (Harley 1990; Pickles 2004). Opening up more embodied forms of communication goes some way towards

rebalancing the sources of knowledge and therefore power in international arenas. In ecosystem service analyses the voices that predominate are those of the international researcher, scientists and economists who put a value on 'services' without truly realising, in an embodied sense, the impacts of these services and their lack, in subsistence communities. Yet, Google Earth and mediascapes may be thought of as transformative mappings which "open mapping to specific, and different positionalities" so that "mapping practices have begun to pay more attention to the spaces of everyday" Pickles (2004:185).

Of the various forms of representation used, written reflective diary, video trails, Google Earth trails and Mediascape surrogate walks, all had their strengths and weaknesses in terms of representing spatial concepts and a sense of place, some of which are dependent on the scale of subject being represented (Table 7.1).

Table 7.1 Comparison of different visualization methods used in this research.

Visualization method	Media	Strengths	Weaknesses	Good for
Written accounts (with or without photographs)	Text, images On-line blogs	Immediate and relatively quick to produce. May be used with different aims (e.g creative writing, tourism, scientific account) Can invoke a sense of place	Single account, passive visualization More difficult to understand spatial concepts, topography unless specifically defining a route	Reflective diary Promoting a point of view Recounting a journey Giving directions Visualising a sense of place
Mapping	Maps Interactive mapping, GIS	Good at presenting spatially located information. Good at generalising and simplifying spatial data Many methods for representing quantitative data	More difficult to express a qualitative sense of place May over simplify local variation in data Information scale dependent	Representing geographically located information Visualising spatial data

Video	Moving images, audio	Animated, compelling. Storylines can be developed. Sense of movement or journey can be invoked. Can generate a deeper sense of place.	Time consuming to edit and produce. Passive visualization Spatial context not always obvious	Telling a compelling story. Education Visualising a sense of place
Google Earth	Maps, interactive 3D terrain, text, images, video, hyperlinks	Superimposed imagery within spatial context. Interaction Animation provides a sense of movement Quantitative graphics and information can be displayed alongside images, etc Wide distribution to users through the internet Can embed sense of place within map	Limited capacity for audio Text and images can obscure map Disconnection between virtual world and bodily understanding of needs, values	Virtual world can make connectivity between places Good for landscape scale visualization of place within spatial context
Mediascape	Audio, text, images, video	Portable. Spatially located media within a surrogate location Bodily understanding of place	User has to be open to empathise with context and content of mediascape in order to make mental connections to the 'other' place. GPS may be unable or slow to fix location so requires open area to use. Quantitative information less easily communicated.	Generating emotive connection with another place. Can make comparison of distant and local (to the user) place.

Further research is needed to evaluate fully the effectiveness of these communication tools within the context of assessing local values of ecosystem services. However, this novel empirical work shows promise for challenging the reliance of standard mapping practices in this context, breaking away from the reductionist approach to mapping to

open up ways of communicating concepts of space and place between different worldviews. Distribution of fly-through multimedia trails across landscapes using Google Earth illustrates how multiple voices can be used to compare the place. By juxtaposing spatial context, quantitative data and qualitative analysis within the one frame understanding of ecosystem service values from a non-economic perspective can be visualized. However, it is the embodied understanding through a mediascape that holds more exciting prospects for development. Cold, hard scientific facts of water quantity and quality in a given river presented without contextual information presents a different form of understanding to the surrogate experience of walking across a hot dry arid plain carrying twenty litres of water. It may also provide a more considered valuation of how much that water is worth and to whom.

The visualization of the values of place in this way is a realisation of qualitative visualization methods within the arena of ecosystem services and illustrates the subjective component of value and the way that value is transformed through change in scale. Enabling local people to present and represent their own values of ecosystem services through multimedia in many forms is a way to provide a range of world views, each with a different 'voice', to global decision-makers that will fill the 'silence'.

Chapter 8

Conclusions

Finishing the Trail

The landscape is the world as it is known to those who dwell therein, who inhabit its places and journey along the paths connecting them.

(Tim Ingold 2000:193)

Chapter 8 Conclusions - Finishing the Trail

8.1 Approaching the finish

This research has presented my journeys through the landscapes of the Rift Valley. The voices of the people with whom I walked have contributed to explaining the knowledge and values they have of the environment in which they live. Ecosystem services have been shown to be essential for the direct needs of local people but also that there are potential inequities in how valuations are made and whose values are considered. New ways of communicating knowledge and values have also been explored.

There is circularity about research trails in identifying how research findings meet research aims and objectives. Section 8.2 summarises to what extent this was achieved as well as describing other outcomes from the research. The contribution that this research makes to knowledge and research methods is laid out in Section 8.3. Future work is outlined in Section 8.4 and a statement of the significant value of the research as a whole concludes this thesis in Section 8.5.

8.2 Key research findings

8.2.1 Traditional knowledge and ecosystem services

Aim 1: To investigate the role of traditional spatial and ecological knowledge for the valuation of ecosystem services.

1.1 To examine traditional spatial and ecological knowledge, beliefs and practices with reference to ecosystem services.

This research has documented elements of Tugen ethnoecological knowledge through the process of hodology and reviewed the influences that are bringing about changes

related to the management of ecosystem services. Chapter 4 Tugen Trails puts traditional knowledge into context, documenting at landscape scale drivers of change to both ecosystem services and related knowledge and practices. In these agro-pastoral communities, traditional knowledge and practices are constantly changing through colonial and post-colonial influences. The research showed that ecotourism opportunities such as trails offer ways to build on traditional knowledge of flora, fauna and landscapes that may bring new income to both individuals as trail guides and communities for services. However, one of the main outcomes from establishment of trails is to build awareness within the communities of their own heritage and the importance of sustainable use of ecosystem services.

Ecosystem services are crucially scale and time dependent. Although the MA (2005a) approach purports to act at many scales, in reality local evaluation is not uniform across space. Even case studies in discrete regions do not adequately reflect community or individual circumstances, knowledge and values. There is a distinct danger that, in the rush to quantify ecosystems, biomes, regions, species and features of the environment by looking at what services they provide, local spatial knowledge is subsumed and ignored in the generalisation, and worse, important land use regimes are totally overlooked in small scale mappings. It is important that scientists and communities share and build on both formal and informal knowledge (Fabricius et al 2001).

The corpus, praxis, kosmos elements of traditional knowledge (Berkes 1999) contribute to the management of ecosystem services but environmental and cultural changes, population growth and development of a monetary economy bring about changes in traditional land management practices. As this happens knowledge has to be modified and practices assessed. The case study in Sandai demonstrates that cash cropping for short term financial gain conflicts with the traditional practice of livestock keeping, and

both compete for use of ecosystem services from the same ecological zones, the wetlands. There are resulting impacts on biodiversity and regulating services, such as erosion regulation and water purification, which have immediate impact locally and may affect the neighbouring Lake Bogoria. Maintaining traditional land use practices, if regulated, may be sustainable; trying to reap benefits from all ecosystem services is seen to put pressure on the ecosystem services of the wetlands.

Putting an economic value on ecosystem services in agro-pastoral societies gives rise to issues of human rights and gender equity. First, ecosystem services for many people serve human needs by direct provision of water, grazing, medicines and good soil on which to grow subsistence crops through common use of resources. Although valuable as a concept, care has to be taken that putting a monetary value on these services does not infringe people's basic human rights. Imposing economic value to the essential needs of life may be viewed as a hypothetical exercise. Second, as land rights and livestock ownership traditionally resides with men, monetary benefits from use of ecosystem services, such as revenue from cash crops, may not be accessible to women. Third, use of ecosystem services, such as water for irrigation, impacts mostly on the lives and livelihoods of women and girls because of their traditional roles and responsibilities.

This objective was successful in using a new approach to assess the role of traditional knowledge within an ecosystem services framework.

1.2 To critically review the role of traditional values for ecosystem services at different levels of governance

One of the main strengths of this thesis was the unravelling of local values for ecosystem services and how they are formed by the community and sectors of the

community but also influenced by other agents within governance. In reviewing this objective it is necessary to reflect on how conceptual understanding of values may be applied through different levels of governance. The specific visualization mechanisms appropriate to illustrate ecosystem service values across levels of governance, such as video and Google Earth, will be reviewed further in the next section.

Local values for ecosystem services have been shown to be closely related to human needs but how those needs are interpreted into local practice is changing and often contested. It is evident that traditional knowledge is a factor in the beliefs, practices and understanding of ecosystem services in Tugen communities, however, environmental, economic and social changes have modified associated values. For instance, the social pressure to educate a growing population of children requires increased monetary income for many households; this may result in commodification of once common natural resources for personal economic gain or the planting of cash crops for added cash income so changing environmental management regimes and underlying ecosystem functionality and services. This illustrates how social changes may prompt increased involvement with a monetary economy and so change the comparative values of ecosystem services. As local livelihoods diversify and are in a state of transition, pressure is placed on the environment as it faces multiple demands. Corresponding governance requires sound understanding of the drivers of change and the biophysical and social outcomes to make informed decisions. Using an ecosystem service approach, local knowledge and values may be used to assess sustainability of development under different future scenarios. In Sandai, as elsewhere in Kenya, there are complex trade-offs and dynamics in the use of natural resources which consequently affect ecosystem service values. The comparative valuation method together with qualitative evaluation described in this study provides basis for community participation in environmental

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governance and social learning at local level that is straightforward and understandable in its implementation. Although time precluded evaluation of the findings with the Sandai community it is believed that this could be a tangible and practical approach to facilitate community appreciation of ecosystem service issues. It is recommended that the approach could be introduced to local decision making particularly in contentious issues so that the values of different actors are recognised and understood.

Three primary case studies: the contentious use of the wetlands, equity of water management and development of a community conservation sanctuary; have illustrated the use of this ecosystem service approach in understanding local values of ecosystem services.

It has been shown how ecosystem service values for the wetlands in Sandai are conflicting (see Chapter 5 Resource Trails). There are many stakeholders at local level but also in the wider region, such as LBNR and WWF; developing methods for communicating and debating the importance of those values is essential for sustainable and equitable use. The biodiversity value of the wetlands in Sandai is recognised, both traditionally and as a basis for ecotourism, yet the wetlands are being degraded rapidly. Numbers of livestock still hold value, being the traditional symbol of wealth and a staple resource in agro-pastoral livelihoods, therefore wetlands are valuable for grazing; at the same time good soil for cropping, particularly cash crops, has high economic value (see Chapter 5 Resource Trails). The language of ecosystem services itself is a useful tool for people, and decision makers to understand the relative importance of ecosystems such as wetlands for development and conservation. Understanding conflicting values and evaluating them may provide new solutions for future management however the costs and benefits of alternative scenarios should be fully understood and debated, not just through economic values but through traditional,

cultural and ecological values. It is recommended that using an ecosystem services approach with methods such as those described in this thesis will expose the underlying causes of the conflict and be a useful basis for dialogue.

The dynamics of use and management of ecosystem services gives rise to issues of equity visually illustrated in the case study of the gendered roles in water management. In ecosystem services assessments attention needs to be paid to the heterogeneous nature of local communities. There are pronounced gendered differences in labour and opportunities within patriarchal societies which need to be evaluated within ecosystem service assessments as women often face greater impacts when ecosystem services fail. This is exhibited particularly in the issue of water supply (see Chapter 6 Women's Trails). There is also evidence to suggest that women should have more involvement and equity in decision making to provide greater resilience to the provision of ecosystem services in the face of environmental change. Although it has been shown that the values for water within ecosystem services are apparently not distinguishable through gender, the impacts of change in this service for the lives of women are. Although ecosystem service values are a valuable reference system and means of dialogue quantification of ecosystem service values may mask practical consequences. Taking the ethnographic approach to valuation enables these consequences to be exposed to decision makers not only within the local community but to other actors such as NGOs and conservation organisations.

Using the example of water use and issues in one community also opens up a means to discuss those values with other communities having shared use of resources, such as the community upstream who are extracting water for irrigation. The qualitative and comparative valuation approaches could be used by all actors, in upstream communities, downstream communities such as Sandai and in conservation

organisations. Most importantly, participatory methods such as mapping and video would introduce counter-values and the significance of those values to the different actors.

Dealing solely with the monetary value of ecosystem services can lead to many ethical issues that are not being fully discussed in the rush to assess how much nature is worth. There are unforeseen consequences to humanity and nature if value systems such as ethics, morals, religion, aesthetics and culture are totally subsumed by economic values. In many cultures harnessing socio-cultural values for nature together with education and awareness-raising is of much greater importance, and may have a much greater impact, than imposing a monetary charge

Although this thesis has argued the drawbacks of commodification of nature and the inequities for traditionally non-monetary and poor communities, applying economic costing to ecosystem services is fitting given the right circumstances but should be applied with awareness of underlying consequences. In this instance, maintaining supply in the lower catchment through a payment for ecosystem services scheme for commercial enterprises may be appropriate. Within this scheme, downstream use of water and ecosystem services of the wetlands by the LBNR should also be accounted. However, economic inducements for both maintaining vital services and for biodiversity conservation based on ecosystem service values is just one of a suite of tools to use in specific circumstances and at different levels of governance. Although it is acknowledged that economic valuation of ecosystems services does have a place, particularly in relation to PES schemes that have been proven to be successful, this study highlights some of the draw backs to economic valuation and promotes a qualitative approach to understanding socio-cultural, ecological and economic values and how they are formed. Indeed, the PES framework is now being promoted not only

as an economic tool but as an organisational framework for sustainably managing the environment (Vemuri and Gorman 2010) that should incorporate different modes for valuation. The qualitative approaches illustrated in this thesis may be used as a foundation on which to understand the value of ecosystem services in this context and to build a common ground for dialogue. The benefits, challenges and alternatives to total commodification of nature should be considered and used to improve communication of the issues involved in the process.

Situations of conflict in use of ecosystem services at different spatial locations are duplicated throughout Kenya and, with refinement of this methodology, could be used to bring about cross-community understanding. Using case studies, such as Sandai and the Waseges catchment, may be useful to propagate deeper understanding of ecosystem services and possible solutions within other similar communities. This cross-community learning represents another modality of use of the approaches discussed here. Furthermore, extending the research to other communities and areas would highlight the commonalities and differences in ecosystem service utilisation and values. Although national decision makers are well aware of many issues there is little time or scope to deal with individual case studies so paying attention to issues of high value and importance across different communities would focus time and resources at the level of national governance.

The hegemonic relationship between global, Western, and traditional knowledge inevitably leads to the supposition that values for ecosystem services, like knowledge, may vary in influence at different levels of governance. The case study of the establishment of the Chuine sanctuary in Sandai illustrates that the comparative values for biodiversity and ecotourism appear to be moderated by the interests of national and regional conservation institutions. There is some evidence that intrinsic values are of as

great if not greater importance in promoting biodiversity conservation and human well-being than mere economic values (McCauley 2006). Yet, the premise of revenue for local people is generated and used alongside traditional values of wildlife to strengthen the case for biodiversity conservation by establishing a community sanctuary. However, unless financial and social capital is available to support the sanctuary its future value from tourism may not be realised. It is important to maintain dialogue between scales of decision making. At local level the knowledge and values are important for daily livelihoods, regional and national governance is likely to have different priorities and values. Therefore establishing how values are formulated and perceived from both economic and non-economic perspectives may open up areas for discussion. Revealing how these values are constructed, exposing winners and losers within the community and in the wider region will help both local people and decision-makers assess circumstances more realistically. Alternative scenarios based on the values from different stakeholders would illustrate potential outcomes from taking any particular course of action. In particular the use of ecosystem service valuations for conservation management would provide a useful tool for conservation organisations to facilitate dialogue with local communities. In Sandai it is envisaged that comparing ecosystem service values for community conservation areas such Chuine from the perspectives of local people and conservation organisations, specifically from LBNR, WWF and KWS would highlight differences in values but more importantly lead to discussion.

Finally, there are implications and applications for the approach taken by this thesis at national and international levels of governance. A complexity of socio-political and economic positions related to environment and development, at international, national and local levels of governance, were revealed both from literature review and from the research. There appears to be a lack of correlation between international, national and

local values of ecosystems services that is demonstrated in the differences between development and environment agendas. As shown in Chapter 2, neither the MDGs (UN 2000) nor Kenya's Vision 2030 (GK 2007) adequately link poverty and development issues with ecosystem services or the environment. The IUCN (2005) is recognising connections between ecosystem services and MDGs but they are not yet necessarily being adopted in the development arena, social sciences or in national level governance. Understanding the values inherent in maintaining ecosystem services and emphasising the need for sustainable development rather than just achieving development goals per se as implied by the MDGs (Gore 2010) is imperative and this thesis goes some way to bridge this understanding by drawing attention to this gap in the Kenyan context.

Using debates on ecosystem services as a framework could be used nationally to impart an additional strength to the three pillars of development: economic, social and political, as outlined in Kenya's Vision 2030. The economics of ecosystem services would strengthen understanding of how ecosystems fundamentally support economic growth; however a more comparative focus, including values as perceived from the local perspective, would illustrate how social development is affected by ecosystem health; finally understanding how the equity of provision of ecosystem services is important for political stability and growth is of fundamental importance, as highlighted by the case study of women and water.

At national level selected ecosystem services and aspects of human well-being have already been mapped for the most part showing individual services such as water supply, biodiversity and tourism. Further analysis of comparative values and the meaning of values at different scales are important to feed into national decision making and would strengthen the call for greater attention to be paid to the environment within national economic development. A qualitative approach is the first step into

outlining how loss of ecosystem services will affect human well-being as well as quantitative review of economic gain and loss. This approach provides basis for discussion between different parties that may lead on to more formal quantification of the economic implications. However with a current lack of full knowledge of ecosystem functions and the time taken for a full evaluation video, mapping and film offer a rapid way to open discussion.

The basis for discussion of natural resource management in policy making are seen to be changing through the influence of ecosystem service approach and valuations and the trade-offs between 'environment' and 'development' are evolving to combine ecological, social and economic benefits. Indeed, an international forum, the Ecosystem Services Partnership (reported in de Groot et al 2009) has been established as a platform for communication and practical implementation of the approach. However, there are still many questions to be resolved in assessing values through different scales and integrating the ecosystem service approach in policy making. This study offers a way to approach valuation through a social understanding of the comparative values of ecosystem services that may help communicate the impact of changes to ecosystem service supply between communities and levels of decision making. For instance, qualitative representation of the impacts of over extraction of water in the upper catchment of the Waseges together with a comparative valuation of how those services supply human needs could be a vehicle on which to base dialogue between the communities in the upper and lower catchment. Although promises were made to periodically stop extraction the ensuing drought in 2009 prevented monitoring that this was occurring.

This research has clearly illustrated that, in issues of governance and management of resources as well as ecosystem service valuations, it is necessary to ask 'Whose value

counts?' and 'Who pays the price?' Qualitative ecosystem service approaches have been shown to be relevant to environmental governance in a number of modalities: intra-community, inter-community, cross-community and inter-agency between multiple actors at local and regional level as well as for more considered national and international policy-making. Towards these goals appropriate methods of communication are imperative to make knowledge and values of ecosystem services accessible to a broad audience including policy makers, scientists and communities. This is reviewed in the second aim of this thesis.

8.2.2 Participatory and visualisation trails

Aim 2: To explore methods for incorporation of alternative representations of cognitive knowledge and values within participatory mapping and geographical visualization praxis.

2.1 To develop a participatory methodology to integrate mapping technologies and video.

The visual participatory methods of PV and participatory mapping offered engaging and complementary methods for ethnographic research and provided a considerable amount of qualitative data. As part of a larger suite of mixed methods, they contributed components of space and place that invoked a deeper cognitive understanding of the links between ecosystem services and livelihoods. They helped to appreciate the "variability and complexity of the livelihoods of poor families" (WRI 2007:135) in connection to ecosystem services on which they depend. PV was successful in its uptake by participants who responded enthusiastically and used the medium to record the essential links between ecosystem services and livelihoods. It was particularly useful as a research tool, enabling personalised accounts that contributed a visual

component reinforcing the voices presented in this thesis. The use of PV with the women in Sandai adds a poignant exemplar study to this emerging method of research.

Full integration of the PV and PGIS with participants in the field was not taken as far as envisaged due to technological limitations, lack of equipment and GIS facilities. However, combining GPS tracking of the trails and PV enabled later construction of novel visualisations that simulated the trails in Kenya. (The research ethics surrounding this are acknowledged.) Google Earth offers a platform for dissemination of knowledge in the form of surrogate trails. One of the most successful outcomes of this research was the use of mediascape for producing embodied understandings of place by integration of media and maps to produce a surrogate walk. The 'Walking with Water' accounts in the video and the mediascape were particularly poignant in illustrating the arguments for equity of using ecosystem service valuations in environment and development projects.

2.2 To critically compare video and mapping within the context of visualization of the values of ecosystem services.

The critical analysis, not only of video and mapping, but textual accounts, Google Earth and mediascape, brought together elements of content analysis and visual analysis. Reverting to the broader definition of geographical visualization (W.L.G.J. 1913) enabled a comprehensive review of how space and place are visualized within different media. Comparing different media revealed how easily tourist, colonial or other positional 'gaze' is communicated. Representations are inevitably subjective, whether covertly to propagate a 'lie' (Monmonier 1996) or overtly to illustrate counter points of view. Used in conjunction text, video, maps and audio can help to fill the 'silences' that are inherent in maps. The most important issue is that the reader, viewer or mediascape walker should endeavour cognitively to understand another's point of view.

8.2.3 Interdisciplinarity and Hodology

Two other important outcomes from this research are the approaches to interdisciplinary research used in this study and the use of hodology as a research method.

Hodology (Turnbull 2007) was found to be a useful and apt research tool, particularly in this ethnographic research in Kenya where walking is the norm. Importantly, it became more than just a data collection method or even a way to make mental and physical connections; it evolved into a vital component for visualization through the surrogate walks and the way that trails gives a framework to this whole thesis. Walking trails are shown to be appropriate for academic journeys of discovery from data collection, through reflection and analysis to presentation.

This study was truly interdisciplinary in its paratactical approach to the relationships between natural science, social science and GIS. At times it felt as though the social science elements were overwhelming other concerns because of the ethnographic and participatory nature of the fieldwork and the wealth of theoretical literature to absorb. However, the ecosystem services framework remained a strong ground on which to base the components of natural science and absorb my interests in biodiversity. The GIS components provided a strong bond through visualization of local values for ecosystem services. The paratactical nature of the work was not just in the written element; negotiating my position within the complex of local people, conservation organisations and academic interests created another practical interface of interdisciplinarity. Through people working within this mediating position, at all levels of governance, communication between development and conservation institutions may be achieved.

Polyvocality in both its definitions, in interdisciplinary research (Evans and Randells 2008) and in using multiple voices within writing this thesis (Crang 1992) created dilemmas but gave scope to an expressive and inclusive way of writing. Both cases enabled the interdisciplinarity of the subject to be demonstrated and different viewpoints to be heard. It also led to a 'thick description' of ethnographic analysis and intellectual effort (Geertz 1973) whose visible forms and articulations are the words of this thesis and the media that accompanies it. Being able to use, understand and communicate multiple voices facilitates a more holistic form of policy making.

8.3 Contributions to knowledge

My work contributes to knowledge in a number of ways that can be gathered within two overarching areas: in interdisciplinary methods and in ecosystem services debates.

8.3.1 Methods

The originality of the approach to this study provides new insights into the process of interdisciplinary research and there are strong contributions to methods and an interdisciplinary methodology. First, my open approach to the participatory research, with post-colonial and feminist theories being consciously put into practice, enabled new ideas and combinations of ideas to evolve that added freshness to the work. Inevitably, research is steered by funding sources and academic offices demanding clear goals and outcomes from the start. However, after change of locale, my approach enabled a fluid reconstruction of the study by listening to the concerns of the participants in the study that I believe led to a more interesting, complex and original work. Therefore, I would disagree with the advice of Donovan et al (2010: prepress) that interdisciplinary research should prepare "to learn to focus on the outcome of the

project rather than the disciplinary setting of the work". The interdisciplinary journey should be flexible enough to generate new ideas and directions along the way. I am legitimised in this view from the arguments presented by Metz (2009:517) that the communitarian theory, "grounded on salient sub-Saharan beliefs and practices, actions are right insofar as they respect relationships in which people both share a way of life, or identify with one another, and care for others' quality of life, or are in solidarity with each other". By being open and respectful to the beliefs and values of the people in Kenya, rather than doggedly following narrow Western, colonial forms of academic pursuit, the trails that structured this thesis, the theoretical approaches and the visualizations were mapped out. Through this open inclusiveness, they contribute a new and fresh approach to research.

Second, two methods were trialled extensively during this research and contribute to the interdisciplinary methodology. The comparative values questionnaire contributes a flexible method of making ecosystem service surveys accessible to local understanding. The concept of hodology was extended to link paths and ideas with visualization methods. However, it is also hoped that walking the TransRift Trail has contributed in a practical way to its development as a future tourist route.

Third, there are new contributions in the approach in presenting geographical information, particularly through the embodied experience of mediascape and the combined use of visual media and voices. To work effectively, mediascapes require a repositioning of the mental understanding of the user, not just by passively watching or reading but by actively participating to 'become' part of the visualisation, to 'walk with water'. In this way it may be possible for decision makers to look beyond the bullet points and cognitively understand the rich picture. Also explored was the approach of combining voice and vision in analysis but layered with my own interpretation in a way

that did not diminish the local voices. This approach will contribute to research within current qualitative GIS developments and opens new avenues for future research in postcolonial GIS.

8.3.2 Ecosystem services

This research offers timely contributions within the ecosystem services arena and is particularly relevant in light of the current multimillion pounds Ecosystem Services for Poverty Alleviation (ESPA) programme (NERC 2009). By exploring the role of traditional knowledge and local values for ecosystem services this research adds a new take on previous debates. It contributes explicit examples to illustrate flaws in the commodification of ecosystem services arguments. International decision making tends to be far removed from the young girl in Africa having to collect water rather than schooling. It is centred on capitalist market economies with all the inherent value structures. I do not deny that valuing natural capital by economic means may be powerful incentive to protect the environment. However, "equally demanding are the social and political challenges associated with incorporating this understanding into effective and enduring institutions, to manage, monitor, and provide incentives that accurately reflect the social values of ecosystem services to society" (Daily and Matson 2008:9456). Social values, like the societies, communities and individuals that form them, are extremely variable. This research highlights the multiplicity of priorities, and therefore values, at different levels of governance and within different arenas. Using local scale examples it exposes issues of inequity in use, benefits, roles and responsibilities surrounding management of ecosystem services that need to be fully understood in their valuations. Most importantly it contributes by asking, and asking again, the questions 'Whose value counts?' and 'Who pays the price?'

8. 4 Forging new trails

There are always new paths to explore whether in the physical landscape, academic study or practical application. This research has opened up many new themes for research and applied work in three areas: in ecosystem services debates, within the Rift Valley and in the development of methods.

1. There is a need for greater understanding of how women's values, practices and knowledge may be incorporated into ecosystem service assessments. Particularly with the uptake of PES schemes and the current interest in ESPA, it is important to recognise differences between sectors of a community.

2. There is scope for more explicit research into the construction and meaning of intrinsic values of biodiversity and ecosystem services from conservation, and cultural perspectives and how they relate across different societies and worldviews.

3. The critique of the divide between development and environment in international arenas with reference to impacts at national and local scales should be further explored.

4. Further work could evaluate and formalise the comparative values method for ecosystem services evaluation for use within local communities.

5. An issue that was not fully explored in this thesis but which was an undercurrent of the research was the politicisation of indigeneity in the case of the Enderois and their claims to land and resources around Lake Bogoria. A great deal of anthropological data has already been collected to support this.

6. There is scope for a longitudinal survey following the progress of the TransRift Trail. This would identify if it develops as a local resource or as an international

destination and monitor the effects on ecosystem services and human well-being in the region.

7. The highland Tugens, living in the Tugen Hills, follow different livelihoods with greater reliance on forest resources and farming the steep slopes of the escarpments. A comparative study would complement this research in looking for commonalities and differences in knowledge and values.

8. There is scope for exploring hodology as an ethonographic research methodology in other locations and more fully integrate participatory video and mapping.

9. Participatory mobile methods could be developed to create embodied understandings of other places, linking to themes of hodology. This should include evaluation of the effectiveness of dissemination of knowledge within communities and to higher levels of governance. (An element that is needed to complete this research.)

10. Development of Google Earth and mediascapes within ecosystem services scenario building for local areas could be used to create an embodied understanding of how landscapes may look if different ecosystem services are prioritised. This would also identify how alternative visualizations can be incorporated into knowledge exchange and policy making at different levels of governance.

8.5 The end of the trail

This thesis has illustrated how the concept of ecosystem services is useful for framing research on how local people value and manage their environment. Intrinsic values of

biodiversity and nature may also be given a voice within this framework. However, there are limitations to be addressed so that the concept of ecosystem services is more than just another 'dramatic solution to humanity's chronic disregard for nature' (Redford and Adams (2009:785), particularly when considered from aspects of traditional knowledge and local values. Access to drinking water, food, clean air and many other direct use resources supported by ecosystem services is a fundamental human right. Novel contributions have been made to understanding the values of ecosystem services for local people living in the semi-arid lands of the Rift Valley in Kenya. Throughout this thesis their voices have been heard alongside my own as together we forged trails of learning. These voices are normally lost in policy making arenas but by constructing video, Google Earth and mediascape presentations it is hoped that they will be heard.

As I reach the end of this academic journey I would argue that the journey is as important as the outcome, because the journey for myself, conservationists, women carrying water and all my friends in Kenya continues. This research has contributed to current debates on ecosystem services by specifically raising awareness of the potential inequities in ecosystem service valuations. It has offered new ways for policy makers to visualise the meaning of local values. It has also opened new avenues of academic study. Following the words of Wangari Maathai:

> *"I have been on a journey and this journey has never stopped."*

> (Maathai 2008a:286)

Appendix 1

Ecosystem Services Questionnaire

Sandai Ecosystem Services Questionnaire

This questionnaire is part of a study by Kate Moore from the University of Leicester, with Lake Bogoria National Reserve, of the community values of natural resources for well-being.

It is about your use of natural resources in Sandai, what parts of environment you value the most and what services the environment provides to you.

This includes

- cultural use and values,
- costs and benefits
- values of conservation.

The objectives of the questionnaire are:

- to understand the socio-economic basis of the community
- to identify the different values attributed to different parts of the environment for the well-being of the community
- to identify the different uses made from different parts of the environment
- to identify different values of the environment related to role of individuals in the home and community
- to assess the perceived changes in use and value of the environment
- to identify different issues related to the conservation of the environment and resources in Sandai

This information will be used to improve decision-making in the community and Lake Bogoria National Reserve and for research by Kate Moore.

Each questionnaire will be given to three or four different individuals in a household. **Individual identity will be kept confidential.** By completing this questionnaire the respondent agrees that the information may be used for the purposes described above.

A report of the findings will be given to the Chiefs in Sandai, and to Lake Bogoria National Reserve.

Instructions for the interviewer

- Please make sure that the respondent understands the purpose of the questionnaire.
- Please make sure that each question is understood.
- Please get individual responses rather than from a group.
- Please note any comments that the respondent makes, particularly when filling in the grids. These are important for the analysis.
- Please initial and number the bottom of each page.
- No payment will be made to any respondent. This survey is for the benefit of the community as a whole.

Village name   Household number   Interviewer   Date

Part A: The first set of questions are about your household and you as an individual.

Location: Village name / GPS [   ] **Household Number** [   ]

How many people in your household?

[   ] Number of men   [   ] Number of women   [   ] Number of children under 14   [   ] Total in household

[   ] Number of children over 14

Compared with other households in Sandai how would you rank the household prosperity? (interviewer)

[ ] Very high   [ ] High   [ ] Average   [ ] Low   [ ] Very Low

INDIVIDUAL QUESTIONS

[ ] Male   [ ] Female   Ethnic group [   ]

Age [   ]   Ageset [   ]

What is your position in the household?

[ ] Head of household (male)   [ ] Head of household (female)

[ ] Wife of HoH   [ ] First son   [ ] Other son

[ ] First daughter   [ ] Other daughter

[ ] Father of HoH   [ ] Mother of HoH

[ ] Other (state relationship to HoH)

What are the main sources of your <u>personal</u> living?

[ ] Subsistence farming (crops)   [ ] Subsistence farming (livestock)

[ ] Cash crop farming (state cash crops grown) ………………………………….

[ ] Shop   [ ] Selling farm produce

[ ] Beekeeping   [ ] Tree nursery   [ ] Poultry

[ ] Other employment (state type)   ……………………………………

[ ] Other own business (state business) ……………………………………..

What is your level of education?

[ ] No school education   [ ] Primary   [ ] Secondary

[ ] Certificate   [ ] Diploma   [ ] University

What is your role in the village?

[ ] Chief/assistant chief   [ ] Headman/Sub headman   [ ] Elder   [ ] Councillor

[ ] Committee chairman/woman   [ ] Committee member

Village name   Household number   Interviewer   Date

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Part B The second set of questions will be used to look at the economic, spiritual and cultural values that you attached to different parts of the environment today.

Give a score to the services from which you benefit for your well-being to the areas listed on the top line? (So think of what you value the most in your life now and where it comes from)
Score on a scale of 1 (low value) to 5 (high value), leave blank if not used

Score on a scale 1-5 the importance of these services to your life ↓	Cultivated land	Kesubo Swamp	Loboi swamp	River Waseges	Chuine sanctuary	Scrub land / dry land	Lake Bogoria Reserve
Grazing/ food for livestock							
Food for humans							
Water for irrigation							
Drinking water							
Timber, fuel, fibre e.g grass for roofing							
Medicinal plants							
Spiritual use							
Cultural use							
Biodiversity / wildlife conservation							
Good soil for crops							
Good soil for building							
Ecotourism							
Science and education							

Comments from interviewee and remarks of interviewer:

Part C Identifies past and potential future use.

Please think of how your benefits from the environment are changing in comparison to the values you get from the environment today.

For each area and each resource was the importance for your life more or less in the past than today (e.g. through different traditional use and values or better productivity)?
Indicate with ↑↑ much more important, ↑ more important,
      ↓ less important, ↓↓ much less important, leave blank if the same.
Which do you think will give less value to you in the future (e.g. through degradation, misuse, climate change, encroachment, etc) **and which give more value to you in the future** (e.g. through increased tourism, better management)?
Indicate with ↑↑ much more value, ↑ more value,
      ↓ less value, ↓↓ much less value, leave blank if the same.

	Cultivated land		Kesubo Swamp		Loboi swamp		River Waseges		Chuine sanctuary		Scrub land / dryland		Lake Bogoria Reserve	
	Past	Future	Past	Future	Past	Future	Past	Future	Past	Future	Past	Future	Past	Future
Grazing/ food for livestock														
Food for humans														
Water for irrigation														
Drinking water														
Timber, fuel, fibre (e.g grass for roofing)														
Medicinal plants														
Spiritual use														
Cultural use														
Biodiversity /wildlife conservation														
Good soil for crops														
Good soil for building														
Ecotourism														
Science and education														

Comments

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Part D Environmental conservation issues

This set of questions concerns specific environmental issues in the Sandai location.

Rank the following uses of Chuine in order of importance (1 low – 5 high)

Ecotourism	Wildlife Conservation	Natural resources	Farmland	Grazing
☐	☐	☐	☐	☐

Do you agree that Chuine should become a wildlife sanctuary? ☐ Yes ☐No

Please give reasons for you answer.

Rank the following uses of Loboi swamp in order of importance (1 is low 5 is high):

Ecotourism	Wildlife Conservation	Natural resources	Farmland	Grazing
☐	☐	☐	☐	☐

Rank the following uses of Kesubo swamp in order of importance (1 is low 5 is high):

Ecotourism	Wildlife Conservation	Natural resources	Farmland	Grazing
☐	☐	☐	☐	☐

What do you consider are the greatest threats to the swamps?

What are the greatest threats to water supply in Sandai during the year?

How do you think that the water supply in Sandai may be improved?

Rank the following uses of trees in order of importance to you (1 is low, 7 is high):

☐ Honey production ☐ Medicine ☐ Cultural spiritual ☐ Fuel for the home ☐ Making charcoal to sell ☐ Shade ☐ Bring rain

Do you use mainly traditional medicine? ☐Yes ☐ No

In the last 5 years if you have been sick where have you gone to get non-traditional medicine? (give approximate number of visits)

☐ Sandai ☐ Loboi ☐ Marigat ☐ Ravine

☐ Nakuru ☐ Other (state where) …………………………………………

Village name   Household number   Interviewer   Date

Which wildlife have traditional or cultural value and why?

Which wildlife do you consider a problem and why?

Do you think that hunting of selected wildlife should be allowed?   Yes   No
If yes which species and why?

Which wildlife do you consider should be protected and why?

What do you consider are the benefits of Lake Bogoria National Reserve?

Date of interview

Name of Interviewer

Name of respondent (optional)

Thank you for taking part in this survey.

Village name   Household number   Interviewer   Date

Appendix 2
Mapping the Tugen Trail

Poster for Festival of Postgraduate Research, University of Leicester, 2009

Winner of the Grant Thornton Prize for Best Presentation in Science and Technology

MAPPING THE TUGEN TRAIL

Communities and conservation across the Rift Valley, Kenya

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University of Leicester

Introduction

The Tugen Trail is a 140 kilometres trek that crosses the Rift Valley in Kenya through diverse landscapes using local trails formed by humans and wildlife. Trails were walked and filmed as a combined cultural and environmental study of the issues surrounding conservation and development in the region.

Benefits of walking trails for conservation

- Pro-poor tourism (SNV 2008) is sensitive to the benefits for the local community and promotes cross-cultural understanding.
- Training and recruitment of local tour guides who share their knowledge of flora, fauna and local culture.
- Raising awareness of communities to the importance of environmental conservation to reduce poaching and non-sustainable activities.

Digital Trails

Digital trails are being developed to demonstrate Tugen cultural values of the environment and wildlife alongside the practical hardships of living in these semi-arid lands including

- A participatory video (Lunch & Lunch 2006) of the walk;
- A Google Earth trail giving global visibility;
- A media-scape to be used on GPS-enabled mobile device.

Benefits of using digital media

- Alerting conservationists to the needs and values of local people;
- A marketing device to promote the trail to international tourism;
- As a participatory process in the community.

Methodology

In rural Kenya walking is the normal mode of travel so that the act of walking opened up a relaxed and fluid communication with old men, women, chiefs and local guides. They related tales of how the environment and wildlife has changed, how their lifestyles were moving from pastoralism to agriculture. Walking, together with participatory mapping and video, were fused in this interdisciplinary research through 'hodology', the concept of trails of movement and thinking that interconnect ideas (Turnbull 2007).

Challenges

Traditional 'values' of protecting the environment using cultural practices cannot be sustained against the challenges and effects of poverty, increasing population and drought. The benefits to the communities from tourism need to be demonstrated quickly. Yet marketing this new form of adventure tourism in this relatively unknown area of Kenya is difficult.

Lake Bogoria

Tugen Hills

Kenio Valley

Chororget Sego

Kapkelewe

Sacho

Tenges

Timanoi

Radat

Molok

Sirinta

Molos

Magi Moto

Hot Springs

Kasmar

Emsos

Nyalilpuch

Wasegus

Mochongoi

0   5kms

Also available at http://www.geog.le.ac.uk/katemoore/

Appendix 3

Supporting media

- Walking the TransRift Trail: a reflective journal

  http://www.Africa/Kenya/Rift-Valley-Province/blog-329777.html

The following are available on the accompanying DVD or from my web site.

  http://www.geog.le.ac.uk/katemoore/

- 'The TransRift Trail' in Google Earth

- Resource Trail in Google Earth

- Sandai Trails Videos

- 'Walking with Water' video

- 'Sandai women at Lake Bogoria' video

- 'Walking with Water' Mediascape

Google Earth may be downloaded from http://earth.google.co.uk/download-earth.html

Mscape software is now unsupported but may be downloaded from

http://www.hpl.hp.com/downloads/mediascape/index.html. The mediascape may be

viewed on a desk top computer using the MScape tester.

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Journal Abbreviations

AAAG   *Annuls of the Association of American Geographers*

ACME   *ACME: An International E-Journal for Critical Geographies*

EJISDC   *Electronic Journal of Information Systems in Developing Countries*

IIED   *International Institute for Environment and Development*

IJGIS   *International Journal of Geographical Information Science*

LBJMC   *Lake Bogoria Joint Management Committee*

PLA   *Participatory Learning and Action*

PNAS   *Proceedings of the National Academy of Science*

Trans IBG   *Transactions of the Institute of British Geographers*

For other abbreviations see Glossary

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