CONSERVATION AS DISTURBANCE: DEVELOPMENT, DIVERSIFICATION, AND SOCIAL NETWORKS NEAR TARANGIRE NATIONAL PARK, NORTHERN TANZANIA

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A dissertation submitted to the faculty of the University of North Carolina at Chapel Hill in partial fulfillment of the requirements for the degree of Doctor of Philosophy in the Department of Geography.

Chapel Hill
2012

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ABSTRACT

Timothy David Baird: Conservation as Disturbance: Development, Diversification, and Social Networks near Tarangire National Park, Northern Tanzania
(Under the direction of Martin W. Doyle)

While the prevailing trend in scholarship on the social dynamics of biodiversity conservation in the developing world has been to focus on the social costs associated with protecting natural resources, some recent studies have identified poverty reduction near parks and protected areas (PAs). Taken together, these studies suggest that socioeconomic constraints as well as opportunities may be present in the areas that border PAs, however little comparative research has addressed how local groups may respond to these factors. By focusing on PAs as centers of uncertainty, upheaval, and disturbance, this dissertation examined social adaptive responses to constraints and opportunities associated with proximity to Tarangire National Park (TNP) in northern Tanzania. I examined six communities in Simanjiro District located at varying distances to TNP to address three primary questions: (1) How have community-level development projects been distributed across the study area since the park was created in 1970? (2) To what extent are households economically diversified in each of the study communities? and (3) How are social networks to spread risk related to livelihood diversification? A mixed methods approach to data collection and analysis was adopted to address these questions. Semi-structured group and stakeholder interviews (n=64) were conducted with local land users, government officials, religious leaders, NGO administrators, school administrators and others living or operating in the study area. Also, a standardized survey of

households was conducted with an opportunistic sample of 36 households in each of the 6 study communities (n=216). Lastly, basic infrastructure was geo-coded using a GPS receiver (n>100). Methods of analysis included content analysis of qualitative interviews, simple descriptive statistics of data from interviews and surveys, spatial analysis of infrastructural development, and regression analysis of household survey data. The findings indicate that: (1) infrastructural development and external financial support are greater close to the park compared to distant communities; (2) livelihood diversification is also greater close to the park; and (3) utilization of traditional social networks of exchange is inversely associated with livelihood diversification. These results help to elucidate some of the mechanisms by which communities and households adapt to conservation related constraints and opportunities.

ACKNOWLEDGEMENTS

This research would not have been possible without the assistance of a number of institutions and individuals.

My work was primarily funded by a Doctoral Dissertation Research Improvement grant from the National Science Foundation, a Fulbright Hays Fellowship from the U.S. Department of Education and a Research Residency grant from the Carolina Population Center. I am so thankful for these institutions and the opportunities they helped provide.

My graduate training has benefited immensely from the guidance of Thomas Whitmore, Paul Leslie, and Martin Doyle, each of whom I have worked closely with over the years. Without Dr. Whitmore I would not have attended UNC and may not have pursued a PhD. I am forever grateful that he was willing to take a chance on me and invest so much of his time on my growth and development. Without Dr. Leslie I likely would not have had the tremendous opportunity to work at the Carolina Population Center or conduct my research in a place as captivating as northern Tanzania. I have been humbled by his willingness to share his work with me and I look forward to many more opportunities to sit around the campfire with him in Simanjiro. And without Dr. Doyle, I would not be nearly as intellectually engaged with the world or prepared to enter an academic career as I currently am. My frequent conservations with him over the years about a wide range of topics have collectively been one of the great thrills of my graduate experience. I look up to each of these men and hope to be able to pass on to others what they have given to me.

My research has also benefited greatly from methodological and conceptual expertise provided by Clark Gray and Peter White. Working with these scholars has been a pleasure and I am so grateful for their willingness to serve on my committee, their close attention to my material throughout the writing process, and the supportive and encouraging comments they have offered me along the way.

So many others have contributed to my work and in so many ways. My work would not have succeeded were it not for the dedication of Gabriel Ole Saitoti and Isaya Rumas, my field assistants in Tanzania. They not only shepherded me through the tumultuous arena of research in rural Africa with steadfastness and professionalism, but they also embraced me as a friend. I think of them often and with great fondness and gratitude. I would also like to thank: Terry McCabe for his repeated council and good-natured field mentorship; Ashley Carse for our endless conservations about science, research, and life; and Phil McDaniel for his friendly and regular assistance with GIS-related concerns. Lastly to my parents, David and Terry, to friends, especially Peter Jacobs and Daniel Rhoda, to writing group members, to the members of the CPC IGERT program, and the faculty and staff of UNC-Geography, I would like to say thank you so much for your support.

No person is more deserving of my gratitude than my wife, Kiyah Duffey. She has not only helped to create the space in which I have been able to work, but she has engaged me intellectually and emotionally in ways that have propelled me forward. Her support is my greatest strength and for it I am immeasurably grateful.

And to my children, Eleanor and Oliver – as you have inspired me, so too may you be inspired throughout your lives. Love, Dad.

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CHAPTER 1

Introduction

1.1. Parks and People

Since before recorded history, societies have promoted the protection of natural resources. The western notion, however, that the environment should be protected from degradation through the establishment of reserves and land-use restrictions grew out of the global expansion of European colonial activities in the 17th and 18th centuries (Grove 1992). It was during this period that scores of scientists were drawn into employment with British, French and Dutch East India trading companies to examine exotic floras, faunas, and geologies for commercial purposes. As extraction gave way to widespread degradation across the Indian Ocean basin, however, scientists' skills in empiricism and analysis were instrumental in detailing ecological processes, cataloging environmental decline, and instituting measures to restore and protect degraded resources and landscapes (Grove 1992).

Today more than 160,000[1] terrestrial and marine protected areas (PAs) protect locations recognized for their natural, ecological, or cultural values. Together they cover over 13% of the terrestrial surface of the earth (UN 2011). The International Union for Conservation of Nature (IUCN) has classified protected areas into 7 categories according to their management objectives: (Ia) Strict Nature Reserve; (Ib.) Wilderness Area; (II)

[1]See http://www.protectedplanet.net/.

National Park; (III) National Monument or Feature; (IV) Habitat/Species Management Area; (V) Protected Landscape/Seascape; and (VI) Protected area with sustainable use of natural resources[2]. It was during the 1992 World Parks Congress (organized by the IUCN) that the number of categories was expanded to 7 to include categories that allow resource extraction. In the build up to the 2003 World Parks Congress, the extension of protected area status, by the IUCN, to strongly anthropogenic landscapes (e.g., agricultural areas, urban parks, etc.) was met with criticism by many who fear that the growing trend to incorporate human activities in protected areas "compromises their effectiveness as tools for the conservation of wild biodiversity" (Locke and Dearden 2005, 1). Alongside these growing concerns regarding human activities *within* protected areas, awareness of the importance of lands *bordering* protected areas has also grown.

PAs and the areas they border can have strong effects on each other. When Great Smoky Mountains National Park was established in 1934, an estimated 40,000 visitors passed through the border town of Gatlinburg, TN. The following year that number increased to 500,000 (Abramson and Haskel 2006). And between 1940 and 1950 the cost of an acre of land in Gatlinburg increased from $50 to $8000 (Callahan 1952). Galapagos National Park, off the coast Ecuador in South America, has also received large numbers of tourists, especially in the last decade. Growth in the tourist industry, however, as also spurred immigration to the islands from mainland Ecuadorians and an increase in illegal fishing (Bremner and Perez 2002). And along the border of Yellowstone National Park, ongoing tensions between ranchers and conservationists have focused on wolf reintroduction (Duffield et al. 2008) and brucellosis transmission by wild buffalo (Ketcham 2008).

[2] See http://www.iucn.org/about/work/programmes/pa/pa_products/wcpa_categories/.

Generally, academic and management concerns regarding PAs and border areas have been divided between those focused on the effects of conservation on local people (Adams and McShane 1992; Brosius et al. 2005; Brockington et al. 2008; Dowie 2009) and those focused on the effects of local people on PAs (Brandon et al. 1998; Terborgh 1999; Child 2004). New efforts to understand hybrid social/ecological systems, such as PAs and border areas, must strive to move beyond simple cataloging of effects to broader analyses of the dynamics that exist between parks and people including greater focus on social and ecological adaptations to feedbacks and changing parameters.

1.2. Goals for the Dissertation

Despite their efforts to protect biodiversity and insulate landscapes from change, parks and protected areas are important agents of change. By imposing restrictions on local land users and drawing new resources to boundary areas, parks and PAs introduce new opportunities and constraints in the lives of people who live near them, and ultimately stimulate and catalyze change.

Understanding how parks lead to change is critical. In the last 3 decades there has been a 500% increase in lands designated as protected areas (UNEP 2003). In addition, concerns surrounding biodiversity protection are linked to global efforts to develop the poorest humans on the planet. Overwhelmingly, areas of high biodiversity value are located in developing countries where poverty is high – and in this way the fates of biodiversity protection and development efforts to reduce poverty (another Millennium Development goal) will often be linked. Finally, efforts to protect biodiversity and reduce poverty will be challenged as global climate change causes biodiversity hot spots

to migrate (see Dean 2008) and shifting climatic patterns affect regional rainfall regimes and, correspondingly, local economic activities.

Generally, scholarship on the social dynamics of conservation, especially in the fields of geography, anthropology and rural sociology, has focused on identifying and describing the social costs of biodiversity protection (West 2006; West et al. 2006) including eviction, alienation from resources, land use restrictions, and conflict. Many of these studies have focused on individual local cases using ethnographic or other qualitative approaches. These studies have elucidated important causal mechanisms, however, the extent of these mechanisms near parks and PAs remains unclear. Conversely, recent quantitative studies (Andam et al. 2010; Barrett et al. 2011) showing poverty reduction near park borders fail to illustrate the cause of shifting household fortunes. In most cases, these studies have been large, secondary data analysis projects, lacking qualitative insights. As such, there are opportunities to focus on how local communities and households adapt to new opportunities as well as constraints near parks using comparative research design and mixed qualitative and quantitative methods.

In response to these opportunities, this dissertation utilizes a comparative study design and ethnographic and survey-based methodologies to address the following over-arching question: How have communities and households adapted to opportunities and constraints associated with Tarangire National Park (TNP)?

1.3. Field Work and the Savanna Land Use Project

To address both causal mechanisms and the incidence of phenomena related to the question above, I conducted fieldwork in six communities in Simanjiro District, northern

Tanzania between January and December, 2010. Within the district, two of the study communities are located adjacent to the eastern border of TNP (see Figure 1.1); two are located near the park, but not adjacent; and two are located far from the park border. I was aided by two research assistants, Gabriel Ole Saitoti and Isaya Rumas, and several other employees who helped me to maintain a field camp in the study area and conduct a large, multi-site, household survey. At the peak of my work I had 11 assistants.

The first half of 2010 was spent conducting group interviews within the study communities. Interviews typically focused on one of several themes including: community development, household demography, social networks of exchange, education, religion, and livestock and agricultural issues. These interviews were semi-structured and copies of the interview templates are included in the Appendices. Interviews (n=64) were conducted with village leaders, administrators, educators, pastors, and groups of individuals (typically male) who were knowledgeable in the various subject areas. The primary purpose of these interviews was three-fold: (1) to understand current activities, changes, and trends; (2) to help me to design a household survey instrument that would best measure the incidence of these activities; and (3) to develop rapport within the communities.

Interviews early in the data collection period raised several new, interesting topics that ended up becoming important aspects of the dissertation. For example, early on I sought to establish general timelines and maps of community development to get a sense of the context in which household decisions were made. Through group interviews with community leaders and administrators, I learned that communities near the park have more extensive water and education infrastructure than communities far from the park

border. Furthermore, I learned that a large number and wide range of organizations have contributed to development near the park, whereas few organizations have been involved in communities far from the park. These findings, which were unanticipated, caused me to investigate these issues in greater detail and ultimately became central to my analyses in chapter 2 and an important aspect of my discussion section in chapter 4.

In June 2010, following months of qualitative work and rapport building in the study communities, I began creating a structured survey instrument to procure data on household demographic, social, and economic behavior including information on assets, activities, and perceptions. Development of this tool was strongly influenced by insights I gained through group interviews and continuous consultation with my field assistants who have years of experience conducting household surveys with the Maasai in this area. Once the survey was developed we field tested it with multiple respondents and made several adjustments before settling on a final version. Enumerators were trained and surveys (n=216) were administered beginning in August, 2010. A copy of the final household survey can be found in the Appendices.

As will be discussed in the following chapters, the household sample was drawn opportunistically. However, individuals from each age-set, wealth status, and geographic location within each community were included. Local leaders were enlisted to assist in the identification of households to meet these sampling criteria. This sampling technique was employed for two reasons: (1) the absence of reliable census records, and the resources to construct exhaustive sampling frames in each community frustrated efforts to create a random sample; and (2) in addition to providing data for my dissertation, this data collection effort was meant to collect a follow-up round of data on respondents in

the study area who were first surveyed in 2005 (i.e., the sample was determined in 2005)[3]. Indeed, one of the strengths of this dissertation work is that it is part of a much larger research project.

The Savanna Land Use Project is run by Drs. Paul W. Leslie (University of North Carolina-Chapel Hill) and J. Terrence McCabe (University of Colorado-Boulder), and includes faculty from the University of Florida (incl. Drs. Abraham Goldman and Michael Bindford). Project goals have centered on examining social-ecological systems (SESs), including the role that parks and PAs play in shaping social and environmental outcomes, in northern Tanzania. Work for this large project has involved several graduate students from UNC and CU and faculty and students from the University of Dar es Salaam in Tanzania. While Drs. Leslie and McCabe have examined several topics in many areas in Tanzania, work in Simanjiro District has been guided by the broad hypothesis that parks and protected areas are drivers of social and ecological change. This work has included examinations of migration, land use (Cooke 2007), risk perception (Baird et al. 2009), gender issues (Davis 2011) and several other topics, manuscripts for which are currently in preparation.

1.4. Broad Conceptual Approach

While the body chapters themselves engage several different literatures directly, including scholarship from a variety of disciplines on conservation and communities, disturbance ecology, social capital and networks, and livelihood diversification, here I will present a brief description of the broad conceptual framings offered by the fields of

[3] This in itself is a strong rationale for the data collection strategy as it allows for tapping, and contributing to, a richer set of data.

political ecology (PE) and resilience studies (RS) that have guided the design and implementation of research for this dissertation[4].

1.4.1. Political Ecology

As a field, PE can be understood as a intellectual movement that provided early responses to apolitical representations of environmental degradation and has since grown in many directions. Originally drawing from the fields of ecology and Marxian political economy, the sub-discipline has often focused on how state control, neo-liberal politics, globalization, and free-market capitalism have strongly shaped the lives of subsistence households and communities. Political ecologists claim that this has led to adverse outcomes for social wellbeing and environmental health in many cases. Robbins (2004) described the social dynamics of conservation as one of the most clearly articulated themes in the PE literature. This approach, he argued, has coalesced in response to the widespread notion that conservation has a benign effect on human systems of production. Neumann's (1998) study of the creation of Arusha National Park in northern Tanzania and the attending alienation of local people from their former lands is exemplary of this approach. According to Neumann (1998), what resulted was a decline of the *moral economy* (Thompson 1971), or reciprocal engagements between community members to alleviate individual and collective risk. He further noted (1998) that these conditions can

[4] An alternative organizing theoretical construct would be the rural livelihoods framework championed by Frank Ellis (2000). To understand rural livelihoods in the developing world, this framework focuses on assets and different types of capital (e.g., natural, physical, human, financial, and social). Many aspects of this framework would fit well with the research design, data collection, and data analysis of this project. However, there are multiple reasons that I did not adopt this framework as part of a broad conceptual framework: (1) it has traditionally focused on agricultural households and concomitantly is generally not utilized in the pastoralist literature; (2) it has not offered robust critiques of conservation like political ecology has; and (3) it is not positioned to draw similarities between disturbance in social and ecological systems – which is conversely a strength of resilience studies. With this in mind, however, the livelihoods literature IS cited extensively in chapters 3 and 4 through a discussion of livelihood diversification.

lead to increased degradation outside and within the park as locals struggle to make ends meet.

In addition to Neumann's work (2004; 2005), a number of studies have investigated the social, economic, and political impacts of conservation on those living in or displaced from protected areas (Ghimire 1994; Emerton 2001; Brockington 2002; Geisler 2003; Adams et al. 2004). These studies provide largely qualitative evidence in support of the notion that the "transfer of Western conservation approaches to the developing countries has had adverse effects on the food security, and livelihoods of people living in and around protected areas" (Ghimire and Pimbert 1997, 13). Still, the process of change has been less well articulated and the need for empirically based generalizations regarding social responses to conservation remains. In the context of livestock production in East Africa, Brockington (2002) noted that while the general problems associated with conservation are well known, "the detailed anatomy of livelihood change following large-scale land loss has not been studied" (2002, 142).

PE has become the target of several critiques as it has grown rapidly in the last two decades[5]. These critiques have focused on PE's drift from the field of ecology (Peterson 2000; Walker 2005; Jones 2008), its narrow approach to scale (Zimmerer and Bassett 2003; Rangan and Kull 2009), its marginal contributions to policy debates (Walker 2006), and its biases regarding the primacy of political or neo-liberal factors in understanding environmental change (Vayda and Walters 1999). Methodological critiques, however, have been comparatively rare. I will offer one here that links PE's

[5] Walker (2006) notes that "the Cultural and Political Ecology (CAPE) specialty group of the Association of American Geographers grew from 221 to 532 members between 2002 and 2005" (393).

conceptual and methodological approach to its struggle to contribute to larger human/ environment debates outside Geography.

Turner and Robbins (2008) have described political ecologists as generally "skeptical of postpositivism" (301), which they defined as "the ontology, epistemology and methods of science adjusted to account for critiques from alternatively explanatory frameworks" (301). Instead, they suggested, PE scholars are driven by structuralist and/or constructivist explanatory approaches and typically rely on qualitative data collection and analysis strategies including participant observation, oral histories, interviews, and archival analysis (301, 303). These conceptual and methodological underpinnings, particularly the aversion to postpositivist approaches which include comparative research design and quantitative methods of analysis, limit PE's capacity to build towards a more cohesive understanding of human/environment interactions.

Walker (2003; 2006), who has expressed concern about PE's ability to "theorize up" (2006, 387), noted "that a very large proportion of today's political ecology still focuses on individual case studies with relatively weakly developed efforts to compare or contrast these into broader, integrated regional or global analysis" (2006, 387). Furthermore, the few efforts that had been made towards integration, particularly edited volumes (Zimmerer and Bassett 2003; Watts and Peet 2004), have been constrained by the "very different contexts, methods, and analytical categories of these individual cases" (Walker 2006, 387). It is my sense that postpositivist paranoia is part of this struggle.

Generally, where PE scholarship ignores comparative research design and quantitative methods: (1) the incidence and/or spatial extent of phenomena are not known; (2) the effects of diverse factors are not controlled for; (3) methods of analysis

are not easily comparable across research projects; and (4) generalizability is sacrificed for greater emphasis on specificity. Among the implications of this approach are that case-studies become isolated spatially and conceptually from other scholarship, they are precluded from incorporation in larger comparative projects or meta-analyses, and they struggle to function alongside other case-studies as the necessary building blocks of greater understanding of human/environment interactions.

1.4.2. Resilience Studies

Broadly speaking, the field of resilience studies has endeavored to understand change in complex, adaptive SESs by focusing on system resilience in the face of external disturbances or perturbations. The resilience approach grew out of the field of ecology but now integrates social and natural science perspectives. It is a grand, ambitious project that seeks to understand the basic, universal components and processes of adaptation across a wide range of social and ecological phenomena. While the central purpose of this dissertation is not to measure social or social-ecological resilience, a review of their definitions is instructive and will help orient research for this dissertation *vis à vis* the foci of research in the field of resilience studies.

Currently, the literature defines resilience as the capacity of a system to absorb disturbance and re-organize while undergoing change in a manner that allows for the persistence of system function, structure, identity, and feedbacks (Walker and Salt 2006). Adger (2000) has defined social resilience as the ability of human communities to withstand shocks to their social structure including environmental variability and economic turmoil. Here resilience is taken to mean more than simply the persistence of

social structure and identity within SESs but also the adaptive capacity to respond to the opportunities and constraints that disturbance presents (Folke 2006).

It is now commonly recognized that ecological and social systems are interdependent, but that adaptability is mainly a function of the social component (Walker et al. 2004). To date, however, most studies on the resilience or adaptive capacity of SESs have remained close to their academic roots in ecology by focusing on anthropogenic disturbances to environmental processes (Walker and Salt 2006). Comparatively fewer studies emanating from traditional social science fields have examined how humans themselves respond to changes in SESs and how these responses feedback on system structure and function[6].

Folke (2006) has thoroughly reviewed the research on the social dimensions of resilience in SESs. Some work has examined social resilience as it relates to coastal systems (Adger 2000), the vulnerability of urban areas (Pelling 2003), migration patterns (Locke et al. 2000), famine and food system vulnerability (Fraser 2003; Fraser et al. 2005), and dynamic relationships between humans and the environment from an archaeological perspective (van der Leeuw 2000; Redman 2005). Other work has focused on social strategies for managing uncertain resource and ecosystem dynamics, including institutional flexibility (Armitage 2005; Ostrom 2005) and social capital and conflict (Adger 2003; Ostrom and Ahn 2003; Galaz 2005).

[6] Prior to the widespread displacement of cultural ecology by political ecology in the fields of human geography and anthropology, cultural ecology did focus much attention on human adaptation to environmental parameters. As a field, cultural ecology was ultimately criticized for ignoring the role that the global political economy played in shaping local issues. With the recent rise of resilience thinking I believe we can see a return to many of the concerns of the cultural ecologists as well as an incorporation of the many of the lessons of political ecology (though political ecology is rarely cited).

While productive advances have been made in recent years towards a detailed theoretical perspective of the links between social and ecological systems (Berkes and Folke 1998; Adger 2000; Berkes et al. 2003), comparatively little scholarship has addressed the effects of conservation on SESs (Bengtsson et al. 2003; Berkes and Turner 2006; Turner and Berkes 2006). Overwhelmingly, these efforts have been made by biologists and conservation planners, have focused on environmental outcomes, and have largely failed to inspire empirical work by social scientists.

While political ecology suffers from an over-abundance of case studies that are not well connected to each other (conceptually or theoretically), the field of resilience studies suffers from the opposite problem – a striking lack of case studies to test its grand unifying theory of change – particularly from social scientists. Correspondingly, resilience studies needs fine-scale case studies of human/environment interactions - not only because they serve as the foundation for larger comparative projects and nomothetic endeavors, but because they are well-suited to elucidate the processes of local adaptation, phenomena which are central to the resilience approach. Understanding adaptation requires knowledge of change AND comprehension of causal mechanisms. While identifying causality in the social sciences is especially challenging (see Axinn and Pearce 2006), sustained local observation, particularly qualitative empirical strategies, is well suited to teasing out causal patterns.

Parks and PAs offer several potentially fruitful opportunities for case-studies informed by social science and the framings of RS. First, parks and PAs are ubiquitous, particularly in the developing world where activities in local, often rural, communities are generally focused around a few economic activities (e.g., agriculture, livestock, etc.).

These characteristics can facilitate comparison and help to limit confounding factors. Second, parks and border areas can function as natural experiments wherein some land is protected and some is not and some people (i.e., members of a social group, etc.) are affected and some are not. Third, where poverty and biodiversity co-exist, important policy concerns are localized and complexity and feedbacks are brought into greater relief (see Millennium Development Goals[7]). Finally, resilience scholars have missed an opportunity to extend the principles of disturbance ecology to examine the full impact that parks and conservation-related initiatives have on social issues and consequently SESs. Political ecologists have shown how parks and PAs can introduce surprise, hardship, and new resources to local communities. In this way they can be viewed as disturbances or perturbations that can lead to adaptive responses within social groups and create new feedbacks.

1.4.3. Integrating the Literatures

While the works of political ecologists and resilience scholars follow radically different scholarly lineages, they do share a commitment to interdisciplinary scholarship and mixed methods as well as common departure from historic intellectual trajectories within their respective fields. In each case, researchers have reversed the progressive scaling down of the unit of observation in favor of a broader, more encompassing approach to human-nature relations where complexity is embraced and abstractions are carefully considered.

However, it could be perceived as counter-intuitive, even heretical, to integrate insights from PE and RS given that: (1) the development of PE stemmed, in part, from a

[7] See http://www.endpoverty2015.org/en/goals.

rejection of the application of natural science theories in the social sciences; and (2) the central conceptual project in RS has been to infuse theories of disturbance and resilience, originating in the field of ecology, into the realm of social science. I see this integration, however, as entirely rational and pregnant with important new questions.

Despite their rising popularity in various academic disciplines, the fields of PE and RS have missed important opportunities to investigate ***change*** and ***adaptation*** respectively. Generally speaking, political ecologists' discomfort with the method and language of natural science has precluded the use of comparative design and quantitative methods in much of their work, as noted above. This has undermined their ability to identify the incidence and magnitude of ***change***. Conversely, the field of resilience has missed important opportunities to study ***adaptation*** in SESs for its lack of case studies (as noted above), and nuanced perspectives on power, vulnerability, production, conflict, and social relations. Integrating these perspectives allows for the shortcomings in one approach to be mitigated by the strengths in the other approach.

1.5. Layout of the Dissertation

This dissertation is written as three independent manuscripts (chapters 2, 3, and 4) each drafted for a specific journal. As such, each manuscript contains: an introduction; discussions of relevant literature and the study site; a presentation of methods and findings; and a final discussion of the findings and their implications. These manuscripts are integrated and broad conclusions are presented in the final chapter of the dissertation.

To address the general research question presented above, the three main chapters focus on specific aspects of community and household-level adaptation to opportunities

and constraints associated with the park. Chapter 2 uses ethnographic and descriptive analyses to investigate the extent, distribution and financing of infrastructural development in the study area. Chapter 3 uses descriptive and multivariate analyses to examine the household-level patterns of income, wealth and livelihood diversification. Chapter 4 uses ethnographic, descriptive, and multivariate analyses to focus on trends in social networks of material exchange and their collective relationship with livelihood diversification. Finally, Chapter 5 ties the three main chapters together into a single story, draws parallels between the social dynamic of conservation and other human/environment concerns, and proposes new directions for future research.

Figure for Chapter 1

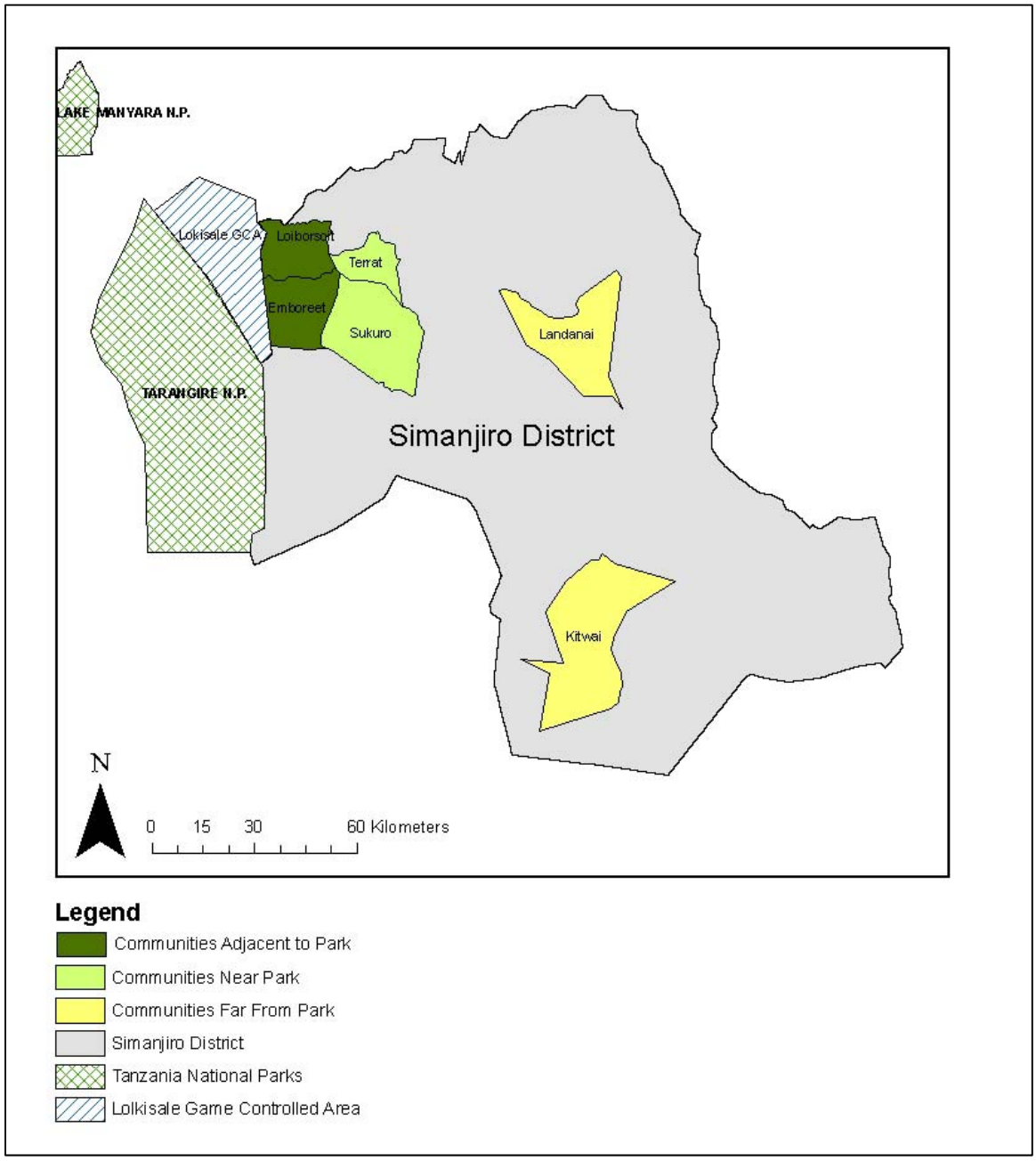

Figure 1.1. Map of study area.

CHAPTER 2

Development and Education near Tarangire National Park

2.1. Introduction

Recent studies on the social outcomes associated with conservation in the developing world have found evidence of poverty reduction in communities near parks and protected areas (Andam et al. 2010; Sims 2010; Barrett et al. 2011) suggesting that social benefits can accrue in these places. These findings challenge a wide body of literature which has historically focused on the social costs of conservation (West et al. 2006; Wilkie et al. 2006; Coad et al. 2008). Missing from these new studies of poverty reduction, however, is an understanding of the underlying mechanisms that shape household-level opportunities (Andam et al. 2010). This study endeavors to address this concern by examining the role of external organizations and sources of funding in shaping community development and household-level outcomes near Tarangire National Park (TNP) in northern Tanzania.

Parks are strong attractors of tourist infrastructure and non-governmental organizations (NGOs), including those concerned with conservation and indigenous rights issues (Levine 2002; Campbell and Vainio-Mattila 2003). Such organizations may seek to work with local communities (Coomes et al. 2004; Tallis et al. 2008), or be recruited by park-side communities to provide support. Either way, outside organizations can become part of the overall impact of parks. Often these organizations engage directly with community-level committees, organizations, and/or other institutions to: build requested infrastructure, implement health interventions, facilitate community seminars

on chosen topics, influence local land-use, and/or other types of community outreach (Mbaiwa et al. 2011). Interactions between local institutions and outside organizations can serve as added constraints within communities (Goldman 2003; Haley and Clayton 2003; Igoe 2003) or can function as new constructive opportunities (Nelson et al. 2010). Regardless, the outcomes associated with these collaborations shape the local context in which people live and can profoundly affect household perceptions and behavior (Baird et al. 2009). Studies that ignore these mediating institutions and organizations and the projects they introduce and/or support will fail to fully understand the detailed anatomy of household-level change and ultimately the effect of PAs on local lives.

To address the paucity of research on the relationship between outside organizations and communities near parks, this study compared communities near and far from TNP to investigate three research questions (RQs): (RQ1) Since the park was created in 1970, what community-level development projects have been created and sustained? (RQ2) What form has development taken and how has it been funded? and (RQ3) Are these projects associated with human behavior at the household level?

2.2. Methods

2.2.1. Case Study

The Tarangire-Manyara region of northern Tanzania is semi-arid, rainfall insecure with frequent droughts, and among the most diverse and complex grassland savanna ecosystems in the world (Olson and Dinerstein 1998). Lying at the heart of a large network of PAs, TNP itself protects important dry season water resources which help to support the largest population of elephants (*Loxodanta africana*) in northern Tanzania

and the second largest seasonal migration of large ungulates in East Africa. To the east of the park, spread across several local communities, the Simanjiro plains offer important grazing and calving areas for thousands of wildebeest (*Connochaetes taurinus*) and zebra (*Equus burchelli*) that migrate to the area to feed on nutrient-rich forage in the wet season.

Also in this area, the local Maasai people have traditionally practiced transhumant pastoralism to cope with seasonal fluctuations in water and forage availability. The area that is now the park was once an important refuge for livestock during the dry season, however, when the park was formed in 1970, access to these resources was cut off. In response to this and other factors, the Maasai have been incorporating agriculture and wage-labor migration into their livelihood strategies in the last several decades (McCabe et al. 2010). This conversion has been associated with a more sedentary lifestyle and a shift away from communally managed lands to more individual land tenure.

2.2.2. Data Collection

The study was conducted within the ethnically Maasai district of Simanjiro between January and December 2010. Six study communities were selected based on geographic proximity to the eastern border of TNP. Two communities are adjacent to the border; two are located near the park, but not adjacent; and two are located farther from the park (Figure 2.1 and Table 2.1). Throughout the paper, the 4 communities adjacent to and near the park will be collectively referred to as “near” unless otherwise explicitly stated.

Study communities were selected to highlight the effect of proximity to TNP on community and household outcomes while minimizing the effect of proximity to urban centers and markets. Daily passenger transportation to the large urban area of Arusha is available in each of the 4 communities near the park, though for how long this has been the case is unclear. Regular transportation is available 3 days a week in one of the distant communities and only once a week the other community. These differences are not related to differences in physical distance to Arusha which are all easily within a few hours commute on roads of reasonable quality. Instead, differences are associated with availability of vehicles providing bus services – which appears driven by local demand. Other available options for distant communities include hitchhiking and/or bicycling short distances to access major roads where daily bus service is available to Arusha or the district capital, Orkesumet, where supplies are available. In fact, the community with the least regular transportation is, in fact, the closest to the district capital. Reliable information on the history of transportation to and from each of the study communities was not able to be collected due to issues related to great variability in transport regularity and recall error.

Fieldwork included mixed qualitative and quantitative methods of data collection which included semi-structured group interviews (n=64), participant observation, and a structured survey of households (n=216). In the absence of reliable census records, which precludes accurate estimates of population and therefore population growth rates, and a lack of resources to construct exhaustive sampling frames in each community, (which each contain several hundred households widely distributed across the landscape) an opportunistic sample was drawn wherein individuals from each age-group, wealth

status, and geographic location within each community were included. Local leaders were enlisted to assist in the identification of households to meet these sampling criteria.

Maasai field assistants and I conducted interviews in Maa, the local language, and/or Kiswahili, the national language of Tanzania.

2.2.2.1. Group Interviews

To identify what community projects had been created (i.e., RQ1), what form they had taken, and how they had been financed (RQ2), I conducted qualitative, semi-structured group interviews with community members and leaders and government and school administrators in each of the study communities to learn about Maasai notions of development and the existing infrastructure in each area. This approach was utilized to facilitate open discussion and solicit descriptive narratives around broad questions from people who would have been involved with or known about local projects. Questions focused on the number, location, and financial history of water points, schools (primary and secondary), health clinics, churches, veterinary and agricultural services, roads, transportation, cell-phone coverage and other material development projects. "Financial history" referred to the source of money that was used to support the development project from its inception through to 2010 (e.g., sources of funds to build a school or repair a broken bore-hole pump). Interviews solicited information on how projects/funds came to the community, (e.g., did the community actively recruit the project or funds to the area or was the project introduced to the community from some outside entity?) This yielded insight on the level of agency the Maasai have maintained or garnered as development has occurred and, more specifically, which projects and forms of development the

communities themselves have been most interested in pursuing. Finally, all schools, water-points, and health clinics were visited and geo-coded using a hand-held Global Positioning System (GPS) receiver.

2.2.2.2. Household Survey

To assess whether community-level development projects were associated with household-level behavior (RQ3), I designed and field tested a structured household survey. Trained Maasai enumerators conducted the survey with 36 household heads in each of the six study communities. Household measures of education were identified as suitable indicators for household response to community-level projects. The survey solicited information on several education-related topics including: the level of education for the household head and the wives of the household head; the number of children currently eligible for school (i.e., between the ages of 6 and 15 (Serneels et al. 2009)) and the number enrolled. This approach was utilized because it was effective at estimating the incidence of household educational attainment across the study communities.

2.2.3. Data Analysis

The analyses of qualitative and quantitative data proceeded in four main analyses each comprised of multiple steps as described below in the following paragraphs. The goal of the first analysis was to conduct a cartographic comparison of the timing, number and distribution of material development projects in the communities near TNP with communities far from the park between 1970 and 2010 (RQ1). The goals of the second and third analyses were to categorically compare the number and diversity of funding

source types that have: (1) supported each type of development in the study communities (stratified by community and proximity to the park); and (2) provided unsolicited vs. solicited resources for development (stratified by proximity to the park) (RQ2). The goal of the fourth analysis was to compare, across near/far strata of communities, the proportion of household heads who were educated, the proportion of household heads' wives who were educated, and the proportions of school-age boys and girls who were enrolled in school in 2010 (RQ3).

To cartographically compare the timing, number and diversity of material development projects between communities (RQ1), content analysis of qualitative group interviews was used to extract information on the years projects were completed as well as the years that projects ceased to be useful (i.e., dam failed and wasn't repaired). These data were paired with GPS coordinates of project locations within a GIS to create maps of the number and distribution of development projects for three time periods: the past to 1970; 1971 to 2000; and 2001 to 2010.

To categorically compare across communities the number and diversity of funding source types that have supported each type of development AND whether the support was unsolicited by the community or actively solicited (RQ2), content analysis of qualitative group interviews was used to extract information on each project's sources of funding for construction, maintenance, and repair over the history of the project as well as whether the support was solicited or unsolicited by the community. Results were compiled in two tables.

To compare, across near/far strata of communities, the proportion of household heads who were educated, the proportion of household heads' wives who were educated,

and the proportions of school-age boys and girls who were enrolled in school in 2010 (RQ3), data from the standardized survey of households were used to calculate proportions. To facilitate analysis, household heads were stratified into groups of age-sets. Maasai males are traditionally organized into age-sets that span 14-15 years. At the time of the survey, the two youngest age-sets included men who were approximately 20 to 50 years old and the next two age-sets included men who were approximately over 50 years old. The older strata would have entered primary school approximately 40 to 70 years ago, while the younger strata would have entered school approximately 10 to 40 years ago. Household heads were stratified in this way because TNP was gazetted 40 years ago (1970). Women's ages were not able to be precisely known, so women were stratified according to their husband's age-set.

2.3. Results

2.3.1. Timing and Spatial Distribution of Development Infrastructure

From the interviews on the history of development projects (RQ1), three specific types of infrastructure emerged as most important to community members and were illustrative of the differences and similarities that existed among the study communities: schools, water points and health clinics (Figure 2.1). Prior to the formation of TNP, few of these kinds of features existed. Collectively, the data show a growing divergence over time between the 4 communities near the park and the 2 communities distant from the park in terms of school and water construction projects (Figures 2.1 and 2.2). This divergence, however, is not apparent in the case of health clinics. (Appendix S1 shows,

with greater specificity, the data presented in Figure 2.1 of the number of features in each community over time.)

2.3.2. Financing and Recruitment of Infrastructural Development

Findings from the qualitative interviews to address how development projects were financed (RQ2) (Table 2.2) show that the financial costs of construction and maintenance of infrastructural development, especially schools and water points, in the 4 communities near the park were borne by a greater number and diversity of organizations than in the 2 communities far from the park. Categorical representation (Table 2.2) unavoidably understates the differences between near and far communities. Not only did the 4 communities near the park receive support from more types of organizations compared to the 2 distant communities, they also generally received support from more organizations of the same type and often more support from each individual organization. There are many important, yet subtle details about how these projects were funded, that can't be conveyed except through thick description. A thorough, descriptive comparison of development financing in two communities (i.e., Loiborsoit and Landanai (Appendix S2)) indicates the character and magnitude of the difference between the two places. Furthermore, the profile of development we see near the park in Loiborsoit can also be found in the other three study communities near the park. In these communities, support from outside organizations including international NGOs, religious organizations, foreign donors, hunting companies, photographic safari companies, and often the parks organization itself was integral to the proliferation of education and water projects in this

area. This diversity and volume of outside support did not exist in the two distant study communities.

Finally, some of the infrastructural development close to the park was directly supported by organizations attracted to the park: (1) Tanzanian National Parks (TANAPA) made large contributions in each of the 4 communities near the park building dams, school dormitories, and one entire health clinic; (2) photographic safari companies paid these communities large sums for land allocations along the park border; (3) hunting companies, which have federal contracts, are required by law to support the development of the communities in which they operate (Nelson et al. 2007; Sachedina and Nelson 2010) (three hunting companies operated in the area near the park, whereas only one company operated in one of the distant communities); and (4) a consortium of conservation, tourism, and development organizations paid communities near the park for the preservation of ecosystem services (Nelson et al. 2010).

Findings from the qualitative interviews to assess whether development projects were solicited or unsolicited by communities (also RQ2) (Table 2.3) show that, generally, the number of organization types providing unsolicited development is positively associated with proximity to the park. Conversely, the association between the number of organization-types providing solicited development is more nuanced with lower numbers found in communities adjacent to the park and far from the park and higher numbers found in communities near but not adjacent to the park. Group interviews revealed that, historically, communities adjacent to the park acquired resources for infrastructural development in many ways. Leading up to and following Tanzanian independence, governmental, religious and other NGOs delivered many unsolicited

resources to local people including water points, schools and clinics based on their perceived needs and donor priorities. In the past 10 to 15 years, however, communities have begun actively soliciting support in ways that included: (1) drafting proposals to religious organizations; (2) appealing to foreign donors; (3) forming or recruiting NGOs; (4) leasing land use rights to photographic safari companies; and (5) lobbying hunting companies and TANAPA for contributions. This is especially the case in communities that are near the park but not adjacent. These communities began to solicit support from organizations that had previously provided unsolicited support in the communities adjacent to the park. In many cases, they recruited organizations operating near the park into their own communities. Adjacent communities, on the other hand, continued to accept support that was forthcoming from external organizations and, in some cases, began to lobby new sources for support (i.e., hunting companies, TANAPA, and foreign donors). Contrary to this situation near the park, most of the development in the communities far from the park was financed through community contributions and district government funds with few opportunities to solicit external organizations for support.

2.3.3. Household-Level Effects: Education

Findings from the analyses of survey data on education (RQ3) show that: (1) higher proportions of household heads and household heads' wives were educated in communities near the park compared to distant communities; and (2) higher proportions of school-age boys and girls were enrolled in school in communities near the park compared to distant communities in 2010 (Figure 2.3).

2.4. Discussion

These findings move in a new direction the discussion touched off by Wittemyer's recent study of human migration to PA borders (2008). Responses to that study (Igoe et al. 2008; Shoo 2008; Joppa et al. 2009) have weakened its case that population growth near parks has outpaced rural growth, but the prospect that resources are being accumulated along park borders remains critical and ripe for inquiry, investigation, and discussion. My findings, which are consistent with recent studies highlighting benefits near PAs (Andam et al. 2010; Barrett et al. 2011), show that a diversity of financial resources has been attracted to the border of TNP to build water and education infrastructure and that levels of education are greater near the park. Qualitative group interviews with local residents and leaders revealed that this has not been the result of specific top-down development planning or heralded community-based conservation initiatives as other studies have found (Bandyopadhyay and Tembob 2010; Sheppard et al. 2010; Mbaiwa et al. 2011), but rather the disjointed and unplanned but cumulative effects of (1) the infiltration of local communities by external organizations and unsolicited projects; and (2) the subsequent emergent capacity to engage, learn about, and ultimately solicit support from these (and other organizations) to realize new opportunities.

According to group interview respondents, the earliest development projects throughout the study area were unsolicited and generally funded by religious organizations, foreign NGOs, and the local district government. Typically, organizations would simply come into a community, introduce themselves to leaders and ask for

permission to work in the area. An elder from one of the communities near the park recalled that, “they brought a letter asking if the community would welcome them to come and do development.” Often, offers to contribute to education or health related development projects were made by religious organizations connected with local churches that had been established years before during the colonial period (Hodgson 2005). One resident described this graduated engagement simply: “[they] came here, saw problems, and helped.” Another respondent said, that the “missionaries saw how people were suffering - even before the villagers were asking for help, the missionaries stepped in to help.” In the early post-colonial period, much of the development in this area came in the form of churches and schools with the earliest projects located in the communities adjacent to the park with support from Catholic and Pentecostal missions. In some cases, development has continued since this period with only limited community oversight and control. One resident near the park noted that “the church as done many things. We are just seeing from afar. We don’t have a voice in these things.” In other cases, however, external organizations established development projects or built infrastructure and then handed control over to the community.

Ultimately, communities learned that they could shape ongoing streams of support that began with unsolicited contributions and/or solicit new resources from these and other organizations. According to one respondent near the park, the religious mission “asked for permission to preach [and] got land from the village. At that time the village asked for help with a school and the mission responded.” In the case of a foreign supported NGO, one respondent said, “they came here to sell their policies, pitch their services - and then they left. But then we followed them to ask for help." In time,

communities near the park began to solicit support from a variety of external organizations. Far from the park, however, unsolicited development has been virtually non-existent and opportunities to solicit have been limited.

Observations that communities near TNP first became exposed to unsolicited development and then began to solicit it directly are demonstrative of these communities' abilities to adapt to new constraints and opportunities. The issue of adaptive capacity is a major concern in the literature on social/ecological systems (Adger et al. 2005; Engle 2011) and a full engagement of the breadth of this work is outside the focus of this paper. I will briefly describe, however, what adaptive capacity may mean in this context and offer one un-tested hypothesis of how culturally prescribed social interactions may have proffered the capacity to adapt and shape local development.

Reviewing the expansive history of thinking on adaptation and adaptive capacity, Engle (2011) defines adaptive capacity simply as the ability to adapt. He goes on to note that it influences social/ecological systems "by modulating between maintenance of the status quo and transformation of the system into a new state, depending on which is most 'desirable'"(2011, 650-651). For rural, poor communities who desire new development in the study area, 'modulation' has required that local people had the capacity to: recognize sources of support, perceive access to them, imagine an outcome where funding is acquired, build community support towards recruiting the resource, prepare a formal proposal, negotiate with funding organizations, and ultimately oversee the allocation of funds to project tasks. Furthermore, these adaptations have taken place within existing and emerging institutional structures shaped by diverse cultural, political, and economic contexts. Prior research on the determinants of adaptive capacity supports

the notion that more well educated individuals and groups are better suited to these tasks (Brooks et al. 2005).

Also, in pursuing development through engagement with external organizations, communities often need to overcome repeated failures. Describing one community's experiences with TANAPA, a respondent noted that "you ask them today and they will respond in 5-6 years [and] they use their own contractors… poor construction." Local residents often complain of the quality of TANAPA development projects pointing out that dams have failed and that they are moving out of collapsing buildings. Interactions with hunting companies are equally challenging with many requests simply ignored; "we asked once to help build a school – but didn't get anything". In another case, a community adjacent the park informed a hunting company, "we don't want to see you on our land until you build an office."

Evidence of communities' efforts to solicit development supports survey findings which showed that 90% of respondents support mandatory household contributions to finance school construction. Taken together, these observations indicate that communities desire some forms of development, but how these communities have modulated between the status quo and a new system remains unclear. Here, I present one hypothesis of how the dynamics of Maasai social organization, especially the age-set system, may have influenced the dramatic engagement with and recruitment of organizations and resources since 2000 (see Figure 2.1) by introducing novelty into management strategies while maintaining traditional institutional arrangements.

The Maasai age-set system organizes initiated men into 14 to 15 year cohorts and provides structure for the progression of men from warrior-hood through junior and

senior elder statuses over the course of their lives. Men within a cohort move through these positions together, with transitions coming every 14 to 15 years when a new cohort of warriors is initiated. Each cohort is given a unique name and individuals will remain a part of their cohort for life.

Just before 2000, the Landis age-set transitioned from warrior-hood to junior elder status customarily displacing the older age-set, the Irkishumu, and making way for a new set of warriors, the Korianga. Traditionally, power struggles exist between adjacent age-sets as each group is at once reluctant to relinquish the duties and privileges of the position they are leaving and eager to take on those of the position they are gaining. This longstanding cultural institution is the source of special alliances and contests within Maasai society (Spencer 1993). More educated than their seniors, and seeking to establish themselves as elders and win influence within the community, the Landis may have been motivated to mobilize their skills and familiarity with the outside world to approach external organizations, and recruit resources to their communities – resources they perceived as available.

This hypothesis suggests that the persistence of the age-set system, which routinely displaces the old with the new, may be a key ingredient in promoting novelty, learning, and adaptive capacity within Maasai society which allows for the modulation between maintenance and transformation of the system – and in this case has catalyzed recruitment of financial resources near the park.

2.4.1. Implications of Development

The implications of develop financing near the park should be not be viewed necessarily as unidirectional (Agrawal and Chhatre 2011). While important new gains in public health, education, and food security are apparent, new challenges may also arise[8]. In the short term, increased access to water should reduce food insecurity and vulnerability to drought where multiple water points and types of points are available to support cattle production (Oluoko-Odingo 2011). In the longer term, there could be negative consequences associated with water development including increased population density and landscape degradation where people and herds are attracted to available water (Fratkin 1997). However, these negative effects will be significantly reduced where social institutions to manage collective resources are in place (Ostrom 1990; Fratkin and Mearns 2003). The implications of higher levels of education near the park, including more schools, greater proportion of educated household heads and wives, and higher enrollment of eligible children are largely positive. A recent case-study on the Maasai-related Il Chamus of Kenya found education to positively effect a range of food security and income indicators (Little et al. 2009). Educated households had higher livestock holdings, greater expenditures, better health, and higher savings.

Regarding the diversity of development funding in the area, it seems likely that past successes in procuring resources from outside organizations will engender further solicitations and that engagement with outside organizations will increase, but there is little empirical work to draw from here. Furthermore, as time passes communities may become increasingly aware that proximity to the park is a type of asset that can be leveraged to procure resources. The combination of successful solicitations by local

[8] That development efforts have often led to negative outcomes has been an important theme in the fields of political ecology and development studies.

communities, the increased activity in the area by outside organizations, and increasing rates of education among local communities may fuel a positive feedback loop wherein development occurs at increasing rates through time. In the short term, a diversity of financial resources would appear to confer a degree of functional redundancy (Adger et al. 2005) within the system where when one organization fails to support a project, another steps in. In the longer term, some funding organizations may become more established in the area than others and exert more control or influence over the system with potentially negative consequences. Ultimately, questions regarding the recruitment, establishment, and influence of external resources on hybrid social/conservation spaces will be important as global efforts to protect biodiversity and reduced poverty expand.

Tables for Chapter 2

Table 2.1. Study communities' population and proximity to park (actual and categorical).

Community	*Population in 2002 (TZ Census[a])*	*Approx. Distance to Park[b] (km)*	*Adjacent / Near / Far to Tarangire NP*
Loiborsoit	4160	27	Adjacent
Emboreet	2244	23	Adjacent
Terrat	2837	43	Near
Sukuro	2704	34	Near
Landanai	4993	92	Far
Kitwai	1273	96	Far

[a] The 2002 Tanzanian Census (Tanzanian National Bureau of Statistics 2004) offers the most reliable estimate of population for these communities.
[b] Represents Euclidean distance from the community center to the eastern border of TNP.

Table 2.2.[a] List of the types of organizations[b] that have contributed to development.

Community	*Schools*[c]	*Water Points*[d]	*Health Clinics*
Adjacent to the Park			
Loiborsoit	Religion Government Community Tourism NGOs	Religion Park Community Government Tourism Hunting	Religion Government Community
Emboreet	Religion Park Foreign Tourism Hunting Community NGOs	Government Religion Foreign Tourism Community NGOs	Religion Government Community
Near the Park			
Terrat	NGOs Government Park Community Religion Tourism	NGOs Religion Government Community Tourism	Government Community
Sukuro	Park Religion Government Community	Park Religion Government Community Foreign Hunting	Park Government Community
Far from the Park			
Landanai	Government Community Religion	Religion Community	Government Community
Kitwai	Government Community Hunting	Government Community Hunting	Government Community

[a] For each community and development type (i.e., schools, water points, and health clinics) a list of words is presented for the types of organizations that have contributed financial resources for the corresponding development type and community. Generally, these words are organized, from top to bottom in order of their importance, or the magnitude of support provided for building, supplying, maintaining, and/or repairing infrastructure within the community.

[b] Word descriptions: **Government**, district government; **Community**, community contributions; **Religion**, religious organizations; **Park**, Tanzania National Parks; **Tourism**, tourist photographic safari companies; **Hunting**, tourist hunting companies; **NGOs**, non-governmental organizations; **Foreign**, foreign donors.

[c] Includes primary and secondary schools and secondary schools under construction.

[d] Includes dams and other water points.

Table 2.3.[a] Types of organizations[b] that provided unsolicited or solicited support by development type.

Development Type	*Unsolicited*	*Solicited*
Adjacent to the Park		
Water[c]	Religion	Foreign
	Foreign	Hunting
	NGOs	
	Park	
	Tourism	
Education[d]	Religion	Hunting
	Foreign	Park
	NGOs	Foreign
	Tourism	
Health	Religion	
Near the Park		
Water[c]	Religion	NGOs
	NGOs	Hunting
	Foreign	Religion
	Tourism	
Education[d]	Religion	Park
	Tourism	Hunting
		NGOs
		Religion
Health		Park
Far from the Park		
Water[c]		Hunting
		Religion
Education[d]		Hunting
		Religion
Health		

[a] For each community strata (i.e., adjacent to the park, near the park, far from the park) and development type (i.e., water, education, and health) a list of words is presented for the types of organizations that have provided unsolicited assistance and for those that have been solicited to contribution to local development.
[b] Word Descriptions: Government, district government; Community, community contributions; Religion, religious organizations; Park, Tanzania National Parks; Tourism, tourist photographic safari companies; Hunting, tourist hunting companies; NGOs, non-governmental organizations; Foreign, foreign donors.
[c] Includes dams and other water points.
[d] Includes primary and secondary schools and secondary schools under construction.

Figures for Chapter 2

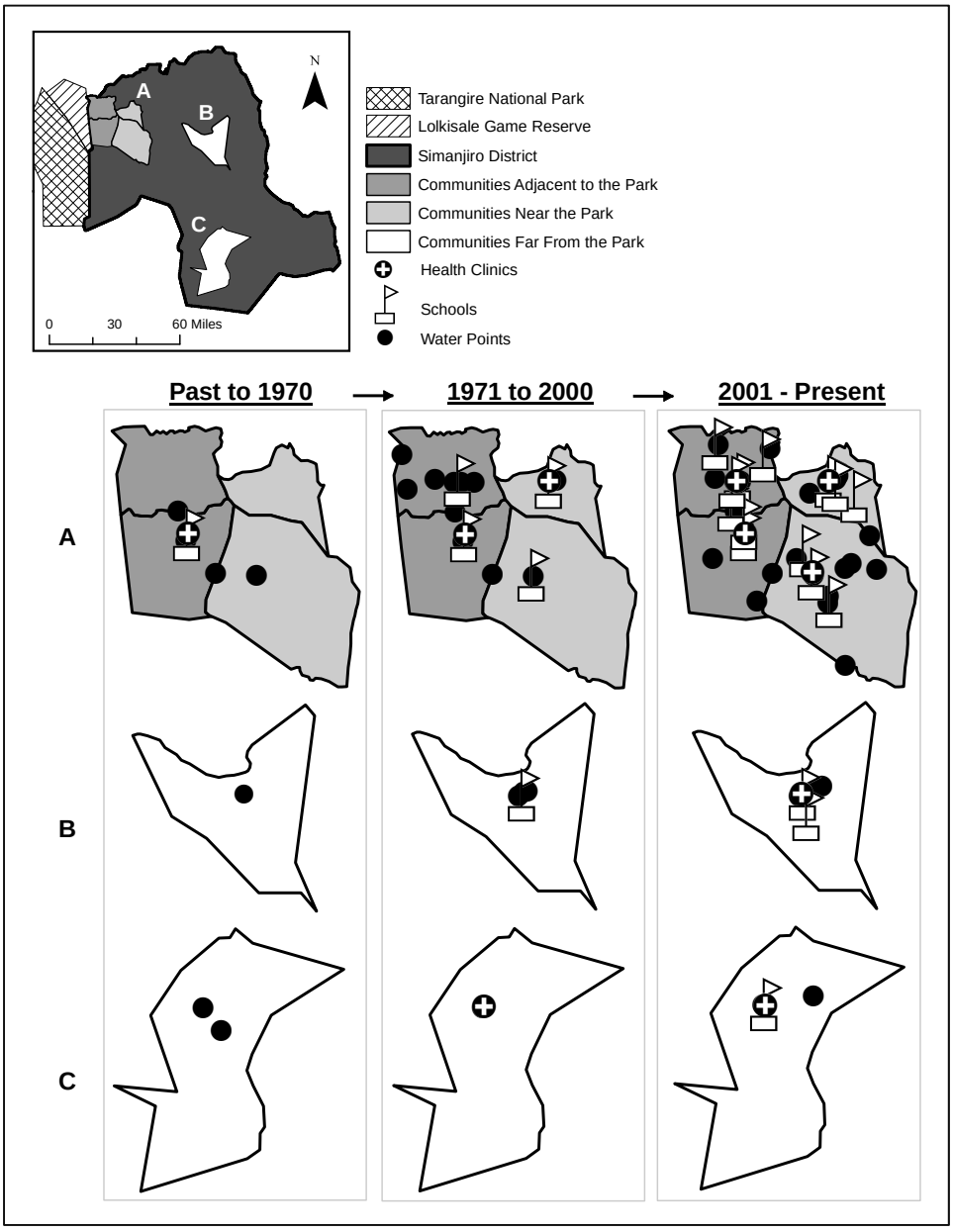

Figure 2.1. Map of study area and the spatial and temporal distributions of schools, water points, and health clinics (collectively referred to as features) within the study communities. Time is stratified into three categories (i.e., Past to 1970, 1971 to 2000, 2001 to Present) and features represented within those categories are those that were built before the end of the time range and were also operational at the end of the time range. Also, projects under construction at the end of 2010 were included in the features represented within the time period '2001 to Present'. Primary and secondary schools are combined and represented as "Schools" and dams and other water points (including dug wells, springs, and improved river points) are combined and represented as "Water Points".

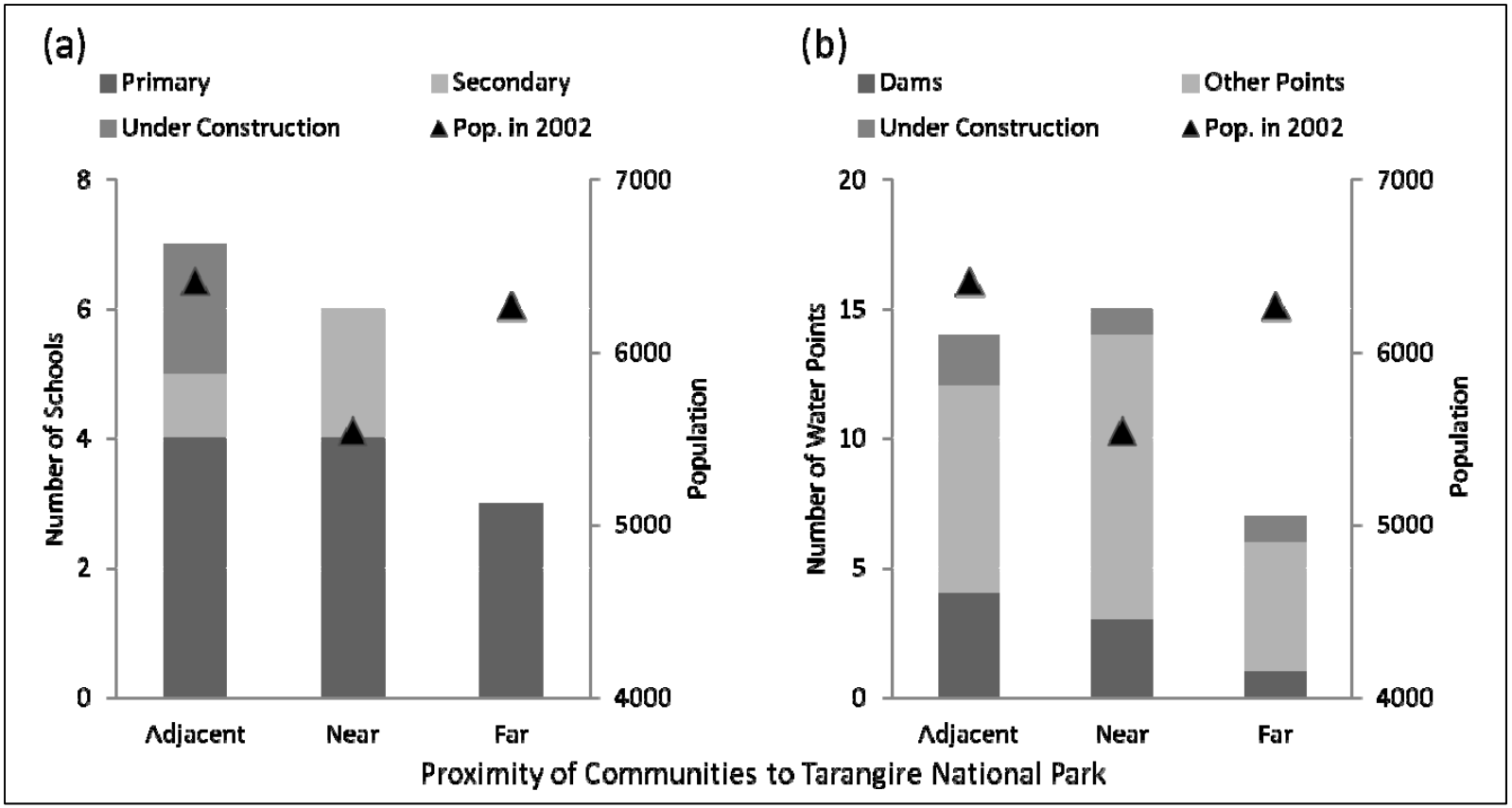

Figure 2.2. Tables (a) and (b) expand the data presented in column "*2001 – Present*" of Figure 2.1 (as well as last three rows of Appendix S1) showing the number of schools (a) and water points (b) that were functioning or under construction as of December 2010. Communities are stratified according to their proximity to TNP (i.e., Adjacent, Near, Far) and feature totals are summed for each group of communities. Dams and other water points are disaggregated as are primary and secondary schools. Population estimates from the 2002 Tanzanian Census are presented on the secondary axis for each pair of communities (see note [a] from Table 2.1 for more information on community populations).

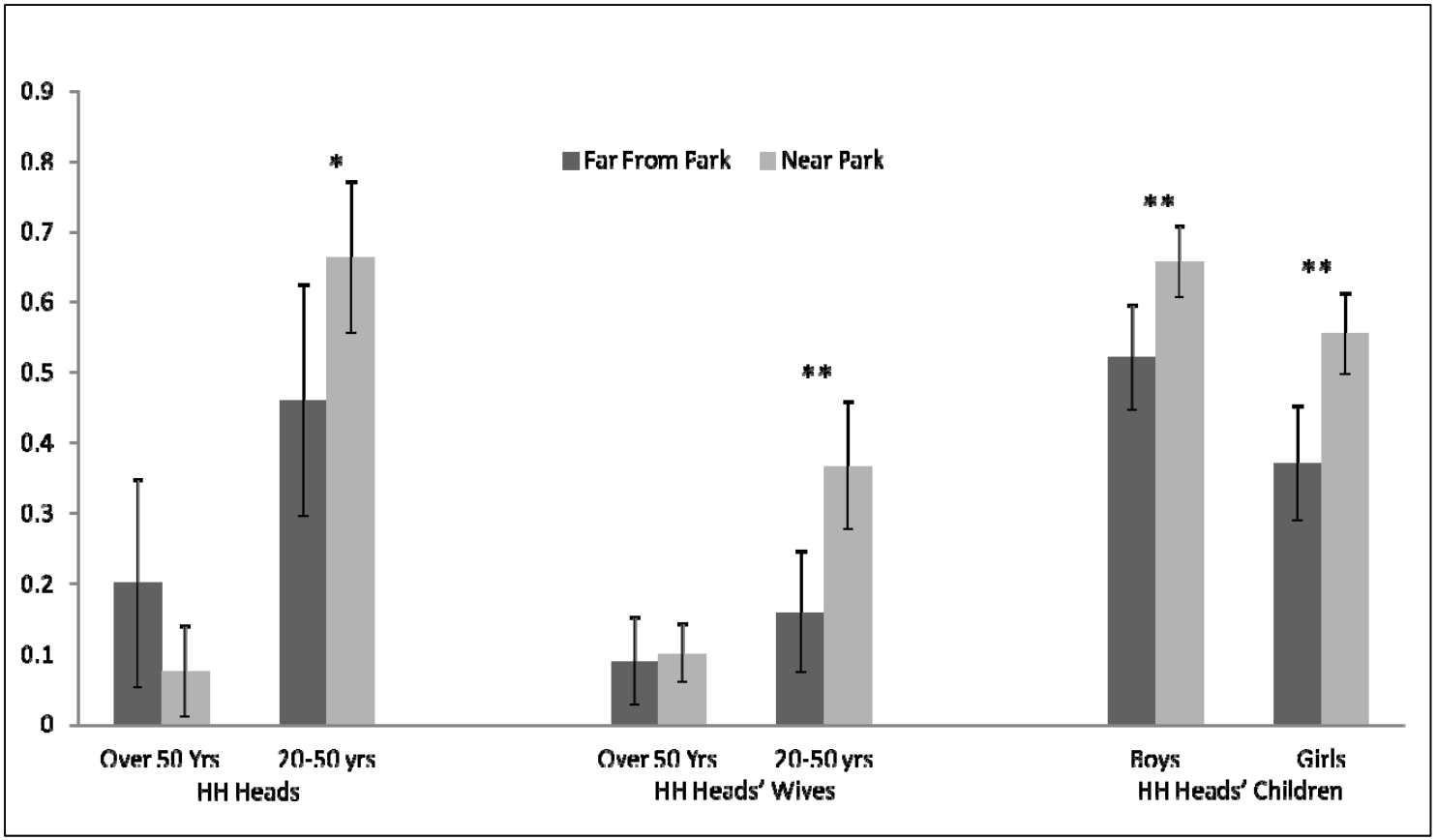

Figure 2.3. Proportion of household (HH) heads, heads' wives, and heads' children from household sample who attended school. The sample is stratified by approximate age of household head (i.e., "Over 50 yrs" and "20 – 50 yrs") and proximity to TNP (i.e., Adjacent and Near = Near Park; Far = Far From Park). Comparisons of "Near Park" and "Far From Park" are made within each age-group (or gender for students) for each variable. For example, a chi-square test is used to test the difference between HH heads between 20 and 50 far from the park and those between 20 and 50 near the park. Horizontal bars with an * or ** represent $p < 0.05$ and $p < 0.01$ respectively for chi-square tests.

CHAPTER 3

Conservation, Disturbance and Livelihood Diversification

3.1. Introduction

The proliferation of parks and protected areas (PAs) around the world has spurred extensive research and a general consensus that the fates of local livelihoods and local environmental protection and linked (Adams et al. 2004; Agrawal and Redford 2006; Cernea and Schmidt-Soltau 2006; West et al. 2006; Wilkie et al. 2006; Barrett et al. 2011). Despite this consensus and a wealth of research on the social costs associated with biodiversity conservation (West et al. 2006; Coad et al. 2008), much remains unknown about how parks and PAs create opportunities and constraints for people, and how people adapt to these effects creating new conservation and development concerns in the process. Some recent studies have found measures of poverty reduction on the borders of parks and PAs (Andam et al. 2010; Sims 2010; Barrett et al. 2011; Ferraro and Hanauer 2011; Naughton-Treves et al. 2011). These findings run contrary to much of the literature on the social dynamics of conservation, which have focused on the social burdens created by parks and PAs (Brosius et al. 2005; West et al. 2006; Brockington et al. 2008). Recent studies showing poverty reduction near parks, however, lack convincing theories of change and have struggled to describe the mechanisms that underlie these phenomena. Andam et al. (2010) noted, that "research to understand these mechanisms is a clear future priority" (9999).

This paper examines the mechanisms that underlie wealth and income measures among agro-pastoralist households living near Tarangire National Park (TNP) in northern Tanzania. Parks and PAs are conceptualized as centers of disturbance and upheaval, to which households respond in ways to spread risk, reduce variance in household income and wealth, and increase welfare. As such, this paper examines the character and incidence of livelihood diversification in agro-pastoral communities near TNP compared to control communities.

3.2. Conceptual Framework

In this paper, we offer a conceptual model of change which views: (1) parks and PAs as centers of disturbance in social/ecological systems (SESs); and (2) livelihood diversification at the household level as an adaptive response to park-related disturbances. A common definition of disturbance used by ecologists is "any relatively discrete event in time that disrupts ecosystem, community, or population structure and changes resources, substrate availability, or the physical environment" (White and Pickett 1985, 7). Gallopín (2006) broadened this definition by suggesting that perturbations (i.e., disturbances) are "the external or internal processes interacting with the system and with the potentiality of inducing a significant transformation in the system, be it slow or sudden" (2006, 295). In the literature on the social aspects of disturbance, scholars have focused on: (1) humans as drivers of disturbance in ecosystems (Hobbs and Huenneke 1992; Dale et al. 2001); or (2) human responses to natural disturbances such as droughts (Block and Webb 2001) or hurricanes (McSweeney and Coomes 2011), though in the later cases ecological definitions that stress pronounced changes in resources are

generally adopted. In looking at adaptive capacity and response to forest disturbance in the developing world, Coleman focused on "disturbances which alter the flow of forest resources essential for community livelihoods" (2011, 855). Here we adopt Coleman's conceptual approach to disturbance.

Parks can be centers of disturbance. By disrupting established relationships between resources and resource-users, introducing new constraints and opportunities, recruiting new resources, and creating the space for new learning, new relationships, and new feedbacks parks resemble in character and function more commonly regarded disturbances such as hurricanes and economic or political crises. Yet parks do not constitute singular disturbances, bound in time neatly around the period of each park's creation. Rather, parks can foster a type of repeat disturbance where ongoing phenomena and punctuated events, centered on the park, introduce novelty and catalyze processes of change and response. These events can take place years after the creation of a park and can take many forms, including: park expansion, political contests over land-use restrictions around parks, and the attraction of development and conservation NGOs to communities along park borders.

Much of the scholarship on the mechanisms that affect the social consequences of conservation has focused on fast-moving processes such as the eviction of local residents from land (Brockington and Igoe 2006), the alienation of resources from local residents (Ghimire and Pimbert 1997), the implementation of programs including community-based conservation initiatives (Goldman 2003; Berkes 2004), and the attending political processes involved in each of these projects (Igoe 2003; Brosius et al. 2005). Change, however, is shaped by the interaction of slow and fast variables (Holling and Gunderson

2002). Furthermore, recent studies on the household-level outcomes associated with human/park interactions have again focused on fast-moving variables such as income and wealth (Andam et al. 2010; Sims 2010; Barrett et al. 2011; Ferraro et al. 2011).

Slower processes of social change associated with parks, PAs, and households have received comparatively less attention. Over time, parks can "grow" into the landscape becoming more normalized or established components within the SES. This happens over the course of years as social institutions and ecosystem components adapt to it. During this process, political administrations change, programs or initiatives can come and go, and generations pass – but, like a K-strategist, the park endures and can become more fixed in the landscape and in the minds of local people. And yet, despite this process of establishment (or normalization) which evolves over decades, the park can also remain as a center of disturbance, or creative destruction (Schumpeter 1950). This role is demonstrated directly and indirectly in a number of possible ways:

- Conservation and development NGOs attracted to communities bordering the park can provide financial and/or infrastructural resources to groups and individuals dramatically improving access to key resources such as water and education (Chapter 2);
- Markets for tourism and ecosystem services can expand beyond the park to nearby communities who can collect rents to support local development (Nelson et al. 2010; Sachedina and Nelson 2010);
- Government officials can impose new, or alter existing, land-use restrictions surrounding PAs to limit economic activities (Neumann 1997; Nelson et al. 2007; Davis 2011);
- Park and government officials can expand park borders into adjacent areas (Nkwame 2011); and
- The promise, or threat, of shocks may shift local perceptions of opportunities or risks respectively in dramatic ways that lead to behavioral changes (Baird et al. 2009).

Each of these examples, which represent disturbances subsequent to the formation of a park, can unfold in acutely punctuated events or more drawn out periods (Gallopín 2006).

There are two conceptual representations of the profile of disturbance that parks may facilitate. First, parks can be conceptualized as a single disturbance event around the time of park formation with a gradual reduction in the disturbance level as time goes by (Curve 1, Figure 3.1). This is the representation implied in much of the scholarship on the social consequences of conservation (though the language of disturbance is not commonly used). Second, several periods of disturbance following park formation may occur where shocks and corresponding attenuations follow from park-related phenomena (Curve 2, Figure 3.1). This can be thought of as the repeat disturbance associated with parks.

Subsequent disturbances, separated in time but not space from the initial creation of the park, can help to create an atmosphere that amplifies variance in the returns to certain household economic activities – an alarming prospect in areas where people live close to the subsistence level and a modest reduction in household income could be disastrous, and annual variance is already high. Land-use restrictions can reduce the expected return from agricultural activities, whereas park expansion and further alienation of forage and water resources can severely undermine pastoralist activities. Alternatively, some households may be motivated by opportunities associated with new markets (including labor markets) and new connections with outside organizations attracted to the area. Over time, this continual upheaval can cause households to seek to reduce variance in their own wealth and income and insulate themselves from future shocks by supplementing traditional economic activities with new, less familiar activities that may serve to spread risk (Barrett et al. 2001), including: off-farm wage labor, migrant labor and remittances, and sharecropping. This often protracted shift from

traditional economic activities to normative, diversified livelihood strategies can be seen as an important part of gradual, socio-cultural shifts and is correspondingly exemplary of the types of "slow" processes that are often overlooked in studies of the social dynamics of conservation.

The transition to a more diversified portfolio of economic activities, or livelihood diversification is common throughout the developing world (Ellis 2000; Barrett et al. 2001), however, its application as a strategy in communities near parks and PAs is not well understood (Homewood et al. 2009). To address these concerns, this study asks the following research questions (RQs): (RQ1) How do household-level measures of wealth, income, and livelihood diversification in communities near TNP compare with communities distant from any parks? and (RQ2) What is the effect of proximity to TNP on measures of livelihood diversification when controlling for other factors?

3.3. Livelihood Diversification

Ellis defines livelihood diversification as "the process by which rural families construct a diverse portfolio of activities and social support capabilities in order to survive and to improve their standards of living" (1998, 4). As a strategy, diversification is pursued for a variety of reasons and holds a number of implications which will be discussed below.

Research on the factors that influence the decision to diversify has tended to stratify them into two broad categories which Barrett et al. refer to as push and pull factors (2001). In some cases, individuals or households will be pushed into diversifying by constraints whereas in other cases, opportunities may pull decision-makers towards

new opportunities. Framing this divide in terms of "necessity" and "choice," Ellis (2000) points out that these factors often operate in concert with each other. Furthermore, the literature on rural livelihood diversification in the developing world has tended to focus on two general types of households: agricultural households whose primary source of income has been farming, and pastoralist households who have traditionally relied on livestock production. These two types of households are typically separated by larger ethnic and cultural divides and are often discussed independently of each other.

Research on livelihood diversification among farming households in the developing world have tended to discuss it in terms of off-farm or nonfarm employment. Ellis (1998; 2000) and Barrett et al. (2001) provide thorough overviews of livelihood diversification, framing its determinants in the largely economic terms of rationality by focusing on: credit market failures, varying returns to land and labor (which can be related to seasonality), labor market opportunities, ex ante risk mitigation strategies, and ex post coping strategies.

According to Ellis (2000) and Barrett et al. (2001), diversification is ubiquitous throughout the developing world, although others have found it to be poorly distributed signifying barriers to entry in some economic contexts (Reardon 1997; Reardon et al. 2000; Barrett et al. 2001). Along these lines, some have found that access to public assets such as roads and private assets such as education and credit are associated with off-farm activities (Escobal 2001). Alternatively, issues related to gender, wealth, and occupation differences can shape access to off-farm activities (Smith et al. 2001).

Among many pastoralist groups, diversification into agriculture is the most common form of livelihood transition (Little et al. 2001; McCabe et al. 2010), though

new types of diversification are emerging including waged employment and labor migration (Homewood et al. 2009). Similar to farming households, diversification among pastoralists is generally seen as a coping and/or risk mitigation strategy with poorer households being pushed into new strategies and wealthier households diversifying to mitigate their exposure to risk (Little et al. 2001; Brockington 2002; Homewood et al. 2009). Studies have linked diversification to land privatization and reduced access to grazing areas (Galaty 1994; Homewood 2004), market integration (Little 2003), education (Berhanu et al. 2007), and NGO-sponsored development (Igoe 2003). Others have noted that diversification into agriculture is also a way for herders to generate income without selling livestock – thus insuring the persistence of pastoralist livelihoods (McCabe 2003; McCabe et al. 2010).

The role of disturbances, or shocks, in shaping diversification strategies in the developing world is an important theme in the literature on diversification. Studies have shown that climatic and geologic shocks including droughts (Block and Webb 2001), hurricanes (McSweeney and Coomes 2011) and tsunamis (Mills et al. 2011) can serve as ex post drivers to diversify. Similarly, diversification has also been observed following extreme economic crises as an adaptive response to boost household incomes (Priebe et al. 2010). Other studies have found ex ante diversification strategies to buffer local households from shocks associated with policy changes (Barrett et al. 2001) and extreme weather events (Adger et al. 2005). And while the notion that parks constitute disturbances in SESs has not been explored, a small number of studies have drawn connections between conservation and livelihood diversification (Brockington 2002; Goldman 2003; Homewood et al. 2009; Trench et al. 2009). Generally, these studies

have provided qualitative assessments, have not included proper controls, or have stratified households economically, not geographically (see Trench et al. 2009). As such, the effect of proximity to parks and protected areas on livelihood diversification remains under-explored. As developing areas become more integrated in a globalizing world and efforts to protect biodiversity increase, understanding the connections between conservation and livelihood diversification will be critical to many areas of social and environmental concern.

3.4. Study Area and Data Collection

3.4.1. Study Area

The Tarangire-Manyara region of northern Tanzania is one of the most diverse grassland ecosystems on the planet (Olson and Dinerstein 1998). It contains the second largest migration of ungulates in East Africa after the Serengeti-Mara migration (Lamprey 1964; Kahurananga 1981; Reid 1998). Geographically, it connects a larger network of protected areas that extends from Serengeti National Park in western Tanzania to Kilimanjaro and Mkomazi National Parks in the East. Tarangire National Park, however, protects only 15% of the larger Tarangire-Simanjiro ecosystem which extends far into communities in Simanjiro District (see Figure 3.2). This exemplifies a concern among conservationists that a vast majority of East Africa's wildlife are dispersed outside of PAs on lands that humans use (Western and Gichohi 1993) and supports a conviction that unfenced, uncultivated lands near parks are necessary to increase the total range of resources that wildlife can access (Western and Ssemakula 1981). This concern over

biodiversity protection and land-use surrounding the park has driven conflict between local communities and conservationists since TNP was gazetted in 1970.

Before the park was established, the areas that are now TNP and Simanjiro District comprised portions of the traditional territory of the Kisongo Maasai (Igoe 1999). This group's economic activities have traditionally centered on transhumant pastoralism, a culturally engrained activity that is well suited to this area's semi-arid climate and high degree of rainfall variability. In the past few decades, however, the Maasai throughout East Africa have begun to adopt agriculture (McCabe 2003; Cooke 2007). Prior to eviction from the park, local Maasai faced many risks in their daily livelihood activities, including human and livestock diseases, livestock predation, limited access to water, and drought. Since the creation of TNP, new concerns have evolved.

Beyond the major shock to local livelihoods when TNP was created, residents were evicted and access to forage and water resources within the park was cut off (Igoe and Brockington 1999), several subsequent events associated with TNP could be characterized as disturbances. These events were unexpected, affected the resources on which local livelihoods were based, shifted perceptions and led to new relationships. Beginning in the 1980s, land tenure conflicts arose between communities near the park and federally sanctioned hunting companies attracted to wildlife on community lands (Baldus and Cauldwell 2004; Nelson et al. 2007). Pressured by communities and mandated by government regulations, these hunting companies eventually began to make contributions to community development (i.e. water and education infrastructure) beginning around 2000. Even before this time, communities near the park also began leasing land to photographic safari companies, soliciting Tanzania National Parks

(TANAPA) for financial assistance, and actively cultivating relationships with religious organizations, foreign donors, and NGOs to procure new resources to support community development projects (Chapter 2). In some cases, where outside organizations are clearly drawn to the park, as with TANAPA and hunting and tourist companies, the issue of causality is generally straightforward. In other cases, the pull of outside organizations (e.g., religious organizations and NGOs) to communities near the park is less clear, though even in these cases more resources are being captured near the park compared to control communities far from the park (Chapter 2).

Shocks to the SES associated with the park have been both positive and negative. In some cases, new schools and water access points have been built with support from conservation organizations (Chapter 2). In other cases, events have added uncertainty to livelihoods (Sachedina 2008; Davis 2011). In 2005, communities near the park received a letter from the Regional Commissioner stating that agriculture near the park should cease (Sachedina 2008). The stated rationale was that the expansion of agriculture near the park was harmful to wildlife, though no evidence of this was presented. While this edict lacked jurisdictional authority, it confirmed longstanding and widespread concerns in the communities that land tenure and land-use rights were insecure (Baird et al. 2009). Since 2005, some efforts have been made to reduce uncertainty and support local livelihoods. A consortium of conservation, development and tourism organizations has signed agreements with two communities near the park to pay for the protection of ecosystem services near the park (Nelson et al. 2010, Personal communication with D. Peterson, 2010) and ensure the persistence of quality grazing lands. These efforts to build capacity and ease local conflict, however, may be undermined by TANAPA's plans

to review the boundaries of the 15 national parks in Tanzania, beginning with TNP which have touched off panic in some communities near the park (Nkwame 2011). Prior research in this area has shown that even the perceived threat of park expansion can lead to the conversion of rangelands into agriculture to demonstrate private ownership (Baird et al. 2009).

This study focused on four communities located near the eastern border of TNP (i.e., two adjacent to the park border and two near the park but not adjacent) and two control villages much farther from the park (see Figure 3.2). Throughout the paper the 4 communities adjacent to and near the park will be collectively be referred to as "near" the park unless explicitly stated otherwise. Communities far from the park will generally referred to as "distant". Table 3.1 presents basic statistics on communities' populations and proximities to TNP.

Study communities were selected to examine the effect of proximity to TNP on community and household outcomes while controlling for the effect of proximity to urban centers and markets. Daily transportation to the large urban area of Arusha is available in each of the 4 communities near the park, though for how long this has been the case is unclear. Regular transportation is available 3 days a week in one of the distant communities and only once a week from the other community. These differences are not related to differences in physical distance to Arusha which are all easily within a few hours commute on roads of reasonable quality. Instead, differences are associated with availability of vehicles providing bus service – which appears to be driven by local demand. Other options for distant communities include hitchhiking and/or bicycling short distances to access major roads where daily bus service is available to Arusha or the

nearby district capital, Orkesumet, where supplies are available. Reliable information on the history of transportation to and from each of the study communities was unavailable.

3.4.2. Data Collection

Fieldwork included mixed qualitative and quantitative methodologies of data collection including group interviews, participant observation, and a structured survey of households (n=216). In the absence of reliable census records, and the resources to construct exhaustive sampling frames in each community (which each contain several hundred households widely distributed across the landscape) an opportunistic sample was drawn wherein individuals from each age-group, wealth status, and geographic location within each community were included. Local leaders were enlisted to assist in the identification of households to meet these sampling criteria.

Qualitative and quantitative methods of data collection were integrated to address each research question (RQ1 and RQ2). Qualitative semi-structured group interviews (n=64) were conducted with community members, administrators, and leaders in each community to: (1) assess the character and value of livelihood decisions and their effects on household wealth, income, and livelihood diversification; (2) inform the development of a household survey instrument; and (3) yield information on the monetary value of livestock and agricultural products to facilitate the conversion of survey measures (i.e., livestock sales, agricultural yield, etc.) into income measures for analysis. This method allowed for open discussion around generally framed questions about household economics and decision making as well as more targeted questions about seasonal market prices. Participants were selected for their daily participation in livestock and farming

activities and knowledge of current livestock and agricultural markets. The interviews solicited information on a range of topics including the market prices of livestock and agricultural products, farming strategies, issues of bringing products to market, off-farm employment, strategies for herd management and networks of exchange between households. All group interviews were conducted by me with the assistance of 1 or 2 Maasai assistants/translators (generally 2 to ensure accurate translation).

To procure quantitative data on household economic measures for use in statistical analyses and comparison across communities, a structured household survey was conducted with 36 household in each of the 6 study communities (n=216). Data were collected on: livestock holdings including breed types , gender and age; purchases and sales of livestock in previous 12 months; land allocation; area of land farmed; species farmed; farming techniques; agricultural yields in 2010; off-farm employment by household members; remittances to the household; and household demography. Surveys were conducted by trained Maasai enumerators between September and December, 2010.

3.5. Analysis

Our examination of the effects of proximity to TNP on measures of poverty and livelihood diversification included two main analyses, each comprised of multiple steps as described below in the following paragraphs. The goal of the first analysis was to conduct a general comparison of poverty and livelihood diversification measures in the communities near TNP with communities far from the park (RQ1). The second analysis involved the estimation of regression models to examine the relationship between four measures of livelihood diversification and proximity to TNP when controlling for other

factors (RQ2). Descriptions of the variables used in each analysis are presented in Table 3.2.

The values for many of the variables used in these analyses were reported directly by survey respondents themselves. Some measures, however, were derived from a combination of information captured on the survey and information collected during semi-structured group interviews. Specifically, measures of income (i.e., monetary value) from livestock sales, income from agricultural harvest, and total income were calculated by multiplying household livestock sales and harvest numbers (i.e., number of 100kg bags of maize) respectively by the prices of each[9]. To estimate the prices, one of the authors conducted semi-structured group interviews with local residents throughout the study area in Jun/Jul and Sep/Oct to capture seasonal variation in market prices for agricultural products (e.g., maize and various species of beans) and livestock with attention to differences across species, breeds, genders, and ages (i.e., sizes). These interviews revealed notable variability in prices across space and time especially for livestock, which is consistent with observations from livestock transactions in Kenya (McPeak and Barrett 2001) which point to weak spatial correlation in price movements. Ultimately, values from different times and places were averaged to produce a single value used in income estimations across communities. This was done to shift the focus of livestock and harvest valuation away from markets and spatial differences and towards livestock and harvest numbers described in monetary terms.

[9] In other studies of the Maasai, measures of household income have included the value of all milk sold, however, Homewood et al. (2009) have shown that income from the sale of animals constitutes more than 96% of the total income from livestock (2009, 227). Furthermore, milk sales are often conducted by wives within the household, not household heads. Procuring accurate information on milk sales, therefore would have added considerable time and expense to the household survey to yield data of uncertain accuracy, that is ultimately known to comprise a tiny percentage of the total income from livestock. For these reasons, data on milk sales was not collected and is not represented in the measures.

This decision had strengths and weaknesses. The strengths were that it allowed for the aggregation of livestock sales and harvest numbers into a single measure of income in a way that allowed for a comparison of the *numbers* of livestock and bags of harvest across communities. This was important because the benefit of these items in terms of provisioning the household was very similar across communities. A lactating cow or a bag of maize provides the same amount of nourishment to a household regardless of differences in the market value of that item across communities. Often, the values of crops are of secondary importance to households because crops are grown to eat, not to sell. Consequently, cultivation displaces the need to sell livestock to buy grain rendering the livestock market less relevant to the household (McCabe et al. 2010). The weakness of this decision to aggregate prices across space and time was that it was a considerable abstraction of the parameters that shape human behavior on the ground in Simanjiro District. Variability in space and time was evident, however, the complexity of the livestock and agricultural markets and the feedbacks inherent in them were beyond the scope of these analyses. Ultimately, economic decisions in this area are more often driven by efforts to maximize wellbeing and food security than monetary wealth, and so measures that permit comparison on these terms were more desirable.

3.5.1. Comparison of Wealth, Income and Livelihood Diversification Measures

To compare household wealth, income and diversification measures near and far from the park, study communities were stratified into two categories: one category of four communities located near TNP and a second category comprised of 2 communities located far from the park (see Figure 3.1 and Table 3.1). Communities were stratified in

this way because prior studies in the area found that households in the 4 communities near the park perceive it as a source of risk in their lives whereas households in the control communities do not (Baird et al. 2009). For each strata (i.e., near and far) means of diversification measures were calculated and differences between strata were tested for significance while accounting for clustering at the community level. Variables included 1 measure of wealth (i.e., TLU/AE) and 1 measure of income (i.e., total income) commonly used in research on the Maasai; and 12 measures of livelihood diversification (Serneels et al. 2009; Trench et al. 2009).

3.5.2. Wealth & Income

Per capita household wealth was measured using an index of livestock holdings at the time of the survey interview, or Tropical Livestock Units (TLU) which accounted for differences in species type (see Table 3.2). Income was measured by summing all income sources in the 12 months prior to the time the survey was administered to the respondent (see Table 3.2). This measure includes the value of all livestock sold, crops harvested, household head employment, remittances to the household from migrant workers, and income from leased land during that period (see endnote i). The monetary value of household head (HHH) employment, remittances, and income from leased land were estimated directly by respondents. The calculation of income variables related to livestock sales and agriculture is described above.

3.5.3. Livelihood Diversification

Measures for livelihood diversification included dichotomous variables for whether the household kept improved breeds, farmed, farmed multiple species, used a tractor, and earned income beyond livestock and agriculture sources (i.e., other income). Further proxies for livelihood diversification included size of land allocation (land allocations are applied for and distributed through community government structures), acres in cultivation in 2010, and yield per acre (for maize), total number of income sources, and percentage of total income coming from each of the following categories: livestock, agriculture, and all other sources. Values for yield per acre, and percentage of total income coming from livestock, agriculture, and other sources were constructed by drawing on survey questions for total acre acres cultivated, total harvest, total livestock holdings, and total income from other sources (including all sources mentioned above). All other diversification proxies were reported directly by survey respondents.

3.5.4. Regression Models

Ordinary least squares (OLS) regression models were estimated to investigate the effect of proximity to TNP on four measures of livelihood diversification while accounting for other factors. The measures of livelihood diversification included: *percentage of total income from livestock*[10]; *percentage of total income from agriculture*; *percentage of total income from other sources*, and *total number of income sources*. These measures of livelihood diversification are well established in the literature on the determinants of diversification (Block and Webb 2001; Minot et al. 2006; Homewood et al. 2009). Each of the dependent variables that measures a percentage of total income is

[10] In pastoralist societies, lower (or intermediate) measures of percentage of total income from livestock are indicative of livelihood diversification.

censored at 0 and 1. Values for the variable *total number of income sources* are whole numbers ranging between 0 and 4. Tobit and Poisson models were also estimated where appropriate to account for censoring or a count distribution, however, results in each case were not meaningfully different than the OLS models.

Proximity to TNP is represented by the variable *community* which identifies each respondent's community of residence. As noted in Table 3.1, two communities are located adjacent to the border of TNP (i.e., Loiborsoit and Emboreet), two communities are located near the border (i.e., Terrat and Sukuro), and two communities are located far from the park border (i.e., Landanai and Kitwai). Predictors controlled for include HHH characteristics (i.e., age, education, and religion) and HH wealth characteristics (i.e., log normalized values of TLU, AE, and TLU/AE). Means and standard deviations for all variables used in the regression models are presented in Table 3.4. All models were adjusted for clustering at the level of the community (Angeles et al. 2005), which corrects for any community-level correlation arising from the clustered sampling strategy. A supplementary set of models were also estimated to test for interactions between TLU and AE and non-linearity in the relationship between diversification measures and TLU and AE but were not significant, did not change other coefficients, and were consequently excluded from the final models.

3.5.5. Strengths and Weaknesses of Approach

The comparative design of this study controls for the fact that poverty is ubiquitous in the study area and not restricted to areas near the park. Many studies that look at the effect of parks and PAs on social outcomes focus only on areas near parks and

therefore cannot separate the effect of the park from other factors (West et al. 2006; Andam et al. 2010; Barrett et al. 2011). Furthermore, this case-study was researched over the course of a full year in the field using quantitative and qualitative methods. Qualitative group interviews greatly enhanced the quality of the household survey by alerting us to what measures of diversification were most important within communities and helping us to understand why communities were diversifying and how new activities were integrated in larger social processes of exchange and reciprocity, issues that will be raised again in the discussion. Several recent studies on household-level outcomes associated with proximity to parks and PAs have been large, secondary data analysis projects and consequently offer a more limited understanding of the casual mechanisms underlying and the local implications of their findings (de Sherbinin 2008; Andam et al. 2010; Sims 2010; Ferraro and Hanauer 2011).

The central weaknesses of this approach are that the sample size is small and the sampling strategy was not random – reflecting the typical factors that limit case-studies and lone field researchers with limited resources. Mean measures of household wealth obtained in this study, however, are consistent with measures from much larger studies of Maasai households in Tanzania that utilize random samples(Homewood et al. 2009), suggesting that this sample is not necessarily skewed.

3.6. Results

3.6.1. Comparison of Wealth, Income and Livelihood Diversification Measures

The results for the comparison of wealth, income and livelihood diversification measures in communities near and far from TNP (RQ1) are presented in Table 3.3. First,

the results of the wealth and income measures and then the livelihood diversification measures are discussed below. Overall the results from the proxies for wealth and income were not broadly consistent with recent studies that found poverty reduction near parks and PAs compared to control areas (Andam et al. 2010; Sims 2010; Barrett et al. 2011). Differences between community strata were not significant for either the measure of wealth or income. This finding is consistent with recent findings that proxies for poverty (e.g. infant mortality rates) in developing countries were no higher in areas near parks compared to national averages (de Sherbinin 2008).

Measures of livelihood diversification, however, were significantly different in most cases. Results show that while most households in the study area were farming, very few far from the park were farming multiple species compared to households near the park. The mean number of acres farmed per household was similar across the strata despite the difference in land allocation which was significantly higher near the park. Yield per acre was also higher near the park, but a notable difference in tractor use was not significant due to community-level clustering. Regarding livestock, a significantly greater proportion of households near the park were keeping improved breeds compared to distant households.

Differences in the components of total household income (i.e., livestock, agriculture, and other) were all significant between the two groups of households. The mean percentage of total household income coming from the sale of livestock far from the park was almost double what it was near the park. Correspondingly, the mean percentages coming from agriculture and other sources were much lower for households far from the park compared to households near the park. These differences were

consistent with differences in: (1) the proportion of households deriving income from sources besides livestock and agriculture; and (2) the average number of sources of income for each household, which were both significantly higher near the park.

These results point to an ambiguous relationship between the park and poverty reduction but a positive association between proximity to the park and livelihood diversification.

3.6.2. Regression models

The results for the regression models (RQ2) are presented in Table 3.5. First the results for the control factors and then the results for proximity to TNP are discussed below. Generally, the results of the control variables are consistent with previous research from East Africa which found that geographic measures generally were better predictors of diversification than socio-demographic measures, with the exception of education (Trench et al. 2009).

At the individual level, measures of age, education, and church membership were only significant in the models estimating % of total income from livestock sales and total number of income sources. Members of the youngest age-set (i.e., aged 20-34) got more of their total income from the sale of livestock compared to the reference category (aged 50), however age was not significant in any of the other models. The effect of education was negative in the model estimating the % of income from livestock and positive in the model estimating total income sources, findings that are consistent with each other. Respondents who reported membership in “other” churches (i.e., not Lutheran or Catholic) derived more of their total income from livestock sales than respondents who

were not members of any church. And members of the Catholic Church received income from fewer sources than respondents who were not members of any church.

At the household level, measures of wealth (ln(TLU)), household size (ln(AE)), and wealth per capita (ln(TLU/AE)) were only significant in the first model listed in Table 3.5 wherein wealth was positively associated with % of total income from livestock and household size and wealth per capita were negatively associated, results broadly consistent with other findings from Africa (Barrett et al. 2001).

Consistent with the descriptive results in Table 3.3, proximity to TNP, as measured by the respondent's community of residence, was significantly associated with the dependent variable in each model, and generally the coefficients for the communities near the park were in the opposite direction of the coefficients for the communities far from the park when compared to the reference community (i.e., Sukuro; near the park, but not adjacent). Respondents in Loiborsoit and Terrat, near the park, derived a lower percentage of their household income from the sale of livestock compared to Sukuro (note: Emboreet, near the park, was not significantly different from Sukuro), whereas the communities far from the park derived a much higher percentage. In general, the magnitude of the differences between coefficients for communities near the park compared to distant communities is large. In the models estimating the % of total income from other sources and total number of income sources, communities near the park had positive coefficients or coefficients not significantly different from Sukuro, whereas communities far from the park had significant negative coefficients. Only the model for % of total income from farming did not follow these patterns.

3.7. Discussion

3.7.1. Livelihood diversification

Taken together, the results provide strong evidence that proximity to TNP affects livelihood diversification (RQ2), and weak evidence that wealth and income measures are not significantly different between communities near the park and distant ones (RQ1). The most convincing evidence of livelihood diversification is that households near the park derive a much smaller percentage of their total household income from the sale of livestock than control households, findings consistent with other studies in this area (Homewood et al. 2009; Trench et al. 2009). Controlling for other factors, households far from the park generate most of their income through livestock sales. For this group, agriculture is limited primarily to maize and yields per acre are low. Furthermore, few households in distant communities pursue income generating activities beyond livestock and agriculture. With this strategy, the benefits of diversification are reduced as livestock and agriculture are each dependent on precipitation, and therefore returns are covariate (Ellis 2000; Barrett et al. 2001).

In the communities near the park, the basic household economic infrastructure that underlies measures of wealth and income is categorically different. Survey results shows that these households derived a smaller percentage of their income from livestock sales than the control communities. Group interviews revealed that households have been adopting and/or expanding other income generating activities including agriculture, off-farm employment, labor migration, and share-cropping for years. Survey results also show that the scope of agriculture near the park is broader than in control communities,

with households cultivating varieties of beans in addition to maize and generally attaining higher per acre yields.

While quantitative findings are cross-sectional and comparative across space, and therefore do not account for baseline differences between communities[11], they nonetheless provide important insights into the household strategies that underlie wealth and income outcomes in communities near parks and PAs and consequently shed light on recent findings of poverty reduction near parks (Andam et al. 2010; Sims 2010; Barrett et al. 2011). In this case, the mechanisms that generate income and wealth vary across space even where income and wealth themselves do not. It may be that livelihood diversification is a precursor to higher incomes as other studies have found (Bezu et al. 2011; Bigsten and Tengstam 2011). However, maximizing income, in these communities, was not the central purpose of diversification. Group interviews and participant observation in the study area pointed to several reasons why households had been diversifying: to reduce the need to sell livestock (see McCabe et al. 2010), to protect privately held land from park expansion (see Baird et al. 2009); to insure themselves against loss, and to build the capacity to handle problems independently. In this way, poverty measures, such as wealth and income, can be seen as the outcomes associated with risk-sensitive adaptations, not simply the barometers of park-related opportunities and constraints. In light of this, the potential connections and feedbacks between livelihood diversification and other risk management strategies, such as social networks are called into question.

[11] As noted earlier, however, control communities are similar to study communities in terms of a number of criteria including ethnicity, culture, economics, and environment. Consequently, concern for profound differences at baseline (before the park was created) is low.

Historically, Maasai have managed risk collectively through common property regimes and longstanding institutions of exchange and reciprocity that both rely on and support strong, dense social networks. As groups increasingly embrace risk management strategies at the household level corresponding shifts in the structure and function of broader social networks could be expected. Ellis notes that "the concept of livelihoods seeks to convey the non-economic attributes of survival, not just the economic ones; it therefore includes, inter alia, the social relationships and institutions that mediate people's access to different assets and income streams" (2000, p. 290-91). This perspective, taken with the findings presented here, point to the need for new research on the relationship between diversification and social networks.

Over time, the Maasai have developed complex social networks that revolve around livestock and commonly managed rangelands (Spear and Waller 1993). During group interviews, community members described an earlier time when people relied almost exclusively on livestock to provision their households. When a family's herd suffered major losses to drought or disease, or the family faced other problems for which cash was not available, they relied on social networks of exchange and reciprocity for loans or gifts to carry them through. As households diversify into new income generating activities that reduce risk and consequently the importance of traditional reciprocal exchanges of social insurance, networks may ultimately erode reducing adaptive capacity, community cohesion, and resilience (Adger 2006). Alternatively, networks may expand or evolve as households are able to engage with new groups, and expand the assets and resources through which exchanges can be conducted and networks can be based. These competing hypotheses, or consequences (Agrawal and Chhatre 2011), offer

new directions for research on the social dynamics of conservation and should be examined more closely.

The implications of diversification are multitudinous. Prior studies have identified several benefits associated with livelihood diversification including higher incomes (Bezu et al. 2011; Bigsten and Tengstam 2011), reduced environmental impact (Caviglia-Harris and Sills 2005), greater social resilience, (Adger 1999; Adger et al. 2002), and ability to respond to disturbance (Adger 1999). Conversely, diversified livelihoods may increase transaction costs and barriers to information and consequently reduce access to and benefit from new technologies in agricultural settings (Sumberg et al. 2004). Furthermore, it may be that the ways in which the implications of livelihood diversification are understood are insufficient to understand diversification near a park. Diversification strategies may include activities that: (1) that deplete soil fertility and reduce biodiversity undermining conservation efforts, as is the concern with agriculture in this area: and/or (2) support the persistence of longstanding economic activities whose effects on ecosystem processes are more benign, as with livestock production (McCabe et al. 2010). They may lead to win-win situations (Ferraro and Hanauer 2011), or pit social wellbeing against environmental health. In either case, patterns of diversification may become normalized with local cultures (McCabe et al. 2010), creating positive feedbacks from generation to generation.

3.7.2. Parks as Disturbance

Lastly, these findings are consistent with findings that link livelihood diversification to various type of disturbance in SESs (Barrett et al. 2001; Block and

Webb 2001; Adger et al. 2005; Priebe et al. 2010; McSweeney and Coomes 2011). Taken together with the history of disturbance in the Tarangire/ Simanjiro region described above, these findings suggest that the hypothesis that parks and PAs support repeat disturbances to SESs is tractable and should be investigated further. Ecologists have found that human activities have altered disturbance regimes (Hobbs and Huenneke 1992; Dale et al. 2001) and in some cases efforts to control disturbances regimes have themselves created new disturbances in ecosystems. This is evident especially in cases where fire suppression led to devastating crown fires (Syphard et al. 2007). This same dynamic may exist where parks and PAs, seeking to reduce the effects of human disturbance on ecosystems, ultimately disturb longstanding relationships between resources and resource users through cascading shocks and feedbacks, leading to dramatic, unanticipated changes in SESs.

Testing this park-as-disturbance hypothesis would require detailed data on the pre-park state of the SES, and comparative studies that examined multiple parks through time alongside control areas would be ideal, if not difficult to obtain. Still, disturbance ecology offers several insights to social studies of conservation. Disturbance interval and magnitude, along with the diversity or homogeneity of the disturbance regime may have profound effects on the character, incidence and diversity of human responses. While measurement challenges remain, appreciation of these dynamics between parks and people and the feedbacks that they engender will be critical as efforts to protect biodiversity (Rands et al. 2010) and reduce global poverty (Sachs et al. 2009) expand and confront increasingly dynamic conditions shaped by global climate change, population growth, and globalization.

Tables for Chapter 3

Table 3.1. Study communities' population and proximity to park (actual and categorical).

Community	*Population in 2002 (TZ Census[a])*	*Approx. Distance to Park[b] (km)*	*Near (Adjacent/Not Adjacent) & Far*
Loiborsoit	4160	27	Near (Adjacent)
Emboreet	2244	23	Near (Adjacent)
Terrat	2837	43	Near (Not Adjacent)
Sukuro	2704	34	Near (Not Adjacent)
Landanai	4993	92	Far
Kitwai	1273	96	Far

[a] The 2002 Tanzanian Census (Tanzanian National Bureau of Statistics 2004) offers the most reliable estimate of population for these communities.
[b] Represents Euclidean distance from the community center to the eastern border of TNP.

Table 3.2. Descriptions of variables used in poverty and livelihood diversification comparison (Table 3.4) and regression analysis (Tables 3.3 and 3.5).

Variable	*Description*	*Table 3 (Means)*	*Tables 4 & 5 (Reg. Models)*
Household wealth and income measures			
TLU	Tropical Livestock Units (measure of livestock holdings that accounts for differences across species)[12].		Yes (Ln)
AE	Adult Equivalent Units (measure of HH size that combines members of different ages and genders to compare provisioning requirements across households)[13].		Yes (Ln)
TLU/AE	TLU divided by AE (measure of per capital livestock holdings). This is a common measure of wealth among the Maasai.	Yes	Yes (Ln)
Total income	Total HH income in the 12 months preceding the survey interview coming from all sources including the value of all livestock sold, crops harvested, household head employment, remittances to the household from migrant workers, and income from leased land).	Yes	
Other household head (HHH) characteristics			
Age	Categorical measure of age-set of HHH, which is a proxy for age. Age-sets are: Korianga (20-34 yrs); Landis (35-49 yrs); Irkishumu (50-64 yrs); Seuri and older age-sets (over 64 yrs).		Yes
Education (0/1)	Measure of whether or not the HHH had any formal education (i.e., attended school).		Yes
Religion	Measure of HHH membership in church (Lutheran, Catholic, Other Church, or not a member of any church).		Yes

[12] Tropical Livestock Units (TLUs) are defined here as: 1 adult zebu cow = 0.71; 1 adult sheep/goat = 0.17 (Homewood et al. 2009)

[13] Adult Equivalents (AE) is a measure of a group of people expressed in terms of standard adult reference units, with respect to food or metabolic requirements. An adult male serves as the reference adult with other categories measured as fractions of that reference: adult male = 1 AE; adult female = 0.9 AE; male/female 10-14 years = 0.9 AE; male/female 5-9 years = 0.6 AE; infant/child 2-4 years = 0.52 AE (Homewood and Rodgers 1991; Sellen 2003).

Variable	*Description*	*Table 3 (Means)*	*Tables 4 & 5 (Reg. Models)*
Household diversification measures			
Improved breeds (0/1)	Measure of whether or not the household keeps any improved breeds of cattle (i.e., Sahiwal, Boran, Mpwapwa). Improved Breeds generally grow faster and bigger, reach sexual maturity quicker, have higher fecundity, lactate at higher rates, and are considerably more expensive than the traditional zebu species.	Yes	
Farming (0/1)	Measure of whether or not the HH farmed in 2010.	Yes	
Farming multi spp. (0/1)	Measure of whether or not the HH farmed more than one crop species in 2010.	Yes	
Tractor (0/1)	Measure of whether or not the HH used a tractor to plow in 2010.	Yes	
Allocation	Measure of the number of acres formally allocated to household for private use as of 2010.	Yes	
Acres farmed	Total number of acres farmed in 2010 for all crops.	Yes	
Yield	Total yield/acre for maize in 2010.	Yes	
% of income (livestock)	Percentage of total HH income from the sale of livestock in the 12 months preceding the survey interview.	Yes	Yes
% of income (farming)	Percentage of total HH income from the value of harvested crops in the 12 months preceding the survey interview.	Yes	Yes
% of income (other)	Percentage of total HH income from all other sources of income (i.e., not livestock sales or harvest value) in the 12 months preceding the survey interview.	Yes	Yes
Other sources (0/1)	Measure of whether or not the HH had income from other sources (i.e., not livestock sales or harvest) in the 12 months preceding the survey interview.	Yes	
# of sources	Total number of sources on income in the 12 months preceding the survey interview (i.e., livestock sales, harvest value, HHH employment, remittances from migrant workers, and income from leased land).	Yes	Yes
Proximity to park measure			
Community	Categorical measure of HH community of residence (Near: Loiborsoit, Emboreet, Terrat, Sukuro; Far: Landanai, Kitwai)	Yes*	Yes

* Dichotomized: Near and Far.

Table 3.3. Comparison of mean values and significance tests[a] for household (HH) wealth and incomes measures and livelihood diversification measures in communities near and far from TNP.

Variable	*Far*	*Near*	*P-value*
HH wealth and income measures			
TLU/AE	4.9	5.6	0.515
	(0.044)	(1.024)	
Total income (x 1000 USD)	1.98	1.66	0.309
	(0.18)	(0.23)	
HH Livelihood diversification measures			
Improved Breeds (0/1)	0.05	0.20	0.095^{+}
	(0.04)	(0.06)	
Farming (0/1)	0.91	0.95	0.226
	(0.01)	(0.03)	
Farming multi. spp. (0/1)	0.08	0.44	0.025*
	(0.06)	(0.09)	
Tractor (0/1)	0.39	0.91	0.120
	(0.28)	(0.05)	
Allocation (acres)†	12.2	33.1	0.020*
	(3.78)	(4.95)	
Acres Farmed	6.0	7.6	0.486
	(1.87)	(1.12)	
Yield (100kg bag)	2.2	4.3	0.044*
	(0.47)	(0.62)	
Mean % of income from livestock	0.74	0.38	0.032*
	(0.11)	(0.04)	
Mean % of income from farming	0.17	0.41	0.061^{+}
	(0.09)	(0.05)	
Mean % of income from other	0.06	0.20	0.025*
	(0.02)	(0.04)	
Other sources (0/1)	0.26	0.53	0.021*
	(0.05)	(0.06)	
# of sources	1.9	2.5	0.001**
	(0.07)	(0.04)	

[a] Statistical significance tested using student's t-tests (continuous) or chi-squared tests (categorical).
† Two cases dropped from Landanai where value was greater than or equal to 200.
$^{+}$ $p < 0.10$
* $p < 0.05$
** $p < 0.01$
*** $p < 0.001$

Table 3.4. Mean values of the regression predictors for livelihood diversification proxies.

Predictor	*Full Sample*	*Far*	*Near*
Individual measures for HHH			
Age 20-34 (0/1)	0.18	0.20	0.17
	(0.01)	(0.02)	(0.01)
Age 35-49 (0/1)	0.37	0.37	0.37
	(0.07)	(0.07)	(0.10)
Age 50-64 (0/1)	0.31	0.34	0.29
	(0.04)	(0.02)	(0.06)
Age over 64 (0/1)	0.15	0.09	0.17
	(0.04)	(0.07)	(0.05)
Education	0.38	0.35	0.39
	(0.08)	(0.04)	(0.12)
Lutheran Church	0.38	0.72	0.22
	(0.12)	(0.06)	(0.09)
Catholic Church	0.26	0.08	0.34
	(0.07)	(0.02)	(0.06)
Other Church	0.08	0.00	0.12
	(0.04)	(0.00)	(0.05)
No Church	0.28	0.20	0.32
	(0.06)	(0.07)	(0.08)
Household measures			
Ln (TLU)	3.25	3.15	3.29
	(0.21)	(0.18)	(0.29)
Ln (AE)	5.37	4.88	5.60
	(0.72)	(0.04)	(1.02)
Ln (TLU/AE)	1.55	1.44	1.60
	(0.11)	(0.07)	(0.15)
$N_{households}$	209	65	144
$N_{communities}$	6	2	4

Table 3.5. Variable coefficients and significance tests from the OLS regression models of livelihood diversification.

Predictor	*% from livestock*	*% from farming*	*% from other*	*# of sources*
Individual measures				
Age 20-34	0.14*	-0.08	0.05	0.28
Age 35-49	0.02	0.05	0.02	0.08
Age 50-64	0.02	-0.01	0.01	0.02
Education	-0.12*	0.02	0.08	0.29**
Church Lutheran	0.04	-0.08	0.07	0.07
Church Catholic	0.02	0.00	-0.05	-0.14^{+}
Church Other	0.19*	-0.18	-0.02	-0.11
Household measures				
Ln (TLU)	0.33*	-0.17	-0.18	0.05
Ln (AE)	-0.26*	0.18	0.17	0.36
Ln (TLU/AE)	-0.31*	0.18	0.17	-0.03
Communities (near)				
Loiborsoit	-0.15***	0.15*	0.00	0.27*
Emboreet	0.05*	-0.11***	0.06*	0.35*
Terrat	-0.06	-0.01	0.06^{+}	0.09
Communities (far)				
Landanai	0.20**	-0.10*	-0.15**	-0.31*
Kitwai	0.46***	-0.32***	-0.19**	-0.58***

Reference categories are age older than 64 and community near the park Sukuro.
$^{+}$ $p < 0.10$
* $p < 0.05$
** $p < 0.01$
*** $p < 0.001$

Figures for Chapter 3

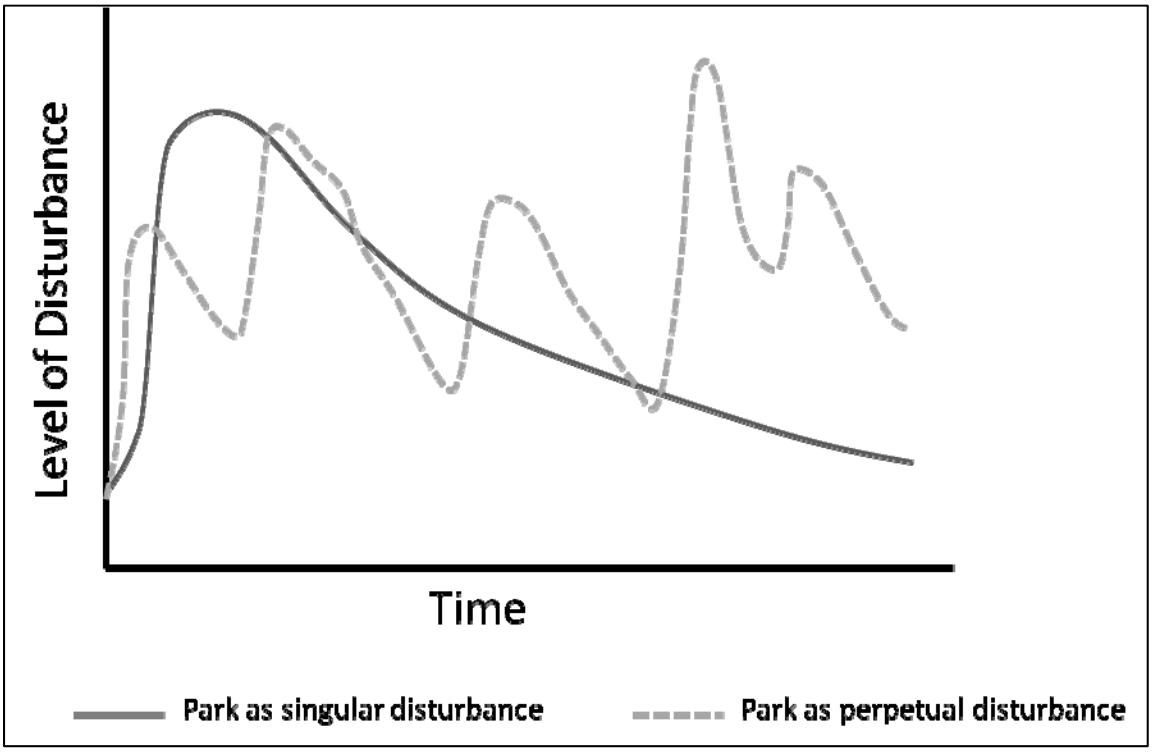

Figure 3.1. Conceptual model of parks as singular and repeat disturbances.

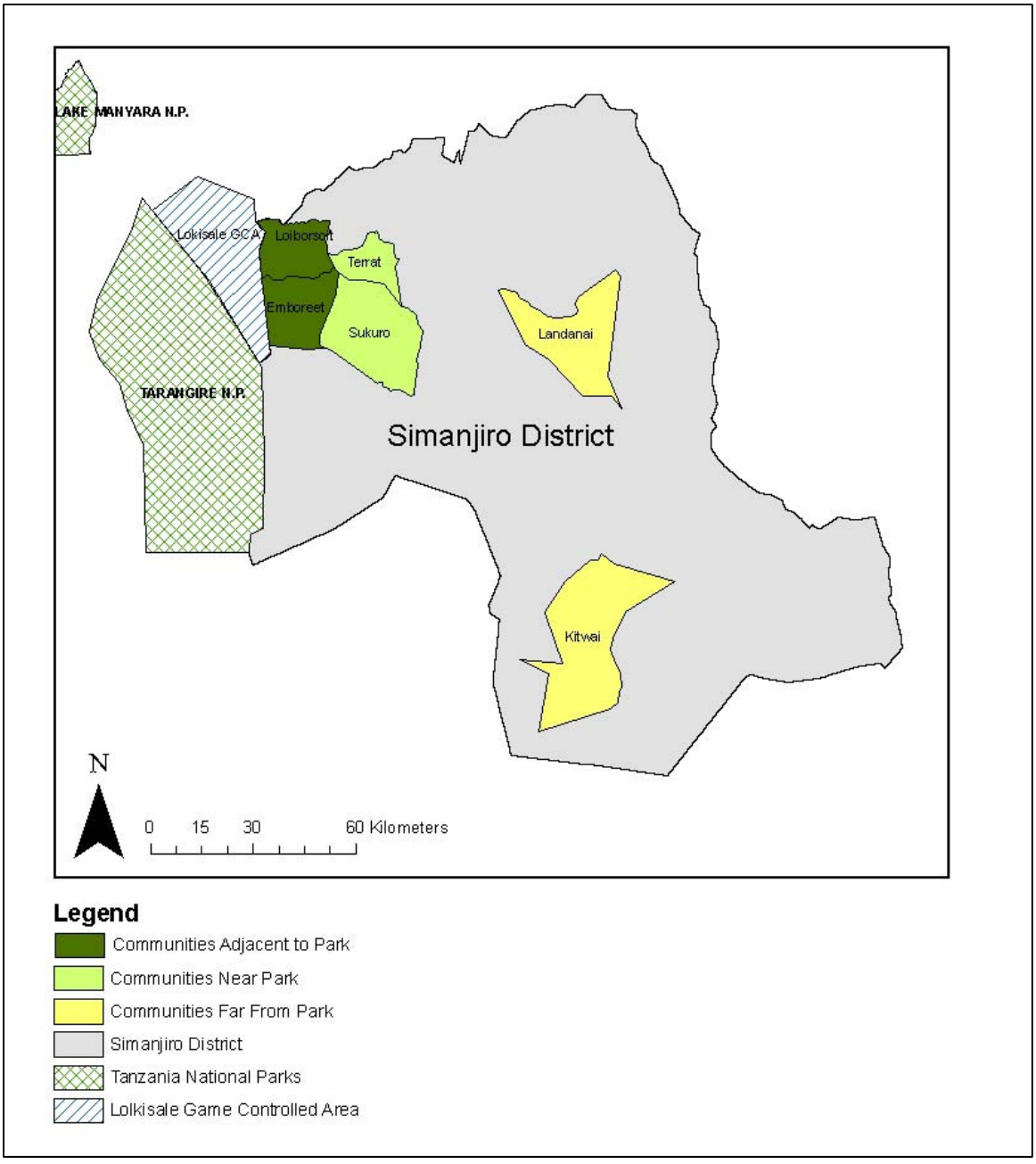

Figure 3.2. Map of study area.

CHAPTER 4

Livelihood Diversification and Social Networks of Exchange

4.1. Introduction

Social networks, and the various forms of social capital they confer on their members, have been extremely popular areas of social research in the recent past (Woolcock and Narayan 2000; Freeman 2004; Watts 2004; Borgatti et al. 2009). Within this large body of research much focus has been on characterizing the structure and function of networks and examining the consequences of social networks for individual outcomes (Newman 2003; Borgatti et al. 2009). Fewer studies have focused on how social networks evolve in response to outside factors (Ostrom 1990; Newig et al. 2010). In the developing world, where social welfare projects are absent or limited, social networks are critical components of household security, disaster relief, and social wellbeing, especially in rural areas (Fafchamps 1992; Woolcock and Narayan 2000). Of special importance are networks wherein the exchange of material goods[14] helps to alleviate food insecurity and raise funds to address other concerns including health issues (Befu 1977; Ensminger 2002). Ultimately, networks of this kind serve to spread risk and reduce vulnerability within communities and may serve many other purposes including supporting the capacity for collective action (Adger 2003; Reynolds et al. 2003). Despite the importance of social networks in this context, much remains unknown about

[14] Material goods maybe livestock, food, clothing, tools, etc.

how traditional networks of exchange in subsistence economies are changing in response to the growing importance of household economic diversification (Barrett et al. 2001; Little et al. 2001; Homewood et al. 2009; McCabe et al. 2010).

This paper seeks to build on these studies by focusing on the traditional mechanisms of social support and reciprocity that undergird longstanding social networks among a subsistence society in the midst of economic change. To do so, it views exchange of material goods between households as: (1) historically important sources of household security and community cohesion; and (2) at risk of widespread decline as households pursue diversified portfolios of economic activities. Specifically, this paper examines the character and incidence of inter-household exchanges of material goods (IHE) and the association between IHE and changing household strategies to diversify income streams (i.e., livelihood diversification) in ethnically Maasai, agro-pastoral communities in northern Tanzania.

4.2. Conceptual Approach

In this paper, I offer a conceptual approach which views: (1) inter-household exchanges of material goods (IHE) as a set of traditional strategies in Maasai society to build social networks and manage risk and uncertainty; and (2) livelihood diversification as an emerging strategy in Maasai society to manage risk and uncertainty. This approach supports several competing hypotheses:

1. The two may be inversely related. Since diversification and IHE each function to manage risk, the rise in diversification is associated with a reduction in IHE.

2. The two may work in concert. Since diversification has opened up new pathways of economic activity, including new partners, and new material goods, the rise in diversification is associated with an increase in IHE.

3. New constraints and opportunities associated with diversification affect different exchange mechanisms in different ways.

4. Despite functional similarities between IHE and diversification, IHE is deeply engrained in Maasai social organization and is correspondingly unaffected by changes in diversification.

While there may be reasons to hypothesize that the Maasai would seek to combine the risk management benefits of diversification and IHE, it is perhaps more likely that the trends towards individualization that are evident in the Maasai transitions from commonly managed land to private land tenure and from reciprocal labor to wage-labor will also be evident in approaches to manage risk. Thus, while the findings from this study will address each of these hypotheses directly or indirectly, this paper focuses primarily on the first hypothesis which posits that diversification is associated with a reduction in IHE (Figure 4.1).

To establish the context of this study, I will first review the literature on social networks of exchange and then the literature on livelihood diversification before presenting my research questions.

4.2.1. Social Networks of Exchange

Broadly defined, social networks are structures of individuals or institutions which are held together by some form of interdependency. They have become a major area of interest in several fields across the social sciences (Watts 2004). In 2009, Borgatti noted that the number of papers in the Web of Science on "social networks" nearly tripled in the preceding decade (Borgatti et al. 2009). This is not surprising given the diversity of ways in which social networks facilitate the production and exchange of information and material goods at various scales. The history of network analysis in the

social sciences is quite well reviewed elsewhere (Mitchell 1974; Freeman 2004; Watts 2004; Borgatti et al. 2009) and I will not endeavor to do so here. Reviews have showed that researchers in the social sciences have been especially concerned with the structure of social networks including issues of centrality, connectedness, openness, and density (e.g., Granovetter 1973; Wolfe 1978; Granovetter 1985; Bodin and Crona 2009). Borgatti points out that while there have been many studies of the determinants, or antecedents, of network connections, the "primary focus of network research in the social sciences has been on the consequences of social networks" (2009, 894).

One avenue of scholarship on the consequences of social networks has focused on natural resource management and governance (Pretty 2003; Bodin et al. 2006; Bodin and Crona 2009). Some have argued that social institutions and networks are important components of social capital and adaptive capacity (Folke 2006; Walker et al. 2006) and are central to strategies to protect biodiversity (Agrawal and Gibson 1999; Pretty and Ward 2001; Pretty and Smith 2004) and adapt to changes in natural capital brought about by climate change (Adger 2003). Others have claimed that some network structures are more supportive of equitable and effective management than others (Newman and Dale 2005; Bodin and Crona 2009).

Many recent empirical studies on social/ecological systems have focused on the role of social networks in shaping governance outcomes in the developing world (Tompkins et al. 2002; Bodin and Crona 2008; Prell et al. 2009; Gelcich et al. 2010; Stein et al. 2011). In doing so, they have tended to focus on information exchange and collective action to manage resources and/or resource crises. Fewer studies have focused on the exchange of material goods between individual actors or households - a

particularly salient issue where the subsistence strategies for rural households in developing countries include the harvesting, consumption, and exchange of natural resources and consequently hold profound implications for resource management and biodiversity conservation.

As with social networks, the history of scholarship on social exchange is extensive and very capably discussed elsewhere (Sahlins 1972; Scott 1976; Befu 1977; Mauss 1990). It is unfortunate that the recent surge in scholarship on the effects of social networks on natural resource management has not more directly engaged the work in anthropology and sociology on material exchange and moral economies (Thompson 1971), though some exceptions exist (Reynolds et al. 2003). In addition to providing households with needed material goods especially food, exchanges between households create networks of reciprocity, trust, and support (Ensminger 2002). Hunt has distinguished between exchange and transfer, where exchanges involve reciprocity and transfers do not necessarily (Hunt 2002). In the context of this study, as I will describe later, transactions involve the expectation of reciprocity and therefore I refer to them as exchanges throughout the paper.

Pastoralist and agro-pastoralist societies provide vibrant examples of how social networks and material exchange are integral to social/ecological systems and natural resource management (Homewood and Rodgers 1991; Little and Leslie 1999; McCabe 2004; Homewood 2008). Exchange within pastoralist groups can take many forms including, loans, gifts, restocking, and bridewealth and generally support the persistence of existing land use practices. While exchange traditions are institutions driven by many factors, including the forces of cultural inertia and history (Hodgson 2004), perhaps the

most common function of exchange articulated in the literature on pastoralist communities is that they are mechanisms to pool risk and promote security and stability in the face of uncertainty (McCabe 1990; Bollig 1998; Cronk 2007; Aktipis et al. 2011). Households may form networks with each other to insure against loss from a number of concerns including drought and disease. Another function of exchange networks is their role in promoting herd and family development (Johnson 1999; de Vries et al. 2006; Aktipis et al. 2011). Through various types of networks, an individual can acquire wives for himself or his sons and diversify the species in his herd. And through the development and growth of his herd and his family (which provides the labor to manage the herd, among other things) an individual can reduce the chances that future losses will require assistance from his network. In this way, exchange networks serve to promote the independence of the household at the same time that they provide the promise of support in times of need.

Despite the functionality of exchange networks in contributing to ex ante risk mitigation strategies and ex post risk coping strategies, few studies have examined the effect of livelihood diversification on social networks of exchange. Livelihood diversification itself is understood as a means by which households can manage their exposure to risk and cope with adverse circumstances (Ellis 2000; Barrett et al. 2001). This raises questions about the relationship between livelihood diversification and social networks of exchange in agro-pastoralist societies specifically and about functional redundancy in social networks more generally.

4.2.2. Livelihood Diversification

Defined simply, livelihood diversification is the "process by which rural families construct a diverse portfolio of activities and social support capabilities in order to survive and to improve their standards of living" (Ellis 1998, 4). The effect of livelihood diversification as an instrument of risk management has been framed in the language of "push" and "pull" factors (Barrett et al. 2001) wherein households facing adverse circumstances are pushed into diversification and households responding to opportunities (which in some cases may be opportunities to reduce future exposure to risk) are said to be pulled into diversification. Functionally, these justifications are closely aligned with those that shape decisions to participate in social networks of exchange, yet little scholarship has examined this.

Much of the literature on livelihood diversification has focused on its determinants (Ellis 2000; Barrett et al. 2001) with fewer studies examining the role of diversification as a predictor, or independent, variable (Caviglia-Harris and Sills 2005; Bezu et al. 2011; Bigsten and Tengstam 2011). The literature on livelihood diversification among pastoralists and agro-pastoralists follows these trends. While many studies have focused on the drivers of diversification, including land privatization (Galaty 1994; Homewood 2004) , NGO sponsored development (Igoe 2003), education (Berhanu et al. 2007), market integration (Little 2003) and biodiversity conservation (Homewood et al. 2009) (see also chapter 3), less research has been done on outcomes driven by livelihood diversification among pastoralists. Important exceptions to this include work done of the effect of livelihood diversification in shaping family size (Hampshire and Randall 2000) and livestock management activities (McCabe et al. 2010).

As noted above, few studies have investigated the relationship between social networks of exchange and livelihood diversification. Cinner and Bodin (2010) have used social network analysis to examine how the structure of social networks of natural resource users affects patterns of livelihood diversification. They found that diversified resource users, connected through networks that span occupational fields, tend to specialize as development occurs, but that communities remain economically diversified. Many opportunities, however, to examine these and other issues remain.

Following the opportunities to integrate the literatures on social networks and livelihood diversification, this study seeks to understand the character and incidence of inter-household exchange of material goods (IHE) among Maasai households in Simanjiro District, northern Tanzania. Furthermore, it seeks to understand how IHE has changed and how livelihood diversification at the household level is associated with IHE. Along these lines, the study investigates three research questions (RQs):

> RQ1. What are the primary instruments/mechanisms of IHE? How are they used? How are they changing?
>
> RQ2. What is the incidence of these exchanges in the study community and how does it compare to the past?
>
> RQ3. What is the effect of livelihood diversification on IHE, controlling for other factors?

4.3. Study Site

The area to the east of Tarangire National Park (TNP) in northern Tanzania is well suited to investigate questions focused on the relationships between biodiversity conservation, economic diversification, and social networks. The area has been studied for many years and much is already know about the people and their land use. The communities in Simanjiro District, which borders the park, are ethnically homogenous, in

the process of diversifying their livelihoods and have traditionally maintained elaborate networks of exchange (Homewood and Rodgers 1991; Aktipis et al. 2011). Furthermore, the district, which is part of the larger Tarangire-Manyara region, contains communities that are both near to and far from TNP.

The Tarangire-Manyara region of northern Tanzania is one of the most diverse grassland ecosystems on the planet (Olson and Dinerstein 1998) and for decades has been the focus of intense biodiversity conservation efforts. A central feature in the region is Tarangire National Park (TNP), which geographically connects a larger network of protected areas that extends from Serengeti National Park in western Tanzania to Kilimanjaro and Mkomazi National Parks in the East. In addition to the largest population of elephants (*Loxodanta africana*) in northern Tanzania, TNP endeavors to protect the second largest migration of ungulates in East Africa after the Serengeti-Mara migration (Lamprey 1964; Kahurananga 1981; Reid 1998). TNP, however, protects only 15% of the larger Tarangire-Simanjiro ecosystem which extends far to the east into Simanjiro District where the study communities are located (see Figure 4.2). This situation embodies a longstanding concern among conservationists that much of East Africa's wildlife is dispersed outside of protected areas on lands that humans use (Western and Gichohi 1993; Msoffe et al. 2011) .

Before the park was established, the areas that are now Simanjiro District and TNP comprised portions of the traditional territory of the Kisongo Maasai (Igoe 1999). This group's economic activities have traditionally centered on transhumant pastoralism, a culturally engrained activity that is well suited to this area's semi-arid climate and high degree of rainfall variability (Homewood and Rodgers 1991; Ellis and Swift 1993). In

the past few decades, however, the Maasai throughout East Africa have begun to adopt agriculture for various reasons (Cooke 2007; Baird et al. 2009; McCabe et al. 2010). More recently, some Maasai have begun to adopt other livelihood activities including wage labor migration to urban centers, rural off-farm employment, and sharecropping (Baird et al. 2009; Homewood et al. 2009) (see also chapter 3).

This study is part of a larger study of the effect of TNP on community development and livelihood change in Simanjiro District. Six ethnically Maasai communities are included in the study (see Figure 4.2). Communities were originally selected to highlight proximity to TNP. Two communities are located adjacent to the park, two are near the park but not adjacent, and two are located far from TNP. Earlier findings from the larger study have shown a positive association between livelihood diversification and proximity to TNP (see chapter 3). These findings are consistent with other studies that show diversification to be a growing trend among the Maasai (McCabe 2003; Cooke 2007) and that biodiversity conservation may be driving it in some cases (Baird et al. 2009; Trench et al. 2009). Analyses for this paper will seek to expand on these findings by examining the association between livelihood diversification and social networks of exchange as will be explained below.

4.4. Methods

Mixed methods of data collection and analysis were integrated to address each research question. The primary methodological approaches utilized here (i.e., group interviews and household surveys) are ubiquitous in the social sciences, very well

established, and generally uncontroversial. I will first describe my use of qualitative group interviews and then the implementation of a quantitative household survey.

4.4.1. Data Collection

Semi-structured group interviews (n=64) were conducted with community members, administrators, and leaders in each community to: (1) assess the character of, and causal mechanisms underlying inter-household exchanges (IHE) and other aspects of Maasai life; (2) inform the development of a household survey instrument to measure the incidence of IHE and other household variables; and (3) yield information on the monetary value of livestock and agricultural products to facilitate the conversion of survey measures (i.e., livestock holdings, agricultural yield, total income, etc.) into income measures for analysis. This method allowed for open discussion around broadly framed questions about household economics and IHE as well as more targeted questions about seasonal market prices. Participants were selected for their daily participation in livestock and farming activities and knowledge of current and historical use of IHE. The interviews solicited information on a range of topics including: how transaction types are different from each other; how and when each type of transaction is used; how social organization and the age-set system affect patterns of exchange between households; how new economic activities and material goods have been incorporated into these exchange processes; and how current trends are different now than they were in the past. All group interviews were conducted by me with the assistance of 1 or 2 Maasai assistants/translators.

To procure quantitative data on the incidence of IHE for use in statistical analyses and comparison across communities, a standardized household survey was conducted with 36 household in each of the 6 study communities (n=216). Data were collected on issues that included: the number and type of transactions with other households; the item exchange; the terms of the exchange, the purpose of the exchange, and the age-set of the other party, the relation of the two parties; and basic household demographic and economic variables.

By nature of the data collection strategy, these data provide extensive information on the respondent and his engagement with other parties[15]. It provides limited information, however, on the other parties with whom transactions were conducted. Therefore these data preclude the elucidation of several aspects of the larger exchange network structure. They do, on the other hand, provide robust information on the extent to which the respondent is engaged in local social networks of exchange. This was done as a matter of necessity and intention. First, respondents were disinclined to reveal detailed information about the parties they exchanged with as many transactions are meant to be private - details about the transaction itself, however, were not off-limits. Second, by design, this study sought to examine the association between household livelihood diversification and engagement in IHE. As such, the data communicate little about the characteristics of the network itself and much about individual membership in the network.

In addition to information on current IHE, the survey collected information on the respondent's perceptions of how the incidence of IHE in the present compared to the past. In the case of perceptions of the past, questions were asked about the past generally

[15] Respondents are (i.e., household heads) are typically male.

and about the specific period around 2002-2003. This specific time period was a relatively good year for rain preceded by two poor years, and therefore resembled the recent climatic conditions at the time the survey was conducted in 2010. Surveys were conducted by trained Maasai enumerators between September and December, 2010.

4.4.2. Data Analysis

The analysis of the dynamics of IHE proceeded in several steps as described below. The goal of the first set of analyses was to describe the primary mechanisms of exchange and how they are used, how they are changing, and how they are integrated into the social and economic lives of local people (RQ1). The goals of the second set of analyses were to: (1) use descriptive statistics to identify the extent to which these mechanisms are being used in the study communities; and (2) use descriptive statistics to identify how respondents perceived how the incidence of IHE in the present compared to the past (RQ2). And the goal of the third set of analyses was to estimate regression models to understand how livelihood diversification is associated with the utilization of these exchange mechanisms and perceptions of their use compared to the past (RQ3).

The values for many of the variables used in these analyses were reported directly by survey respondents themselves. Some measures, however, were derived from a combination of information captured on the survey and information collected during semi-structured group interviews. (For a description of how total income and other income measures were calculated, please refer to the methods section of chapter 2.)

4.4.2.1. Description of IHE

To describe the primary instruments of exchange, how they are used, and how they are changing (RQ1), I coded six group interview responses using qualitative analytical software. These interviews focused exclusively on IHE. Beyond identifying the basic structure and function of exchange mechanisms, coding focused on linking the exchange mechanisms to larger social and economic processes, such as household demographics, including family creation and growth, and herd management and development – issues themselves that are closely intertwined. My interpretation of these interview responses was strongly supported by insights gained through other group interviews that focused on different aspects of Maasai society, including issues related to household and community social and economic processes.

4.4.2.2. Incidence of IHE at the Community Level

To identify the incidence of IHE at the community level (RQ2), household survey data of exchanges was used to calculate: (1) community means of household loans, restocking, and gifts; and (2) community means of total exchanges involving livestock, maize, and all other items. These measures identify the incidence of exchange mechanism type (i.e., loans, restocking, and gifts[16]) and exchange item type (i.e., livestock, maize, and other), respectively. To examine differences in the ratios of exchange mechanisms and differences in the ratios of exchange items utilized by households, mean percentages of total IHE in the form of gifts and mean percentages of total IHE in the form of livestock were calculated for each community, respectively.

4.4.2.3. Perception of historic and contemporary IHE at the Community Level

[16] Categories based on the results of descriptive analysis.

To examine perceived differences in the incidence of each IHE mechanism (i.e., loans, restocking, and gift giving) between the past and the present (also RQ2), household survey data of perceptions was used to calculate proportions of household heads in each community, for each mechanism, who fell into each category of perception: those who felt that the mechanism was less common now than it was in 2002-2003; those who felt that it was as common; and those who felt that it was more common.

4.4.2.4. Regression Models

To examine the association between livelihood diversification and: (1) current utilization of IHE; and (2) perceived incidence of IHE compared to the past (RQ3), Poisson and multinomial logistic regression models were estimated, respectively. Measures of current IHE utilization included: total number of loans (given or received); total number of restocking events (i.e., group efforts to provide poor families with needed animals) (contributed to or benefitted from); total number of gifts (given or received); and total IHE (given or received). Poisson models are used in these cases because each dependent variable is a count variable. Measures of perceived incidence of IHE compared to the past included perception of relative frequency of: loans; restocking; and gifts. Multinomial logistic regression was used because, in each case, household responses fell into 1 of 3 categories of perception regarding each mechanism as described above.

Livelihood diversification is represented by the variable *Percentage of Total Income from Livestock*, which is stratified into four categories (i.e., 0-25%, 26-50%, 51-75%, and 76-100%) to capture non-linear effects. The idea behind this variable is that

households that are more diversified tend to have a lower percentage of income coming from livestock[17] than households that are less diversified. This measure of livelihood diversification is well established in the literature on economic diversification in subsistence communities (Block and Webb 2001; Minot et al. 2006; Homewood et al. 2009). Predictors included characteristics of the household head (i.e., age, education, and church membership) and the household (i.e., measures of household size, per capita wealth, and acres allocated). Descriptions of the variables used in each set of models are presented in Table 4.1. Means and standard deviations for all variables used in the regression models are presented in Table 4.2. All models are adjusted for clustering at the level of the community (Angeles et al. 2005), which corrects for any community-level correlation arising from the clustered sampling strategy.

4.4.3. Strengths and Weaknesses of Approach

The methodological approach described above has several strengths. First, mixed methods of data collection and analysis provide detailed qualitative information about IHE and how and why they have changed as well as quantitative data on the present use of IHE and perceived incidence of IHE compared to the past. Many studies of social dynamics focus on descriptions of causal mechanisms and change or they focus on incidence of phenomena and statistical associations between variables. Few are able to do both. Second, this study uses perceptions of change to get at historical conditions and therefore can comment on longitudinal change despite being a cross-section data collection project. This particular strength is supported by the consistency of the qualitative accounts of change and the quantitative measures of perceived change.

[17] Livestock are traditionally the predominant basis for livelihoods.

The central weaknesses of this approach are that the sample size is small, the sampling strategy was not random, and the absence of true longitudinal data. Mean measures of household wealth obtained in this study, however, are consistent with measures from much larger studies of Maasai households in Tanzania that utilize random samples, suggesting that this sample is not necessarily skewed with regards to wealth.

4.5. Findings

4.5.1. Inter-Household Exchanges (IHE)

The primary mechanisms by which households in the study area exchange material goods are lending, restocking, and gift giving[18]. In addition to being identified through informal interviews early in the data collection process, these general categories are referred to in the literature (see Homewood and Rodgers 1991; Aktipis et al. 2011). Here I will present findings from group interviews about how each mechanism is used and how it has changed from the past.

4.5.1.1. Lending

Loans are contractual agreements based on trust and arranged verbally between two parties (generally household heads) whereby a material good is provided to the borrower by the lender and a date and form of repayment are specified. Loans are private arrangements between the parties and are only extended in the event that the borrower is facing a particular problem. That is, loans are not extended for the expressed purpose of speculation by the borrower. There are two general types of loans: loans where the item

[18] Marriage is another important mechanism of exchange among the Maasai. It is not covered here, in part, because it is more directly an instrument of family creation and growth and less directly an instrument of risk management compared to lending, restocking, and gift giving.

transacted is kept and put to use by the borrower, and loans where the item is sold to generate cash with which to address the problem. Typical problems that may drive a borrower to seek out a lender include: herd losses from drought, disease, and/or predation sufficient to inhibit the provision of food to the household; family medical emergencies requiring expensive care; and other problems requiring cash.

Currently, as in the past, loans between households are generally given and repaid in the form of livestock. In these transactions, repayment typically includes the principle plus interest. Consequently, animals of lesser value are loaned and those of greater value are repaid. Because of their capacity to reproduce, female animals are more valuable than males. Male animals, therefore, are often given as loans and female animals are used to repay the loan. For example, a loan of an ox would be repaid with a heifer, because a heifer is more productive and therefore more valuable. Similarly, a female sheep would be used to repay a loan of a ram. In other cases, a loan of a goat or sheep may be repaid with a cow (i.e., a heifer would serve to repay a loan of a female sheep). This creates an incentive for the lender to take on the risk of lending and can also serve as a strategy for herd development. In one group interview, respondents indicated that because loans of male goats are often repaid with immature oxen, one can "build a herd using goats." In other words, by focusing on goats, which reproduce quickly, a household head can subsequently expand the diversity and value of his herd by extending loans to others. Furthermore, since the acquisition of wives in Maasai society is dependent on the transfer of bridewealth from the groom's family to the bride's family, traditionally in the form of livestock, herd growth is a necessary precursor to family growth.

For the borrower, loans are an important tool to maintain family affairs in the face of hardship. For most subsistence societies, problems often require cash (i.e., for medical expenses, etc.). For the Maasai, who often store wealth on the hoof, problems often require the sale of animals to raise the cash to deal with problems. If the sale of animals would render the household food insecure, then a loan may be necessary. In this case, the borrowed animal would be sold, and the cash used to address the problem.

4.5.1.2. Restocking

Restocking is similar to lending in that it has traditionally been used when a household faces a problem, generally when a household has lost most or all of its livestock to drought, disease, or predation and the household head can no longer provide for his family. Unlike loans, however, restocking involves the transfer of material goods (generally several animals) from multiple individuals to the troubled household making this type of exchange more public than lending. Furthermore, items (generally livestock) are not loaned, but gifted, and therefore repayment is not involved, though recipients are expected to contribute to restocking efforts for other households when the need arises. Smaller restocking events, typically for smaller families, may be taken care of within the homestead[19] of the receiving household. With larger households, however, restocking events are typically organized by leaders and contributors are recruited from within the larger clan[20].

[19] A homestead (i.e. boma) is a group enclosure where several households may live. Household heads may be brothers, fathers and married sons, or members of the same age-set. Boma sizes can range from 2 to 3 households to more than 10.

[20] In the Maasai system of social organization, clan membership is passed down patrilineally.

Group interview participants noted that the primary purpose of restocking was to support and provision the family, especially children. In some cases, household heads may liquidate the household herd to support unhealthy behaviors, particularly drinking. In a case like this, a clan member would be appointed to oversee the restocked animals. As one respondent stated, "the clan wants to take care of children, not drunks." In some cases, restocking is used to provide animals to households with unmarried sons who are seeking wives but lack sufficient bridewealth. In a situation like this, not having a wife is considered a problem and restocking is therefore appropriate – though only for the first wife. Individuals cannot receive restocking support to acquire subsequent wives. Given these examples, it can be seen that, for the receiving party, restocking is an instrument that supports both the maintenance of the household and even its establishment.

4.5.1.3. Gift Giving

Gift giving is the most versatile of the three exchange mechanisms and is different from lending and restocking in many ways. Perhaps most importantly, unlike lending and restocking, which traditionally are only used in the event that the receiving party has a specific problem, gifts can be given for a number of reasons which include but are not limited to addressing a specific problem. Other reasons for giving gifts are centered on establishing friendships between individuals. In Maasai society, friendships are generally solidified through the transfer of a gift from one party to another. Once established, friendships extend and strengthen an individual's social network. Social networks, which may be comprised of family, clan, and age-set members as well as friends, are the foundation of a household's support system and the first people to which a household will

turn when it confronts problems and is in need of assistance. In this way, gifts can be seen as tools to extend the household's safety net.

Unlike loans, gifts are very public forms of exchange, with parties generally giving each other nicknames that serve as reminders of the gifts. Typically, these nicknames are simply the name of the item gifted (i.e., goat, heifer, etc.) and replace birth names in everyday interactions between the parties. The nicknames are meant to demonstrate publicly the formality of the friendship and often they will be passed down to the children of the parties. Gift giving is a common and even expected tool of social networking. As one respondent noted, "It's not good to call someone from your age-set by his name. You need to give the gift…" and use the nickname.

Another distinguishing characteristic of gifts is that they can be either solicited or unsolicited. In the case of unsolicited gifts, one individual will offer a gift to another individual. As noted above, the individual receiving the gift may or may not have a problem that needs to be addressed. In the case of solicited gifts, an individual will ask another individual for a gift and upon receipt of the requested gift will invite the giver to "follow the gift". This means that the giver is invited to come to the friend in the future when he needs or desires a gift and the receiver will be there to reciprocate. Even with unsolicited gifts, the expectation is that the giver will, at some point in the future, "follow the gift" and ask for something. Interview respondents said that gifts are very much like loans (i.e. a good is exchanged in the present with the expectation that a reciprocal good will be exchanged in the future) except that there is no contract with gifts as there is with

loans. Common gifts include various species of livestock, carved sticks, and blankets. Even daughters are gifted – with one man's daughter becoming another man's wife[21].

Given their flexibility, it is not surprising that gifts are used in wide variety of situations. Elders may use gifts to reward the obedience of younger generations. For example, an elder may ask a young person to move the elder's herd a long distance to find water or to perform some other task. The youth honors the elder by obeying and may be given a gift to mark their relationship. A similar tactic may be used by an elder who wants a certain young man to marry his daughter in the future. In this case, the elder may ask the youth for a gift "to see his obedience first," as one respondent put it. This use of gifts to prospect for sons-in-law and facilitate marriage is common. In fact, elders may extend gifts to each other in the hope of arranging a daughter for one of their sons. In some cases, gifts are used to prospect for children. In the event that a household head is sterile he may ask his brother to lay with his wife. Any resulting children will belong to the head and for his service the brother will typically be given a heifer as a gift. In other cases, gifts are used to establish strategic relationships with others to support future herd maintenance and growth. When a gift is given, however, it's not always clear what reciprocal gift may be coming in the future. In some cases an individual may give one cow as a gift at one point and receive multiple cows in the future. But, as was noted above, gifts are not contracts. As one community member put it, "you have to follow every gift – but it's not a contract. You could follow it and get nothing".

4.5.1.4. Changes from the Past

[21] The Maasai are polygamous and bride wealth would be paid to the father of the daughter, even in a gift situation (in this case, access to the daughter would be the gift).

The descriptions of lending, restocking, and gift giving offered above present an overview of these mechanisms and how they have traditionally been used. Here I will present findings from qualitative group interviews on how IHE have been changing in response to the increasing incorporation of agriculture into household economic activities as well as the increase in development more generally.

The rising dependence on agriculture among the Maasai over the last few decades has affected IHE in a number of ways. According to respondents, the inclusion of agricultural products in IHE began as soon as cultivation became common. Gifts and loans of maize are now used to move harvest output from households with surpluses to households with shortages. An individual may have a productive year on his farm while others do not and using loans and gifts he can distribute his surplus maize to households in need. Then, in the future, when his farm doesn't perform well, he has people to go to for help. This is particularly helpful given the highly variable spatial distribution of rainfall in this area within and between years.

The use of agricultural products (generally 100kg bags of maize) in Maasai lending and gift-giving culture does vary in notable ways from more traditional exchanges. In the case of loans, interest payments are not typically included in repayment as is the case with livestock. When I asked why this was the case, one respondent said, "we don't slaughter maize." Furthermore, with agricultural gifts, nicknames are not used following the exchange as they are with other types of gifts.

Changes associated with development have brought new opportunities and constraints that have affected the use of IHE. Traditionally, restocking and loans were reserved for problems or crises only. One respondent pointed out that "you can't get a

loan or restocking if you don't have a problem." But now in some communities lending, restocking, and gift giving are being used to help households capture opportunities – especially educational opportunities. Students who have passed their primary school exams and are eligible for secondary school face stiff fees. To cover school related expenses, households may be forced to sell many animals. This burden is too great for some families and many students forgo secondary education for lack of funds. In some cases, however, friends, clan members, and others have supported the family through restocking, gifts, and/or loans so that the student could continue his/her education. This is a relatively new phenomenon and seems to be more common in communities near TNP.

School construction and the attending increase in student enrollment, which in some cases is supported by exchange mechanisms mentioned above, are introducing new constraints on exchange networks. For example, young women, many of whom are enrolled in school and are embracing aspects of the developed world, do not want their fathers to decide who they will marry. Describing the challenges that he faces in asking for gifts one father said "I can't always give daughters now because they want to choose." According to interview respondents, this has undermined gift giving culture. Now that young people can't expect a wife in return, elders say that is it harder to get them to obey. "Obedience disappeared!" As a result, group respondents felt like gift giving was less common than is used to be.

Issues of "obedience" are closely related with more general concerns regarding trust in several of the study communities. In group interviews, respondents noted that people do not trust each other now as they did in the past. They attributed this to a

number of things including population growth and an increase in the incidence of loans that are not repaid – "there are some cheaters now". Now, they claimed, it is more difficult to have faith in a borrower and therefore many loan requests are simply denied. In the past, however, people didn't refuse loans. People "were just waiting for the cow's stomach". That is, they were freely extending loans and waiting for cows to give birth so that the loan could be repaid. In the past, respondents claimed, you didn't need to know people well to lend to them. Now, friendship (marked by gift exchange) is often a necessary prerequisite for lending. Ultimately, people are more cautious now and only extended loans to people they know well.

4.5.2. Incidence and Perception of IHE

Comparison of household means of exchanges by mechanism (i.e., loans, restocking, and gifts) by community (RQ2) revealed that one community (i.e., Kitwai) utilized each exchange mechanism to a much greater extent than the other five communities (Figure 4.3). Average household mechanism ratios by village, however, as measured by percentage of total exchanges in the form of gifts, did not mirror differences in total exchanges (Figure 4.3). Household means of exchanges by type (i.e., livestock, maize, and other types) revealed that livestock was the dominant item type for transactions in each community (Figure 4.4). Correspondingly, household means by village of percentage of total exchanges in the form of livestock did not vary dramatically between communities (Figure 4.4).

Comparison of proportions of household heads, by community, who perceived the use of IHE mechanisms (i.e., loans, restocking, and gift giving) as less common, as

common, and more common now compared to 2002-2003 (also RQ2) revealed that the great majority of households in one community (i.e., Kitwai) believed that the use of each exchange mechanism is more common now than in the past (Figure 4.5). Conversely, the vast majority of households in the other 5 communities perceived the use of each mechanism to be as common or less common now compared to the past, with the highest percentages indicating "less common" found in the two communities adjacent to TNP.

4.5.3. Predictors of IHE

The results for the regression analysis of the association between livelihood diversification and actual and perceived use of IHE (RQ3) are presented in two tables. As expected, livelihood diversification, as measured by the respondent's percentage of household income coming from livestock, had a significant effect on the use of IHE when controlling for other factors (see Table 4.3). In each Poisson model, exponentiated coefficients (which represent multiplicative effects) were less than 1 for each category of livelihood diversification (i.e., Income from livestock 0-25%, 26-50%, 51-75%) compared to the reference category (i.e., Income from livestock 76-100%) indicating that households that derive more than 25% of their income from sources besides livestock engage in loans, restocking, and gifts to a lesser extent than households that do not. In the case of total IHE (model 4), households deriving more than 25% of their income from sources besides livestock engage in approximately 1/2 as many exchanges as households that do not. The categorical representation of livelihood diversification also picks up some non-linear effects which indicate that, in the case of the model for loans,

intermediate levels income diversification (i.e., Income from livestock 26-50%) are associated with the lowest levels of exchanges compared to the least diversified group.

For the multinomial logistic regression models (Table 4.4) multiple control variables had significant effects on the perceptions that loans, restocking, or gifts were as common or more common compared to less common in 2009-10 compared to 2002-03. At the individual level, measures of age were only significant in the models for loans and gifts, and generally showed: (1) younger ages generally to have lower odds of perceiving loans as more common compared to less common; and (2) the youngest two age categories to have greater odds of perceiving gifts as as common compared to less common. Church membership was significant in the models for restocking and gifts with church members having greater odds of perceiving restocking as as common and perceiving gifts as more common, compared to less common in each case. Education was significant in the models for loans and restocking with educated household heads having greater odds of perceiving each as more common compared to less common. In the model for loans, however, educated household heads also had lower odds of perceiving loans as equally common compared to less common.

At the household level, household size, (ln(AE)) was associated with increased odds of the household head perceiving each of the exchange mechanisms as more common compared to less common. Per capita household wealth (ln(TLU/AE)) and land allocation (ln(Acres)) were also significantly associated with increased odds of perceiving gifts as as common compared to less common and decreased odds of perceiving gifts as more common compared to less common, respectively.

As expected, livelihood diversification was significantly associated with reduced odds of the household head perceiving each exchange mechanism (i.e., loans, restocking, and gifts) as more common compared to less common.

4.6. Discussion

The qualitative results of this study provide evidence that: (1) IHE, in the forms of lending, restocking, and gift giving, are used by Maasai households to spread risk and to create and strengthen social networks to support herd and family development (RQ1); and (2) the ways in which households are using IHE are evolving to incorporate new opportunities associated with agriculture and education (RQ1). These findings, also elaborate a set of exchange mechanisms (IHE) that have been under-examined in the ethnographic literature on the Maasai (Aktipis et al. 2011).

In several distinguishable ways, IHE have been central to households' strategies to insure themselves against catastrophic loss (i.e., restocking), to manage smaller problems (i.e., loans and gifts), and to promote marriage and family development through important inter-generational relationships (i.e., gifts)[22]. Furthermore, the centrality and versatility of these mechanisms as tools to facilitate social and economic endeavors is exemplified by ongoing adaptations in their use. For example, the incorporation of agricultural products in IHE, which followed immediately after the adoption of agriculture, according to interview respondents, helps to mitigate the risks associated with rain-fed agriculture in an area characterized by high rainfall variability. Unable to move their farms to where the rain falls as they do with livestock, households move

[22] In many ways, IHE serve the same function that banks and insurance companies do in the developed world.

harvests, through exchange networks, to where rainfall was limited by transferring surplus harvest to households with low harvests. Similar innovations are evident in the growing use of restocking and loans to support educational opportunities. And yet, despite these innovations, the use of IHE appears to be on the decline throughout the study area.

The quantitative results of this study provide strong evidence that: (1) the incidence of IHE is dramatically lower in five of the study communities compared to the sixth community (RQ2); (2) that communities with comparatively low IHE perceive a reduction in the use of IHE over the past 7 years whereas the community with comparatively high IHE perceives an increase over that time period (RQ2); and (3) incidence and perceptions are significantly negatively associated with livelihood diversification at the household level.

These findings support the hypothesis that livelihood diversification and IHE are inversely related. This relationship was noted in several group interviews with community members, but was elaborated most clearly during an interview about restocking in Terrat on July 22, 2010. At one point in the interview, I asked the question "Is restocking different now from what it was in the past, and if so, how?" They asserted that there have been no changes in the mechanics of restocking, but that in the past it was used more frequently. In the past, they noted, people were poor and they were depending exclusively on livestock. Today, they said, people have more options. Today people are engaged in farming, or in wage-labor. A household that has lost many animals, they described, might have farm proceeds to support themselves – so there is no need for restocking.

Taken together these findings outline a story of adaptation wherein a traditional system of exchange is, at once, evolving and declining. While the cross-sectional nature of this study precludes a more robust examination of change, descriptions from group interviews and data on perceptions from the household survey tell a consistent story of IHE decline. This story of decline, along with the inverse relationship between IHE and livelihood diversification found here, is well aligned with studies that have detailed the rise in livelihood diversification among the Maasai in the last couple decades (Coast 2002; McCabe 2003; Cooke 2007; Homewood et al. 2009; McCabe et al. 2010).

One debate in the literature on livelihood diversification among pastoralists is whether diversification is cyclical. Arguing that it is, Little et al. (2001) have suggested that diversification is linked to individual life histories and cycles of family development. Others have argued that process of diversification among is best understood as linear and permanent (McCabe 2003; Homewood et al. 2009; McCabe et al. 2010). My own sense, which is based on arguments from these studies as well as extensive fieldwork in the study area, is that diversification is indeed unidirectional. So - if diversification is linear and negatively correlated with IHE, what are the implications for social networks of exchange?

4.6.1. Social Network Transition

The findings presented here, taken alongside the literature on livelihood diversification among East African pastoralists described above, provide some support for the hypothesis that lower levels of IHE represent a new normal – a watershed in this social network of exchange – and that increased livelihood diversification and reduced

IHE are part of the process of transition from the old regime to a new one. Conceptually, this argument proceeds in three basic steps: (1) households diversify; (2) households change the ways they use a social network; and (3) households reduce the size of their social network. Prior to the transition, households are characterized by low levels of diversification and high levels of IHE. Following the transition, however, this profile is inverted with households exhibiting higher levels of diversification and lower levels of IHE (see Figure 4.1). This hypothesis focuses on the network's density, not its structure, and raises further questions.

What can be the implications for the social ecological system associated with a social network transition of this nature? There are few studies in the literatures on social ecological systems, livelihoods, or pastoralism that offer insights into this question. Robert Putnam's book, *Bowling Alone* (2000), however, on the evolution (and erosion) of community in the U.S. during the twentieth century, draws on numerous studies of social networks and raises several important issues germane to this study. Here I will briefly focus on two: (1) the distinction between bridging and bonding social capital; and (2) the capacity for collective action.

A commonly held notion in the literature on social capital is that social networks confer social capital on their members (Adger 2003; Pretty 2003). It follows, therefore, that different types of networks, or connections within a network, offer different types of capital. "Bonding" social capital is a form of capital conferred by network connections that are focused inward within a society or group of people, whereas "bridging" social capital is conferred through connections that are directed outward.

Putnam (2000), who credited Gittell and Vidal (1998) with the earliest use of these labels, described bonding and bridging in the following way:

> Some forms of social capital are, by choice or necessity, inward looking and tend to reinforce exclusive identities and homogenous groups… Other networks are outward looking and encompass people across diverse social cleavages… Bonding social capital is good for undergirding specific reciprocity and mobilizing solidarity. Dense networks in ethnic enclaves, for example, provide crucial social and psychological support for less fortunate members of the community, while furnishing start-up financing, markets, and reliable labor for local entrepreneurs. Bridging networks, by contrast, are better for linkage to external assets and information diffusion… Bonding capital is, as Xavier de Souza Briggs (1998) puts it, good for 'getting by,' but bridging social capital is crucial for 'getting ahead.'" (2000, 22-23).

Given this distinction, it can be argued that the Maasai institutions of lending, restocking, and gift giving (i.e., IHE) described in this study represent bonding connections between households. Findings from group interviews that IHE are reciprocal and meant to promote solidarity within and across age-sets, and support less fortunate members of the community support the notion that connections are bonding connections. Furthermore, data from my structured survey show that Maasai households conduct IHE almost entirely with other Maasai households (for each transaction recorded, information was collected on the ethnic group of the other party) which serves to create an exclusive, dense network that is inwardly focused.

Framed in terms of bonding connections, the trend towards fewer IHE should be investigated. For example, what are the implications of fewer IHE; of fewer bonding exchanges? One hypothesis is that reduction in bonding connections, which are part of the glue that holds close-knit communities together, would yield greater household independence and, correspondingly, reduced capacity within the community to act collectively. Like other pastoralist and agro-pastoralists, the Maasai have traditionally

avoided collective action dilemmas, like the tragedy of the commons (Hardin 1968), through strong institutions including the age-set system, clan membership, and other social networks founded on exchange and reciprocity (McCabe 1990; Fratkin and Mearns 2003). Together, these institutions promote an atmosphere of trust and interdependency within communities that is central to collective action. It follows, therefore that as these institutions diminish, so too will communities' capacities to avoid free-rider problems and associated negative outcomes (Ostrom 1990), including land conversion and degradation.

An alternative, but not necessarily mutually exclusive, hypothesis is that a reduction in the number of IHE frees up, or releases, material resources (i.e., household resources that would otherwise have been extended as loans, restocking, or gifts) for use in other types of exchanges and/or connections; especially bridging connections with individuals or groups outside the community (see Figure 4.6). While this study has focused on changes in traditional bonding networks, and therefore can only address changes in bridging connections at the household level, there are reasons to suspect that bridging trends are becoming more common. Other findings from this study area (see chapter 2), show that several communities have begun actively recruiting financial resources from external international organizations, in some cases leveraging their close proximity to Tarangire National Park to encourage tourism and conservation agencies to build education and water infrastructure in the area. It's unclear to what extent households themselves are engaging in bridging behavior. However, observed increases in school construction and school enrollment in the study area (see chapter 2) suggest, along with evidence of livelihood diversification, that local households are increasingly

cultivating new forms of human capital (i.e., education and economic skills) that would facilitate growing integration with external individuals, institutions, and organizations (Little et al. 2009).

4.6.2. Household Demography and Land Use

A final consideration that I will address briefly here is that, given the numerous and complex ways in which IHE are integrated into marriage and household growth, herd development, and the persistence of agriculture, a change in IHE may contribute to dramatic long-term changes in household and community demography, social organization, and land use.

While many studies have linked demographic, social, and land use change to changing livelihoods and integration in the market economy (Caldwell 1976; Thornton and Fricke 1987; Lambin et al. 2001), few have focused on the role of exchange networks in demographic shifts. Studies of Maasai demography are themselves scarce (Coast 2001; Coast 2006). However, circumstances associated with changing use of IHE, which include the waning use of daughters in reciprocal exchanges, the rising use of exchanges to support education, reduced access to loans to address problems, and the incorporation of agriculture into exchange mechanisms may ultimately contribute in important ways to changes in nuptiality and total fertility, increased school enrollment (and a corresponding reduction in the pool of available labor), wage labor and migration, and land conversion to agriculture, respectively.

Certainly, the decline of IHE identified here raises concerns about households' and communities' abilities to confront future challenges including perennial struggles

such as drought and disease (McCabe 1987; Aktipis et al. 2011) . But it also raises concerns about how the Maasai will confront new challenges associated the climate change, a growing global concern for environmental conservation, and their own increasing engagement with a rapidly developing world. It may be that the persistence of social networks of exchange, albeit at a level reduced from earlier times, combined with the benefits of individuated livelihood diversification and the development of bridging relationships allows for the flexibility to meet these challenges.

Tables for Chapter 4

Table 4.1. Description of variables used in quantitative analyses.

Variable	*Description*
Household diversification measures	
% of income (livestock)	Percentage of total HH income from the sale of livestock in the 12 months preceding the survey interview.
Household wealth measures	
AE	Adult Equivalent Units (measure of HH size that combines members of different ages and genders to compare provisioning requirements across households)(Homewood and Rodgers 1991; Sellen 2003)[23].
TLU/AE	Tropical Livestock Units (TLU – measure of livestock holdings that accounts for differences across species[24]) divided by AE (measure of per capita livestock holdings).
Land Allocation	Measure of the number of acres formally allocated to household by community for private use as of 2010.
Other household head (HHH) characteristics	
Age	Categorical measure of age-set of HHH, which is a proxy for age. Age-sets are: Korianga (20-34 yrs); Landis (35-49 yrs); Irkishumu (50-64 yrs); Seuri and older age-sets (over 64 yrs).
Education (0/1)	Measure of whether or not the household head had any formal education (i.e., attended school).
Religion (0/1)	Measure of HHH membership in church (Lutheran, Roman Catholic, Pentecostal, Islam, Other)

[23] Adult Equivalents (AE) is a measure of a group of people expressed in terms of standard adult reference units, with respect to food or metabolic requirements. An adult male serves as the reference adult with other categories measured as fractions of that reference: adult male = 1 AE; adult female = 0.9 AE; male/female 10-14 years = 0.9 AE; male/female 5-9 years = 0.6 AE; infant/child 2-4 years = 0.52 AE.

[24] Tropical Livestock Units (TLUs) are defined here as: 1 adult zebu cow = 0.71; adult sheep/goat = 0.17 (Homewood et. Al, 2009).

Table 4.2. Mean values and standard deviations of the regression predictors for livelihood diversification proxies.

Predictor	*Full Sample*
Individual measures for HHH	
Age 20-34 (0/1)	0.18
	(0.01)
Age 35-49 (0/1)	0.37
	(0.07)
Age 50-64 (0/1)	0.31
	(0.05)
Age over 64 (0/1)	0.15
	(0.04)
Education (0/1)	0.38
	(0.08)
Church (0/1)	0.72
	(0.06)
Household measures	
Adult Equivalents (AE)	8.97
	(0.83)
TLU/AE	5.35
	(0.73)
Livelihood Diversification Measures	
Land Allocation	28.68
	(5.41)
Income from Livestock 0-25%	0.26
	(0.06)
Income from Livestock 26-50%	0.26
	(0.06)
Income from Livestock 51-75%	0.20
	(0.06)
Income from Livestock 76-100%	0.28
	(0.14)
$N_{households}$	208

Table 4.3. Poisson Regression models of IHE Numbers (with exponentiated coefficients)

Predictor	*Num of Loans*	*Num of Restocking*	*Num of Gifts*	*Num of Total IHE*
Household Head Measures				
Age 20-34	0.99	2.56**	1.29	1.30
Age 35-49	1.19	2.00**	1.65	1.47^{+}
Age 50-64	1.34	1.69**	1.69	1.50*
Church(0/1)	0.90	1.38*	1.13	1.08
Education(0/1)	1.33	1.01	1.41*	1.29*
Household Measures				
Ln(AE)	2.31***	3.34***	1.47	2.06***
Ln(TLU/AE)	1.49^{+}	1.19*	1.29*	1.35**
Ln (Land Allocation)	0.73***	0.90	0.82^{+}	0.80**
Diversification Measures				
Income from Livestock 0-25%	0.48*	0.44*	0.58^{+}	0.52**
Income from Livestock 25-50%	0.29**	0.59^{+}	0.57	0.46**
Income from Livestock 50-75%	0.48***	0.64^{+}	0.55*	0.54**

Reference category is age older than 64 and income from livestock 75-100%.
$^{+}$ $p < 0.10$
* $p < 0.05$
** $p < 0.01$
*** $p < 0.001$

Table 4.4. Multinomial Logistic Regression Models of Perception

	Loans		*Restocking*		*Gifts*	
Predictor	*As Common*	*More Common*	*As Common*	*More Common*	*As Common*	*More Common*
Household Head Measures						
Age 20-34	0.78	0.14*	1.14	1.87	3.88**	2.28
Age 35-49	0.58	0.38^{+}	0.94	1.57	2.87^{+}	2.74
Age 50-64	0.33***	0.17***	1.31	2.36	1.08	0.98
Church(0/1)	1.01	1.25	2.45**	1.4	1.09	2.17*
Education(0/1)	0.59**	3.98***	1.68	4.08**	0.74	0.82
Household Measures						
Ln(AE)	1.44	2.99*	1.15	2.83***	2.58	5.89**
Ln(TLU/AE)	1.05	0.79	0.95	0.93	1.88**	1.13
Ln (Land Allocation)	0.92	0.56	0.82	0.81	0.61	0.44*
Diversification Measures						
Income from Livestock 0-25%	0.71	0.09**	0.30*	0.04**	1.40	0.20**
Income from Livestock 25-50%	0.59	0.05***	0.79	0.07***	0.73	0.13*
Income from Livestock 50-75%	0.47	0.06***	0.33^{+}	0.12*	1.50	0.38

Reference category is age older than 64 and income from livestock 75-100%.
$^{+}$ $p < 0.10$
* $p < 0.05$
** $p < 0.01$
*** $p < 0.001$

Figures for Chapter 4

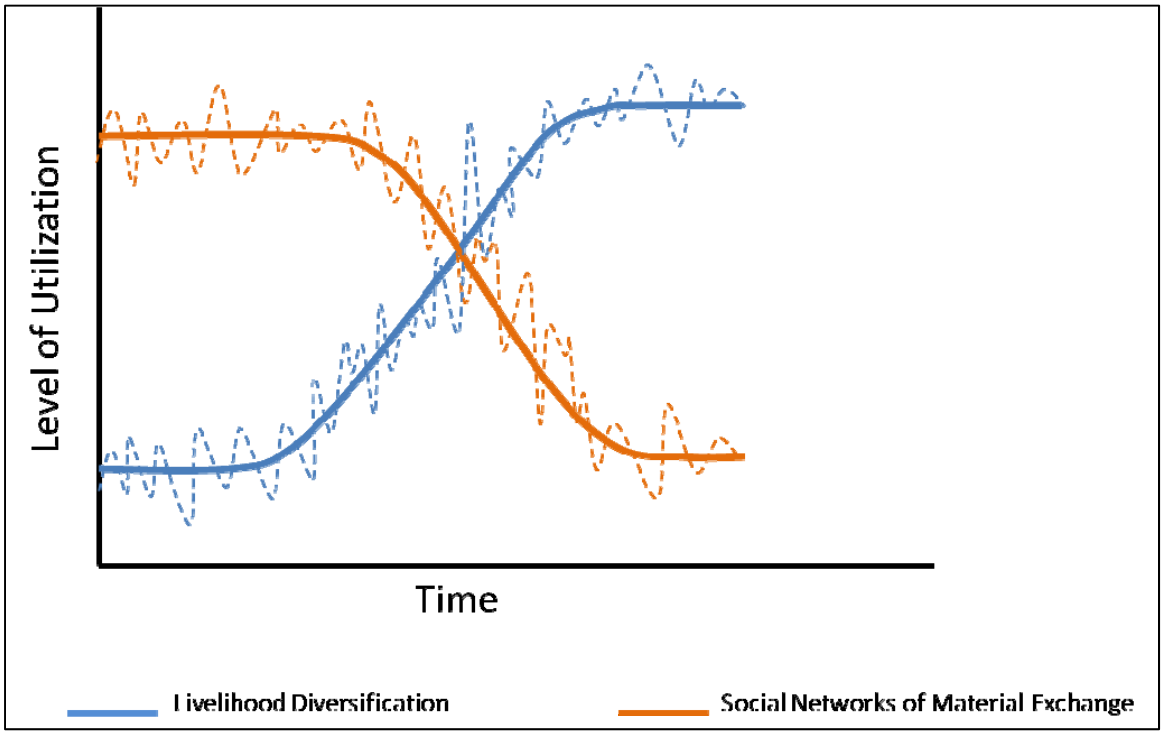

Figure 4.1. Hypothesis regarding livelihood diversification and social networks of material exchange

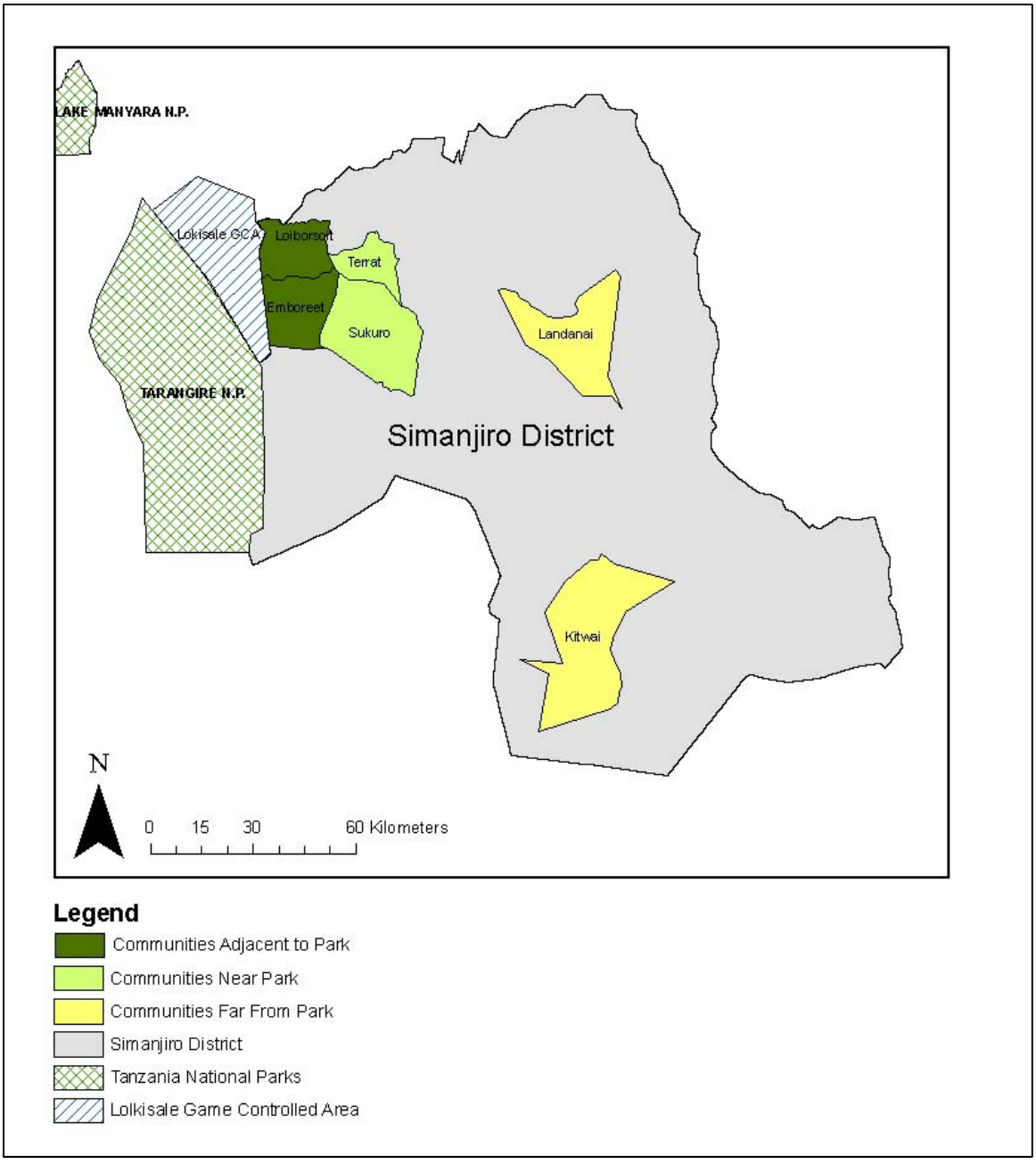

Figure 4.2. Map of study area.

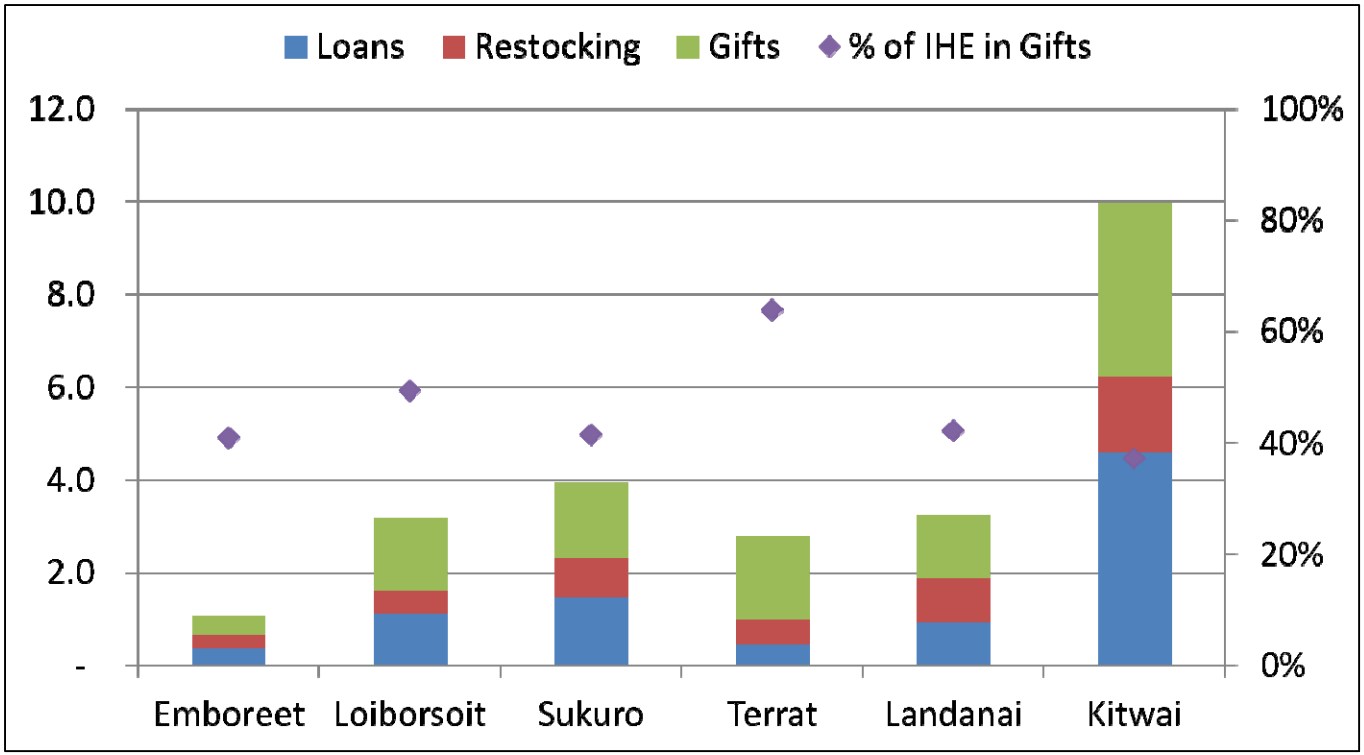

Figure 4.3. Incidence of IHE by exchange mechanism and percentage of total IHE in the form of gifts. This shows the average number of exchanges, by mechanism (i.e., loans, restocking, gifts) for households within each community. Along the secondary y-axis the percentage of total exchanges in the form of gifts is presented.

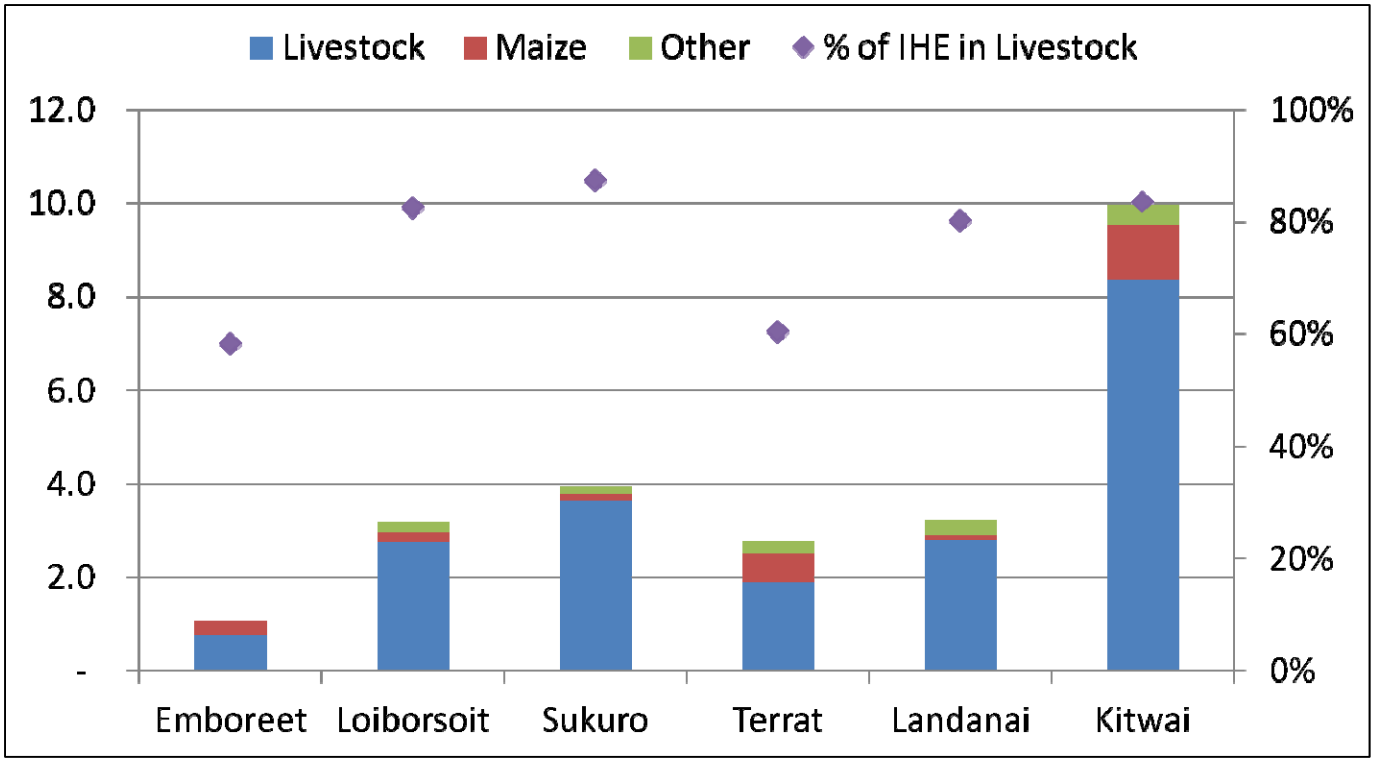

Figure 4.4. Incidence of IHE by exchange item and percentage of total IHE in the form of livestock. This shows the average number of exchanges, by item (i.e., livestock, maize, other) for households within each community. Along the secondary y-axis the percentage of total exchanges in the form of livestock is presented.

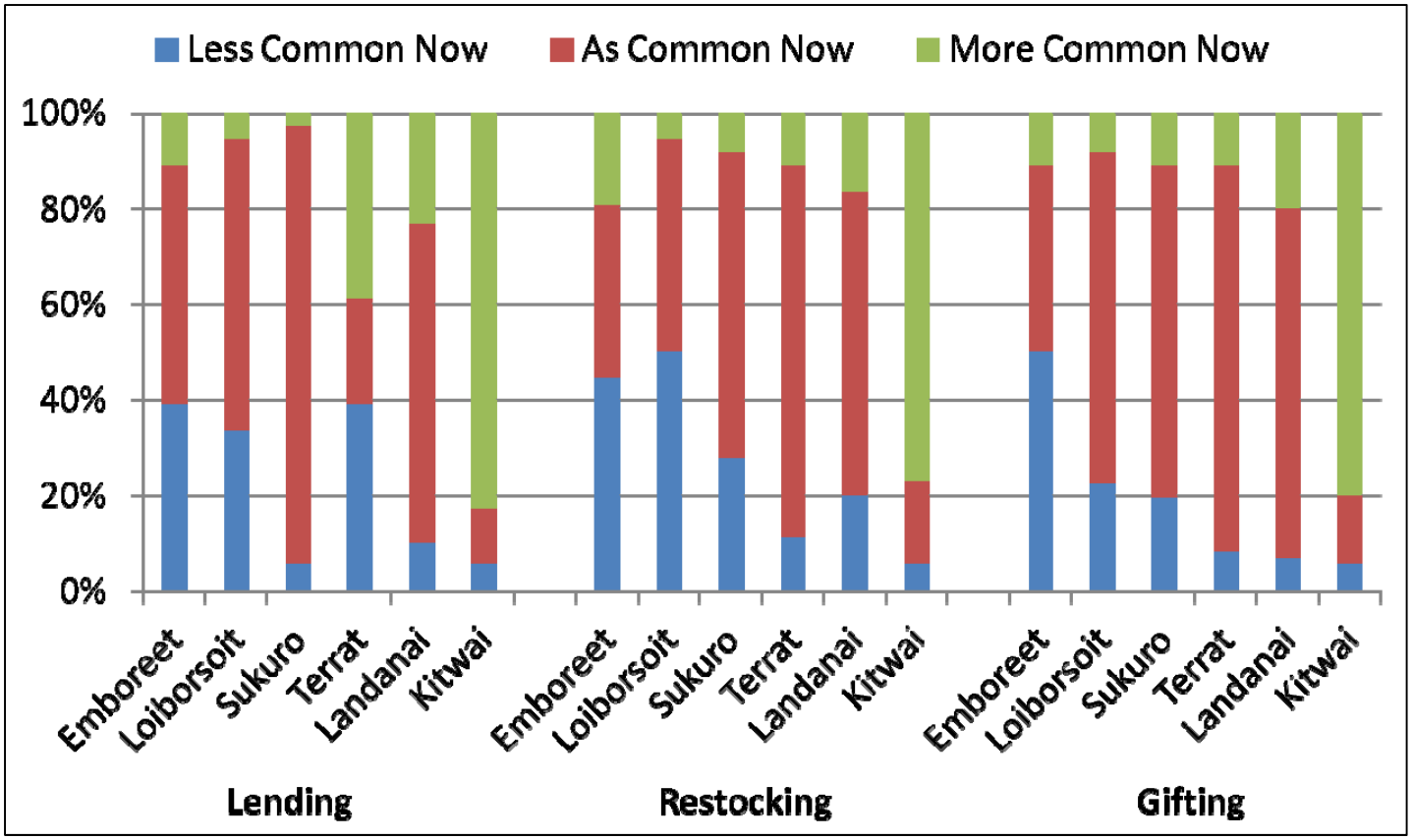

Figure 4.5. Percentages of household perception of the incidence of each IHE (i.e., lending, restocking, gifting) in the present compared to the past, by community.

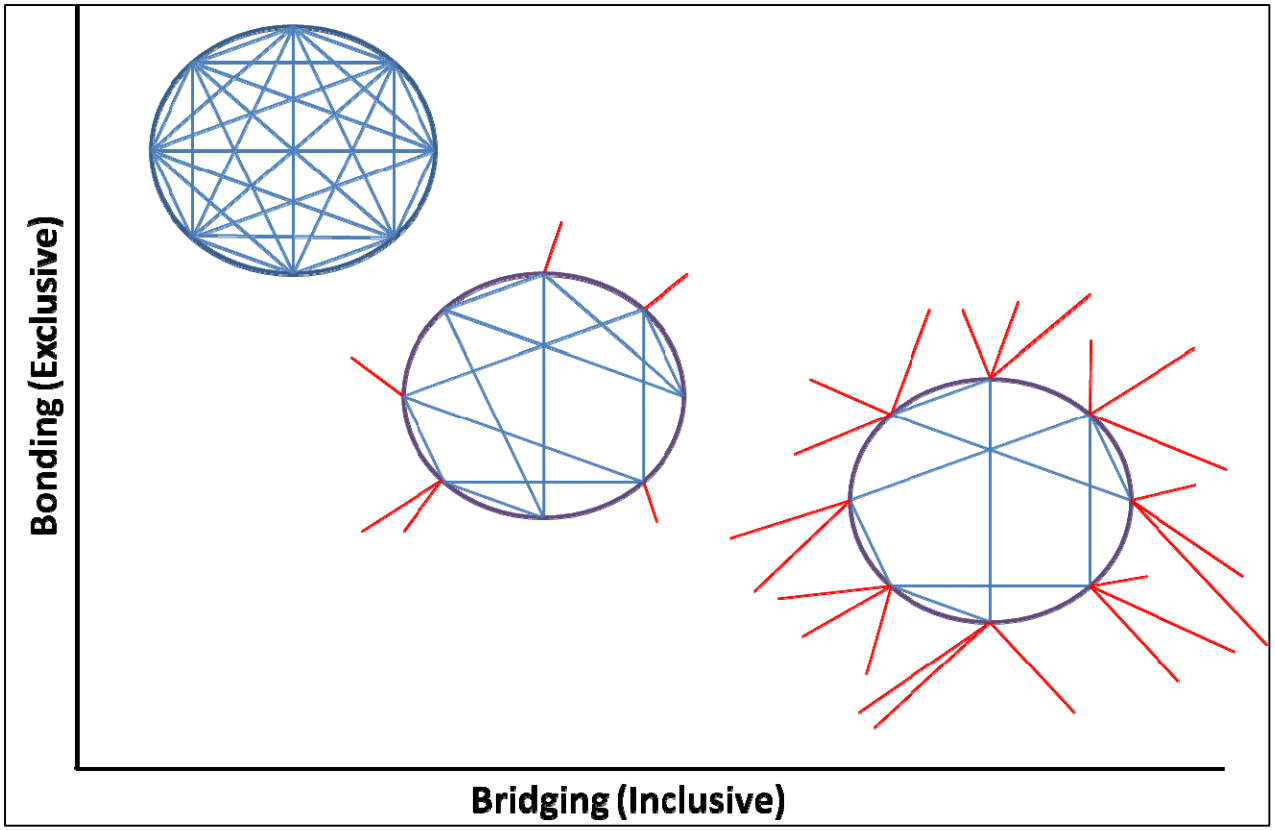

Figure 4.6. Conceptual model of social network transition from bonding to bridging connections.

CHAPTER 5

Conclusion

This dissertation has examined the effect of proximity to Tarangire National Park (TNP) on the communities and households east of the park in Simanjiro District, in northern Tanzania. The findings presented in chapters 2, 3, and 4 help to expand the broad narrative that can be told about parks. Parks endeavor to preserve, but they become centers of disturbance and hence, agents of change. In many cases, changes introduce profound initial constraints in the lives of people who live near parks. This aspect of the social dynamics of conservation has been well documented by political ecologists and others. Less well documented have been manifestations of human agency and social adaptive capacity to respond to emergent opportunities and constraints. Insights from resilience studies about complex adaptive social-ecological systems provide some conceptual grounding for inquiry along these lines.

Informed by these perspectives, the findings presented here also point to two general conclusions regarding TNP: the effect of the park is pervasive; and the effect is ultimately co-determined by many parties, acting both individually and collectively. Households, communities, and organizations each respond to park formation, and their responses lead to new opportunities and new constraints which, in turn, lead to new responses.

The three chapters that constitute the main contributions of this dissertation (i.e., Chapters 2, 3, and 4) are separate parts of a singular cohesive story of the direct and indirect effects of TNP on the communities nearby. Furthermore, this story is consistent with much broader issues regarding socio-economic responses to constraints and opportunities. Section 5.1. and 5.2. of this chapter will outline these connections. In section 5.3., I will discuss the broad implications of this work for the political ecology and resilience literatures, and directions for new research. In the last section (5.4.) of this conclusion chapter I offer a final story and idea.

5.1. The Singular Story

Parks cause change. They strive to preserve and protect – to insulate from change, but their effects on the opportunities and constraints that individuals and groups face engender important socio-cultural and economic shifts throughout the larger social-ecological system and undoubtedly undermine efforts to protect biodiversity. Keeping with this idea, I will now offer a brief story of TNP, which will draw on, and integrate, the findings presented in this dissertation.

The park was gazetted in 1970. Prior to this period, pastoralism was the dominant land use, agriculture was rare, and local infrastructure was sparse throughout the study area. As time passed, a diverse group of outside organizations concerned with conservation and/or development were drawn or recruited to communities near the park. In many cases outside financial support was used to build water and education infrastructure (chapter 2). Construction of wells, dams, and schools markedly affected the constraints and opportunities that local residents faced. For example, increased

access to water reduced water insecurity and the need to travel long distances to find water in the dry season. Ultimately water infrastructure contributed to lower local livestock mobility and supported more sedentary lifestyles. Similarly, school construction in the area has affected local lives encouraging sedentarization, pulling herd-boys out of the labor pool, and increasing rates of education near the park (chapter 2).

Within the context of rising education and water security, increased interaction with foreign organizations (chapter 2), and a growing sense that the park may expand further or that land use restrictions may be imposed (chapter 3), local residents have increased their use of agriculture and ventured into urban areas, at times to seek out further education and at times to seek out agricultural inputs and new sources of income. It is difficult to say whether schooling or farming leads to migration or whether occasional travel to urban centers for supplies, phone cards, etc. underscore the importance of farming and of obtaining education for oneself and one's children . It seems likely, however, that patterns vary between households, and that ultimately agriculture, urban labor migration, education, and water security become part of a broader positive feedback loop. It's not clear which one causes which – and causality likely varies across households, but over time it is likely that these factors begin to reinforce each other.

Ultimately, this constellation of constraints and opportunities, push and pull factors, which often create and fuel feedback loops, have led households to diversify their income streams to include rain-fed agriculture, urban labor migration, rural off-farm employment and, at times, sharecropping (chapter 3). This is widely understood as a means by which households reduce the chances that a major loss in any one economic

pursuit will be catastrophic for the family – it's a way of reducing variance in income and wealth – a way of mitigating the risk that household consumption will fall below some basic subsistence level – and way of reducing food insecurity (Ellis 2000; Barrett et al. 2001).

Finally, as families seek to manage risk at the household-level through increasingly diversified livelihoods, the importance of traditional, community-level institutions for risk management is waning. Specifically, the use of social networks of exchange (i.e., lending, restocking, and gift giving) near the park is low and has been declining (chapter 4). Households have begun managing risk at the level of the household instead of relying on their neighbors to support them through difficult times.

While it is unclear how this story may continue to unfold, adaptations in household economics (chapter 3) and exchange (chapter 4) may represent a linear and permanent transition from one system of socio-economic relations wherein diversification is low and exchanges between households are important, to another wherein diversification is increased and the value and use of exchanges is diminished (chapter 4). Such a transition would affect feedback relationships and hold implications for human demography, the capacity for collective action, land use and therefore biodiversity. Furthermore, decline in the social networks of exchange, or reduced density of these networks, which can be seen as a form of erosion of "bonding" connections within a society (Putnam 2000), raises the question of whether local communities and households are also shifting their focus from "bonding" networks to "bridging" ones. In other words, are the Maasai forging connections with external, more diverse groups and individuals who are able to tap new assets and information (Granovetter 1973)?

Evidence of community-level connections with external organizations (Chapter 2) suggests so. It is likely that the observed rise in education (Chapter 2) and the adoption of new and diverse economic opportunities (Chapter 3) are both the cause and consequence of growing engagement with outside groups. Nonetheless, as local residents continue to pursue educational and economic opportunities, including agriculture and urban labor migration, the foundations on which to build new bridges are being laid.

Not all the connections illustrated in this story are directly examined within this dissertation. However, the findings presented in chapters 2, 3, and 4, taken alongside the literatures on conservation and pastoralism in East Africa (Little et al. 2001; McCabe 2003; McPeak 2006; Homewood et al. 2009; McCabe et al. 2010), are consistent with the general arc of this narrative. The people who live near TNP generally view it as a threat (Baird et al. 2009); as a disturbance in their lives (Chapter 3). This disturbance comes with clear constraints (e.g., eviction, alienation from resources, and land use restrictions), but opportunities are also apparent (Chapter 2). Responding to both, households and communities are building new infrastructure (Chapter 2), pursuing new economic activities (Chapter 3), and correspondingly changing their social networks (Chapter 4).

The story presented here, while specific to this field site, is also conceptually similar to stories that can be told in much different contexts.

5.2. A Different Context

Efforts to protect biodiversity and ecosystem function, whether through parks and PAs or regulation to limit greenhouse gas (GHG) emissions, will shift risk exposure for certain groups who will likely respond by changing their patterns of resource utilization

and their relationships with other groups. These groups may be agro-pastoralists, local merchants, commercial fisherman, labor unions, foreign donors, corporations, or nation states. Ultimately, as these groups adapt to manage risk, their actions will have implications for social well-being, economic development, and environmental sustainability.

Not unlike pastoralists or agro-pastoralists, international and multi-national organizations respond to changes in exposure to risk by adjusting their activities. As a guiding principle, we could expect organizations to make these adjustments in accordance with their missions. In some cases, this would mean adjusting their activities in response to constraints or opportunities to better protect biodiversity. In other cases, efforts might be focused on promoting health, poverty reduction and development in underserved communities. And in still other cases, adaptive strategies may entail trimming costs to remain competitive in a globalizing world economy.

In her book, *The Corporate Greenhouse*, Schreuder (2009) argues that European efforts to regulate GHG emissions through an emissions trading scheme (ETS) (i.e., cap and trade) will cause firms, especially in energy-intensive industries, to relocate production outside of Europe to countries where emissions are not regulated (i.e., non-abating countries under the Kyoto Protocol). Essentially, emissions regulation adds costs to firms' means of production, to which they can respond in 4 basic ways: (1) investing in more energy efficient plants; (2) buying emission credits; (3) reducing production; and/or (4) relocating production outside the EU (2009, 134). Given the comparative costs of these options, Schreuder argues that relocation of production is likely, in many cases, and that trans-national corporations will be important vehicles for this transition.

The implications of this for global emissions targets, she claims, will likely be negative, as production shifts from comparatively energy-efficient practices in Europe to more energy intensive practices elsewhere. To these concerns, I would add that as production shifts from one area to another, relationships between firms, governments, workers, and consumers will be affected with consequences and feedbacks that are difficult to predict. In this way the E.U. ETS case reveals striking similarities with events that are unfolding along the border of TNP.

Near TNP, household and community-level adaptive responses to park-related constraints and opportunities fundamentally resemble Schreuder's predicted responses of trans-national corporations to the E.U. ETS. This connection across scales may point in the direction of a broad, unifying theory of environmental management: As groups (e.g., rural households, multi-national corporations, or nation states) confront constraints and opportunities associated with efforts to regulate natural resources (e.g., parks, GHG emission regulation, etc.), they will adapt in ways that allow them to better achieve their goals (e.g., reducing food insecurity, maximizing profits, or growing GDP). Adaptive responses will lead to new resource utilization, new modes of production, and new social and economic relationships between parties. And ultimately, responses may lead to unintended consequences that serve to undermine environmental and/or development targets. While more research is needed to further evaluate connections within and between cases, future efforts to manage natural resources, at local and global scales, would benefit from greater consideration of the social and economic processes of adaptation.

5.3. Implications for the Literature and Further Research

5.3.1. Literature

In chapters 2, 3, and 4, I discussed the implications of each set of findings for various bodies of literature. Chapter 2, for example, challenged longstanding concerns in the conservation and communities literature (Adams et al. 2004; West et al. 2006; Brockington et al. 2008), which spans several academic disciplines, about the effect of parks on local groups by offering evidence of accrued benefits near a park – and the mechanisms of accrual. Chapter 3 married the interests of the livelihoods literature (Ellis 2000; Barrett et al. 2001) with those of environmental economists focused on poverty reduction near parks and protected areas (PAs) (Andam et al. 2010; Sims 2010; Barrett et al. 2011) and suggested that variance in income is an important, but under-examined, aspect of social responses to conservation. And in chapter 4, the concerns within the literatures on pastoralism, livelihood diversification, and social capital, important in the fields of human ecology (Homewood et al. 2009; McCabe et al. 2010) and resilience (Adger 2003; Folke 2006), were advanced through an examination of social networks of exchange (Pretty and Smith 2004; Borgatti et al. 2009).

In the following two sub-sections, I would like to move beyond the implications of these findings for specific questions and topics within the literatures, and focus on broader issues and opportunities within the fields of political ecology and resilience studies.

5.3.1.1. Political Ecology

The social and political dynamics of parks and PAs have been major themes within the field of political ecology (Zimmerer and Bassett 2003; Robbins 2004; Borgerhoff-Mulder and Coppolillo 2005; Zimmerer 2006). Overwhelmingly the scholarship on conservation that may be characterized as "political ecology" has highlighted the social costs associated with biodiversity protection (West et al. 2006). As a body of scholarship, political ecology has focused its attention on critical interpretations of human-environment interactions wherein conservation in the developing world is regarded as an extension of geo-political and/or neo-liberal processes that ultimately serve to dispossess, disempower, and impoverish local communities. Thus engaged, the field of PE has missed an opportunity to examine the social, political, economic and cultural **effects** of conservation on local communities – questions that political ecologists could be well suited to address.

One reason for this failure is a broad tradition, within political ecology, of descriptive accounts of isolated cases combined with the pervasive absence of comparative research design and controls in many of the case studies that populate the field. The **effect** of conservation on social outcomes is poorly understood without an understanding of the counterfactual; an understanding of how events unfold in the absence of conservation. Furthermore, political ecologists' attentions have been on documenting the injustices visited upon local residents by conservation activities. Undoubtedly, there is great value in this work, however, it falls short of a greater understanding of the ways in which conservation and communities adapt to each other through time and space. In focusing on social justice and victim narratives, political

ecology has underappreciated the agency, resilience, and adaptability of local groups and in so doing has visited a further injustice upon its research subjects.

Given the wealth of understanding within political ecology of the nuances and multi-scalar interactions between political and economic processes and the ways these interactions can shape conservation and social outcomes, attention by political ecologists to the concerns outlined above could yield important new insights into park-community interactions.

5.3.1.2. Resilience

As a social scientist interested in the resilience literature and tasked with conducting an independent, small-scale, cross-sectional study, I struggled somewhat to apply its insights in my work. Drawing from my experience designing and implementing the research presented in this dissertation, I offer here some thoughts on how to advance resilience research through small scale studies.

Since its genesis (Holling 1973), the resilience approach to questions surrounding complex, adaptive social-ecological systems has struggled to operationalize itself within the typical confines that limit most research projects, especially in the social sciences. For example, locating system boundaries, separating external from internal processes, defining system structure and function, understanding disturbance regimes, and identifying thresholds are all nebulous, even subjective, and undermine both individual and collective efforts to test many hypotheses that a resilience approach might encourage. In some cases, these struggles are linked to the ambition of the resilience enterprise – understanding the complexity of SESs – and are therefore somewhat unavoidable. In

other cases the scholarship on resilience suffers from something that may be more easily addressed, something I'll call a problem of conceptual scaling and continuity.

As a field, resilience studies has focused on some very big questions (e.g., how do complex systems function and evolve). This body of literature is rife with broad conceptual papers that hypothesize about multi-scalar connections and all-encompassing systems. What the resilience project needs now, however, is data – particularly in the form of hundreds of on-the-ground, empirical case studies – a point that has been made elsewhere (Berkes and Folke 1998; Anderies et al. 2006).

Furthermore, to be successful at moving this field and these broad concepts forward, small studies will need to relinquish the language and conceptual breadth of the resilience approach somewhat and focus instead on its spirit. By this I mean that the goals of the resilience project cannot be easily scaled from the global to the local. Small scale, cross-sectional studies by definition are not suited to elucidating the resilience of social-ecological systems. However, understanding regional and global systems requires detailed understanding at the local level. As a consequence of this problem of conceptual scaling, case studies can either suffer from a lack of precision as they try to explain too much or they risk precluding themselves from incorporation into larger meta-analyses for lack of conceptual continuity with the larger complex adaptive model (see Gunderson and Holling 2002). Here I want to offer a strategy to address these concerns.

What small studies can offer to the resilience project are detailed analyses of small scale, site specific adaptations. It should be noted that *adaption* is not synonymous with *change*. Identifying *change* is necessary but not sufficient to understand the process of *adaptation* and ultimately the structure and function of complex adaptive systems.

Understanding adaptation requires an understanding of causal mechanisms, a task that quantitative measures of change, difference, correlation, etc. are poorly suited to evaluate. In the social sciences, this is best achieved through qualitative methods including interviews, focus groups, participant observation, ethnography and other techniques.

In this dissertation, I strived to catalog simple observations from which I could draw solid conclusions. In addition, I wanted the findings to speak to issues of complexity and resilience and be in a form that could be integrated in future, larger analyses. My strategy in this regard was to better understand local adaptations to park-related phenomena by integrating qualitative and quantitative methodological approaches. Qualitative methods were used to identify casual mechanisms and quantitative methods were used to identify the incidence of those mechanisms. This model, which uses mixed methods to focus on local adaptation, may be useful for future independent scholars conducting small scale projects who wish to embrace and support the larger themes and goals embodied in resilience studies.

5.3.2. Further Research

As could be hoped for with any research, the findings from this project have raised several new questions. Here I will describe a few of these questions and their implications for future research. First I will focus on questions for which I have data, and then larger questions that should lead to new research projects.

Findings presented in chapter 2 which highlighted the large role religious organizations have played in supporting infrastructural development raise several new questions. Central among these questions is: Why has religious engagement been so

much greater in the communities near the park compared to distant communities? In addition to this, have religious organizations been drawn to the park border? If so, why? In either case, what is the effect of the distribution of religious ideology in rural Africa? Specifically, how does church membership and attendance affect household demography, education, and land use? It may be that religious organizations are indeed attracted to the park border (in some cases) for reasons that have not previously been identified and that church messaging on issues of family planning, education, and work have affected many aspects of Maasai life.

Evidence of development near the park (Chapter 2), much of which is financed by the park or other conservation-oriented organizations, taken together with evidence that local residents perceive the park as a source of risk in their lives (Baird et al. 2009) call into question the character of the relationship between the park and local communities and correspondingly what opportunities exist for sustainable co-management of natural resources in the area. One approach to address this issue would be to investigate the perceived sources of development in the area. Are perceptions of financial support for development well aligned with actual investment, and how does this effect change with proximity to the park? One hypothesis here is that, near the park, actual investment by conservation organizations is not well aligned with local perceived value of this investment[25], and that the effects are better aligned for other sources of investment and at greater distances from the park.

[25] Preliminary analysis of parts of my household survey show that respondents tend to disagree that conservation has contributed to development in the community – even where conservation organizations have been important contributors to water and education infrastructure. This is not the case, however, with other types of organizations.

While in Tanzania, I did collect data to address the questions outlined above and will proceed with these analyses in the near future. Beyond these concerns, findings from this dissertation point to several directions for new data collection and corresponding analyses.

First, simple comparison across different parks or PAs would help to address the question of whether the findings presented here are site specific or more generalizable. Therefore, the application of this same research design in another location would be informative. Along these lines, focusing on the effects of parks and PAs on school enrollment and attendance would be especially illustrative as education is linked to many other aspects of rural life, including marriage and family growth, migration, the labor pool, livelihood diversification and land use (Little et al. 2009).

Insights from chapters 2 and 4 on connections with external organizations and the decline of social networks of exchange respectively suggest that productive new directions for research may include examination of bridging social networks as bonding networks erode. This course of inquiry could focus on urban-rural linkages, connections with different ethnic groups or resource-user types, or engagements with local, regional, national and international organizations.

Integration of social and natural sciences is often precluded in research for dissertations, as it was here. As such this research focused on social outcomes associated with proximity to a park. Equally important, however, would be research on the environmental implications of conservation in areas adjacent to parks where human activities had been affected by the park. Of particular interest would be assessments of biodiversity and soil fertility in areas where agriculture has increased. Especially, the

population and seasonal distribution of migratory species, that utilize lands within and around the park and thus create strong linkages across areas, should be examined. One hypothesis here would be that biodiversity and livelihood diversification are inversely related. However, there may be situations where low densities of agriculture are associated with increased local diversity. Questions of this type should be investigated.

Finally, the idea that parks are centers of repeat disturbance, presented in chapter 3, offers many opportunities for new research. For example, how do SESs with parks compare to other systems with repeat disturbance regimes? How do park systems vary where disturbance homogeneity varies? In other words, how does the diversity of disturbances associated with a park affect social and ecological outcomes in the system? Questions of this nature will involve large, longitudinal data collection efforts and likely require collaboration across projects.

5.4. A Final Story; a Final Idea

Throughout the duration of my fieldwork I generally refrained from asking questions about the park in any of my meetings or interviews with local residents, leaders, or administrators. The reason for this is that "the park" has become a very charged topic in the minds of local residents and discussions of it tend to elicit strongly negative responses (see Sachedina 2008; Baird et al. 2009; Davis 2011). My goal was simply to document the development, economic livelihoods, and social connections within communities located various distances from the park. During one interview, however, that Dr. Terry McCabe[26] and I conducted with a group of nine elders from the

[26] Dr. McCabe is Professor of Anthropology at the University of Colorado at Boulder. He works closely with Dr. Paul Leslie (UNC) who together serve as principal investigators for our larger project in Tanzania.

community of Terrat, the topic of park-community interactions was central. The goal of the interview was to learn how local residents adjusted their herding practices following their eviction from the park in 1970. At the end of the interview, we asked the elders how they imagined their lives would have been different if the park had never been created. They responded that the park generated wealth for the government not for them, and that their lives would have been much different with no park – because then they would have been able to capture the benefits from wildlife and there would have been more development in their communities, and less conflict with the government.

Perhaps this dynamic between the park and the communities is not really about the park – it's about access to resources. And not just about access to water and forage for livestock, but about access to any resources that can be derived from the land that local residents view as their land. The park generates millions of dollars a year in revenue, very little of which they have access to – and it is this situation that shapes the context in which communities and households adapt to the park. In this way the park doesn't just change access and opportunity – it also changes expectations. Scholars, donors, planners, developers, and administrators may be well served to consider this.

APPENDICES

Appendix 1: Group Interview Template – Community Administration

Date Initial Interview Conducted _____
Village:_____
Name of Village Chairman:_____
Name of Village Executive Officer:_____ GPS of Village Center:

Sub-Villages:	Sub-Village Chairmen	_____
1._____	_____	_____
2._____	_____	
3._____	_____	Pop Est. From LGMD:
4._____	_____	_____
5._____	_____	
6._____	_____	
7._____	_____	

People in attendance (for initial interview):

_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____

PART B: VILLAGE INFRASTRUCTURE

B.1. WATER – DAMS

B1a. Number of Dams in Village: _____ B1b. Number of Dams in Village Operational (in use): _____

	General Location of Dam	GPS	Year Built	Source of Funds to Build	Years Damaged/Broken	Years Repaired/Fixed	Source of Funds to Fix	Do Dams Dry up in Dry Season? When?
1.								
2.								
3.								
4.								
5.								

*Notes:*_____

_____

_____

PART B: VILLAGE INFRASTRUCTURE

B.2. WATER – BOREHOLES

B2a. Number of Boreholes in Village: _____ B2b. Number of Borehole in Village Operational (in use): _____

	General Location of Borehole	GPS	Year Built	Source of Funds to Build	Years Damaged/Broken	Years Repaired/Fixed	Source of Funds to Fix
1.							
2.							
3.							
4.							
5.							
6.							

*Notes:*_____

_____

_____

PART B: VILLAGE INFRASTRUCTURE

B.3. ELECTRICITY

B3a. Is there electricity in the village: _____ B3a1. If no, has there ever been in the past: _____

B3b. How is the electricity generated: _____ B3c. What year did the electricity begin: _____

B3d. What year did it end: _____ B3e. What organization paid to begin the electricity _____

B3f. Who pays now (if it's still running – if not, when did it end): _____

B3g. Who has access to the electricity (businesses, offices, bomas, NGOs, etc?) _____

B4. ROADS

B4a. Please list any concerns you have regarding roads in your village:

	Concerns	Rank (in order to importance)
1.		
2.		
3.		
4.		

PART C: VILLAGE SERVICES

C.1. HEALTH CLINICS

C1a. Number of Health Clinics in Village: _____

C1b. Number of Private Clinics in Village: _____

C1c. Number of Public Clinics in Village: _____

C1d. For each clinic, fill out the table below:

	General Location of Clinic	GPS	Year Built	Public or Private	Source of Funds to Build	Source of Funds to Supply	# of staff (Drs and nurses)	Reliability of supplies (good, bad, in between)
1.								
2.								
3.								
4.								

*Notes:*_____

_____

_____

_____

PART C: VILLAGE SERVICES

C.2. SCHOOLS

C2a. Number of Schools in Village: _____

C2b. For each school, fill out the table below:

	General Location of School	GPS	Year Built	Source of Funds to Build	Number of levels/grades	# of Teachers	Religious Affiliation
1.							
2.							
3.							
4.							
5.							

*Notes:*_____

_____

_____

PART C: VILLAGE SERVICES

C.3. CHURCHES

C1a. Number of Churches in Village: _____

	Type of Church (Lutheran, Islamic, etc.)	General Location of Church	GPS	Year Built	Source of Funds to Build	Source of Funds to Run	Approx. Size of congregation
1.							
2.							
3.							
4.							
5.							

*Notes:*_____

_____

PART C: VILLAGE SERVICES

C.4. VETERINARY SERVICES

C4a. Number of Veterinary Clinics in Village: _____

C4b. Number of Cattle Dips in Village: _____ C4c: Number of Dips in Use: _____

C4d. For each clinic, fill out the table below:

	General Location of Clinic or Dip	GPS	Year Built	Public or Private	Source of Funds to Build	Source of Funds to Supply	# of staff (Drs and asst.)	Reliability of supplies (good, bad, in between)
1.								
2.								
3.								
4.								
5.								

*Notes:*_____

_____

_____

PART D: OTHER VILLAGE PROJECTS

D.1. VILLAGE PROJECTS (NGO and Govt) include old projects and projects in other villages that affect local people

	Type of Project (Govt. Or NGO)	Source of Funds	Purpose of Project	Location of Project	Year Began	Year Ended
1.						
2.						
3.						
4.						
5.						
6.						
7.						
8.						
9.						
10.						

*Notes:*_____

_____

_____

PART E: OTHER VILLAGE CHARACTERISTICS

E.1. GRINDING MACHINES

E1a. How many grinding machines are in the Village: _____

E.2. POPULATION CHARACTERISTICS

E2a. When was the last Village Census Conducted: _____. Where are census records:_____

E2b. What is the general ethnic composition: (approx. % of each tribe)_____

E2c. How has population changed in the last 10 years (increase rapidly / increase / neutral / decrease / decrease rapidly): _____

E2d. What has caused the population change: _____

E.3. LAND CHARACTERISTICS

E3a. What is the total area of the village: _____

E3b. How much land is allocated for grazing: _____

E3c. How much land is allocated for farming: _____

E.4. OTHER VILLAGE INFORMATION

If there is any other information the respondent would like to relate, please record here:

_____
_____
_____
_____
_____

Appendix 2: Group Interview Template – Community Projects

Group Interview - Village Projects		Village:		Date:	
Group Comp.		Sub.Vill:		# People:	
Organization:			Project:		
Source of $:		Amt of $:		Use of $:	
Nature of the Proejct:					
Years Operating:			Contact:		
How did the project begin?					
Who initiated?					
How has project affected people?					
Any other pos. or neg.?					
Organization:			Project:		
Source of $:		Amt of $:		Use of $:	
Nature of the Proejct:					
Years Operating:			Contact:		
How did the project begin?					
Who initiated?					
How has project affected people?					
Any other pos. or neg.?					
Organization:			Project:		
Source of $:		Amt of $:		Use of $:	
Nature of the Proejct:					
Years Operating:			Contact:		
How did the project begin?					
Who initiated?					
How has project affected people?					
Any other pos. or neg.?					
Why are projects coming, or not coming, to this area?					

Appendix 3: Group Interview Template – School Administration

2010 Savanna Land Use Project / Timothy Baird / School Survey

Date:		Village:	
School Name:		School Type:	
School Rep. Name:		Position:	
GPS Location:			
Year School Founded:		Year School Built:	
Source of Funds to Build:		Source of Funds to Run:	

	Number of Students			
	Boys	Girls	Total	# of Teachers
2010				
2009				
2008				
2007				
2006				
2005				
2004				

How would you describe patterns of attendance for each of the ethnic groups in the village:

What are the main subjects taught at the school:

What are the most important changes that have taken place at the school in last 5 to 10 years:

Appendix 4: Group Interview Template – Church Administration

2010 Savanna Land Use Project / Timothy Baird / Church Survey			
Date:		Village:	
Church Name:		Church Type:	
Church Rep. Name:		Position:	
GPS Location:			
Year Church Founded:		Year Church Built:	
Source of Funds to Build:		Source of Funds to Run:	
# of members today:		# of members when church began:	
# of Satellite Branchs:		Years they were established:	
What are the basic messages that the church has regarding family creation and family size:			
What are the basic messages that the church has regarding work and land use:			
What are the basic messages that the church has regarding tradition and respect:			
Other Notes (church projects):			

Appendix 5: Group Interview Template – Agricultural & Livestock

Date:		Village:			Sub-village:	
# of Particiants:			Comp. of Participants:			
MAIZE:	Unit of Transaction (circle one):	100kg bag	20kg tin		Other	
	Appox. Time of Harvest (ToH):	Month/s				
	Expected $ at ToH:	Low Tsh:		High Tsh:		
	Expected $ end of season:	Low Tsh:		High Tsh:		
	Price Now (if appl.):	Low Tsh:		High Tsh:		
	Method of Sale (circle) :	Broker	Market		Other:	
	Transport Cost (if appl.):			Paid By (circle):	sellar	buyer
	Avg. Units per Acre:				High:	

BEANS:	Unit of Transaction (circle one):	100kg bag	20kg tin	Other	
Bns Grown:	ToH	*Expected Price at ToH*	*Expected Price at End*	Avg. Price for Year	Avg. /High Units per Acre
Red/White:					/
Maasai Red:					/
Soya:					/
Shoroko:					/
Canada:					/
Kundi:					/
_____:					/

Method of Sale (circle) :	Broker	Market	Other:	
Transport Cost (if appl.):			Paid By (circle):	sellar	buyer

LIVESTOCK:	*Price of Male Now*		*Price of Female Now*	
	Young	Adult	Young	Adult
Goats:				
Sheep:				

	Zebu	Sahiwal	Boran	Mpwapwa
Heifer (Low/High)	/	/	/	/
Sm. Adult Ox (Low/High)	/	/	/	/
Lg. Adult Ox (Low/High)	/	/	/	/
Sm. Bull (Low/High)	/	/	/	/
Lg. Bull (Low/High)	/	/	/	/

Location of Market/s: _____

How do you make the decision about how much land to farm? _____

Appendix 6: Group Interview Template – Education and Religion

Grp. Int. School/Church Village:_____ Date: _____
SV:_____ Group Comp:_____ Group #: _____

How has education changed in this village?_____
_____
_____
Why?_____

How did the school projects begin_____
_____
_____

Why do people send their children to school?_____
_____
_____

Which children are sent?_____
_____
Why?_____

How has religion changed in this village?_____
_____
_____
Why?_____

How did the churches begin?_____
_____
_____

Why do people go to church?_____
_____
_____

Which people go to church?_____
_____
_____

How do people decide which church to go to?_____
_____

Is there a connection between the schools and the churches?_____
_____

Appendix 7: Group Interview Template – Lending, Restocking, Gift Giving

Group Gifting Interview Village:_____ Date: _____
SV:_____ # Attending:_____ Group Comp. _____

How does lending work in the present? When does it happen?_____
_____
_____

Is this different from the past? How? Why?_____
_____
_____

How does restocking work in the present? When does it happen?_____
_____
_____

Is this different from the past? How? Why?_____
_____
_____

How does gifting work in the present? When does it happen?_____
_____
_____

Is this different from the past? How? Why?_____
_____
_____

Have you lent, gifted, or restocked this year? How much?_____
_____
_____

Is this different from last year? _____
_____
_____

Generally, do lending, restocking, and gifting happen equally as often? Which is the most common?_____
_____
_____

Is this different from the past? How? Why?_____
_____
_____

Appendix 8: Group Interview Template – Gifting Follow-Up

Group Gifting Interview Village:_____ Date: _____
SV:_____ # Attending:_____ Group Comp. _____

Changes in gift giving over the last several years:_____
_____
_____
_____
_____
_____
_____
_____

Changes in gift giving between age-sets:_____
_____
_____
_____
_____
_____
_____
_____

Changes in gift giving within age-sets:_____
_____
_____
_____
_____
_____
_____
_____

Agriculture and gift giving:_____
_____
_____
_____
_____
_____
_____
_____

Are gifts ever refused?_____

Between age-sets are gifts asked for or given?_____

Appendix 9: Group Interview Template – Miscellaneous Follow-Up

Group Cleanup Interview Village:_____ Date: _____
SV:_____ # Attending:_____ Group Comp. _____

How much do you charge to rent an acre to another person? _____
_____

How do you store crops? Maize? Beans? Do you lose some of the stored food to bugs/rotting (storage losses)?_____
_____

Are people eating the corn they grow? Are they selling it?_____
_____

How is a maize loan repaid?_____
_____

Are Money/Maize/Animal Loans ever forwarded? (Someone asks you – so you ask someone else)? If so, why ? _____
_____

What's the difference between restocking and a gift?_____
_____

Can someone be restocked if he still has animals? (Or for other things - like if a child is going to school)?_____
_____

Why does Kitwai use loans/restocking/ and gifts much more than your village?_____
_____
Are boys being circumcised this year? What about girls? As much as usual? (Engipaata?)_____
_____

During bad years, do people sell animals to eat – do people have to sell animals if their farms fail?_____
_____

How do you decide which animals to keep – goats or cattle?_____
_____
_____

When outside organizations make contributions to the village for different projects, do households then need to contribute less? _____
_____

Appendix 10: Household Survey

Individual Interviews: Simanjiro, Tanzania. NSF and Fulbright Hays funded Doctoral Dissertation Research Project. August to October, 2010. Under the direction of Timothy D. Baird, UNC- Chapel Hill.
Date:_____ Interviewer:_____
Name of Household Head (Person Being Interviewed)_____
Kabila (Tribe):_____ Clan: _____ Village:_____
Subvillage:_____ Age Set:_____ Age (approx if not known):_____

A. Boma Size

A.1. At the time when you were circumcised, how many married men (including your father) were in your Enkaang?__
A.2. At the time when you were circumcised, how many wives did your father have? _____wives
A.3. In his life, how many wives did your father have? _____ wives
A.4. Is your father alive now? Circle one: **YES** **NO**
A.5. At the time when you were circumcised, what number wife was your mother? _____
A.6. At the time when you were circumcised, how many children did your mother have? _____
A.7. At the time when you were circumcised, what number child were you (for example if you had 1 older sibling by the same mother you are child 2. If you had 3 older siblings by the same mother you would be child 4)? _____
A.8. Now, how many married men (including yourself) are in your Enkaang?_____

B. Household Demography

For each of the respondent's marriages, please list the following information.

Marriages	How was bridewealth paid for (e.g., livestock, exchange, work, other)	Her original Kabila (Tribe)?	Is she still alive?	What is her approx. age?	How many children born?	How many children still alive?
B.1. Marriage **1**	a.	b.	c.	d.	e.	f.
B.2. Marriage **2**	a.	b.	c.	d.	e.	f.
B.3. Marriage **3**	a.	b.	c.	d.	e.	f.
B.4. Marriage **4**	a.	b.	c.	d.	e.	f.
B.5. Marriage **5**	a.	b.	c.	d.	e.	f.
B.6. Marriage **6**	a.	b.	c.	d.	e.	f.
B.7. Marriage **7**	a.	b.	c.	d.	e.	f.
B.8. Marriage **8**	a.	b.	c.	d.	e.	f.

Number of Children (<u>Natural and Foster</u>) Living in Olmari now: (Write the number of children for **<u>each age group</u>** for **<u>each wife</u>** in the table below.
Note difference between foster and natural children. A **<u>foster</u>** child is a child that the mother cares for but did not give birth to. If more space is needed, use back of the sheet.)

	1st Wife		2nd Wife		3rd Wife		4th Wife		5th Wife		6th Wife		7th Wife		8th Wife	
	Natural	**Foster**	**Natural**	**Foster**	**Natural**	**Foster**	**Natural**	**Foster**	**Natural**	**Foster**	**Natural**	**Foster**	**Natural**	**Foster**	**Natural**	**Foster**
B.9. Adult Male (> 15)	a.	b.	c.	d.	e.	f.	g.	h.	i.	j.	k.	l.	m.	n.	o.	p.
B.10. Adult Female (> 15)	a.	b.	c.	d.	e.	f.	g.	h.	i.	j.	k.	l.	m.	n.	o.	p.
B.11. Boys (11 -15)	a.	b.	c.	d.	e.	f.	g.	h.	i.	j.	k.	l.	m.	n.	o.	p.
B.12. Girls (11-15)	a.	b.	c.	d.	e.	f.	g.	h.	i.	j.	k.	l.	m.	n.	o.	p.
B.13. Boys (6-10)	a.	b.	c.	d.	e.	f.	g.	h.	i.	j.	k.	l.	m.	n.	o.	p.
B.14. Girls (6-10)	a.	b.	c.	d.	e.	f.	g.	h.	i.	j.	k.	l.	m.	n.	o.	p.
B.15. Boys (0-5)	a.	b.	c.	d.	e.	f.	g.	h.	i.	j.	k.	l.	m.	n.	o.	p.
B.16. Girls (0-5)	a.	b.	c.	d.	e.	f.	g.	h.	i.	j.	k.	l.	m.	n.	o.	p.

B.17. Are there others living with you and your wives? Circle one: **YES** **NO**
B.18. If **YES**, who?_____
B.19. Are any family members working outside the Olmari for money? **YES** **NO**
B.20. If YES, please describe each person in the table below:

Who are they? (Relation to the person)	Where are they working?	What are they doing?	If they send money, about how much each year?
1.			
2.			

C. Education

C.1. Did you go to school? Circle One: **YES** **NO** C.2. If **YES**, what level did you complete? (example: Standard 1 or Form 2) _

C.3. Did any of your wives go to school? Circle One: **YES** **NO** C.4. If **YES**, how many levels did each wife complete? (Use table directly below)

	1st Wife	**2nd Wife**	**3rd Wife**	**4th Wife**	**5th Wife**	**6th Wife**	**7th Wife**	**8th Wife**
Level of School Completed	a.	b.	c.	d.	e.	f.	g.	h.

C.5. How many children does each wife have in each level? (Enter information into table. If more space is needed, use back of sheet.)

	1st Wife		**2nd Wife**		**3rd Wife**		**4th Wife**		**5th Wife**		**6th Wife**		**7th Wife**		**8th Wife**	
Num. of Children in School for Each Wife	**Boys**	**Girls**	**Boys**	**Girls**	**Boys**	**Girls**	**Boys**	**Girls**	**Boys**	**Girls**	**Boys**	**Girls**	**Boys**	**Girls**	**Boys**	**Girls**
1. **Nursery School**	a.	b.	c.	d.	e.	f.	g.	h.	i.	j.	k.	l.	m.	n.	o.	p.
2. **Standard 1**	a.	b.	c.	d.	e.	f.	g.	h.	i.	j.	k.	l.	m.	n.	o.	p.
3**. Standard 2**	a.	b.	c.	d.	e.	f.	g.	h.	i.	j.	k.	l.	m.	n.	o.	p.
4. **Standard 3**	a.	b.	c.	d.	e.	f.	g.	h.	i.	j.	k.	l.	m.	n.	o.	p.
5**. Standard 4**	a.	b.	c.	d.	e.	f.	g.	h.	i.	j.	k.	l.	m.	n.	o.	p.
6. **Standard 5**	a.	b.	c.	d.	e.	f.	g.	h.	i.	j.	k.	l.	m.	n.	o.	p.
7. **Standard 6**	a.	b.	c.	d.	e.	f.	g.	h.	i.	j.	k.	l.	m.	n.	o.	p.
8. **Standard 7**	a.	b.	c.	d.	e.	f.	g.	h.	i.	j.	k.	l.	m.	n.	o.	p.
9. **Form 1**	a.	b.	c.	d.	e.	f.	g.	h.	i.	j.	k.	l.	m.	n.	o.	p.
10. **Form 2**	a.	b.	c.	d.	e.	f.	g.	h.	i.	j.	k.	l.	m.	n.	o.	p.
11. **Form 3**	a.	b.	c.	d.	e.	f.	g.	h.	i.	j.	k.	l.	m.	n.	o.	p.
12. **Form 4**	a.	b.	c.	d.	e.	f.	g.	h.	i.	j.	k.	l.	m.	n.	o.	p.
13. **Beyond Frm 4**	a.	b.	c.	d.	e.	f.	g.	h.	i.	j.	k.	l.	m.	n.	o.	p.

C.6. How far do your children walk to day school: a. **Primary**:_____km b.**Secondary**:_____km
C.7. Do you have any children in boarding school now? Circle one: **YES** **NO**
C.8. If **YES**, where are they? _____
C.9. Do you support mandatory contributions for school construction? Circle one: **YES** **NO**
C.10. Have you ever been fined because your child didn't go to school? Circle one: **YES** **NO**
C.11. If **YES**, how much money each time?_____
C.12. How many times has this happened? _____
C.13. Have you ever had a child finish Form 4? Circle One: **YES** **NO**
C.14. If **YES**, how many: a. **Boys**: _____ b. **Girls**:_____

D. Religion

D.1. Do you currently belong to a church? Circle One: **YES** **NO**
D.2. If **YES**, what church do you belong to? Circle One:

Roman Catholic	KKKT	FPCT	TAG	Islam	Other

D.3. How many years have you belonged to this church? _____ Years

D.4. Have you ever changed churches? Circle One: **YES** **NO**

D.5. If **YES**: a.When? _____ b.Why?
_____

D.6. Which church/es do your wives belong to? (Enter information into table. If more space is needed, use back of sheet.)

	1st Wife	**2nd Wife**	**3rd Wife**	**4th Wife**	**5th Wife**	**6th Wife**	**7th Wife**	**8th Wife**
Church	a.	b.	c.	d.	e.	f.	g.	h.

D.7. Did you go to church/mosque last week? Circle One: **YES** **NO**
D.8. How many times did you go to church in the last 4 weeks? _____ times
D.9. Rate how strongly you agree or disagree with the following statement:

Statement	**Circle One**				
Laibonok are good for the community.	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree

E. Loans / Restocking / Gifts

Loans (Loans here are meant to refer to transactions that have a contract and a pre-arranged payback item and time period.)
E.1. In the past 12 months, have you received a **loan** from another person? Circle one: **YES** **NO**
E.2. If **YES**, how many **loans** did you receive? _____ loans
E.3. In the past 12 months, have you given a **loan** to another person? Circle one: **YES** **NO**
E.4. How many **loans** did you give? _____ loans
E.5. In the past 12 months, did you **say no** to anyone who asked for a loan? Circle One: **YES** **NO**
E.6. If **YES**, how many loan requests did you **refuse**? a._____ And why did you refuse?
b._____
E.7. In the past 12 months, did anyone **refuse to give you** a loan that you asked for? Circle One: **YES** **NO**

E8. If **YES** for E.1. or E.3., please describe the details of **each transaction** the respondent was involved in, either **GIVEN** or **RECEIVED**. Enter the information into the table. (For example, if the respondent gave 1 loan and received 2, you would write **GIVEN** next to the 1. in the far left column of the table below and complete the row. Then you would write **RECEIVED** next to 2. in the left column and complete the row. Finally you would write **RECEIVED** again next to 3. for the last loan – and then complete the table. If more space is needed, use back of sheet.)

Was the loan given or received? (write **GIVEN** or **RECEIVED**)	**Approx. Month of Loan?**	**What was given/received?**(Livestock, Bags of Maize or Beans, or Other Items) **Be specific.**	**What was the age-set of other person?**	**What was your relation to other person?** (age-mate, friend, relative, clan member, etc.)	**Time to be Repaid**
1.	a.	b.	c.	d.	e.
2.	a.	b.	c.	d.	e.
3.	a.	b.	c.	d.	e.
4.	a.	b.	c.	d.	e.
5.	a.	b.	c.	d.	e.
6.	a.	b.	c.	d.	e.
7.	a.	b.	c.	d.	e.

For E.9. and E.10. Circle the best answer to complete the sentence.

E.9. Lending is **more common** **less common** **as common** now compared to the past?

E.10. Lending is **more common** **less common** **as common** now compared to the time of the Landisi Olng'esher (2002-03)?

Restocking (Restocking here is meant to refer to transactions where someone is given animals by a group of people to replenish his herd.)

E.11. In the past 12 months, have you received restocking from other people? Circle One: **YES** **NO**

E.12. In the past 12 months, have you contributed (given) to restocking another person? Circle One: **YES** **NO**

E.13. If **YES**, how many times did you contribute to restocking another person? _____ times

E.14. If **YES** for E.11. or E.12., please describe the details of **each transaction** the respondent was involved in, either given or received. (See detailed instructions for filling out the table at question E.8.)

Was the restocking given or received? (write **GIVEN** or **RECEIVED**)	**Approx. Month of Restocking?**	**What was given/received?** (Livestock, Bags of Maize or Beans, or Other Items) **Be specific.**	**What was the age-set of other person?**	**What was your relation to the other person?** (age-mate, friend, relative, clan member, etc.)
1.	a.	b.	c.	d.
2.	a.	b.	c.	d.
3.	a.	b.	c.	d.
4.	a.	b.	c.	d.

For E.15. and E.16. Circle the best answer to complete the sentence.

E.15. Restocking is **more common** **less common** **as common** now compared to the past?

E.16. Restocking is **more common** **less common** **as common** now compared to the time of the Landisi Olng'esher (2002-03)?

Gifts (Gifts here are meant to refer to items given or asked for to strengthen a relationship and where no contract exists.)

E.17. In the past 12 months, did you receive a **gift** (not sherehe) from someone to form or strengthen a friendship? Circle One: **YES** **NO**

E.18. If **YES**, how many gifts like this did you **receive**? _____ gifts

E.19. In the past 12 months, did you give a **gift** (not sherehe) to someone to form or strengthen a friendship? Circle One: **YES** **NO**

E.20. If **YES**, how many gifts like this did you **give**? _____ gifts

E.21. If **YES** for E.17. or E.19., please describe the details of **each transaction** the respondent was involved in, either given or received. (See detailed instructions for filling out the table at question E.8.)

Was the gift given or received? (write **GIVEN** or **RECEIVED**)	**Approx. Month of Gift?**	**What was given/received?** (Livestock, Stick, Bags of Maize or Beans, or Other)	**What is age-set of the other person?**	**What was your relation to the other person?**	**Was the gift asked for by the receiver?** (write **YES** or **NO**)	**Did the receiver have a specific problem?** (write **YES** or **NO**)
1.	a.	b.	c.	d.	e.	f.
2.	a.	b.	c.	d.	e.	f.
3.	a.	b.	c.	d.	e.	f.
4.	a.	b.	c.	d.	e.	f.
5.	a.	b.	c.	d.	e.	f.
6.	a.	b.	c.	d.	e.	f.
7.	a.	b.	c.	d.	e.	f.

For E.22. and E.23. Circle the best answer to complete the sentence.

E.22. Gifts are **more common** **less common** **as common** now compared to the past?

E.23. Gifts are **more common** **less common** **as common** now compared to the time of the Landisi Olng'esher (2002-03)?

Sherehe

E.24. In 2010 did you host a sherehe at your Enkaang? Circle One: **YES** **NO**

E.25. If **YES**, how many sherehe did you host at your Enkaang? _____ sherehe

E.26. If **YES** to E.24., what types of sherehe did you host? Circle all that apply:

Circumcision	Engipaata	Political	Raise money for Problem	All Others

E.27. In the past 12 months, did you attend a Sherehe at other Enkaang? Circle One: **YES** **NO**

E.28. If **YES**, how many Sherhe have you attended at other Enkaang? _____ sherehe

E.29. If **YES** to E.27., what types of sherehe did you attend? Circle all that apply:

Circumcision	Engipaata	Political	Raise money for Problem	All Others

E.30. Which type did you attend the most of? Circle one:

Circumcision	Engipaata	Political	Raise money for Problem	All Others

F. Livestock

F.1. At this time, how many **goats** do you have?_____ F.2. How many **sheep** do you have?_____

F.3. At this time, how many different types of **cattle** do you have? (Enter information into the table.)

	Cattle Breed				TOTAL
Cattle Type	**Zebu**	**Sahiwal**	**Boran**	**All OtherBreeds**	
1. Bulls	a.	b.	c.	d.	e.
2. Castrated Males	a.	b.	c.	d.	e.
3. Adult Females	a.	b.	c.	d.	e.
4. Heifers	a.	b.	c.	d.	e.
e. Immature Males	a.	b.	c.	d.	e.
5. Calves	a.	b.	c.	d.	e.

F.4. In the past 12 months (or since we last talked to you), how many of each type of animal has been born or bought?

	Cattle Breed				Goats	Sheep
	Zebu	**Sahiwal**	**Boran**	**All Other Breeds**		
1. Born	a.	b.	c.	d.	e.	f.
2. Bought	a.	b.	c.	d.	e.	f.

F. 5. In the past year, (or since this project last talked to you), how many of each animal has died (and cause of death) or been sold or slaughtered?

	Cattle Breed				Goats	Sheep
	Zebu	**Sahiwal**	**Boran**	**All Other Breeds**		
1. Died	a.	b.	c.	d.	e.	f.
2. Sold or Slaughtered	a.	b.	c.	d.	e.	f.
3. Cause for death (if applicable)	a.	b.	c.	d.	e.	f.

F.6. In the past 12 months, what have been the major problems with your herd?_____

F.7. Have you dipped all your animals within the last 5 days? Circle one: **YES** **NO**

F.8. Have you dipped all of your animals with the last 15 days? Circle one: **YES** **NO**

F.9. If **NO** to F8, why not?_____

F.10. In the past 12 months, have you paid anyone to herd your livestock? Circle one: **YES** **NO**

F.11. If **YES**, how many people have you paid?_____ F.12. How much do you pay each herder?_____

F.13. How are you related to the herder/s?_____

G. Agriculture

G.1. At this time, what is the size of your land allocation in acres? _____ Acres
G.2. Did you rent or lease any acres to others this year? Circle One: **YES** **NO**
G.3. If **YES**, How many acres did you rent/lease to others this year? _____ Acres
G.4. What is your relation to the renter?_____ G.5. What is the kabila of the renter? _____
G.6. Where does the renter live? _____
G.7. Did you sell any animals this year to get the money to farm this year? Circle one: **YES** **NO**

G.8. If **YES**, what animals were sold to get the money to farm this year? (Mark the number sold for each breed and type.)

	Cattle				**Goats**	**Sheep**
Animal Type	Zebu	Sahiwal	Boran	All Other Breeds		
1. Bulls	a.	b.	c.	d.	g.	h.
2. Castrated Males	a.	b.	c.	d.		
3. Adult Females	a.	b.	c.	d.		
4. Heifers	a.	b.	c.	d.		
5. Immature Males	a.	b.	c.	d.		
6. Calves	a.	b.	c.	d.		

G.9. When did you sell these animals (what month/months)?_____
G.10. This year did you sell **fewer** animals **or more** animals than you did to plant last year? Circle One: **Fewer** **More**

G.11. How many acres did you plant this year for each crop? How many bags harvested? How many bags sold at this time? Use the table:

	Maize	**Beans**					
		Red & White	Maasai Red	Soya	Canada	Black	All Others
1. Number of acres you farmed this year (not including leased land)	a.	b.	c.	d.	e.	f.	g.
2. Number of 100kg bags you harvested	a.	b.	c.	d.	e.	f.	g.
3. Number of 100kg bags you have already sold, at this time	a.	b.	c.	d.	e.	f.	g.

G.12. How was the land plowed? Circle all that apply (below):
Hired Tractor Own Tractor Hired Oxen Own Oxen By hand (hoe) Other methods

G.13. Are the maize and beans planted together or separately? Circle One: **Together** **Separately**
G.14. This year did you, or your family, exchange labor on other people's farms **without payment**? Circle One:
YES **NO**

For G.15. and G.16. Circle the best answer to complete the sentence.
G.15. Exchanging farm labor is **more common** **less common** **as common** now compared to farming in the past?
G.16. Exchanging farm labor is **more common** **less common** **as common** now compared to the time of the Landisi Olng'esher (2002-03)?

G.17. During the past 12 months, what were the major problems with cultivation?_____
_____
G.18. Besides livestock and agriculture, do you participate in any other activities or businesses to get more money?
Circle one: **YES** **NO**
G.19. If **YES**, what do you do? _____
G.20. How much money do you get from these activities each year (approx.)? _____

H. Politics

H.1. Did you vote in the general election in 2005? Circle one:	**YES**	**NO**
H.2. If **NO**, why not? _____		
H.3. In 2005, did you actively campaign for one of the candidates? Circle One:	**YES**	**NO**
H.4. Have you ever made a contribution to a political party? Circle One:	**YES**	**NO**
H.5. At this time, do you have a political party membership card? Circle One:	**YES**	**NO**
H.6. Have you ever attended a seminar on politics or your rights? Circle one:	**YES**	**NO**

H.7. If **YES**, how many? _____ seminars (approx.)

I. Projects / Development

I.1. Over the last many years, there have been projects to develop this village. Rate how strongly you agree or disagree with the following statements.

Statement	**Circle One for Each Statement**				
1. The village is developing well.	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
2. The village is developing quickly.	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
3. Development in the village benefits me directly.	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
4. Churches and church organizations have been important sources of development in the village.	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
5. Government has been an important source of development in the village.	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
6. Non-Government Organizations (NGOs) have been important sources of development in the village.	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
7. Conservation (including the park and lodges) has been important sources of development in the village.	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree

I.2. Do you own a cell phone? Circle One: **YES** **NO**
I.3. If **YES**, how much have you spent on vouchers in the past 7 days (approx.)?
_____

BE SURE TO THANK HIM or HER VERY MUCH!

Appendix 11: Number of development features by proximity to TNP (table)

	Schools		*Water Points*		*Health*
	Pri.	*Sec.*	*Dams*	*Other*	*Clinics*
Past – 1970					
Adjacent	1		1	2	1
Near			1		
Far				3	
1971 – 2000					
Adjacent	2		4	5	1
Near	2		1	1	1
Far	1			4	1
2001 - Present					
Adjacent	4	1(2)	4	8(2)	2
Near	4	2	3	11(1)	2
Far	3		1	5(1)	2

Parentheses ( ) indicate feature was under construction in 2010.

Appendix 12: Comparison of development in Loiborsoit and Landanai

A. Loiborsoit (adjacent to the park)

The first mark of infrastructural development in Loiborsoit came in the early 1950s when the colonial government dug a well. This well has become broken and has been fixed many times, at least once by TANAPA in the early 1990s. As noted in the body of the article, 3 new wells were constructed by a Swedish religious organization in 1991 though today only 1 of these remains in operation. And the American religious organization has completed 2 new wells in the last couple years with plans to complete 2 other dug wells in 2011.

In addition to wells, Loiborsoit has acquired several dams over the years, though not all are still functional. Its first dam was constructed in 1990 with support from the district government and community contributions. In 2002 the community successfully recruited a tourist hunting company operating near the park to scrape the dam to remove accumulated sediment. In 2000, TANAPA built two dams in the community. One of these dams failed in 2001 and was never repaired. The other failed in 2008 but proceeds to repair the dam were provided by the district government. Community members then picked up the tab in 2009 when it failed again. Early in 2010, the dam failed a third time – and plans to repair it remain unclear. And around 2006, TANAPA built a third dam in the area immediately near the park, which community members claim is for wildlife but admit that they use it themselves.

Loiborsoit's first primary school was built in 1977 with contributions from community members, the district government, and the Swedish religious organization provided funds to build 3 classrooms and an office (only one other building was built). A

second primary school was built in 2003 with support from community contributions and the district government. For this school, the Swedes contributed 40 desks while the Americans supplied books. And in 2010, a third primary school was opened in the community. This school was also financed primarily by community contributions and the district government, though again the Swedes contributed funds – this time to build a water storage tank and toilets. In 2009, the community began construction on a secondary school with anticipated support from the district government. However, in 2010 the community solicited the American religious organization and secured a pledge for complete funding to build a separate secondary school. A ground-breaking ceremony with American donors took place in July. Other smaller contributions towards education have been directed to individual households. A small Swiss NGO operating in the area has provided some students with school clothes and fees. Furthermore the Swedish organization has helped some families with secondary school fees.

Loiborsoit's first and only health clinic was completed in 2009. All financial resources for this project were provided the American religious organization following a period of recruitment by the community.

Finally, it is noteworthy that Loiborsoit leases 300 acres near the park to a photographic safari company. This yields several thousand dollars a year that community leaders say is directed towards many projects in the community, including water and education projects.

B. Landanai (far from the park)

According to leaders in Landanai, the first improved water source in the area was installed by the German colonial government before the end of World War I. In 1996, this spring/pump needed repairs, so the community turned to the local development arm of the Roman Catholic Church which responded with assistance. The next two water points weren't installed until 2000, with a fourth added in 2002. Construction of these last three was financed by a single German religious organization, but community contributions have been used to keep them in good repair. Landanai has no dams.

Landanai's first primary school was built in 1984 with support from community contributions and the district government. During construction, the community asked the German religious organization, that would later aid with Landanai's water projects, to contribute to the construction of the school. The organization provided roofing for one classroom (an expense usually borne by the district government). Landanai's second primary school was built in 2008 with community and district government support.

Landanai's only health clinic was built in 2009 with community and district government support.

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