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IN SEARCH OF THE SUSTAINABILITY MIRACLE:
LAND REFORM, AGRICULTURAL INTENSIFICATION, AND
CHANGING LIVELIHOODS IN SEMI-ARID THARAKA,
KENYA

presented by

Thomas A. Smucker

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Major Professor's Signature

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IN SEARCH OF THE SUSTAINABILITY MIRACLE: LAND REFORM, AGRICULTURAL INTENSIFICATION, AND CHANGING LIVELIHOODS IN SEMI-ARID THARAKA, KENYA

By

Thomas A. Smucker

A DISSERTATION

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ABSTRACT

IN SEARCH OF THE SUSTAINABILITY MIRACLE:
LAND REFORM, AGRICULTURAL INTENSIFICATION, AND CHANGING LIVELIHOODS IN SEMI-ARID THARAKA, KENYA

By

Thomas A. Smucker

This research examines the dynamics of land tenure change and the impacts on Tharaka land management and the broader livelihood system. The central question addressed by the research is the impact of land tenure reform on patterns of agricultural intensification, in particular the advent of sustainable intensification as indicated by expanded investment in soil and water conservation techniques. However, an understanding of the specific importance of land tenure reform within the context of the social relations within which land managers are embedded requires a broader examination of the evolution of agro-pastoral land use and livelihoods, the context and dynamics of tenure reform, and the implications for changes in other dimensions of the social relations of production.

The research is based on a diverse set of primary data sources, including a household survey, focus group discussions, community workshops, key informant interviews, and participant observation conducted in four locations within Tharaka District. Secondary data make possible an analysis of the evolution of Tharaka livelihoods, land tenure, and land use as a means of situating the impacts of tenure reform within broader historical evolution of human-environment interaction.

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The results suggest that Tharaka land management has adapted rapidly to a new context of more intensive cultivation and more exclusive use rights through a broad expansion of a suite of soil and water conservation measures. Adjudication does not increase the probability of investment, however other dimensions of tenure security play important roles. The broader impacts of tenure reform on Tharaka livelihoods and the prospects for sustainable intensification of crop production are explored through an examination of the changing nexus of the social relations of production. The examination of change suggests new forms of differentiation and new dynamics of risk within Tharaka that underlie resource management and livelihood strategies.

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This dissertation is dedicated to the memory of Junius Gitari, and is further dedicated to his wife Florence, and their children.

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Like any scholarly work, this dissertation is the product of the hard work, guidance, and generosity of many individuals. It represents the dedication of colleagues, family, and friends who provided personal, material, and intellectual support and guidance throughout my graduate career and, particularly, during the process of conducting this research.

The dissertation committee provided excellent guidance throughout my time at Michigan State University. Dr. David J. Campbell was a mentor in every sense of the word. From our first meeting at Ohio University in 1997 to the final round of post-defense editing in 2003, he has provided extraordinary guidance, exemplary patience, and constant encouragement. To begin listing the details of his commitment to the progress of this project would be a never ending task. Dr. David Skole was also a great mentor, providing time, resources, and critical input on this research throughout its development. His enthusiasm for research is unparalleled. I feel fortunate to call him a mentor and a friend. Dr. Jennifer Olson turned up in Nairobi just in time to save my field collection instruments from certain failure. She also agreed to join the dissertation committee in 2000 and has provided a critical perspective on nearly every page that follows.

Drs. Gary Manson and Bill Derman taught excellent seminars that put me on the path to doing this research. They have also provided important criticism of earlier drafts. Dr. Patti Kristjanson of the International Livestock Research Institute (ILRI) in Nairobi joined the committee after the field research had begun. Even before joining the committee, however, she had provided guidance on the study and found a home for this project within a joint ILRI-KARI program. Hers was a reassuring voice

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in those uncertain early days. Likewise, Robin Reid assisted in organizing my appointment as an ILRI Graduate Fellow for which I am extremely grateful.

I must also heartily thank Dr. Bob Walter who kindled my interest in Africa during my time at Ohio University. The research and personal guidance of Drs. Ted Bernard and Ben Wisner have been central to my understanding of change along the Meru gradient. I look forward to engaging more with all of you in the future! Similarly I would be remiss if I did not thank Chris Oliver for opening my eyes to new perspectives in social science. Chris has made me skeptical about some things and more certain of others, and for that I am grateful.

Countless individuals in Kenya provided assistance in the everyday undertakings of field research. Whether it was providing a cup of tea, helping to dig my Suzuki out of a ditch, or guiding us to the next homestead, the friendly spirit of people in Tharaka and Kenya generally made field research a great pleasure. As Mary Mwiandi, my official Meru advisor, once proclaimed: "you know, Kenyans are good people". I can only respond with an enthusiastic "*yenyewe*"!

My work in Tharaka was greatly assisted by the headmen and many *wananchi* who took time out of their day to provide information that made this study possible. Their warm welcome and great enthusiasm in sharing information about their lives made fascinating and enjoyable experiences out of otherwise long, hot days. It is my great hope that the information collected will be used to the benefit of Tharaka communities who contributed selflessly to this research.

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welcomed me to Meru and allowed me to share a classroom at Kenya Methodist University with thirty brilliant young Kenyans. Lucy Kirori's friendship and great assistance on all matters administrative within ILRI were blessings. The Kinotis (Felicity, Eric, Muriithi, and Kanana) remained loyal friends and, truly, a second family in Kenya. Andrew Muchiru, Jeff and Jess Worden, and Shauna and Glen BurnSilver, Fred Atieno, and Tom Ouna were excellent office mates and good friends in Nairobi. Ben Kariuki, Joe Nyamulu, Robin Barr, and Jacqui Kendi were wonderful company in Meru on my short weekend breaks from the heat and exhaustion of field research.

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I would like to express a special note of gratitude to three extraordinary individuals who assisted in collecting the bulk of the data for this project, most often with an annoying American looking over their shoulders and pushing them to dig deeper! Jeremiah Nyaga was an extraordinary researcher and provided deep insights into Tharaka social change. I am also grateful to his wife and little ones who tolerated his absence from home. Martha Kamunyu is made of the stuff that holds communities together. Her work was flawless and I know that she will be doing great things in Tharaka in the near future. Moses Nabi succeeded in talking sense into me when I was on the wrong track. Moses's extraordinary observations and great wit made life in Tharaka all the more enjoyable. *Nani habendi?*

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It seems like yesterday that I was thanking my family for sticking with me through my M.A. thesis. They continue to be perplexed by the time it takes to produce these simple documents but have remained supportive throughout, even as

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CHAPTER 1

INTRODUCTION TO THEORETICAL AND CONCEPTUAL ISSUES

The restructuring of land tenure relations has been a central component of society-environment interaction in post-colonial Africa. Numerous African governments have initiated land reform programs with the objective of creating a code of individualized land rights modeled on European freehold tenure. At the same time, a number of social factors have converged to create evolutionary change within customary land tenure systems.[1] In both cases, rules of access, use, and transfer are reformulated in order to adapt to a changing context of agricultural commoditization, rising population densities, land scarcity, and the increasing value of land as it replaces livestock as the primary indicator of wealth in society. Land tenure change and its implications for land-use and management have emerged as a research focus with important social and environmental implications.

Like several other African countries, Kenya's land reform program has focused on the individualization of land tenure as a means of creating incentives for increasing agricultural productivity. Based on policy formulations established during the colonial era, land demarcation, consolidation, and titling expanded rapidly during the 1960's and 1970's in the highland intensive commercial farming zones of Central and Western Kenya. Since the 1970's, Kenya's land reform program has expanded from zones of high

[1] I adopt the term customary tenure systems to indicate those systems that are primarily under the jurisdiction of non-state actors, including lineage groups and locally appointed committees. I adopt the term cautiously with awareness that it may convey the notion that such systems are immutable or unchanging products of historical isolation from processes of political, economic, and cultural change. Such systems may refer to commonly held notions of custom, whether recent or historical, while also having undergone monumental change due to both internal and external factors. As such, I find the term no more limiting than the term indigenous, which emphasizes solely the local origins of the tenure system.

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rainfall and agro-ecological potential to the semi-arid pastoral and agro-pastoral zones. The state-sponsored adjudication of land rights in the context of the agro-pastoral land-use systems of the semi-arid lower zones east of Mount Kenya has posed particular challenges for achieving the objectives of increasing tenure security, crop productivity, and investments in conservation techniques while maintaining the viability of pastoral and agro-pastoral livelihood systems.

The objective of reform programs that promote individualization of tenure is to increase tenure security through the state-sponsored adjudication of rights, thereby creating incentives for improved land management and increased productivity. Individualization is seen as a means of creating incentives for greater investment in soil and water conservation techniques and increasing the sustainability of agricultural intensification. However, this research argues that the dynamics of land use and management are embedded within the dynamic nexus of social relations that govern the allocation of both land and labor, thus requiring a multifaceted approach to understanding the complex relationships between tenure change, land management, and rural livelihoods.

This research examines the dynamics of land tenure change and the impacts on land management and the broader livelihood system in Tharaka, Kenya. Three research questions address the study's core concern with the relationship between land tenure and land use:

- What is the impact of state-sponsored land adjudication on patterns of agricultural intensification in Tharaka?

- Does individualization of tenure, as a component of tenure security, create incentives for investment in sustainable agricultural intensification?
- Does customary tenure inhibit such investments in long-term productivity?

The objective of this research is to examine the complex relationship between tenure change and patterns of agricultural intensification, in particular the advent of sustainable intensification as indicated by expanded investment in soil and water conservation techniques. The study adopts political ecology as a conceptual framework for the case study analysis of the tenure-intensification relationship in Tharaka. The case study investigates an evolving local livelihood system that is shaped by political, economic, and environmental forces at multiple scales, thereby examining the tenure-intensification relationship within a broader social and environmental *milieu*.[2] Specifically, the identification of the complex linkages between tenure and intensification in Tharaka requires consideration of:

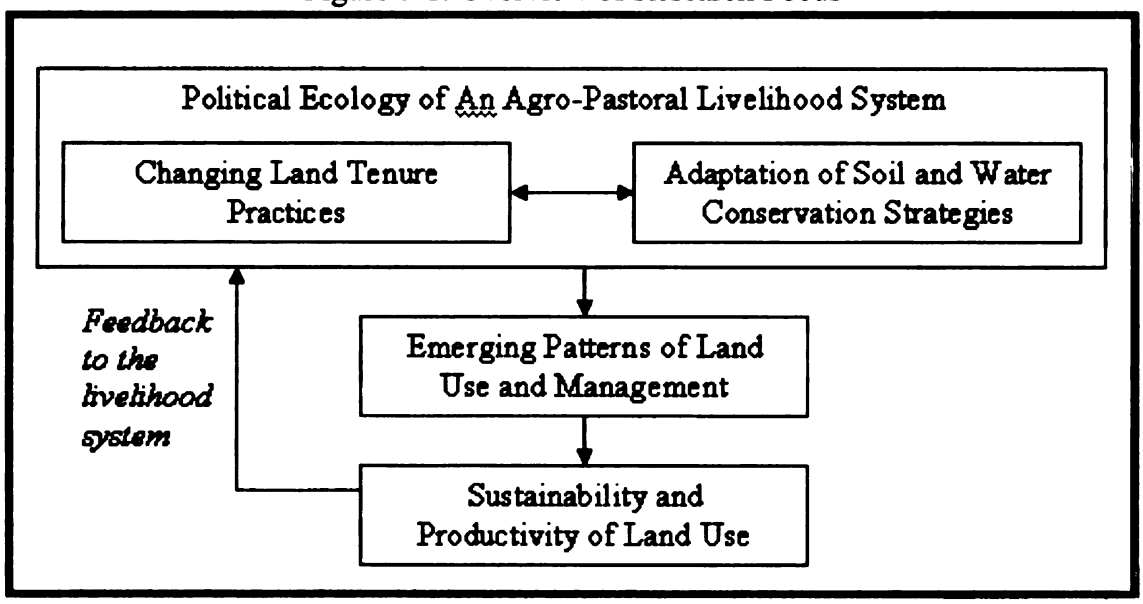
1. the evolution of agro-pastoral land use and livelihoods in semi-arid Tharaka;
2. the historical political economy context of state-sponsored land adjudication in Tharaka, and the implications for land tenure practices and the social relations on which they are based;
3. the relationship between the evolution and reform of Tharaka land tenure and the changing dynamics of agro-pastoral land use and management during the process of agricultural intensification;

[2] In the rural development literature, livelihoods have been described as comprising "people, their capabilities and their means of living, including food, income and assets" (Chambers and Conway 1991). The definition serves as a reminder that rural people tend to transcend categories such as "farmer" and "pastoralist" in the diverse activities that sustain them and the flexibility with which they respond to crises or disruptions within local economies.

4. the implications of the above for understanding the tenurial and resource management dimensions of rural development processes in semi-arid East Africa.

Figure 1-1 illustrates the major foci of the research. The tenure-intensification relationship is examined as a central component of the Tharaka livelihood system. The interaction of tenure and land management underlies the emergence of new patterns of land use and management and new parameters of sustainability and productivity.[3] While levels of productivity and sustainability are outcomes of the mode of land management, they also constitute a feedback to livelihood strategies and contribute to the creation of new tenure-intensification dynamics. Such feedback intersects with wider political and economic forces in shaping the society-environment dynamics of the tenure-intensification relationships.

Figure 1-1. Overview of Research Focus



[3] These highly contested terms, sustainability and productivity, are explored in greater detail below.

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Geographies of Society-Environment Interaction

Geographic research has been characterized by a wide range of theoretical and conceptual approaches to society-environment relationships with diverse origins in philosophy and social theory. This diversity is a result of Geography's engagement with other disciplines and a willingness to accept methodological pluralism (Peet 1998). The result has been a rich tradition in society-environment research that ranges from the strictly quantitative work of regional scientists and planners to humanistic perspectives that reject the objectification of the human experience and human engagement with the natural environment. Between these two perspectives has emerged the diverse field of political ecology which is often historical materialist and structuralist in philosophical underpinning while also concerned with empirical analysis for the purpose of investigating the social origins of environmental change and the mediation of environmental change within the context of social relations of class, gender, age, and ethnicity (Bryant and Bailey 1997; Derman and Ferguson 2000; Peet and Watts 1997)

Political ecology has diverse roots within social science, but perhaps evolved most directly from cultural ecology. Shared primarily by anthropologists and geographers, this field examined cultural adaptation to ecological systems, most often focused on the ecological suitability of traditional agriculture and the problems of agricultural modernization (Mortimore 1972; Porter 1965). A functionalist assumption of cultural ecology is that human behavior and cultural change represent adaptations to environmental conditions, particularly within local contexts (Netting 1986).[4] Despite more recent trends toward considering the role of external factors in the adaptation of

[4] It is an overstatement to label all of cultural ecology as functionalist. However, it can be argued that it is an underlying assumption in major works.

local societies (Grossman 1981), these approaches were criticized for neglecting both power relationships and development processes at national and international levels that structure local society-environment relations. In short, cultural ecology suffered from "a neurotic obsession with individual rationality, a profound ahistoricism, and not least a neglect of political economic structure" (Watts 1983, 14).

Political ecology research has attempted to fill this gap by linking international and national-level processes to local change in society-environment relations. A primary focus has been on the evolution of rural societies in developing countries and changes in their resource use and management in the context of broader political economies of resource access, land use, and production. The land use implications of the position of small farmers within such broader social and economic structures, in particular systems of resource control and access, has been an important theme in the political ecology literature (Bassett 1988; Carney 1997). Blaikie and Brookfield's (1987) suggest a chain of explanation whereby the social relations of land management are examined via an exploration of nested scales. At the local scale are sites within which individuals and small groups make land use decisions. Sites exist within regional settings that involve, among others, the regional physiography, systems of property relations, and settlement history. Regions, in turn, are shaped by class relations and the political, economic, and administrative contexts. At the international scale, external economic forces contribute to trajectories of commoditization of land, labor, and production. The scales are linked in a chain of causation from global scale processes to local social relations in influencing land use decision-making.

Land-Use and Land-Cover Change Science and the Human Dimensions of Global Change

A parallel development within society-environment research has entailed the emergence of multidisciplinary interest in the social and environmental dynamics of land use and cover change. Land-use and land-cover change science is a rapidly expanding field of global environmental change that has brought together a diverse set of scientists with a common interest in analyzing and identifying the social and environmental driving forces, the impacts of land-use and land-cover change at multiple scales, and the spatial and temporal dimensions of future changes (International Geosphere-Biosphere Programme 1997). Within this community, a "human dimensions of global change" agenda has emerged which encompasses a concern for understanding the changing dynamics of land-use and land-cover change within local and regional settings and the impacts on habitat conservation, energy use, economic and social development, vulnerability and food security, human health, and peace and security (Stern et al. 1992).

The science of land-use and land-cover change utilizes advances in satellite remote sensing, spatial modeling, and local case studies in order to identify the social and environmental driving forces of land use and cover change. Generally, an important component of the community's work has been research that investigates cause-use-cover scenarios whereby much of the research has focused on modeling the relationship between underlying social and environmental driving forces of change, proximate causes as observed in changing land use, and outcomes in terms of changes in land cover (Lambin 1997). Analysis of driving forces is often based on the socioeconomic or demographic characteristics of households or administrative units (e.g., Geoghegan et al. 2001; Veldkamp and Fresco 1996).

Despite the predominately positivist and quantitative approach of early human dimensions research, there is a growing awareness of the limitations of conventional approaches that focus on demographic, economic, and technological aspects of change to the exclusion of political and socio-cultural dimensions of land-use and land-cover change (Taylor 1997). However, the importance of a broad society-environment agenda that includes many of the concerns of political ecology has been recognized more recently by the scientific community in numerous documents that seek to set research priorities for the study of global environmental change (Human Dimensions Program 1994; Liverman 1998). Because of the difficulty of quantifying cultural and political variables and developing cross-study comparisons, cultural and political dimensions of land-use and cover change have largely been relegated to the local-level, even when local case study evidence suggests regional processes of change. Turner (1999) refers to this as the problem of scale parsimony, whereby causal factors or driving forces are identified and conceptualized in part based on the scale at which environmental change is observed, thus producing a certain epistemological bias. Perhaps the most prominent example of scale parsimony as applied to land use and land cover change in Africa relates to the identification of population growth as a regional driver of land use and cover change at the same time that seasonal labor shortages in smallholder agricultural are widely documented within local tropical farming systems (Connelly 1994; Moseley 2000). The problem of scale parsimony reinforces the importance of investigating the intersection of social processes at different spatial scales through time (Campbell and Olson 1991).

Situating Marginalization, Degradation, and Sustainability

In rural areas of developing countries, social and economic relations affecting land use change processes often entail the "pressure of deprivation" whereby degradational activities of land managers reflect the requirements of social reproduction (Blaikie and Brookfield 1987). For example, Bernstein (1978) suggests that the commoditization of African peasant production may create "a simple reproduction squeeze" which occurs when production of commodities for exchange becomes a central component of livelihoods. The reproduction squeeze is created through changing terms of trade between crops and livestock produced for the market and items of household consumption, resulting in pressures on the household to intensify agricultural production and reduce consumption, thus contributing to "the situational rationality of the land manager who is compelled to mine the soil or fell the forest" (Peet and Watts 1997, 7). The reproduction squeeze illustrates a central dynamic of the pressure to intensify production in African rural systems undergoing different processes of commoditization. More importantly it leads research on land use change dynamics into investigations of the social relations that underlie the reproduction of inequality in resource access, assets, and opportunities for livelihood diversification (Watts 1987).

A starting point for understanding the social dimensions of land degradation among relatively poor land managers has been through the prism of marginalization, a process that shapes social and environmental relations within localities (Wisner 1976a). Marginalization represents an intersection of environmental, economic and political-economy conditions which constrain land managers in their land use decision-making.

Blaikie and Brookfield (1987) illuminate this intersection by defining three kinds of marginality: economic, political-economic, and ecological.

Economic marginality entails the addition of labor to production on low potential land to the point that such increases in labor power merely repay the cost of production. Once all high potential land is under cultivation, low potential land is brought into use and intensified until its marginal cost is equal to marginal utility. This form of marginality can be related to agricultural involution (Geertz 1963) and Von Thunen's (Hall 1966) analysis of declining marginal returns to labor beyond an optimum point of intensification.

Political economy marginalization entails the exclusion of the majority of rural producers from core political and economic processes. This form of marginalization entails the exclusion from political and economic decision-making and is reflected through spatially unequal distributions of land and state resources. Furthermore, this form of marginalization limits access to information and resources that would assist innovation and adaptation to environmental, economic, and demographic change.

Ecological marginality can be defined as a place where natural conditions support the minimal survival of plant populations or agro-ecological production. Rather than inherent, immutable physical properties of a given patch of land that render it necessarily marginal, ecological marginality is shaped by the organization of production and management of resources which can condition the physical properties of land to support non-marginal economic processes which in turn may lead to the creation of a non-marginal political economy space.

The intersection of these forms of marginality provides an illustration of the complexity of land use change processes and the situated, complex nature of definitions of land degradation and sustainability as potential outcomes of society-environment interaction. Research on land degradation has been primarily concerned with decline in an area's biological productivity, decline in its utility to human communities, or both (Johnson and Lewis 1995). The notion of degradation implies a lowering of rank along a fixed scale, yet the productive qualities of land are examined relative to the requirements of human production systems (Blaikie and Brookfield 1987). Despite the perceptual dimensions of defining land degradation, several attempts have been made to quantify economic losses from degradation in African countries. One method has been to quantify the loss of gross cropland output in a single year as a result of land degradation in the preceding year. For example, estimates of the costs of land degradation in Zimbabwe have ranged from <1 percent (Grohs 1994) to 9 percent (Stocking 1986) of annual agricultural gross domestic product (AGDP) (ctd. in Böjö 1996). Despite notorious problems associated with accurate collection of data on agricultural output and productivity in many African countries, such estimates offer an indication of the importance of land degradation as a societal problem. When one considers the impact on productivity of those who rely significantly on subsistence production systems, the importance is even more evident.

In studies of land use change, and specifically agricultural intensification, the notion of sustainability has equally suffered from its lack of a clear definition. Ignoring global debates about the compatibility of economic growth and "sustainable development" (c.f., Sachs 1993), the idea of sustainability normally entails a notion of the

duration over which a given system of production with constant technology, population, and levels of consumption can perpetuate itself without endangering future biological productivity on which the system of production relies. The definitions become more complex when placed within the grounded examples of society-environment relations in which different social groups may have different interest, perceptions, access to, and control over the resources that constitute the components of sustainable environmental systems. Therefore, investigations of sustainability ought to begin by exploring the questions "of what, for whom?" (Campbell and Olson 1991).

The measurement of sustainability varies widely among social scientists. Those considering the sustainable or unsustainable nature of human resource use often engage in a exercise in prediction, whereby a given activity believed to contribute to future sustainability is measured as an indicator of contemporary sustainable (Costanza and Patten 1995). Research on the sustainability of agricultural intensification processes in African smallholder agriculture has relied heavily on such predictive techniques of equating current investments in soil and water conservation techniques with future societal and biological sustainability. While such measures can be criticized as reductionist of the complexity of sustainable systems, they remain valuable surrogate indicators in understanding the adaptation of local societies to the emerging resource management needs.

Land Tenure Change and Agricultural Intensification: Theory and Context

An important area of research that addresses such broader questions of degradation and sustainability has examined the intersection of political, economic, and

cultural forces that shape land tenure practices. Since the 1980's, and in some cases long before, market-oriented reforms in African agriculture have led to the reemergence of questions about the appropriateness of customary land tenure and its contribution to agricultural development. Despite growing interest in tenure issues on the part of international financial institutions (Deininger and Binswanger 1999), Bassett (1993) correctly pointed out that as late as 1980 there existed little empirical research on land tenure systems in Africa. However, the 1990's have witnessed a proliferation of land tenure studies in many African countries. Much of the research has focused on the relationship between land tenure security - a notion often narrowly defined as the individualization of land-use decision-making and elimination of secondary resource rights - and investments in agricultural productivity. The relevance of such research to rural East Africa is great given declining per capita food production and the geographical expansion of state power, statutory tenure systems, market relations, and sedentary agricultural systems to many parts of the continent that had been isolated from such forces in the recent past (FAO 1999).

Understanding the impact of land reform in the context of constantly evolving land-use and tenure systems requires that researchers investigate essential components of the broader social and environmental *milieu* in which tenure practices are formed and evolve. As a conceptual approach, political ecology can be an effective in clarifying the dynamics of tenure change, the implications for land-use change, and more broadly, the social dimensions of land-use and land-cover change in East Africa's diverse social and environmental landscapes.

One objective of political ecology has been to examine the changing dynamics of resource use in a societal context in which resource access and the livelihoods on which they are based are imbedded within power relations among groups in society (e.g., households, kinship groups, communities, non-governmental organizations, private companies, the state). In maintaining the importance of political and economic forces in structuring key aspects of human-environment interaction, the political ecology perspective can contribute to a critical understanding the intersections of resource management, tenure practices, and livelihood change. The reform of land tenure provides a window through which to examine such social dimensions of environmental change. From the political ecology perspective, land-use and tenure change in Tharaka can be seen as a manifestation of a broader political economy of control of and access to resources which are both shaped by and in the process of transforming Kenya's semi-arid landscapes (Blaikie and Brookfield 1987). Below I examine evidence on the change and evolution of tenure system, processes of agricultural intensification, and hypothesized relationships between the individualization of tenure and sustainable intensification.

Customary Tenure, Evolutionary Theory, and Reform

As one component of property relations, land tenure consists of a set of social relations governing the use and disposition of land. These social relations are produced and reproduced through a process of allocating power to individuals or groups over a specified category of resources (Okoth-Ogendo 1989). Land tenure is often considered as a "bundle of rights", indicating that the holder of tenure may possess any of a suite of use rights such as cultivation or extraction of resources (Hahn 1998).

The nature of a system of land tenure relations can be characterized with reference to the breadth, duration, and assurance of rights (Place et al. 1994). The breadth of rights refers to uses and resources encompassed and the conditions under which such use is granted. The duration of rights refers to the length of time for which tenure is granted. The assurance of rights consists of the certainty with which land-use and tenure rights that are granted will not be prematurely interrupted or denied.

Thus, land tenure need not include exclusivity of rights, absolute rights over all resources on the land (e.g., vegetation, water, and fauna), nor right of transfer.[5] Indeed many systems of customary tenure do not allot exclusivity of use rights to all resources on a piece of land. In such systems, overlapping access to grazing resources and fuelwood are often central components of livelihood systems (Agrawal 2001). In contrast, the prevailing approach to state-sponsored adjudication in much of the developing world entails a consolidation of aggregated rights to resources granted in the form of land title to individuals.[6]

Although sometimes portrayed as a static relic of pre-colonial agriculture, Kenya's many customary tenure arrangements have evolved in relation to broader social change (Bruce 1988; Mackenzie 1998; Delville 2000). Under many African customary tenure arrangements, land is held by a corporate unit and use rights are granted to

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[5] The term land-use rights, or usufruct, is often used to indicate a form of tenure in which such limited and disaggregated rights are allocated.

[6] Of course, other types of land reform and land redistribution programs have been carried out in several African countries. Most notable in their contrast with the Kenya program are Tanzania's *Ujaama* villagization program of the late 1960's, Ethiopia's program of redistributing land from landlords to smallholders in the 1970's, and Mozambique's establishment of state farms and agricultural cooperatives in the early 1980's. Within Kenya, pastoral areas such as Kajiado District have undergone a modified version of land adjudication that entails the division of land into group ranches with an administrative decision-making structure (Campbell 1993).

individuals or lineage groupings. Membership in a kinship group, and one's status within such a group, is the central principle on which the dynamics of access are based. The nature of rights is closely related to the intensity of land use. Under shifting cultivation, land is relatively abundant. Exclusive land rights are rare as boundaries are poorly defined and rarely contested. Where population-land ratios increase and fallow declines, increasingly exclusive rights are asserted by local kinship groups in order to exclude the larger social unit from practicing overlapping, concurrent rights to land resources. Under such circumstances, resources such as grazing areas and water resources remain subject to overlapping rights (Migot-Adholla and Bruce 1994).

Furthermore, various societal groups maintain customary claims to land-use rights. For example, under many systems of customary tenure, the land-use rights of women are granted based on their relationship with their husbands or, if they are separated or widowed, through their relationship with other male kin. Thus, an understanding of customary tenure in Africa cannot be derived solely from an analysis of ownership and its absolute or corporate characteristics within local contexts. Rather it is necessary to consider the way in which land as property is enmeshed within changing social relations of custom, obligation, and the changing dynamics of resource use to which local institutions are often responsive (Okoth-Ogendo 1989; Thompson 1991).

In Kenya, as in much of Africa, customary law evolved most notably under colonial rule. Kenya's colonial government attempted to integrate customary systems into the broader colonial system of authority and regulation in the administration of areas identified for African settlement. In order to facilitate the administration of African areas, customary tenure relations were interpreted through the testimony of local leaders

invested with the power to define custom (Berry 1993). Most often, the interpretation of such testimony ignored aspects of African tenure that resembled the European notions of ownership, as this would have complicated the legal process of land expropriation for European settlement (Mackenzie 1994). Thus, contemporary customary tenure systems reflect processes of change that involve internal adaptation to changing land use as well as transformations that have taken place through their incorporation into broader legal and political economic systems.

More recently, customary tenure relations have evolved toward greater exclusivity of rights due to the influence of statutory land law and other social, demographic, economic, and political factors and have had important impacts on local people's livelihoods (Migot-Adholla and Bruce 1994; Firmin-Sellers and Sellers 1999). Given the evolution of customary tenure toward individualization and greater exclusivity, the question arises as to the importance of state-sponsored adjudication of private tenure to improving productivity and investment in sustainable forms of agricultural intensification, the broader dynamics of which are discussed below. An analysis of the dynamics of reform and evolution can serve as a means of identifying contemporary differences in tenure practices between evolving customary systems and statutory tenure systems.

The Social Dynamics of Agricultural Intensification

The intensification of agricultural production has been defined and measured in a number of ways including total output per unit area, frequency of cultivation, use of agricultural technologies and implements, and investments in labor-intensive soil and

water conservation measures (Kates et al. 1993). Each of these dimensions of agricultural intensification is limited in terms of measurement and comparability between land-use systems. In the broadest terms, the process of intensification involves a sustained increase in labor and capital in the production process resulting in increased gross output or market value of output. Such increases may entail internally generated innovation or simply increased input of labor or capital (Brookfield 1984). Both are directly linked to expansion of land under cultivation as an alternative production response. However, treatment of intensive and extensive systems as dichotomous obscures the fact that intensification *in situ* may occur in conjunction with the expansion of the area under cultivation.

Intensification of agricultural production can occur within a wide range of social contexts, demographic structures, and management schemes (Turner 1993). The intensification process may be negotiated, resisted, externally imposed, or internally generated within a spectrum of production systems (Berry 1993). Furthermore, intensification may be limited by environmental thresholds beyond which additional applications of labor or capital to the production process are not tenable (Blaikie and Brookfield 1987). Indeed, intensification is not necessarily a progressive process and may lead to growing inequality, marginalization of the poor, and environmental degradation (Campbell 1981). Perceptions and assessments of the social benefits and environmental sustainability of various paths of intensification vary greatly among groups in society.

The intensification literature on Africa has focused heavily on the ability of rural production systems to respond to population growth and market demand (Pingali and

Binswanger 1984; Bilsborrow 1987; Cleaver 1993). A consumption or needs-based approach to agricultural intensification derives it theoretical propositions from Boserup's (1965) seminal work and later revisions (Boserup 1981, 1985). From this perspective, agricultural change is driven primarily by the changing consumption needs of the local population due to population growth. Initially, labor is absorbed into production by intensifying existing management practices through more frequent cropping, more intensive weeding, or investment in forms of landesque capital such as terraces or erosion ditches aimed at long-term land improvements. Lacking opportunities for colonizing new land, critical thresholds of population density spur technological change that make possible increases in per capita output.[7]

Approaches focused on market demand emphasize the notion that the possibility of higher income drives farmers to maximize production (Schutz 1964; Wharton 1969). Households respond by increasing labor or capital investments in agricultural production. However, caveats appear in the context of risk aversion (Lipton 1968) and subsistence ethics (Grigsby 2001, Scott 1976) that prevail in agricultural societies. Others have framed intensification within the context of technological change in society at large. Hayami and Ruttan (1998) assert that that technology available to farmers and the social institutions that permit the most beneficial use of such technologies are dependent on institutional innovation within societies. Thus, the development and application of agricultural research in the public sector and the reform of land rights can be seen as two

[7] Thus, the impact of Boserup's work was twofold. First, it turned the population-resources debate on its head by positing a positive relationship between population growth, which had been widely considered a fundamental societal problem in the developing world, and food production. At the same time, it validated the notion of population growth as a primary driver of change in agricultural societies. According to Boserup (1965), in the absence of access to additional land, returns to additional units of labor will be relatively generous. In sacrificing leisure time to intensify production, technological innovation brings about a new labor-output curve at a higher level of productivity per unit of land.

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crucial dimensions of induced innovation that affect trajectories of agricultural change at broader scales. In contrast to the above approaches, which tend to favor a single societal factor as a driving force of intensification, cultural and political ecologists have attempted to bridge these perspectives with an analysis of the intersection of consumption, commodity, cultural, and political relations that influence land manager decision-making (Blaikie and Brookfield 1989; Peet and Watts 1997; Rocheleau et al. 1996).

Patterns of change in Kenya's broad historical transition from extensive pastoral and agro-pastoral land-use systems to sedentary intensive agricultural systems reflect political, economic, demographic, and environmental factors. By the 1920's, the combination of colonial land expropriations and population growth began to create new pressures that constrained extensive land-use systems and encouraged the development of exclusionary land rights within the central and western highlands. As commercial rights and land consolidation were granted to Africans in the late colonial period, those well-placed to understand the implications of such changes for future accumulation transformed their wealth from livestock to landholdings, taking advantage of the limited rights of commercial crop production permitted under the colonial government and enforcing new notions of exclusive land rights (Kitching 1980).

Throughout Kenya, the initial consolidation and intensification of land-use by "progressive" farmers was followed by state investment in infrastructure creating an emerging national political and economic core in the central and western highlands. Since Independence, the geographical expansion of intensive agriculture and exclusionary land rights to Kenya's semi-arid lands is characterized as expanding in a gradual, down slope pattern from high to low potential agro-ecological zones (Bernard et

al. 1989; Wisner 1976a). This process of geographical expansion has been characterized by competition among farmers, pastoralists, and agro-pastoralists for the wetter margins of semi-arid lands, which include relatively high elevation areas as well as river valleys and low-lying swamp areas (Campbell 1981). Access to such "wetlands in drylands" remains central to pastoral and agro-pastoral livelihood strategies as they have been a focus of the expansion of land tenure change and commoditized crop production in many parts of semi-arid Africa (Woodhouse et al. 2001).

Recent intensification in Kenya's semi-arid lands has been characterized by greater sedentarization, reductions in fallow periods, increased investment in soil and water conservation, and the blurring of the distinctions between farming and herding systems (Campbell et al. 2000; Scoones 1996; Smith et al. 1997; Tiffen et al.1994). Despite the existence of such common characteristics of change in land use and management in Kenya's semi-arid areas, the timing and socioeconomic effects of intensification vary significantly. Variation in the political economy relationship of such areas to the national economy is one factor that has created an uneven geography of intensification in semi-arid areas. In addition to affecting exchange relationships, the commitment of public resources to agricultural development and the relative importance of an area to national objectives are two factors that contribute to the timing and composition of land tenure policy. Furthermore, the progression of intensification and broader integration is by no means unilinear. For example, rural production systems may undergo disintensification when the array of social and environmental factors affecting access to resources, labor, technology and inputs is altered (Brookfield 1984; Olson 1998). It therefore seems essential to understand intensification as occurring at specific

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political economy "moments" which structure the trajectory of land use change and possibilities for future changes, including reversion to previous extensive patterns.

The Relationship Between the Individualization of Tenure and Agricultural Intensification

The link between the individualization of land tenure and agricultural productivity has been theorized from a range of perspectives that recognize tenure arrangements as a central aspect of the social milieu in which land use decision-making occurs (Bassett 1993; Place et al. 1994). Proponents of individualization assert that freehold tenure represents an enhancement of tenure security by eliminating the customary legal frameworks or other means by which rights to land, the benefits of labor, and capital invested on land might be expropriated. From this perspective, greater security of land access and use encourages investments in land productivity, reduces land conflict, creates collateral for attaining credit, and makes possible a redistribution of land to wealthier and more innovative farmers via the development of a land market. Land titling advocates propose state-sponsored land adjudication and titling as the key to hasten the move away from extensive farming practices typical of many African farming systems, thereby improving the productivity of African agriculture (Falloux 1987; Lewis 1955).

The appropriateness of land reform programs aimed at increasing tenure security through individualizing land rights has been the subject of much recent debate. Critics have recognized the flexible character of customary tenure systems, contending that greater individualization of land rights is often achieved through internally generated tenure changes resulting from population growth and changing factor prices in the absence of formal land titling programs (Deninger and Binswanger 1999). Therefore, it

is in the context of the evolution of customary tenure that analyses of the impact of state land adjudication must be undertaken. Proponents of the evolutionary theory of land rights assert that the growing demand for land for cash crop production and its growing scarcity due to population growth tend to encourage land managers to assert increasingly individualized rights, thus creating a demand for institutional innovation that ensures such rights (Boserup 1965, Deninger and Binswanger 1999; Hayami and Ruttan 1984; Platteau 1996).

Dominant approaches to understanding the linkages between land tenure and land-use change have emphasized economic and legal aspects of change at the cost of neglecting the political, cultural, and environmental dimensions of agrarian societies in which land tenure is embedded. In particular, the resilience of a subsistence ethic that is central to a moral economy of peasant resource access may persist, even when state-sponsored individualization is imposed (Grigsby 2002; Scott 1976). Furthermore, local forms of legitimacy interact with *de jure* rules of tenure in the interpretation and enacting of land rights. Such interaction of *de jure* land tenure systems with local notions of legitimacy in the interpretation of land rights illustrates the crucial element of human agency in the interpretation and evolution of *de facto* land rights (Mackenzie 1998). Interventions aimed at reconfiguring those rights can create an opening for the renegotiation of such rights and the reinterpretation of custom in the context of the evolving social relations of gender, class, ethnicity, and kinship (Lund 2001).

Major components of land-use and social change that have been associated with the individualization of land tenure, and potential alternative interpretations, are the

following (after Bruce 1994; Firmin-Sellers and Sellers 1999; Place et al. 1994; Platteau 1996):

- *Intensification of land-use.* The existence of overlapping use rights and the possibility of expropriation may inhibit investments in landesque capital such as tree planting or terracing. With greater security of tenure under freehold tenure, greater investments in labor and capital in agricultural production may result. This can include greater investment in agricultural inputs as well as more intensive use of land resources as indicated by declining fallow, investments in soil and water conservation techniques, and integration of livestock and crop production activities.
- *Changes in the role of livestock in the land-use system.* Reduced access to resources over which members hold overlapping grazing or other extraction rights limits grazing resources available to sustain extensive livestock land use. Where secondary use rights are strictly prohibited, wealthy households alone may succeed in maintaining larger herd sizes through purchase or rental of additional land. Paradoxically, as crop cultivation intensifies, the importance of livestock for providing manure increases.
- *Changes in the distribution of landholdings and the development of a land market.* The development of land markets has been posited as a beneficial outcome of establishing rights of transfer as one component of tenure security. Through land sales and rentals, wealthier farmers outbid poorer farmers, presumably resulting in greater productivity. However, greater inequality in landholdings and the emergence of a class of landless or land poor may lead to social conflict. Additionally, the

consolidation of land rights in the hands of senior males may have important gender and generational implications for the land-use rights of women and young men.

- *Changes in the nature and frequency of land conflicts.* Because all land tenure rights are allotted to the titleholder following adjudication, litigation and rent seeking activities may decline, thus encouraging investments in land productivity. However, the adjudication process may at least temporarily increase the magnitude of land conflicts among neighbors and between communities. Such an increase in conflict may have the effect of delaying the investments resulting from enhanced tenure security.

Miracles and Disasters: The Intensification of Semi-Arid Land Use Systems in Kenya

Society-environment research from semi-arid Kenya paints competing images of land use and livelihood change in semi-arid land use systems. One image claims a success story of small farmer adaptation to population growth as indicated by greater crop productivity, the expansion of cash crop production, and increased investment in a suite of soil and water conservation techniques. Tiffen et al. (1994) argue that small farmers in humid and semi-arid zones of Machakos have successfully responded to population growth and environmental degradation through widespread adoption of sustainable, intensive agricultural techniques, particularly terracing.

The "Machakos miracle" is often cited as evidence for a population-driven process of sustainable intensification of agricultural production. Tiffen et al. (1994) use the Machakos case study to contest the Malthusian notion that the relationship between population growth and fixed food supply are destined to result in ecological and social

disaster. Like Boserup, however, they maintain the preeminence of population growth as the central factor affecting both social and ecological outcomes without recognition of external forces, in particular employment in and remittances from nearby Nairobi, which has had a great impact on livelihoods in Machakos (Rocheleau 1995b).

A second image of society-environment relations in semi-arid Kenya depicts a progressive process of marginalization of semi-arid land-use systems. This perspective has emphasized that process of intensification and commoditization in areas of high agricultural potential in Meru and Machakos as drivers of downslope frontier migration and marginalization of those without private land rights (Wisner 1976a, 1976b; Rocheleau 1995). Land privatization, declining commodity prices, disadvantageous terms of trade, and disintegrating public services are seen as exacerbating landlessness, poverty, and household vulnerability to drought (Wisner 1976a, 1978; Wangari et al. 1996; Rocheleau 2001). In turn, this vulnerability leads to greater engagement in casual labor primarily among men, thus hindering improvements in land management and farm productivity while increasing labor demands on women.

In this context, changes in land use and management are more complex than a reaction to rising population densities and growing resource competition resulting from population growth. The same is true of tenure status. Different classes of land managers make production decisions within webs of social relations and under a range of material and physical constraints (Brookfield 1984).

The contrasting views of changing society-environment interaction indicate the importance of maintaining a broad perspective within this investigation of land tenure change and its impacts on land use, land management, and livelihoods. That such

opposing interpretations of the changing land use system can be developed from the experiences of a single region seems to reinforce the notion that a preeminent driving force of change is not likely to explain Tharaka outcomes. Like population growth, tenure reform alone is not likely to be the "miracle" which spurs sustainable intensification and reverses the processes of marginalization that have shaped Tharaka livelihoods. Nonetheless, tenure reform is a critical transition during which the entire milieu of physical constraints, resource entitlements, and social relationships governing land-use are reworked. Rather than search for such a sustainability miracle, this research grounds the analysis of the impact of land reform on agricultural intensification in the context of changing Tharaka agro-pastoral livelihoods.

The Significance of This Study

This case study of Tharaka District is of importance to understanding the driving forces of land use change and, particularly, the impact of land tenure reform on semi-arid land management in Kenya. Tharaka's recent land reform may provide lessons for other semi-arid areas that have not yet undergone state-sponsored adjudication, particularly those that are unlikely to develop significant diversification of economic activities in the future. Furthermore, the effects of adjudication in Tharaka may have important implications for Kenya's increasingly diversified pastoral areas, some of which may undertake the dissolution of group ranches in favor of individual holdings.

Furthermore, the Tharaka case study provides insights into the broader applicability of the existing case studies of agricultural intensification in semi-arid Kenya. In terms of land tenure, market participation, and intensity of cultivation,

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present-day Tharaka is broadly similar to Mbeere and Machakos of the late 1960's. As such, the case study speaks to the broader applicability of the results of earlier case studies to areas currently undergoing tenure reform and seemingly rapid intensification of land use, albeit within national and regional contexts that are markedly different.

The land tenure question remains dynamic and the future is uncertain. A primary source of the uncertainty of future tenure policy is the widespread corruption practiced within current system of adjudication that has allowed for the unscrupulous allocations of public land to private individuals (Klopp 2000). As an anti-corruption measure, a newly elected Kenya government ordered the disbanding all locally appointed land committees in 2003. There remains significant public clamor for a revision of current land tenure policies. As such, it is clear that the future direction of tenure reform, as a component of Kenya's broader "land question", is certain to be dynamic in the near term and remain a pressing policy and development issue.

Overview of Chapters

Having presented the theoretical foundation and central concepts on which the research is based, the remaining chapters explore in greater detail the specific characteristics of agricultural intensification and land tenure change in Tharaka. The investigation consists of both assessments that serve to identify the nature of land tenure change and agricultural intensification in Tharaka as well as the relationship between them.

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Chapter Two provides a brief discussion of methodology. The chapter discusses the epistemological approach to the research and presents the data, methods, and analyses that will be employed in subsequent chapters.

Chapter Three provides an introduction to the cultural and physical geography of the study area. After an overview of cultural and physical patterns, the evolution of Tharaka land use is examined in the regional and national contexts. Its historical economic and cultural relationship with neighboring regions, historical problems of Tharaka administration and agricultural improvement, and its peripheral position within the Kenyan national development context are explored. Research by Bernard (1968) and Wisner (1977) and colonial documents are used to establish the characteristics and evolution of the Tharaka land use system in the early and mid-twentieth century. Following this characterization, the chapter continues with the analysis of field data that characterizes central aspects of change in the Tharaka land use and livelihoods, including settlement and demographic change, diversification of economic activities, and the evolution of household drought-coping strategies.

Chapter Four considers the origins and dynamics of Kenya's land reform program and its implications for contemporary distinctions between adjudicated and customary tenure in Tharaka. The first section briefly examines the political economy context of land tenure reform in colonial and post-colonial Kenya as a means of understanding the historical and geographical context of the relationship between land tenure change and land management. Tharaka land tenure change is examined within the context of the process of *peasantization* as it affected the broader pan-Meru region and discusses the implications for understanding the nature of overlapping land rights and the impact of

individualized tenure in Tharaka. The third section examines the process of land demarcation and adjudication in Tharaka. The concluding section examines the household survey data in examining the impacts of reform on land distributions and perceptions of secondary use rights.

Chapter Five examines the impacts of state-sponsored land adjudication on agricultural and livestock land uses in a rapidly changing agro-pastoral system. The analysis delineates the progression of intensification processes in upper and lower Tharaka over the last thirty years. Further analyses of the impact of adjudication on land use and land management draws on secondary data and, more importantly, narratives of recent land-use change in adjudicated and unadjudicated areas collected in focus group discussions in order to delineate major changes in the land use system and resource use since land reform was undertaken in the early 1990's. The analysis focuses specifically on indicators of sustainable intensification and the household and parcel-level characteristics that influence adoption of soil and water conservation techniques.

Chapter Six examines a salient intersection of social and environmental change that demonstrates additional linkages between land reform and the dynamics of agricultural intensification. The chapter examines perceptions of the impacts of alien invasive weeds on household labor requirements and, consequently, the evolution of women's work groups in organizing the labor of land management. In shifting the focus of analysis to the agricultural labor process, the analysis considers the way in which Tharaka communities have adapted to greater labor requirements in the context of land reform, agricultural intensification, and frequent drought. The implications for changing land rights and livelihoods is further explored by examining patterns of intensification in

the context of Tharaka's changing political economy, within which the ability to mobilize kin and wage labor is a crucial determinate of a household's ability to sustainably intensify crop production. The analysis is based on household survey and focus group data on changes in household divisions of labor and perceptions of changing weed ecology and soil quality in Tharaka's upper and lower zones.

Chapter Seven reassesses the linkage between land tenure change and agricultural intensification by integrating the findings of previous chapters on the dynamics of tenure change and agricultural intensification in Tharaka. The conclusion summarizes findings of the Tharaka case studies and examines the implications for understanding society-environment interaction, land use change processes, and the future of land tenure policy in Kenya with particular reference to semi-arid lands.

CHAPTER 2

DATA AND METHODOLOGY

This chapter discusses the nature of the data employed in this study, the methods used to collect primary field data, and the epistemological underpinnings of the analysis employed in subsequent chapters. The analyses are based on a diverse set of primary data sources, including a household survey, focus group discussions, community workshops, key informant interviews, and participant observation conducted in various locations within Tharaka District. Secondary data provide further contextual information on Tharaka livelihoods, land tenure, and land use.

Triangulation is used as a means of supporting interpretations of qualitative social phenomena, whereby "any finding or conclusion in a case study is likely to be much more convincing and accurate if it is based on several different sources of information" (Yin 1994, 96). As such, multiple methods are used to incorporate local people's perception and interpretations of change into the relationships and dynamics explored via the household survey data. In this regard, the diversity of data sources used in this analysis provides both description and measurement of variables related to land tenure security, land management, and agro-pastoral livelihoods. In particular, household survey data provide detailed descriptions of household socioeconomic characteristics, land use, land rights, and economic activities. Because the author's 2001 survey provides data at a single point in time, secondary data are used to consider change through time in key focal areas of this research. However, interpreting processes and dynamics of change in the intervening period required an exploration of narrative accounts of change

through individual and group interviews. This combination of various categories was important to understanding the interlinkages between key components of tenure and land use change.

Primary Field Data

Several data collection exercises were carried out between August 2000 and February 2002 in Tharaka District, Kenya. Each of these was carried out with the assistance of provincial, district, and local leaders. In accordance with the standards of the University Committee on Research Involving Human Subjects (UCRIHS), care was taken to inform participants in each of these activities of the nature of the research exercise, the time commitment, the anonymity of responses, and the potential uses of the information collected. All of the data collection exercises were facilitated by one or more of three Kenyan research assistants employed on this project.

Contact with Tharaka District officials was initiated in September 2000 with the facilitation of the Kenya Agricultural Research Institute (KARI) parastatal. The Ministry of Agriculture offered assistance in initiating the project in several administrative units and in introducing the researcher and assistants to the district commissioner, district officers, chiefs, assistant chiefs, and headmen. Agricultural extension agents accompanied the researcher and research assistants during the early stages of the research.

The Household Survey

A household survey was carried out in order to attain household and parcel-level data (see *Appendix A: Questionnaire for Sample Survey of Household Land Use, Land*

Tenure, and Socioeconomic Characteristics). Household-level data collected included socioeconomic characteristics, economic activities, livestock holdings, grazing strategies, crop production, and drought-coping mechanisms. Parcel-level data were collected on land tenure status, perceptions of land rights, and land management. In order to hone the survey questions and identify a range of coded responses, survey questions were pre-tested with farmers and discussed with agricultural extension agents of Gituma and Gatue Locations of Tharaka District in September and October 2000. The pre-testing exercise contributed to the preparation of a draft version of the questionnaire. A double-blind translation, first from English to Kitharaka and then from Kitharaka back to English, was carried out in order to identify potential linguistic ambiguities in the questionnaire. Once a penultimate draft was completed, three research assistants were trained in the techniques of data collection and the guidelines of UCRIHS. Research assistants engaged in role-playing simulations using the penultimate draft in order to identify further ambiguities in the translation of the questions and to practice communication skills.

A pilot survey of eighteen households was carried out in Karocho Location in November 2000 to identify additional questions and phrasing that provoked confusion or reluctance on the part of respondents. Analysis of the results of the pilot study revealed further linguistic ambiguities as well as differences among the research assistants in their use of probing techniques. These issues were addressed in additional training sessions.

More importantly, the pilot survey identified the potential for adverse reactions to particularly sensitive questions. For example, questions on land rights provoked suspicion on the part of respondents in those areas that had been affected by government

land expropriation. Also, poor households responded negatively to the wording of questions regarding their strategies for avoiding the effects of future droughts. Such questions were reworded in ways that were appropriate to the local context while maintaining the focus of the question on household coping strategies.

Due to great distances between households and the lack of public means of transportation, it was necessary that I led research assistants to each administrative sub-unit in which data were collected. This held several advantages. It allowed me to monitor data collection of a different research assistant every day, which proved important to data quality, particularly in the early stages of the household survey. It permitted me to identify misunderstandings related to specific questions and to coach research assistants in their interactions with study participants. The reliability of the household survey instrument, therefore, was far greater than it would have been without my presence at the household interview sites on a daily basis. Furthermore, accompanying research assistants on a daily basis provided many opportunities for informal conversation following interviews during which additional information regarding local dynamics of resource use often came to light.

Household interviews were conducted in the Kitharaka language. Any adult present at the home on the research team's arrival was invited to participate in the study. When more than one adult was present, it was left to the members of the household to decide who would participate. In most cases, the male household head served as the respondent. When the male head was away, wives or adult children responded to questions. When no adult was present at a homestead, arrangements were made to return to the house on the following day. When an appointment with an adult could not be set

for the following day, an additional household was added to the sample from a randomly selected list of alternates.

The rate of non-response was less than 1 percent of the total sample. In each case, the reason given for not participating in the study was fear of devil worshippers or child abductors, both of which were the subject of intense rumors during the period of field research. While some respondents questioned the purpose of the study and openly expressed their concern that the information not be used for unscrupulous expropriation of land, there was no reason to believe that individuals or households elected not to participate in the study due to community or political tensions regarding the land issue itself. Thus, I am confident that no systematic bias was introduced due to non-response.

A sample of 400 households was collected from the total district household population of approximately 25,000. Sixteen questionnaires were discarded due to incomplete information, leaving a total of 384 observations. The population of four out of the twelve internal administrative units in Tharaka District constitutes the sampling frame.[8] These four units represent a population of 7,500 households or approximately 30 percent of the total number of households in the district.

The sampled locations are representative of variations in land tenure types, population densities, land-use, and agro-ecology within the district. Because one of the primary concerns of the study is to understand the impact of land tenure reform on land use and management, locations were chosen in order to ensure representation of both adjudicated and unadjudicated tenure in each of Tharaka's semi-arid agro-ecological

[8] The use of a subset of locations rather than the entire district population for sampling was necessary for several reasons. The lack of a master list of households in the district was a major constraint. Furthermore, the great distances between households that are not accessible by vehicle rendered the exercise of carrying out a random sample of the entire district logistically impossible within the time available for data collection.

zones. The sample is statistically representative of the district population with a five percent confidence interval.

Parcel-level data on land tenure, perceptions of land rights, and land management were collected for 541 parcels. In some cases, households held land rights in locations outside the location of their primary residence. Thus, included in the sample are 41 parcels located outside the four administrative units that are the focus of the study.

In order to account for the agro-ecological differentiation that exists within Tharaka between midland and lowland zones, stratified random sampling was used to ensure representation from one adjudicated and one unadjudicated unit within each agro-ecological zone (Table 2-1, Figure 2-1; see Appendix B: Characteristics of Agro-Ecological Zones).[9] In agro-ecological zone LM4, Gikingo is an adjudicated location and Turima is unadjudicated. Because Turima's recent settlement did not occur along clan lines, village land committees serve the key role of adjudicating land rights in this location. In agro-ecological zones LM5 and IL5, Marimanti has undergone the process of adjudication while land tenure in Chiakariga remains in the hands of local committees of elders based on clan affinity.

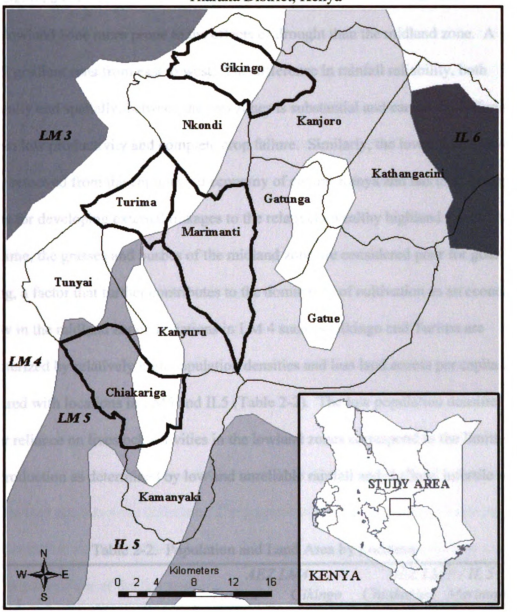
[9] Sampled households within Chiakariga were located exclusively within LM5. The area classified as LM4 in Chiakariga Location consists primarily of the protected Kijege Forest.

Table 2-1. Survey Design and Characteristics of Sampled Units

	Turima	*Gikingo*	*Marimanti*	*Chiakariga*
Units of observation (n)				
Households	92	93	100	99
Parcels	143	125	123	109
Agro-Ecological Zone	LM4: Transitional Lower Midland	LM4: Transitional Lower Midland	IL5: Semi-Arid Inner Lowland	LM5: Semi-Arid Lower Midland
Tenure Institution	Village land committees	Ministry of Lands and Settlement	Ministry of Lands and Settlement	Clans
Settlement	post-1960	post-1960	pre-20th century	pre-20th century

Note: For a description of the characteristics of agro-ecological zones, see Appendix B.

Figure 2-1. Sampled Locations and Agro-Ecological Zones,
Tharaka District, Kenya



Within the broader context of Kenya's agro-ecology, these two zones are similar in vegetation and climate. However, there are numerous differences that make residents of the lowland zone more prone to the effects of drought than the midland zone. A rainfall gradient runs from east to west. The difference in rainfall reliability, both temporally and spatially, between the two zones is substantial and can be the difference between low productivity and complete crop failure. Similarly, the lower zone is even further removed from the commercial economy of central Kenya and has even fewer options for developing external linkages to the relatively wealthy highland zones. At the same time, the grasses and bushes of the midland zone are considered poor for goat herding, a factor that further contributes to the dominance of cultivation as an economic activity in the midland zone. Locations in LM 4 such as Gikingo and Turima are characterized by relatively high population densities and less land access per capita as compared with locations in LM5 and IL5 (Table 2-2). The low population densities and greater reliance on livestock activities in the lowland zones correspond to the limits of crop production as determined by low and unreliable rainfall and shallow, infertile soils.

Table 2-2. Population and Land Area by Location

	AEZ LM4		*AEZ LM 5 / IL 5*	
	Turima	*Gikingo*	*Chiakariga*	*Marimanti*
Area (km2) [1]	50	70	91	118
Total population [1]	9,772	10,190	6,386	5,826
Population density (per km^2) [1]	197	146	71	49
Mean Household size [2]	4.83	4.29	4.03	4.25
Land Access Per Household [2]	7.59	6.44	6.93	9.55
Land Access Per Person [2]	1.57	1.50	1.72	2.25

Sources: [1] Kenya Central Bureau of Statistics (2001); [2] Author's household Survey 2001

For each location, local leaders compiled a list of all households in the location. The list was numbered and one hundred households were selected using a random number table. The selected households were informed of our visit and the nature of the research project at least one day in advance of the arrival of the research team. A headman, the local representative of sub-units within the location, met the research team and guided them to the homes of the respondents. Interviews normally took place at the homestead. In some cases, the information was collected in the course of a farm tour provided by the respondent. On several occasions, respondents were identified within a local market. It was therefore convenient to carry out the interview at the market stall. Although neighbors or friends sometimes eavesdropped on the interview process in both market and home settings, the location of the interview and the presence of other non-participants did not have an observable effect on the information provided.

Focus Group Meetings

A set of two focus group meetings were held in each of the four locations in which household data were collected. The purpose of the focus group meetings was to collect narrative accounts of local land use histories, changes in Tharaka society and land use, and perceptions of the forces driving such changes.

An invitation was extended, via the chief, for one representative from each village committee within each location to attend focus group meetings. In each location, a morning meeting was held that included between eight and ten elder males, most of whom were members of the village land committees. The researcher developed an agenda for each meeting and conducted the meeting as a semi-structured interview that

allowed respondents to develop their narratives and add or respond to the responses of other respondents. A research assistant and at least one local leader were fully informed of the information that was required and assisted accordingly in animating the discussion. The meetings with male elders focused on settlement and land use histories, drought histories and changing coping strategies, the evolution of customary authority over land access and land use, the process of boundary demarcation and changing notions of property and inequality, and finally, the process of land adjudication and its impacts (see Appendix C).

The second group of farmers was of mixed gender and consisted primarily of young men and senior women. Participants were drawn from each of the location's sub-units. The meetings with eight to ten farmers focused on the driving forces of changes in land use, changes in household labor requirements for crop and livestock production, perceptions of local environmental change as related to soils and vegetation, and the impacts of land adjudication on land use and management (See Appendix C).

Key Informant Interviews

A series of key informant interviews were conducted with people who have intimate knowledge of land use change and land tenure issues in Tharaka. These include employees of local and international non-governmental organizations active in the district. Furthermore, civil servants within the local Ministry of Agriculture and Ministry of Lands and Settlement were interviewed in their Marimanti offices. Interviews with government employed provided greater insight into the process of land adjudication and strategies used by individuals and households to claim land during the adjudication.

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Finally, people with knowledge of specific aspects of local land use change were interviewed from time to time in the course of carrying out the household survey. Each of these has been assigned a pseudonym for purposes of citation within the text in keeping with UCRIHS guidelines on the confidentiality of research on human subjects.

Participant Observation

Both casual and planned direct observations of social interactions in Tharaka were important to this research. Most important was observation of official objections hearings related to the land adjudication process in those locations currently undergoing the adjudication process. Such hearings are important venues for contesting land allocations determined by the initial phase of the reform process. The District Lands Officer and several adjudication officers preside over sessions in which testimony is presented regarding the validity of claims of both parties. On some occasions, a lack of evidence required the parties to accompany the Lands Officer to the site of the parcel in order to assemble neighbors and local elders who provided testimony. Observation of such proceedings provided insight into the interaction of local actors in the adjudication process and the norms and values which guided both land rights claims and the Ministry of Lands and Settlement in allocating parcels.

Community Workshops

Community workshops were held in January 2002 in the chief's camp or major market of each of the locations in which survey data were collected. The meetings had two purposes: 1) to inform local people and local leaders of the broad findings from the

household survey, and 2) to allow a forum for discussion of the results that both created dialogue between people and local leaders and allowed the researcher to verify and refine the results based on local peoples' interpretations of land use change processes in Tharaka.

Workshops were held at the chief's camps in Marimanti, Gikingo, Turima, and Chiakariga locations. Chiefs, assistant chiefs, headmen, agricultural extensions agents, and local residents were invited to attend the workshop. The attendance at the meetings ranged from 35 to 85 people, not including local leaders. Between 25% and 50% of participants in each workshop were women. In each case, the results prompted a frank discussion between the local residents, agricultural extension agents, local leaders, and the researcher.

The dynamics of workshop discussions differed from those of the small group discussions. The workshop began with a report by the researcher on the broad results of the household survey related to major land use changes that have occurred in the last twenty years and the forces driving change. The identified differences between locations within Tharaka in terms of land rights, land use, and responses to drought. Following this report, participants were invited to comment on the report. As is customary, male elders were allowed to speak first. Following each extended narrative, the researcher posed questions of clarification in order to focus the speaker's comments and solicit more detailed description of local changes. Participants responded with long narratives, enduring 5 to 10 minutes. Rarely did others respond spontaneously to the remarks of the speaker. However, on occasion, a brief verbal objection would elicit a revision of a previous statement.

Most narratives proceeded in a similar fashion. Initial comments were meant to flatter the researcher and praise the research report. As the commentator expanded on his or her own experiences, the descriptions often became more complex and subtle disagreements with the report emerged. After several people had offered their testimony, subsequent speakers spoke to issues of disagreement and concurrence with the issues raised in the report. Participants did take issue with some interpretations of land use and livelihood change in the local area, and were careful to point out differences between local changes and those in neighboring areas. For example, in all locations the interpretations of the underlying causes of destocking that has taken place in much of Tharaka was alternatively identified as the loss of pasture following land reform, the declining terms of trade between livestock and crops, and increased frequency of drought. Further discussion revealed the way in which local conditions had led to an interpretation that favored one factor over others.

Contextual Issues in Field Data Collection

The information that is provided by participants in social science research is inevitably influenced by the subjects' perceptions of the researcher and their understanding of the scientific and social objectives of the research project (Bernard 1995; Clifford 1986). It is certain that data that were provided by households for this study were influenced by relations of social class, gender, age, and ethnicity between those who provided information, on one hand, and the author and his research assistants on the other. Furthermore, the differential social status and power between the field researcher (a white male), his research assistants (an Imenti male, and two university-

educated Tharaka, one male and one female), and participants in the study affected the research process in many ways. [10] Below I describe particularly salient examples.

One problem identified on several occasions was the possibility that some respondents may have purposefully misreported landholdings, livestock holdings, education, and investment in land management techniques that are most often associated with relatively wealthy farmers. The motives behind such misreporting are diverse and complex. Among poor farmers, some respondents feared that the author and his non-Tharaka research assistant were "mocking" their lack of wealth, desperation during drought, and lack of aptitude for crop cultivation and appropriate land management. Such a response highlights the class and ethnic tensions surrounding the perception of the Tharaka as an ethnic and social underclass within the pan-Meru configuration of sub-ethnic groups, both of which held implications for the interpersonal communication between the researcher and participants in the study.

Another problem relates to misconceptions regarding the purpose of the research project. Despite every effort to inform participants of the purpose of the study, a reluctance to provide certain kinds of information was observed for a small number of respondents. This reluctance was greater among women who generally appeared less comfortable discussing their own land-use and land management decision-making, particularly with non-kin males. In some cases, open-ended questions related to land management nearly brought the interview to an end as the respondent pleaded to interrupt the interview until her husband returned to the home. In nearly all cases, encouragement

[10] The Imenti were the first to benefit from the expansion of commercial rights and the expansion of coffee and tea production and are considered to be the wealthiest of the Meru sub-groups. Increasingly, social class and ethnicity intersect in contemporary Meru identity as cultural relations with wealthier Meru sub-groups of neighboring highland districts continue to sour.

by research assistants led to the female respondents agreeing to continue with the interview. However, I suspect that in a small number of cases the respondents inflated their estimates of investment in land management in order to give what the respondent imagined to be the "correct" answer: one that the respondent believed would correspond to the researcher's idea of appropriate land management.

Underestimates of household assets and investments in land management were due primarily to two factors, the first of which was compounded by the second. In many cases, household survey research in rural Kenya precedes investment by government or non-governmental organizations in a development project or series of projects. Such research is often designed to highlight important agricultural development problems and identify the primary recipients of project assistance. Despite extensive effort to inform local administration and local people about the nature of the current research project, expectations of aid still existed in some cases.

In addition, the drought conditions which prevailed in the district during the period of the household survey should be noted. All households were affected by three consecutive rainy seasons marked by significantly below average precipitation. The extraordinarily low rainfall of the short rains (March-May) of 2000 set into motion the worst drought in living memory for much of eastern and northern Kenya. The crisis that ensued for many Tharaka households had diverse effects on the data collection process as well as the data itself. Foremost, it affected the perception of the researcher and the research team as discussed above. The data reflect this period in time in which households were under particular stress to meet basic subsistence needs.

The gender, ethnic, and class positionalities of the researcher and research assistants entered into the process of data collection process in multiple ways. However, while the reality of the positionality of the researcher is recognized, positionality does not negate the validity of the data. Rather, it does require that the interpretation of data be carried out in a manner that recognizes the imperfect nature of social science data collection and the specific local factors that may effect not only misreporting, but also the way that issues were perceived and discussed in individual and group interviews.

Understanding gendered versions of changing social relations of production in Tharaka presented particular challenges. Given that it was culturally inappropriate to request an audience with women's groups, much of the initial investigation of this aspect of the project was done through key informants, particularly when the household survey led to a discussion with women who were widowed or divorced. However, exploration of changing labor dynamics within the small group format always included both male and female participants. This presented advantages and disadvantages. On one hand, it likely altered women's narratives. On the other hand, it provided insight into some of the tensions that exist into the politics of household labor. While discussions never evolved into charged arguments, they did illustrate very different understanding of change and interpretation of the benefits. Such differing interpretations were particularly enlightening in understanding the contested nature of women's participation in local wage labor and the intrahousehold dynamics of the erosion of established divisions of labor.

Archival Information and Government Documents

District development reports, archival documents, and other secondary sources of data are used in developing a historical narrative of pre-adjudication land-use change. Colonial government documents were used to establish early European accounts and perceptions of Tharaka society and agricultural production. Such accounts assist in creating a picture of the evolution of Tharaka land-use in the broader context of Meru and Central Kenya from the early 20th century. Since Tharaka was given district status in 1999, district reports have provided greater information on Tharaka agricultural, economy, and government development efforts.

Epistemology at the Intersection of Society and Environment

Discussions of epistemology within and between disciplines that investigate society-environment interaction embody many of the central issues of the broader debates over relativism and objectivity that have taken place in the international scientific community in recent years (e.g., Haraway 1989; Latour 1986). Such debates in Geography have called into question nature-culture dualism (Castree and Braun 1998; Kerry 2002), the social construction of nature (Demeritt 2002; Proctor 1998), and the role of empirical field research, remote sensing, and other environmental data in examining society-environment problems (Blaikie 1995; Rocheleau 1995). Because it often integrates and combines constructs and methodologies from the natural and social sciences, society-environment geography often speaks to a range of epistemological positions in communicating research results.[11] This engagement across epistemological

[11] For some observers, human-environment geographers have expended more energy destabilizing other epistemological and theoretical positions than they have "bridging" the perspectives (Turner 1997).

divides has increased as Geographers have contributed to multidisciplinary research efforts under the broad banner of the human dimensions of global change. In short, those seeking to identify the "root causes" or "driving forces" of land-use and land-cover change must often seek to conduct research that speaks to a spectrum of epistemological perspectives on society-environment relationships.

Post-positivist[12] society-environment scholarship has brought epistemological dilemmas to the fore of the broader human dimensions of global change research community. A central issue confronts the problematic nature of the identification of explanatory variables within formulations of the driving forces of land-use and land-cover change in local, regional, national, and international contexts. The conceptualization of driving forces and the selection of variables that act as surrogates of such driving forces is a function of both epistemology and data availability.

A limitation of current research is the priority given to demographic variables. Although they are often geographically referenced, population data do little to increase our understanding of the social dimensions of environmental change where complementary social information is not available. For example, statistical correlations between population growth and land-cover change often vary greatly depending upon geographical scale. "Ecological fallacies" have imputed the driving forces of change at local scales to be the same as those operating at larger scales as supported by statistical analysis of census data (Rindfuss et al. 2003). Furthermore, the implication of the preeminence of population as a driving force is that the social organization of differential resource access and use is often ignored. As such, the relations of production, their

[12] I group a range of epistemological positions on a common ground that have countered the basic tenets of positivism in research on society-environment relationships.

spatial articulations in relation to land use and cover change, and local conceptualizations, negotiations, and struggles that underlie changes in resource access and use are often neglected in favor of a more easily quantifiable relationship between measures of population and changes in land-use characteristics.

Much society-environment research now recognizes the importance of political, cultural, and economic processes as central to understanding changing dynamics of human-environment interaction. However, such dimensions of change do not often lend themselves well to quantification and modeling frameworks. Where variables that can be used as operational surrogates of driving forces are available for modeling purposes, it is important that model results be interpreted in terms of the intersection of cultural, economic, and environmental processes across scales and through time in the study area rather than simply in relation to the surrogate variables (Campbell and Olson 1991).

The approach of this study reflects an epistemological recognition of the importance of empirical data and both quantitative and qualitative insights into land use change dynamics. This position arises not only from the need to understand land use change processes in the context of differentiated communities; it is also founded on a recognition of the partial and situated nature of knowledge generated by scientific investigations of nature-society relations (Proctor 1998). The use of multiple methods provides greater insight into the investigation of the central relationship undertaken in this study without negating the positionality of the research process.

Analyses

This study takes political ecology as a point of departure for exploring the evolution of land tenure and management in a semi-arid area of Kenya. It considers emerging patterns of land-use change and resource use as reflecting the interaction of broader social, cultural, political, and environmental forces through time. The analysis focuses specifically on the local dynamics of changing rules of resource access, driven by both the evolution of customary tenure and state-sponsored land reform, and the impact on the land use, land management, and livelihoods in the study area.

The identification of the impacts of state-sponsored land adjudication on land-use and land management is a difficult task, given the many societal and environmental factors that may drive changes in land-use and land management. For example, changing weed ecology, worsening soil erosion, rapid population growth, and changes in technology might all be considered as additional driving forces of the changes under discussion. Rather than infer a singular and unconditional causal relationship between the land adjudication and changes in land-use and land management, the analysis proceeds from an understanding that land tenure change and the outcome of the adjudication process are themselves reflections of the interaction of a myriad of other forces driving land-use change. The material conditions of society and environment not only constitute the preconditions of the adjudication but also structure the way in which statutory tenure impacts everyday land-use practices. The land reform process represents a critical moment of interaction between state and local institutions that takes place in specific social and environmental contexts. Its importance lies in its role in accelerating or altering the long-term trends in land-use and management and in providing a new set

of rules of land access around which a diverse set of social actors position themselves. It is for this reason that considerable space is allotted to exploring the nature of tenure change and the societal context of agricultural intensification.[13]

Analyses of the impact of land tenure reform on changes in land-use have been constrained in part by limited time series data that demonstrate change following land tenure reform (Place et al. 1993). Such analyses face difficulties in demonstrating causality between various forms of land tenure security and land-use change due to the myriad of other forces that may drive change in the absence of changes in tenure. As a result, some researchers have approached the question of the impact of tenure reform from a comparative case study approach (e.g., Bruce and Migot Adholla 1994).

However, such comparative analyses are weakened by the differences in social and environmental characteristics of the case study areas. Geographic comparisons must take into account differences between study areas in terms of political economy, agricultural potential, and the presence of specific government or non-governmental initiatives that might influence land-use change trajectories. The Tharaka case study combines these limited approaches. It examines change through time within areas of customary and statutory tenure to consider characteristics of the evolving land use system. With a broad historical transition as a back drop, a geographical comparison of households and parcel-level data discerns the interrelationships between land tenure individualization on land-use and land management change in the study area.

[13] In this sense, context does not constitute a variable or factor in itself. Instead, it refers to the essential local *milieu* of society-environment interaction through which a meaningful interpretation of measurements of generic categories or variables is made possible. In short, reference to context is nothing more than a recognition that the characteristics of specific places ought to be considered in the analysis and interpretation of data where the ultimate objective is to derive conclusions that contribute to theory.

The analysis of tenure dynamics is based on an investigation of the political economy dimensions of Kenya's land tenure program and the specific impacts on the perception of land rights and tenure practices. Thus, the notion of tenure security is examined specifically in the context of changing rights of use and transfer that entail intersections of statutory law and social custom. Rather than reify adjudicated and unadjudicated tenure status as a given set of rights, I attempt to place tenure status within the context of evolving tenure practice that are changing with other facets of institutional change.

The analysis of land use change in Tharaka focuses on changes in fallowing practices and investments in soil and water conservation as the primary indicators of agricultural intensification. These indicators are most appropriate in Tharaka where the existence of credit, the use of pesticides and fertilizers, and other capital investments are minimal. An analysis of changes in the area of land under fallow through time is used as a broad measure of intensification. The variation in investments in a range of key agronomic techniques required for sustainable intensification constitutes the primary and most reliable approach to understanding the impacts of adjudication on land-use and management. Frequencies of investment in a range of soil and water conservation techniques are explored by adjudication status and intersections of tenure dynamics and investments of labor explored. A logit model is used to examine the probabilities of substantial investment in soil and water conservation on cultivated parcels adjacent to homesteads as related to tenure, labor, and socioeconomic variables. The model results alone are not used to argue causation of specific variables; rather the results are

interpreted with reference to the complex tenure-intensification dynamics identified through qualitative research.

When combined with household surveys that help characterize livelihood systems, small group discussions and community workshops can be powerful tools for exploring the complexities of community responses to environmental change. The use multiple methods is important to conceptualizing the interaction of forces at different scales that affect land use change. In particular, they can contribute to the growing recognition of the broader importance of social and cultural factors that are often relegated to the local in analyses of the driving forces of land-use and land-cover change (Turner 1999), as well as a recognition of the way in which broader political economy and environmental change is mediated within complex local contexts.

CHAPTER 3

HISTORICAL AND CONTEMPORARY CHANGE IN THE THARAKA LAND USE SYSTEM

This chapter provides a general introduction to the cultural and physical geography of the study area, an assessment of evolving land use and livelihoods, and a discussion of Tharaka's position within the regional and national contexts. Colonial documents, secondary sources, and data from the household survey and group discussions are used to characterize Tharaka land use and management from the mid-20th century to the present. The assessment of changing livelihoods establishes essential context within which to analyze the evolving interrelationships between land tenure, land use, and land management and is, therefore, central to assessing the role of land tenure reform in sustainable intensification. Furthermore, the discussion identifies key components of land use and social change that mediate the impacts of tenure change in Tharaka.

The Physical Setting

Tharaka is situated in a transitional zone along an altitudinal and environmental gradient that separates Kenya's sub-humid highlands from the wide arc of arid and semi-arid plains that constitute more than 80 percent of the country's land area (Figure 3-1). Tharaka's western and northern extremes occupy the lower foot slopes of Mount Kenya. The southern and eastern extreme of the district slopes gradually toward Tana River in the east.

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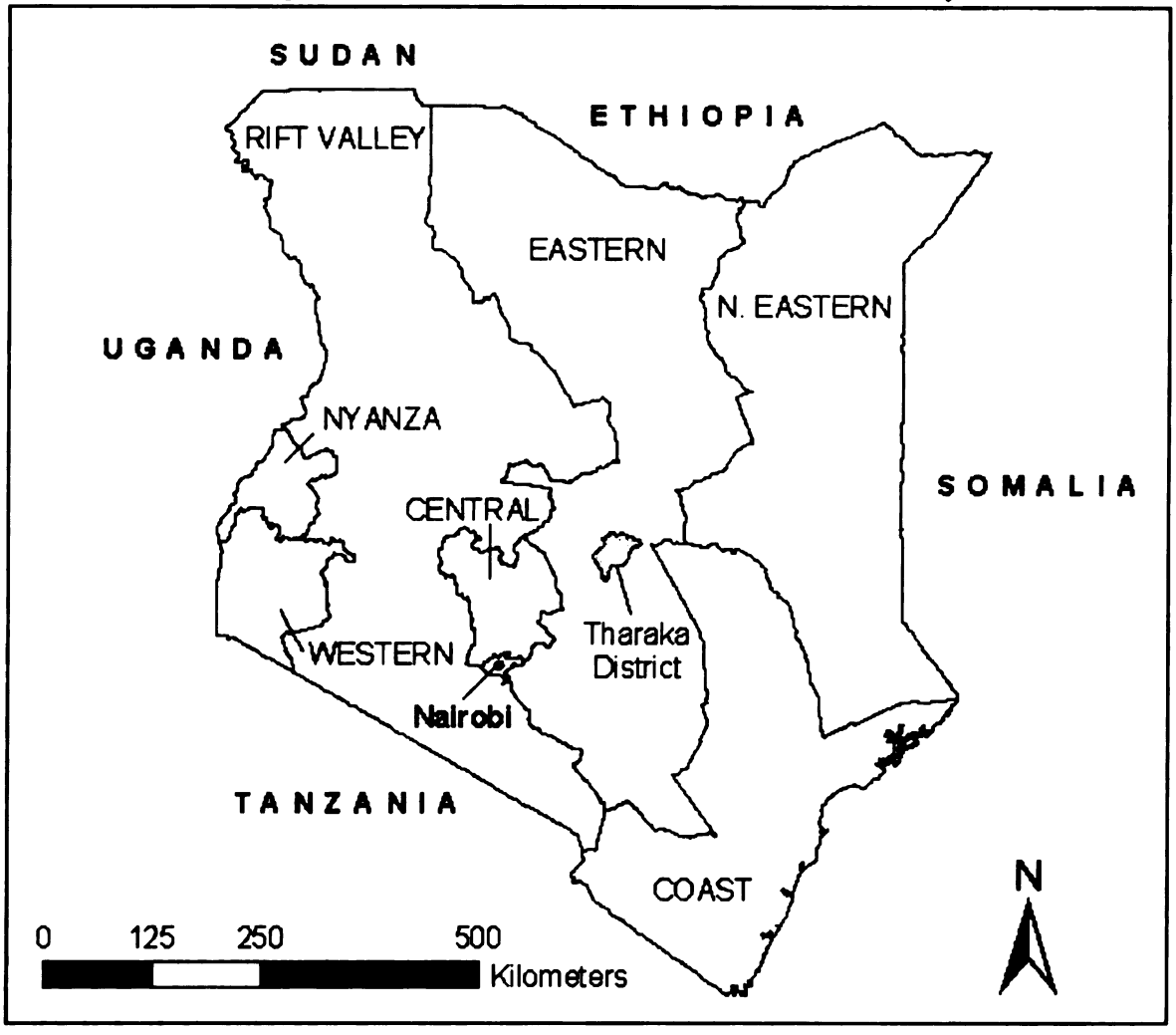
Figure 3-1. Tharaka District, Eastern Province, Kenya



The Tharaka landscape is dominated by a semi-arid savanna bushland consisting of two primary vegetation zones: a dry transitional *Acacia-Commiphora* savanna zone and a *Sansevieria-Bush* zone. The shrublands are dominated by *Commiphora* which are approximately four meters in height and contain a thick understory of shrubs. The woodland areas are dominated by *Acacia* which are approximately three meters in height with sparse understory. At lower elevations, xerophytic vegetation such as *Sansevieria sp.* are common (Pratt and Gwynne 1977).

The vegetation zones correspond broadly with two agro-ecological zones, a sub-humid to semi-arid transitional midland zone (LM4), and a semi-arid lowland zone (LM5 / IL5) (figure 3-2, 3-3 see Appendix B for a detailed description of agro-ecological zones (AEZ)). Average annual rainfall for agro-ecological zone LM4 is 800-1200mm. Sixty percent reliability is achieved at 250-450mm during the second rainy season. Average annual rainfall for the LM5 and IL5 zones is 800-900mm and 500-750mm, respectively, with less than 200mm attained with 60 percent reliability (Jaetzold and Schmidt 1983).

As in much of Kenya, major synoptic features influencing rainfall in Tharaka are large-scale circulation systems in the Indian Ocean and Central Africa as well as the convective rainfall created by the movement of the inter-tropical convergence zone (ITCZ) (Macodras et al. 1989). Given the presence of orographic effects on rainfall along the Meru gradient, there is a strong relationship between altitude, temperature, and rainfall.[14] The total average monthly rainfall indicated in figure 3-3 indicates higher average monthly rainfall in the upper midland zone relative to the lowland zone, particularly during the October–December rainy season.

Figure 3-3 also suggests temporal parameters around which agricultural and herding activities are organized. The first rainy season spans March through May. The season is commonly referred to as the "short rains" due to the perception that it is least reliable and shorter in duration.[15] The "long rains" begin in early October and continue until early January, representing a more productive growing season in most areas of the district. Interannual variability in rainfall pattern presents additional complexity to the

[14] For example, an accepted formula for determining mean minimum and maximum temperature given as $T_{max}(C°) = 33.9 - 5.6A$; and $T_{min}(C°) = 24.4 - 6.9A$, where A = altitude in thousands of meters (Porter 1979).

[15] The same season is referred to as the long rains in other parts of Kenya.

timing of agricultural activities. A very rough estimate of the rainfall requirement for bulrush millet production over a three month growing period is 360 mm (Porter 1979). Planting densities, soil moisture, the distribution of rainfall, and variation among millet varieties make it impossible to establish an exact moisture requirement. Nonetheless, if we were to liberally accept this level of rainfall as a prerequisite for crop maturation, the rainfall record from Marimanti (LM4) would suggest that approximately half of all growing seasons are at risk of crop failure due to lack of rainfall. Particularly drastic crop failures resulted from the failed short rains of 1984 and 2000, in addition to flooding that occurred in 1997 in northern Tharaka following the heavy rainfall associated with the El Niño phenomenon (figure 3-4).

Figure 3-2. Sampled Locations and Agro-Ecological Zones,
Tharaka District, Kenya

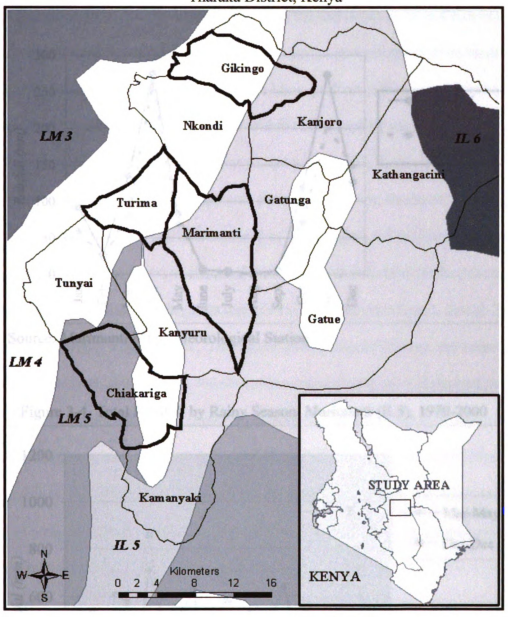
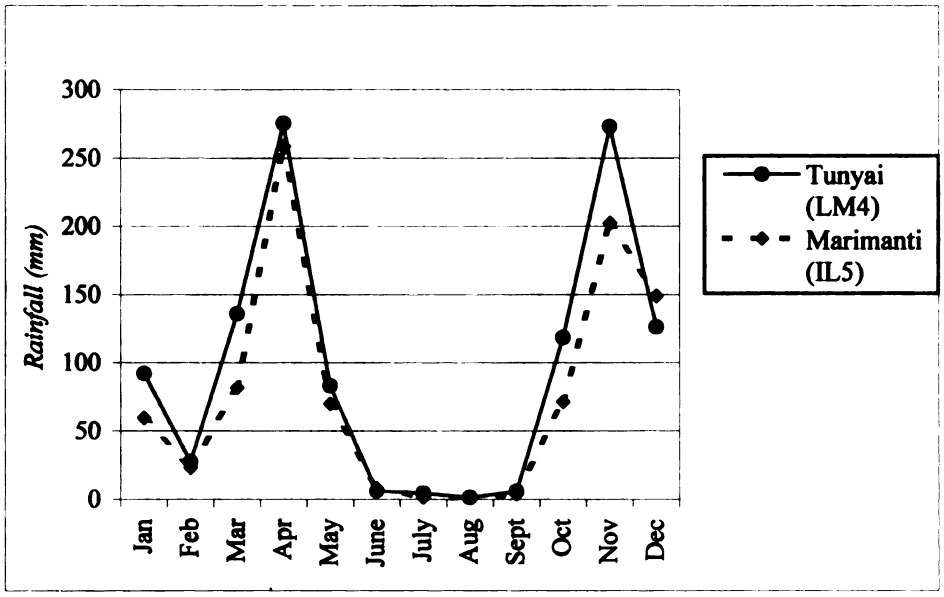
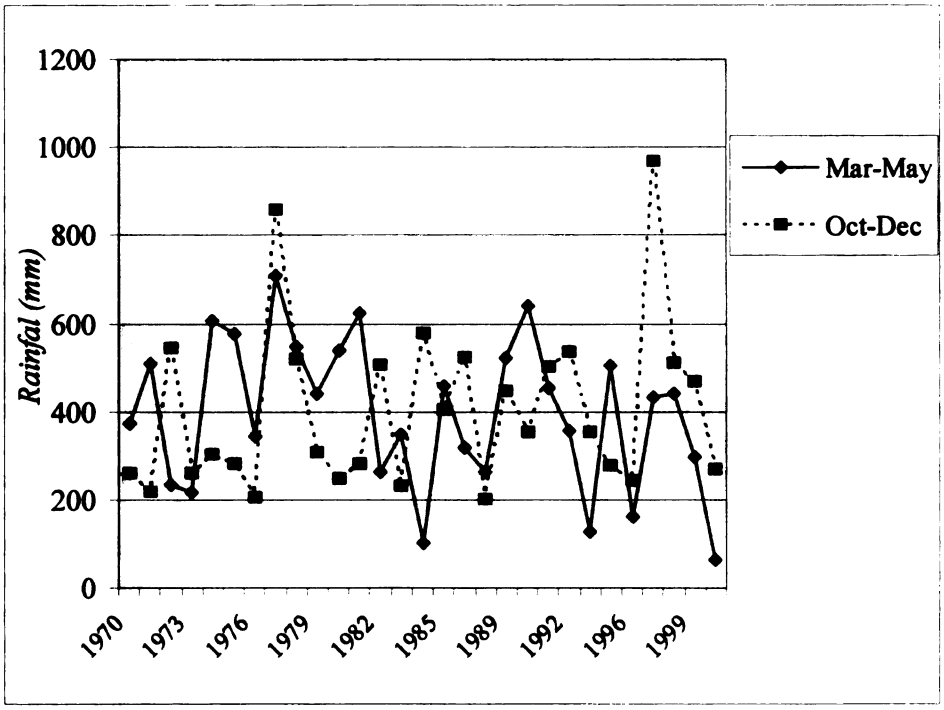


Figure 3-3. Average Monthly Rainfall for Tunyai (LM4) and Marimanti (IL5), 1970- 2000



Source: Marimanti MDD Meorological Station

Figure 3-4. Total Rainfall by Rainy Season, Marimanti (IL5), 1970-2000



Sources: Marimanti MDD Meteorological Station

Although the pattern of ecological zonation would suggest gradually declining agricultural potential as one moves southeast from the footslopes of Mount Kenya toward Tana River, considerable edaphic variation makes such a generalization more tenuous. Soil samples taken by Wisner (1977) along the Meru gradient indicate significant local variation in pH, texture, and organic matter within each sampling site, though a general trend toward greater sandiness and alkalinity and lower organic matter in the drier southeastern areas of the district is apparent. Soils developed on intermediate igneous rocks are of greatest fertility and characterized by red and dark red friable clay (Jaetzhold and Schmidt 1983). The lower midlands of Turima and Nkondi (900-1100m) constitute a narrow margin of medium fertility soils that are unique within the district, though Turima soils are considerably more shallow. The middle level plains of Gikingo and areas bordering the Meru National Park (700-900m) are characterized by well drained, sandy clay soils. The topsoil consists of chromic Luvisols and are loamy sand in texture. The soil characteristics of the erosional plains of Chiakariga and Marimanti (600-700m) are highly variable, but generally of low to moderate fertility. The lower elevation plains consist of well-drained Acrisols and shallow, stony Cambisols that appear dark yellowish and light brown in color (Jaetzhold and Schmidt 1983).

Thus, while there is a general gradient toward lower soil organic matter and greater alkalinity as one proceeds from medium elevation areas to the drier eastern and southern extremes of Tharaka, localized variation in soil quality contributes to a landscape characterized by considerable geographic variability in its potential for sustaining crop production. In addition to the variations identified through soil sampling by Wisner (1977), patches of rocky soils are scattered throughout the erosional plain.

This variability in soil characteristics has been a central factor in determining the micro-patterns of historical Tharaka settlement as well as the recent history of agricultural expansion via both government-sponsored settlement schemes (e.g., Tunyai and Nkondi) and informal, spontaneous settlement (e.g., Gikingo and Turima) in the wetter margins of Tharaka's lower midland zone.

The Cultural Setting

The Tharaka are a sub-group of the larger Meru ethnic group, which includes neighboring highland sub-groups of Imenti, Igoji, Igembe, Mwimbi, Chuka, and Tigania. Kitharaka[16] is a Central Bantu language that exhibits strong lexical similarities to languages of the other Meru sub-groups, as well as that of the Mbeere, Embu, and Kikuyu ethnic groups. Linguistic evidence and oral histories suggest that these groups may have had a common origin in Tharaka and the Nyambene range to the east of Mount Kenya (Fadiman 1993; Muriuki 1974). By the mid 19th century, the Tharaka had developed strong political and cultural relationships with the highland Meru sub-groups. Despite differences in social organization and agricultural production, the groups participated in a common political body, *njuri nceke*, which governed matters related to trade, drought refuge, and resource access among the groups, within which Tharaka delegations played a central role (Wisner 1976a).

With the exception of areas in which land reform has been undertaken, Tharaka social organization is based on internal divisions of patrilineal descent groups, *mĩvĩrĩga*

[16] The Ki- prefix in many Bantu languages indicates a reference to the language or culture of an ethnic group, or a manner of doing things. I adopt the convention of maintaining the Ki- prefix to denote reference to the Tharaka language.

(sing, *mũvĩrĩga*), usually translated as clan.[17] Clan territories have established geographical boundaries between areas of settlement. However, such boundaries have changed countless times through agreement among various clans and through the merging and division of clans. In some cases, sub-location boundaries established during the recent creation of Tharaka district were based upon recognized clan boundaries.

Within a clan area, two settlement units exist. *Matũũra* (sing., *ntũũra*) generally refers to neighborhoods of dispersed homesteads consisting of lineages of varying genealogical depth. Although Tharaka settlement is not in the form of nucleated villages, sub-units of clan territories with approximate boundaries define individual neighborhoods consisting of varying numbers of homesteads.[18] Within *matũũra*, smaller settlement units, *mĩcĩĩ* (sing., *mũcĩĩ*), are comprised of the immediate residents of a homestead, usually consisting of a man, wives, and unmarried children.[19] While clan ties of solidarity and restrictions on certain kinds of interaction extend to the entire clan, the regulation of relationships of mutual obligation has the greatest meaning within the local context where the sharing of labor and produce remains more common among households. The same is true for relations of land tenure for which the *ntũũra* was the level at which land access and settlement were organized before sedentarization.

In areas of long-term settlement under customary tenure, clan elders hold the authority to grant and restrict land-use rights to households (*mũcĩĩ*) or settled clusters of households (*ntũũra*) within loosely defined territorial units. The Tharaka are virilocal

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[17] The term clan is also commonly used to refer to internal agnatic segments of a clan.

[18] Such settlements increasingly are replaced by the sub-unit or village, a division of the sub-location in the Kenya government's administrative structure.

[19] In the recent past, *mĩcĩĩ* likely included married sons and daughters of each wife. Currently, production and consumption among married children is increasingly separate from that of the parents, even as married children settle on land immediately adjacent to that of the father. I employ this more contemporary definition of *micĩĩ*, which exludes married children, in discussions of Tharaka households.

and marriage within one's own clan remains strictly forbidden. Where customary tenure prevails, disputes over male land rights are solved by convening those with elder status within a single *ntũũra*. As a result, customary tenure practice is highly localized and negotiated process whereby individuals mobilize support via agnatic kinship in disputing claims to resources.

Historically, broader political power has been held by a select group of elders who convene councils (sing., *kĩama*; plural, *bĩama*) to negotiate and make decisions regarding clan affairs. Transgressions or potential conflicts between members of different clans require the convening of such a *kĩama* representing all of the clans involved in the conflict. Such *bĩama* were presided over by influential males with elder status.[20]

Lowenthal (1973) reported a total of thirty-two Tharaka clans, whereas this research identified a total of thirty-eight clans. The number of clans is in constant fluctuation. Population growth during the 1970's and 1980's brought about the segmentation of large clans. At the same time, large clans in some areas of Tharaka absorbed small clans as a means of facilitating the land demarcation process in the mid to late 1980's. Both segmentation and merging of clans have been common in the 20th century. Furthermore, the importance of clan membership for most Tharaka has changed drastically in the past twenty years. While restrictions against intermarriage within clans or between two people from clans that have established formal "brotherhoods" (sing., *gĩciaro*) continue to be rigidly observed, the role of clan organization in Tharaka society is changing. Migration and resettlement of tens of thousands of Tharaka to the wetter midland zone in the last 30 years has contributed to change. For the majority of Tharaka

[20] As discussed in Lowenthal (1973) Tharaka *biama* draw their membership from the entire population that held elder status, distinguishing the Tharaka from neighboring ethnic groups for whom a specific age-set would provide political leadership for a fixed period of time.

people who live in settlements that are outside the territorial bounds of their clan, the role of elders is often exercised through local village committees and is sanctioned by chiefs.

Since the colonial period the government has rarely contested the authority of the clans, choosing instead to allow clan elders to maintain their power so long as they cooperated with the directives of government-appointed chiefs. However, since Independence, the power and presence of government administration in Tharaka has increased, creating a new, parallel political hierarchy alongside clan authority. A system of chiefs, assistant chiefs, and headmen provides a local government structure that reaches to the most remote Tharaka communities. The district administration often imposes restrictions on resource use, particularly with regard to hillside grazing, without consultation with clan councils. Due to Tharaka's relative isolation from colonial and post-colonial processes of change, the erosion of cultural organization such as the clan structure and the organization of age-sets (*itana*) remains uneven and of recent origin as compared with other areas of Kenya.

Pre-Adjudication Land Use and Land Tenure

In this section, I draw from secondary sources and land use histories provided by Tharaka farmers and elders to provide a characterization of the pre-adjudication land tenure and land-use system. Drawing on the work of Bernard (1969, 1973) and Wisner (1976a, 1976b), colonial documents, and narratives provided during group meetings and key informant interviews, I identify a suite of evolutionary changes in land use and tenure beginning in the late 1960's that occurred as Tharaka became more integrated into an emerging regional political economy in post-colonial Kenya. The discussion assesses

pre-adjudication changes that were underway before the advent of land reform in order to develop a more critical assessment of the impacts of the adjudication on the land-use system.[21]

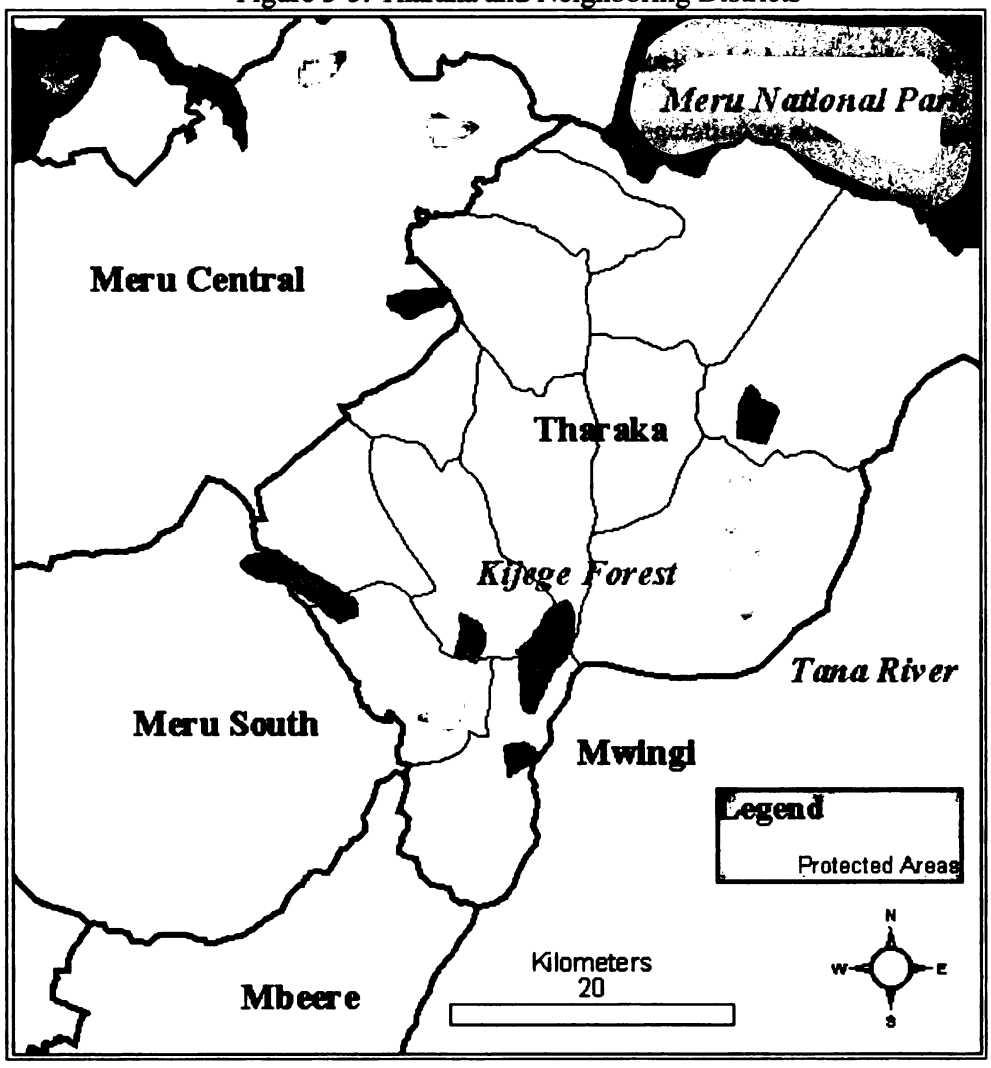
Historically, the Tharaka have relied on goat and cattle herding on extensive scrubland and grassland areas as a primary subsistence activity. The climatic variation and scrubland vegetation that dominates the semi-arid landscape underlies the historical Tharaka preference for goat keeping and only a secondary reliance on local breeds of small East African zebu cattle. As browsers, Tharaka goats (*Capra hirtus*) thrive where *Acacia senegal*, *Acacia tortilis*, and *Combretum sp.* are in abundance, given the higher protein content of such shrubs and trees as compared to grasses (Abella et al. 1984). As such, goat keeping occupies a central economic and cultural tradition in Tharaka society that endures to the present.

However, geographic variation in Tharaka land-use has likely existed for nearly as long as the Tharaka have been settled in the wetter margins of the LM 4 agro-ecological zone, north of Chiakariga Location and the Kijege Forest (figure 3-5) . Early colonial accounts of Tharaka's agricultural geography noted the productivity of Tharaka millet production in the area north of the Kathita River in contrast to the meager crop output reported south of Kijege Forest and near Tana River (Great Britain 1926). In the simplest terms, the productivity of millet cultivation and therefore its economic importance to Tharaka households tended to increase along a gradient as one moved

[21] In constructing a characterization of the Tharaka land-use system from colonial and personal narratives and secondary research, one risks extending such a characterization to a static pre-colonial past. This account should be understood to cover only the period immediately preceding the changes that occurred in the early 1970's. Likewise, it is important to recognize the extent to which such sources of information are both skewed by the limitations of historical narratives and the extent to which the positionality of the individual narrators may shade their accounts.

north and west of the original nucleus of Tharaka settlement between Tana River and Kijege Forest (figure 3-5). In addition to rainfall differentials, a preference among the Tharaka south of Kijege Forest for hillside settlement, which offered protection from livestock raiding by neighboring Kamba and Mbeere groups, further limited agricultural activities (Douglas 2001). Among the first directives of the colonial government in Meru was a restriction of settlement on Kijege's rocky hillsides.

Figure 3-5. Tharaka and Neighboring Districts



Pre-adjudication livestock herding may not have been transhumant in a strict sense but did involve periodic movements of livestock to upland areas during times of drought or other stresses, particularly among households with large herds.[22] For most households, such movements were not seasonal, but were undertaken based on a decision

[22] The extent to which Tharaka moved livestock with regularity seems to have varied significantly from one place to the next with no obvious pattern emerging. It is difficult to isolate the importance livestock movements from trading missions which often involved exchange of livestock for highland crops, particularly with Chuka trading parties (Mwaniki 1974).

of clan elders to move stock during periods of drought. Similarly, a wealthy individual with many animals could undertake a movement of his stock to higher elevation drought refuge areas. Such movements offered access to dense vegetation to nourish livestock and, more importantly, the opportunity to conduct trade with neighboring groups, particularly the highland Imenti, Chuka, and Igoji, with whom the Tharaka share a historical cultural affinity. Separated by a swath of unsettled scrubland forest from the neighboring highland areas of Tigania, Imenti, and Chuka, Tharaka delegations regularly exchanged livestock for grains with highland communities during times of drought (Mwaniki 1974).

Most Tharaka settled in small clusters consisting of local patrilineal kinship groups (*micii*). The Tharaka herding system relied primarily on local scrubland resources, but also benefited from proximity to the four major rivers and numerous seasonal streams that traverse Tharaka and join Tana River at Tharaka's eastern extreme. Because population densities were low, few restrictions existed on the location of new settlements (*ntũũra*). Through the mid-1900s, clan *biama* intervened little in such decision-making. However, inter-clan boundaries were well established and enforced by clan elders.

Political authority was highly localized, with most land tenure disputes settled within local *biama* consisting of elders residing in a single *ntũũra.* Power vested in elders was exercised most often through the creation of ad hoc *biama* to address specific problems or resolve disagreements as they emerged.[23] As such, it is problematic to speak

[23] In attempting to identify indigenous political organization through which colonial power could be extended to the semi-arid areas east of Mount Kenya, colonial authorities lamented that Tharaka political organization was characterized by "little cohesion and practically no indigenous authority" (Great Britain 1937). Local councils convened to settle disputes but quickly dissipated once an agreement had reached.

of a unitary customary system operating in Tharaka during the pre-colonial period. Despite general principles of tenure established throughout Tharaka, the practice of securing resource access was context-specific and a negotiated process which centered upon the mobilization of support among agnatic kin. Women derived their land-use rights from their fathers until marriage and from their husbands after marriage.

Despite the importance of herding activities, swidden crop cultivation was as important as livestock keeping in determining the organization of pre-adjudication land tenure and settlement patterns. The location of settlements by individual *miciĩ* was selected to maximize access to grazing resources and land suitable for millet cultivation. Cleared land was cultivated for two to four years, during which time male hunting parties scouted new areas for settlement. Once identified, experimental plots in the prospective settlement areas were cleared and the remaining vegetation burned. Males cleared, prepared, and planted such plots, sometimes staying away from the homestead for extended periods of time. Among other factors, the success of crop production on such satellite plots over one or more growing seasons determined the decision of the entire group to abandon the existing settlement and begin cultivation of a larger space in the new area. Such experimentation was an important means of identifying the limited patches of fertile soils within a landscape dominated by shallow, stony Cambisols and Acrisols.

A solution suggested by the District Commissioner was to encourage the Tharaka to identify with neighboring groups, particularly the Kamba whose legal code was viewed more favorably by the colonial government.

Recent Change in Tharaka Land Use and Tenure

By the early 1970's, new internal and external forces were bringing about change in Tharaka livelihoods. Externally, changes within the highland and upper midland zones greatly effected Tharaka land-use and economy. The rapid expansion of coffee production by highland farmers in the early 1960's made Meru District the leading coffee producing district in the colony.[24] The commitment of state resources for agricultural development in the highlands led to the implementation of land tenure individualization, rapidly expanding coffee and tea production, and agricultural loans to support the intensification of production and hiring of labor (Bernard 1971). At the same time, the end of the colonial period brought about expanded commercial rights for African small farmers. Ensuing pressures, both political and demographic in nature, led to the creation of planned government resettlement of small farmers, primarily from highland Imenti communities (Munyao 2001).

There were several implications for Tharaka of the expansion of the core of Kenya's cash crop economy to highland Meru. In political terms, the expansion of government administration in highland Meru diminished the power of the customary pan-Meru council of elders, the *njuri nceke*, within which representatives from each of the Meru sub-groups made political decisions related to land-use and settlement, drought relief, and the broad set of issues social and economic relations among highland and lowland Meru sub-groups. As highland Meru became further integrated into the emerging political and economic core of central Kenya through targeted state investments

[24] By Independence in 1964, nearly half of Kenya's coffee was produced on African-owned farms (Bernard 1969).

in land consolidation, infrastructure, agricultural extension, and agricultural credit, Tharaka's political weight within the political configuration of Meru was greatly diminished (Wisner 1976a). During this period, economic differentiation between Tharaka and its highland neighbors increased, particularly in the coffee and tea production areas of central Imenti.

With high demand for labor on highland coffee and tea farms, a pattern of migration for wages from Tharaka to the Meru highlands emerged. Bartering with the Imenti was gradually replaced by the wage relationship or, in some cases, work for food arrangements, both of which provided highland farmers with a desperate work force in years of low rainfall in Tharaka.[25] Wisner (1976a) reports that three-fourths of Tharaka households had sent at least one household member in search of wage labor in response to drought by the early 1970's.

The establishment of government-sponsored settlement schemes in the wetter margins of agro-ecological zone LM4 brought about further changes. Settlements at Nkondi, Tunyai, and Mitunguu were created both to relieve land pressure from the highland zones and to help meet the national demand for cotton production (table 3-1). People from both Tharaka and highland Meru settled in this area and benefited from state subsidies for crop production production. Lowland Tharaka communities benefited little from this expansion of intensive agriculture and, in some cases, specialized commodity production in the form of cotton farming. The beginnings of expanded permanent settlement in LM4 created greater land pressures by limiting midland areas of drought

[25] Although set in motion in the mid-1960's, it should be noted that the monetization of drought relief and other relations between the Tharaka and highland groups such as the Imenti has proceeded gradually and unevenly. Indeed, some Imenti still provide assistance to Tharaka fleeing drought. The majority of Tharaka migrants, however, must find someone willing to employ them, often in exchange for food and housing.

refuge and potential future settlement.[26] Land pressures were further increased by the creation of the Meru National Park in Tharaka's northern plains in 1968, which amounted to an expropriation of more than 800 km^2.

Table 3-1. Selected Settlement Scheme in Meru District

Scheme	*Year Established*	*Acreage*	*Origin of Population*
Mitunguu	1961	2,250	Meru highlands
Tunyai	1966	1,370	Meru highlands and Tharaka
Nkondi	1964	5,720	Meru highlands and Tharaka

Source: Bernard 1969

The expansion of the money economy during the 1960's facilitated Tharaka's integration into an emerging division of labor. In addition to exporting male labor, Tharaka also became a source of raw materials and agricultural goods that complemented the growing specialization of highland agriculture. Extraction of timber, sand, hides, honey, and livestock for export to highland markets increased during this period. As such, Tharaka livelihoods were adapting to the demands of an emerging core-periphery relationship with highland Meru (Bernard 1969; Wisner 1976a, 1978)

In addition to this emerging process of peripheralization affecting Tharaka's role in the regional economy, internal forces were also creating change within Tharaka. The local population increased greatly in the 1970's (Table 3-2). Census figures indicate an average annual growth rate of 4.9% for Tharaka Division between 1969-1979, but negative growth in Chiakariga, one source of out-migration to the midland zone (Table 3-

[26] Additional pressures would later lead many from the drier zones of Tharaka to settle in areas adjacent to these schemes, but without the government assistance that made Nkondi and Mitunguu schemes initially attractive.

3). Such rapid growth may have increased vulnerability to land degradation and land shortages. A 1982 study of Tharaka found that 26% of respondents in the district had settled in their current location due to land shortage and an additional 14% cited land degradation as the primary impetus for colonizing new land (Ng'ethe and Chege 1982). Tharaka elders from Chiakariga and the drier areas of Marimanti identify the early 1970's as the period during which land degradation became a widespread problem. Gully formation, loss of soil fertility, and degradation of grazing resources were widely reported as major drivers of out-migration from places such as Chiakariga and Kamarandi to areas north of Kijege Forest (figure 3-5).

Table 3-2. Population of Tharaka and Sampled Locations

		AEZ LM5 / IL5		*AEZ LM4*	
	Tharaka	*Chiakariga*	*Marimanti*	*Turima*	*Gikingo*
1969					
Population	37,031	5,805	5,785	--	--
Density (km^2)	24	64	49	--	--
1979					
Population	50,277	4,859	5,703	--	--
Density (km^2)	32	53	48	--	--
1989					
Population	74,929	6,386	5,826	9,772	10,190
Density (km^2)	48	70	49	195	146
1999					
Population	100,992	8,557	6,131	6,612	9,283
Density (km^2)	64	94	52	147	146

Sources: Kenya, Central Bureau of Statistics (1970, 1981, 1994, 2001)

Table 3-3. Population Growth Rates for Tharaka and Sampled Locations

	Tharaka	*Chiakariga*	*Marimanti*	*Turima*	*Gikingo*
1969-1979	3.6	-1.6	-0.1	--	--
1979-1989	4.9	3.1	0.2	--	--
1989-1999	3.4	3.4	0.5	-3.2	-0.9

As has been observed in neighboring Mbeere (Riley and Brokensha 1988), the growing scarcity of land brought conditions conducive to a greater role of the clan in allocating use rights, sanctioning land sales, and resolving conflicts that arose when two lineage groups sought to use the same area for settlement and cultivation. The role for elders councils in regulating land access continued to expand until boundary demarcation activities began in the mid-1980's as individual inheritance rights emerged and male household heads began asserting the right to divide demarcated land among their sons. Thus, in areas under statutory tenure, the role of clan *biama* continued to grow until the completion of the adjudication exercise.

By the late 1970's, declining land availability due to the combination of population growth and land degradation was a major driving force behind a stream of resettlement from areas of long-term Tharaka settlement to midland areas of higher rainfall, better soil fertility, and greater proximity to the growing commercial economy of highland Meru and the Mitunguu and Nkondi settlement schemes. This resettlement had the effect of redistributing a significant proportion of the growing population to the midland zone which was largely unsettled. Tharaka and highland Meru had avoided settlement in this zone due to perception of greater disease risk to humans and livestock. The prevalence of tsetse habitat elevated led to high rates of trypanosomiasis among livestock. Among the human population, the wetter environment supported larger

mosquito populations and increased the risk of malaria during the rainy season. Dense wildlife populations also made initial settlement a particularly risky undertaking. In addition, Tharaka migrants found the grasses and bushes of the midland zone to be deleterious to livestock health as they created gastric stress (Bernard 1969). Some returned to lowland Tharaka, returning livestock to what was perceived as a more favorable environment for herding. Those who remained turned to crop production as their primary activity.

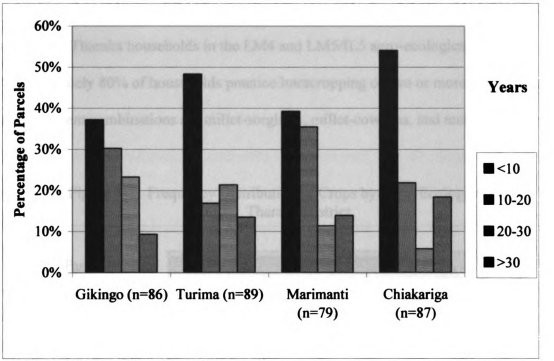
The institutional setting within this new frontier of permanent settlement was quite different from the lowland areas in which clan and lineage authority dominated the social landscape. Settlers from lowland Tharaka did not migrate or settle along clan lines in the midland zone. Village land committees consisting of local elders irrespective of clan affiliation formed in the early 1980's. While early migrants to this zone were able to demarcate large parcels, the scarcity of labor translated into relatively little ability to cultivate large parcels. As population densities increased rapidly in the 1980's due to in-migration, village land committees facilitated the sale of small parcels hived off from the large demarcated parcels of early settlers. Through this process of land sales, land tenure in the midland zone developed such that the relatively egalitarian land distribution of lowland Tharaka was reproduced in the midland zone. However, communities in such recently settled area evolved toward a new institutional framework within which households were more boundary-conscious and more likely to assert exclusionary use rights. Furthermore, tenure in the midland zone was characterized by a lack of lineage and clan authority in the adjudication of land rights.

Those who settled permanently in these new areas of Tharaka settlement maintained kin ties to their former home areas. Some owned livestock that was kept by kin or other households in the lowland zone, while midland zone farmers received people from the lowland communities during periods of drought. Furthermore, sons who left parents behind in the lowland zone maintained inheritance rights to land in those communities. Reciprocal ties between those who settled Tharaka's northern frontier and many lowland communities remained strong for at least twenty years following the main thrust of resettlement in the early 1970's.

The sedentarization of Tharaka agriculture occurred gradually in conjunction with rising population densities, land degradation in lowland zone of long-term settlement, and resettlement in the midland zone. The timing of the process was similar in the lowland and midland zone.[27] Group interviews and survey data indicate that the permanent use of parcels by a lineage and its descendants began in the late 1960's and continued during the 1970's. Figure 3-6 indicates that between 10% and 20% of parcels adjacent to the of the homestead of the respondent had been in permanent use since 1970. The main thrust of migration of lowland migrants to the midland areas of Turima and Gikingo in the 1970's is apparent in the high percentage of parcels (21% and 23% respectively) that came under permanent use during the 1970-1980 period. Boundary demarcation continued during the 1980's and, under government directive, intensified during the early 1990's as the adjudication process loomed in the immediate future.

[27] The mean years of permanent use by a single lineage of parcels adjacent to the homestead of the Chiakariga and Marimanti samples are not significantly different from that of the more recently settled midland locations of Turima and Gikingo ($P(T \leq t) = 0.84$ at $\alpha = 0.05$, df=353).

Figure 3-6. Years of Permanent Use of Parcel Adjacent to Homestead



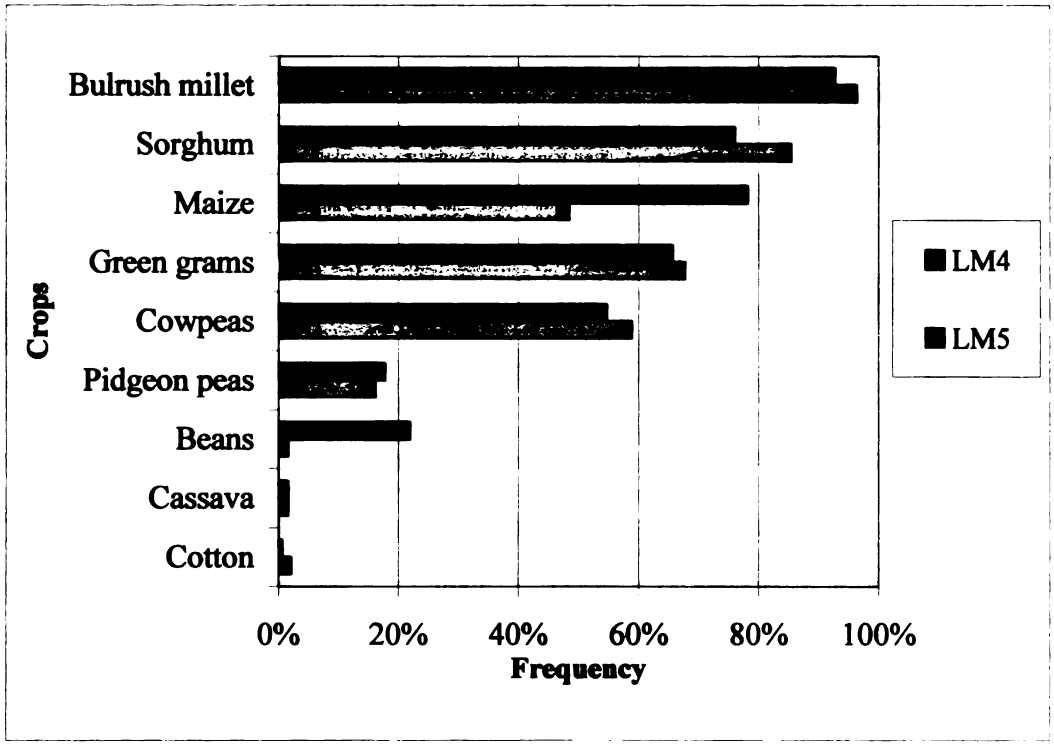
Source: Author's household survey, 2001

Contemporary Tharaka Land Use and Livelihoods

Most Tharaka practice mixed farming, combining goat and cattle herding with crop cultivation. Although crop cultivation has grown in economic importance in the last two decades, both activities remain important to household incomes throughout the district. The dominant grain crops in Tharaka are drought-resistant sorghum (*Sorghum bicolor*) and bulrush millet (*Pennisetum typhoides*). A majority of households also grow legumes, including green grams (*Vigna radiata*) and cowpeas (*Vigna unguiculata*), both of which perform well in the prevailing semi-arid conditions. Maize (*Zea mays*) is widely grown in the wetter midland zone. The Katumani maize composite is an early maturing variety that is planted by most Tharaka farmers at elevations greater than 900m.

Below 900m, farmers plant primarily the Makueni composite, a low yielding, drought-resistant variety. Figure 3-7 indicates the frequency of crops cultivated in both growing seasons by Tharaka households in the LM4 and LM5/IL5 agro-ecological zones. Approximately 80% of households practice intercropping of two or more crops. The most frequent combinations are millet-sorghum, millet-cowpeas, and maize-green grams.

Figure 3-7. Frequency Distribution of Crops by Agro-Ecological Zone, Tharaka District



Source: Author's household survey, 2001

When crop production is sufficient to meet subsistence needs, most households sell food crops in order to pay for other domestic needs such as school fees. Crop sales represent the primary source of income for nearly all families in all four locations. Table 3-4 indicates variation in participation of Tharaka households in local crop markets. The

cropping strategies of the households are remarkably similar across the district, with the exception of Chiakariga. What is striking, however, is the fact that no individual crops are grown solely for household consumption by the majority of Tharaka smallholders, suggesting that each crop is raised using a flexible strategy whereby production beyond subsistence needs of the household can be sold in local markets. While these data offer only a cursory view of potential crop sales in a given year, they do suggest that households in the lower zone are increasingly dependent on cash resources to reproduce their livelihoods. Furthermore, while livestock, fuelwood, and charcoal sales to highland traders were well documented by the mid-1970's (Wisner 1976a), the expansion of crop sales is a relatively new development and an indicator of Tharaka's greater integration within the regional economy.

Although farming and herding are the primary sources of income for the majority of Tharaka households, a range of other activities have emerged as important income sources (Table 3-5). Each of these adds to the flexibility of livelihood strategies. Waged non-farm work, primarily in neighboring highland areas, continues to provide income for many households. With the intensification of crop production, waged farm work for weeding and soil and water conservation has emerged as major source of income for relatively poor families.

Table 3-4. Percentage of Households Growing Selected Crops for Food, Cash, or Both

	Turima		*Gikingo*		*Marimanti*		*Chiakariga*		*Total*	
	No. of Households	(%)	No. of Households	(%)	No. of Households	(%)	No. of Households	(%)	No. of Households	(%)
Green Grams										
Food	14	22	18	29	21	30	32	54	85	33
Cash	4	6	2	3	3	4	1	2	10	4
Both	45	70	42	68	47	66	26	44	160	63
Total	64		62		71		59		256	
Maize										
Food	32	36	20	33	17	39	32	65	101	42
Cash	0	0	0	0	0	0	0	0	0	0
Both	57	63	40	67	27	61	17	35	141	58
Total	90		60		44		49		243	
Millet										
Food	26	29	31	35	43	49	59	61	159	44
Cash	3	3	0	0	0	0	1	1	4	1
Both	58	65	58	65	45	51	36	37	197	54
Total	89		89		88		97		363	
Sorghum										
Food	23	30	23	33	36	39	45	63	127	41
Cash	6	8	4	6	3	3	0	0	13	4
Both	45	59	43	61	53	58	27	38	168	54
Total	76		70		92		72		310	

Source: Author's household survey, 2001

Buying and reselling goods in local markets is an important source of income for many Tharaka, a practice which includes both established kiosks that sell manufactured goods and processed food as well as informal trading network that are exploited by those who are able to access goods in highland markets. Despite the expansion of agriculture that has greatly reduced bushy and scrubland vegetation, both honey and charcoal production maintain economic importance for approximately 10% of Tharaka households.

Households in Chiakariga and Marimanti engage in the production of handicrafts such as grass baskets and mats. With the exception of crop sales, market participation tends to intensify during periods of drought or other stresses. Household economic strategies are dynamic with adjustments in strategies and economic activities often dependent on the success of the most recent harvest, the availability of trade and wage labor opportunities, and access to resources for charcoal production. However, despite this and other forms of diversification of household income, table 3-6 indicates that Tharaka fare poorly as compared to neighboring highland and semi-arid districts in terms of participation in off-farm and non-farm economic activities. The cyclical nature of these activities as they relate to fluctuating household food stocks will be outlined in greater detail later in Chapter 6.

Table 3-5. Sources of Household Income by Location

	Turima	*Gikingo*	*Chiakariga*	*Marimanti*
Economic Activities	*Percent of Households Receiving Income from Activity*			
Farming	95.7	78.0	54.5	80.7
Herding	60.9	27.0	47.6	50.6
Trading	19.6	22.0	14.1	17.3
Waged non-farm work	17.3	8.0	18.2	20.4
Waged farm work	15.3	23.0	30.3	11.9
Bee keeping	9.8	8.0	7.1	7.5
Selling charcoal	9.8	3.0	7.0	7.6
Selling handicrafts	5.4	5.0	37.4	15.1

Sources: Author's household survey, 2001

Table 3-6. Percent of Population Engaged Solely in On-Farm Agricultural Work

District	*Percent of Population, 20-49*
Tharaka	60
Mbeere	52
Meru Central (Imenti)	46
Machakos	31

Source: Kenya (1999)

Drought and Changing Coping Strategies

A central component of Tharaka land use and livelihood strategies revolves around the mediation of subsistence crises of which low crop productivity and subsequent food shortages are an underlying cause. Such crises are exacerbated during periods of irregularly low rainfall. An assessment of coping strategies during subsistence crisis provides insight into the way in which households manage risk and balance the immediate needs of subsistence crises with long-term strategies for maintaining productivity. Vulnerability to such food shortages, as well as specific adaptations, must

be seen in the broader context of changing livelihoods and the structural factors underlying resource access (Blaikie et al. 1994; Campbell 1999; Sen 1981).

Watts (1983) suggests a drought coping sequence whereby households resort to increasingly irreversible commitments of household in order to address the immediate requirements of subsistence. Moderate forms of coping entail the use of available resources, changes in work and consumption habits. When these are insufficient to meet subsistence needs, liquidation of productive assets such as labor and livestock constitutes a more severe stage of coping. The final sequence entails liquidation of land and, in some cases, migration to towns or relief centers. While the model has been critiqued as deterministic and inflexible (Grolle 1995), it nonetheless provides a broad schema that is useful to interpreting changes in coping strategies and their implications for rural production systems.

Coping-strategies may be agronomic in nature, but more often entail a range of mechanisms related to redirecting use of land, labor, productive assets, and cash resources. In Tharaka, drought coping strategies involve changes associated with the production and sale of livestock and the production. Table 3-7 presents a comparison of two data sets that provide information on drought coping strategies in Tharaka. The first was collected by Wisner (1976a) in 1971 and the second is derived from the author's household survey in 2001. While several issues of comparability exist between the data sets, an examination of the relative importance of various coping strategies in each data set provides useful insights into the changing land use and livelihoods during drought

periods.[1] Below I focus on two central aspects of Tharaka: the cyclical nature of livestock and crop sales and the recent development of wage labor as a drought response.

The most important drought response identified by households is the purchase of food. Livestock sales also remain an important means of gaining cash resources for crop purchases. Group meetings in Chiakariga and Marimanti revealed a cyclical process of selling livestock in order to purchase grain during food shortages. During years of surplus production, crop sales are often used to purchase livestock. It has been indicated that crop sales are the primary source of income for most households and that most Tharaka grow staple crops with a view to selling surplus. During drought years, livestock are sold in order to purchase crops for home consumption (Chiakariga Farmers Group Meeting 2001; Turima Elders Group Meeting 2001). The importance of livestock sales and food purchases has likely increased in magnitude due to the gradual elimination of supplementary forms of coping, such as hunting, fishing, and collecting bush foods.

[1] In my research, respondents were asked to identify the things that they did differently as a result of the drought in terms of work, consumption, or farming and herding practices specifically during the drought of 2000. Wisner's survey requested information on all of the responses the household had ever engaged in as a result of drought-induced stress. Given this difference, the rank of individual responses is more meaningful than the frequency of adoption.

Table 3-7. Responses to Drought in 1971 and 2001, Tharaka District

	Wisner (1971)		Smucker (2001)	
Response	*Pct of households*	*Rank*	*Pct of Households*	*Rank*
Buy food	100	1	70	1
Plant before 1st Rain	100	2	55	2
Pray	100	3	18	8
Weed more	97	4	2	19
Ask help from kinsman	95	5	15	10
Sell livestock	89	6	43	3
Move to kinsman's farm	84	7	2	21
Move livestock	81	8	14	14
Plant drought resistant crops	79	9	5	17
Seek wage work nearby	73	10	39	5
Seek wage work outside Tharaka	73	11	15	11
Hunt or fish	73	12	1	24
Collect bush food	71	13	1	25
Cultivate low wet places	44	14	3	20
Send children to kinsmen	43	15	0	--
Ask help from government	16	16	40	4
Dig ridges	10	17	0	--
Try to get a loan	6	18	0	--
Irrigate	3	19	0	--
Plant with first rain	0	20	11	15
Consume stored food*	--	--	23	6
Sell handicrafts*	--	--	22	7
Work for food nearby*	--	--	16	9
Sell charcoal*	--	--	13	13
Work for food outside Tharaka*	--	--	6	16
Sell firewood*	--	--	5	18
Invest more in water conservation*	--	--	2	22
Buy animal feeds*	--	--	2	23

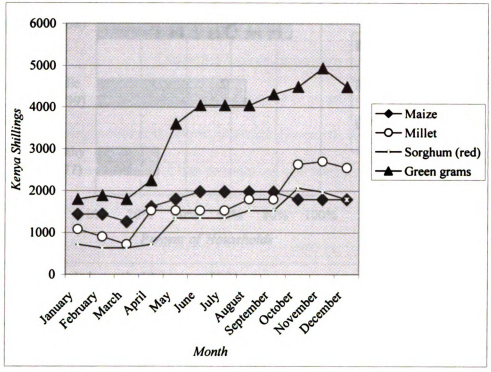
Source: Wisner (1976a); Author's household survey, 2001; * Data not collected by Wisner (1976a)

An important characteristic of the cyclical buying and selling of livestock and crops is poor terms of trade with highland markets in which most Tharaka grains are sold. The poor terms of trade results in part from the control of trade by outside traders,

primarily from highland Meru.[2] For example, prices for millet and sorghum in Marimanti, Gatunga, and Chiakariga markets increased by 100 percent between the failed short rainy season of April-May 2000 and the more productive rainy season of 2001 (Kenya 2000; Chiakariga Farmers Group Meeting 2001). As indicated in Figure 3-8, prices increased sharply immediately following the poor crop performance of the March-April growing season. Likewise, goat prices during the drought were 50% lower immediately following the failed rains than they were twelve months later (Chiakariga Farmers Group Meeting 2001; Marimanti Farmers Group Meeting 2001). It is conventional wisdom among Tharaka that traders work as a cartel in order to manipulate prices so as to take advantage of the desperation of farmers following crop failure (Muthambi 2001). Despite poor terms of trade, livestock nonetheless constitute a first line response for many households, which serves as an indication of the importance of changes in livestock production to Tharaka livelihoods.

[2] Recent liberalization has made it easier for traders from other parts of the country to enter Tharaka markets and this has taken place, particularly during the widespread food shortages in Tharaka at the peak of the 2000 drought. Under normal conditions, however, Imenti traders from highland Meru are the primary traders.

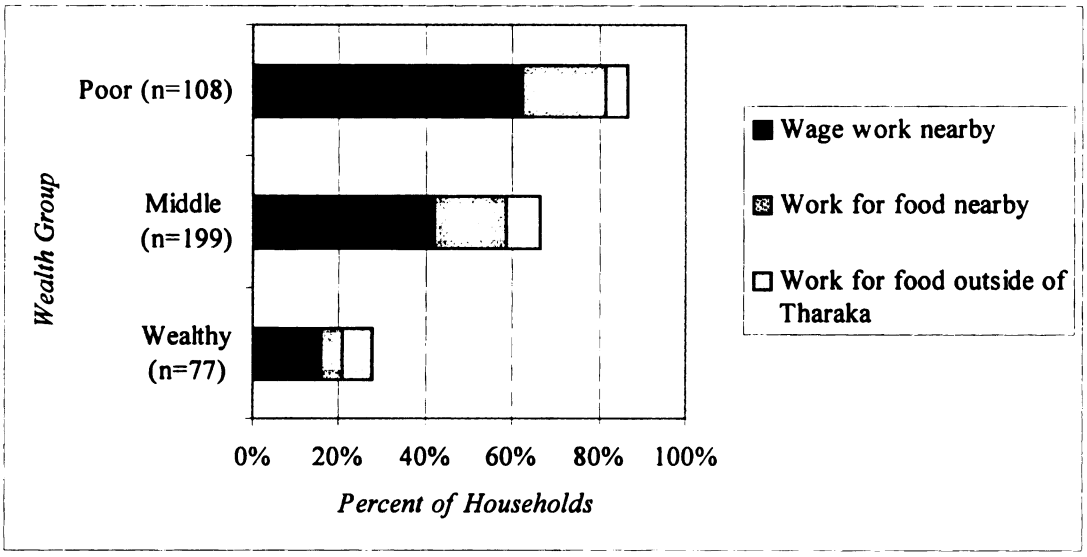
Figure 3-8: Changes in Crop Prices in Marimanti and Chiakariga Markets, 2000



Source: Kenya (2000)
Note: Prices are per 90 Kg bag. The March-April rains of 2000 were the lowest recorded in at least thirty years.

Those for whom the sale of livestock was either not possible or insufficient, wage labor served as an alternative or supplement to livestock sales as a means of gaining cash in order to purchase food. A sign of the desperation of many households is that 15 percent of the population was involved in working for food near the homestead and another 16 percent engaged in work for food arrangements outside of Tharaka. What is remarkable about this response is the degree to which local wage labor is currently a more widely adopted response than wage labor outside of Tharaka (figure 3-9).

Figure 3-9. Participation in Wage Labor and Work-for-Food Arrangements As Responses to Drought of 2000 by Wealth Group[3]



Source: Author's household survey, 2001

Several factors help to explain this relatively low level of out-migration. The 2000 drought was unique in that it was the first time during which the United Nations World Food Programme food assistance was distributed in Tharaka (between June and February 2001).[4] As a result, nearly half of Tharaka residents received food aid in the form of maize, beans, oil, and salt (Muriungi 2001). Furthermore, the rainy season preceding the failure of the March-April 2000 rains was productive, and as a result, food stocks were reported to have been relatively high when the 2000 drought began. Finally, rapid decline in production in the highland Meru coffee sector, and generally rising

[3] Wealth groups were created based on an index composed of land size, number of livestock, use of draft power, and employment of wage labor.

[4] The increase in the importance of requesting assistance from government might reflect this recent change in food aid as government officials are directly involved in food aid distributions.

unemployment in towns such as Meru, Embu, and Nanyuki, created pressures to identify local solutions to meeting subsistence needs.[5]

Changing Labor Dynamics

The above factors are clear as to the decline of wage labor opportunities outside Tharaka and greater incentive to stay in Tharaka. However, the expansion of wage labor, particularly since the mid-1990's, has complex origins related to customary social obligation and increasing household labor needs in the course of agricultural intensification.[6] At least until 1990, wage labor in Tharaka was often viewed as a form of obligatory redistribution of cash or food to needy households. As fewer young Tharaka men were successful in securing waged employment outside the district in the 1990's, many turned to local wage labor as a substitute and refused to work for non-kin neighbors without being paid a wage. Because young men were essentially supplemental labor to that of wives and daughters, the demanding of wage payment did not initially have a great effect on the organization of agricultural labor in Tharaka.

As discussed in greater detail in Chapter 6, the mid 1990's brought about a proliferation of exotic weed species with which Tharaka farmers had no experience in eradication. The spread of new weeds was greatly accelerated by the traversing of crop fields by livestock to graze on crop residues (Karimi 2000). The 1997 El Nino floods

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[5] As an indication of the decline in the Meru coffee sector that had previously sustained Tharaka wage seekers, coffee production peaked in 1985 at 63110 metric tons, realizing sales of Ksh 439,770,360 (USD 5,863,605). By the drought year of 2000, it had steadily declined to 13,370 metric tons with gross realization of Ksh 77,644,302 (USD 1,035,257). The decline is attributed to declining international prices, delayed cooperative payments, and conversion of coffee farms to food crops (District Agricultural Office, Meru Central, Meru South, and Meru North, unpublished records).

[6] Despite the relatively large percentage of Wisner's (1976a) respondents who attest to having sought wage labor locally, group discussion reveal that wage labor was a very poorly established concept in most Tharaka communities through the end of the 1980's (Gikingo Elders Group Meeting 2001).

provided an additional rapid vehicle for exotic weed propagation. The effects on household labor needs were felt almost immediately. Whereas households engaged in just one round of weeding during a typical growing season in the late 1980's, by 2000 households with sufficient labor resources undertake three rounds of increasingly labor-intensive weeding.

Out of this process of expanding labor requirements and greater vulnerability to drought emerged the reorganization of women's work groups, previously based on reciprocal labor sharing arrangements within *matũũra*, which began to demand wages for access to their labor, particularly by the relatively wealthy or those who had family members providing remittances from outside the district. The result, as confirmed by the variability by wealth class of participation in wage labor (Table 3-7), is a new dynamic of drought coping whereby most poor households must decide whether to divert labor resources labor from their own fields at critical times by selling labor in order to purchase food or other household needs, thus endangering their own productivity. The decision takes on even greater complexity when one considers that productivity may be extremely low during periods of abnormally low rainfall, regardless of the quantity of labor invested. The gender dimension of this dimension of Tharaka livelihoods is discussed in greater detail in Chapter 6.

Conclusion

The above chapter provides an overview of the basic elements of Tharaka livelihoods and a description of recent changes in Tharaka land use and livelihoods. It suggests that recent changes in agro-pastoral land use should be framed in the context of

broader transitions taking place within Tharaka and in the relationship between Tharaka communities and the rest of Kenya, particularly the eastern Mount Kenya region. Furthermore, it points clearly to the notion that customary land tenure relations and the social relations and institutions which underlie them have evolved with the changing dynamics of resource use, a point I return to in Chapter 4 where the external forces shaping tenure change and the dynamics of tenure reform are examined in greater detail.

To this point it has been demonstrated that Tharaka land use and livelihoods are based on the production of food crops and the rearing of livestock, primarily goats. The mix of activities had shifted in favor of sedentary crop production by the 1970's with both planned and spontaneous settlement in Tharaka's lower midland zone (LM4) and, consequently, limitations on exploitation of the ecological gradient through transhumant movements and the accessing of dry season and drought refuge grazing areas for livestock. Such large-scale spontaneous resettlement from lowland to midland areas counters the characterization of a simple downslope movement of commoditization and tenure individualization of Kenya's eastern ecological gradient (Bernard et al. 1989). The middle zone of the Meru gradient underwent a rapid conversion to settlement and intensive agricultural production in less than twenty years that was driven initially by the establishment of government-planned settlement schemes. However, outside of the settlement schemes, spontaneous resettlement of population from Tharaka's driest zones had outgrown the population of the settlement schemes by the mid-1980's.

We have also seen an alteration of the primary forms of exchange between Tharaka and the Meru highlands, to which most of Tharaka trade is directed. Tharaka remains an exporter of labor and livestock during drought years and, despite chronic food

shortages, an exporter of food crops (primarily maize, millet, sorghum, and green grams) during years of surplus production. Fuelwood and charcoal, much of which is destined for the densely populated highlands, is also an important source of income for thousands of Tharaka people. Tharaka land use and management plays a specific role within the regional political economy of the eastern Mount Kenya region: a role characterized by poor terms of trade and a reproduction squeeze, whereby "a deterioration in the terms of trade between commodities produced for the market and items of necessary domestic consumption acquired through the marketplace is transmitted to the household economy in terms of reduction in consumption, an intensification of commodity production, or both" (Watts 1984, 189). Thus, Tharaka society has undergone a process of "subsistence-plus" commoditization which links the intensification of land use and management to the regional economy of eastern Mount Kenya (Bernstein and Woodhouse 2001).

The above discussion serves as a means of identifying the web of cultural, political, economic, and environmental relations that structure the decisions made by land managers. It provides a historical overview of the evolutionary processes that have been underway within the study area since the late 1960's, including the intersections of changing land tenure practices and changing land use in the upper and lower zones. Therefore it establishes the temporal and geographic dynamics of Tharaka land-use intensification as a first step toward the task of delineating the specific effects of the recent land adjudication on contemporary land use.

Having identified the broad outline of the Tharaka livelihood system, I turn now to a more focused discussion of the land tenure reform program in Kenya, the national political economy context of its expansion to Tharaka and the current distinctions

between customary and statutory tenure systems in terms of perceptions of land rights and tenure practices. The analysis serves to expand the discussion of the dynamics of tenure reform in Kenya as a means of understanding the effects of reform on the dynamics agricultural intensification in Tharaka.

CHAPTER 4

KENYA LAND REFORM AND THE ADJUDICATION PROCESS IN THARAKA

This chapter examines the origins and dynamics of Kenya's land reform program and its implications for contemporary distinctions between adjudicated and customary tenure in Tharaka. The discussion explores the political economy dimensions of land reform as a means of contextualizing the current phase of the reform process in Tharaka and other semi-arid areas. The first section briefly examines the political economy context of land tenure reform in colonial and post-colonial Kenya as a means of examining the rationale and societal dynamics that led to the promotion of tenure reform as a means of improving land management. It examines the changing role of the African reserves, or non-scheduled areas, during the colonial and post-colonial periods and their importance to colonial and post-colonial development strategies. The second section places Tharaka land tenure within the context of the process of *peasantization* as it affected the broader Meru gradient. The third section examines the process of land demarcation and adjudication in Tharaka itself. The concluding section of the chapter considers the potential effects of adjudication on land distributions and the differences in contemporary tenure practices that exist between customary and adjudicated areas.

Tenure Reform and Its Political Economy Context

As discussed in Chapter One, land tenure systems consist of a set of recognized rules or norms established through state or local institutional frameworks that govern the rights of individuals and groups to land or land resources. As a subset of broader systems

of property relations, land tenure systems are historically dynamic and entail the reproduction of rights within such institutions and, more generally, via social relations. In Tharaka, land tenure practices can be seen to have undergone gradual and, in some cases, localized trajectories of change. While local dynamics of resource use underlie the evolution of customary tenure, the broader political economy transformations affecting central Kenya and the Meru gradient specifically have been central to shaping Tharaka's contemporary land tenure practices both directly and indirectly. Indirect influences have already been identified in the constriction of Tharaka herding systems resulting from the downslope expansion of Meru crop production and the changing relationship between Tharaka and highland Meru communities. The direct influences on Tharaka land tenure have included the application of a land policy devised during colonial crisis and promoted in the post-colonial era as a means of geographically expanding the realm of peasant agriculture through the elimination of customary tenure. The following assessment is a means of identifying the differences between statutory and customary tenure and the contemporary implications for land management requires an examination of the political economy context of land reform in Kenya.

Colonial Change and the Origins of Individualization

While pre-colonial systems of land tenure were dynamic, East African tenure systems have undergone particularly rapid change from the beginning of the colonial period. This change was driven by the adaptation of land use systems to internal and external forces, and reforms brought about by colonial decree, land expropriation, and the reorganization of internal regions of colonial Kenya into a patchwork of European

settlement and native reserves. In keeping with the principles of indirect rule, this reorganization was itself based on the promotion of customary tenure institutions as a form of self-government within areas designated for African settlement that would govern land tenure issues of the African population. The dual system of tenure was designed to maintain settler access to African labor which was a central requirement of colonial accumulation (Berman 1990). Titled freehold and commercial rights for African farmers were introduced in the late colonial period with both political and environmental justifications. Since Independence, post-colonial governments have supported the expansion to arid and semi-arid areas of the land adjudication project launched during colonial rule, citing both tenure security and improved land management as the impetus for proceeding with little change to the colonial formula for reform (Okoth Ogendo 2000).

Land tenure was a central concern of the architects of British colonial rule, which saw the organization of land rights as a key to furthering the development of Britain's colonies both for the vitality of empire and the well-being of subjects. A component of Lugard's doctrine of indirect rule reflected a social evolutionism that viewed the process of land tenure individualization as both natural and central to social progress (Lugard 1965). Within early colonial Kenya, the philosophical vision of planners such as Lugard met with the realities of the colonial state and political economy in the planning of African tenure and settlement. Native reserves of central Kenya, also known as non-scheduled areas or Trust Lands, were to be the focus of changing tenure strategies during the colonial period.[21] Attempts to recreate customary tenure within African "reserves"

[21] When formal colonial rule was established in Kenya in 1920, all land was identified as Crown Land and was, therefore, open to expropriation for European settlement or government use. Although ethnic reserves

before 1930 were soon followed by efforts to individualize African land tenure as a means of promoting the self-sufficiency of the reserves as a crucial piece of the patchwork of colonial production (Mackenzie 1998).

Current human-land relationships have been fundamentally shaped by land alienation and the creation of a dual system of tenure in colonial Kenya which provided the framework for European and African settlement. Crown Lands, opened for British settlers and enterprises, constituted approximately 7% of Kenya's land area and a far greater share of its high elevation and high rainfall areas (Walker 2002). To delimit African settlement, the boundaries of "native reserves" were established by the colonial government beginning in the early 1920's. The dual tenure policy of settler and African lands had two complementary objectives. The first was to provide sufficient land for large-scale agricultural production to attract British settlers to Kenya's fertile and well-watered central highlands. The second objective of this policy was to create conditions that would facilitate the mobilization of African wage labor in order to produce the spatial concentration of labor power necessary for settler and plantation production. During the first three decades of colonial government, the Kenya colonial administration held that English land law was not relevant to the African sector and thus permitted customary or African forms of tenure to continue.[22]

One measure of the success of this policy was the gradual intensification and expansion of settler agriculture during the 1920's and 1930's and the ensuing

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were created in the 1920's, it was not until 1938 that colonial government created a legal category of land known as 'Trust Lands' or 'native lands', and later referred to as non-scheduled areas (Okoth Ogendo 1999).

[22] It is important to note that the complexity and spatial heterogeneity of customary law was such that powerful individuals, particularly those who served as chiefs under colonial rule, were influential in defining and translating custom to Europeans, often to their own advantage (Leys 1975; Mackenzie 1998).

transformation of relations between settler and African agriculture (Berman 1990). During the first two decades of land alienation and settler production, land was abundant enough to allow African farmers to cultivate expropriated land as squatters or as holders of tenancy contracts. As settler production intensified and the labor demands of settler agriculture increased, tenancy contracts for cultivation of settler estates declined in the face of settler demand for both land and alienated labor (Cowen and Shenton 1996). These forces led to greater administrative attention to the African reserves given their crucial function of reproducing the wage labor force and, more generally, providing the conditions for the maintenance of large-scale inequalities between scheduled and non-scheduled areas (Kitching 1980).[23]

By the 1930s, concern for the productivity of the African reserves became more pronounced in the face of growing pressures on land and resultant land degradation (Great Britain 1934, 1937). As these concerns arose, political opposition by emerging African political organizations around the issue of land access intensified. In the context of nascent land-related formal and informal resistance (c.f., Mackenzie 1998), the Carter Commission was established to deal with two underlying challenges: ensuring the role of the non-scheduled areas as labor reserves for settler agriculture and identifying the labor arrangements that would make it possible. It was the Carter Commission which recognized the importance of identifying progressive farmers to whom land titles could be issued and from which an indigenous class of agrarian capitalists would arise, whose

[23] In addition, Mackenzie (1998) and Kitching (1980) have shown that the intensification of subsistence crop production within the reserves entailed a major transformation of household divisions and expansion of women's labor power in agriculture as women's social labor became the key resource for the reproduction of labor power, particularly 1920.

interests would be aligned with those of the colonial project (Great Britain 1934). Cowen and Shenton (1996) explain:

> The colonial government recognized the utility of individual ownership in the context of enforcing the boundaries of ethnic reserves in Central Province in the 1930's. Whereas Kikuyu with significant livestock wealth had squatted on unused European land through the early 1930s, stricter enforcement of a boundary between zones of European and African settlement required the already crowded reserves to absorb greater numbers. Despite the ineptitude that colonial administrators believed the hallmark of African farmers, policy emphasis turned to the project of creating self-sufficiency through the establishment of freehold tenure (336).

The colonial government was thus charged with the dual task of creating "humane and regulated pressures" to promote wage labor while seeking to retain the African reserve as a sufficient and sustainable resource for the reproduction of African wage labor through subsistence production (Okoth-Ogendo 1991).

Early African political resistance to colonial land policy identified salient connections between land tenure policy within the reserves and the proliferation of mandatory soil and water conservation programs promoted by the government. Within the Kikuyu reserves, political resistance organized by the Kenya African Union (KAU) in the early 1950's focused on boycotting communal soil and water conservation projects, particularly terrace construction (Sorrenson 1967). While withdrawal of African communal labor as a form of opposition to colonial decrees was an important form of resistance in itself, the KAU political strategy was clearly based on a broader understanding that land consolidation and the introduction of communal land management were strategies for reducing political pressure for expanded African settlement and commercial rights, both "imagined needs" which were fueling "non-cooperation of the peasant population" (Kenya Colony and Protectorate 1956, 4).

Such resistance to compulsory soil conservation work groups were important in subsequent years in areas as diverse as highland Embu and the semi-arid divisions of Mbeere and Tharaka, as the expansion of colonial land improvement programs underlined the importance of subsistence agriculture in the reserves to the political economy imperatives of colonial accumulation (Kenya Colony and Protectorate 1958; Riley and Brokensha 1988; Chiakariga Elders Group Meeting 2001). That land degradation in the African reserves was fundamentally a crisis of inappropriate indigenous agricultural and herding practices played into colonial notions of trusteeship and guardianship which held that colonial development entailed a moral obligation to propel African societies from their backward state toward one that more closely resembled their own (Cowen and Shenton 1996). It was in this context that one can view the perceived moral obligation of colonial administrators to bestow upon the African population the techniques that would allow the population to develop greater self-sufficiency while also gaining acceptance of the broader system of management of land and labor.

Such paradoxical imperatives of the preservation of colonial power surfaced again in the context of Swynnerton's *Plan to Intensify African Agriculture in Kenya*, the principles of which contributed heavily to the letter and spirit of the 1968 Land Adjudication Act under which most land in Kenya has been adjudicated in the post-colonial period (Kenya Colony and Protectorate 1954; Berman 1990). The Swynnerton Plan suggested a comprehensive reform program that would consolidate multiple holdings into individually held lands unit for which titles would be issued and loans for agricultural improvements secured.

It is commonly noted that the Swynnerton Plan sought to bring about the intensification of agricultural production in high potential areas through the individualization of land rights, the extension of land secured credit, and the development of a land market. However, rather than merely a policy prescription to limit land degradation, the Swynnerton Plan also represented a political strategy aimed at maintaining the unequal distribution of land resources between the European settlers and an increasingly stratified African population (Kitching 1980). In addition to creating a class of progressive, relatively wealthy farmers with interests tied to the colonial project, such reforms were viewed as a means for African reserves to attain self-sufficiency in hopes of reducing political pressure for the redistribution of settler farms (Cowen and Shenton 1994; Okoth-Ogendo 1991).

Underlying Swynnerton's proposed program was a more complex version of a social evolutionism steeped in historical materialism which saw land tenure individualization as broadly beneficial to social development, if neither a natural alternative to redistribution nor one that could be implemented without difficulty. Specifically, Swynnerton foresaw a process whereby "able, energetic or rich Africans will be able to acquire more land and bad or poor farmers less, creating a landed and a landless class" (Colony and Protectorate of Kenya, 10).

Post-Colonial Continuity and Change

The post-colonial government acted rapidly to accelerate the land reform program begun under British rule through consolidation and registration of landholdings in the

emerging core of Kenya's commercial agricultural economy.[24] Within one year of Independence, the Kenyatta government had commissioned a report on the progress of and national prospects for expanded land consolidation and registration (Kenya Colony and Protectorate 1966). The Commission, also known as the Lawrance Mission, collected testimony primarily from local African political leaders, many of whom it can be safely assumed were interested parties in the bolstering of support for land reform in the former reserves (Kitching 1980; Mackenzie 1998). The Commission took issue with the notion that demand among African farmers throughout Kenya was sufficiently strong "that the Government has no option but attempt to complete the whole programme within ten years" (Kenya Colony and Protectorate 1966, 23). To the contrary, despite "continuous and dedicated urging and propaganda by officials and leaders of public opinion", the Commission found the interest in land reform "far from enthusiastic" and largely based on fear of expropriation by an emerging landed class of Africans (Kenya Colony and Protectorate 1966, 24). However, Leys (1975) explains:

> The truth of the matter was...that the Lawrance Mission's job was not to assess the objective effects of land registration, but to recommend 'a realistic acceleration of the programme', as they themselves put it. From their own account of the background to the appointment of the mission, the following facts emerge. The Kenya government was seeking aid for a broad programme of agricultural development. As far as the ex-reserves (now called 'Kenya's peasant farming areas') were concerned, this involved, first, an accelerated programme of land registration, and then the provision of credit and extension services. The British government undertook to finance the former, provided the Kenya government could obtain funds (i.e. from other sources) for agricultural credit. The 'other sources', on the other hand, had made it clear that they would only finance credit for farmers who had freehold tenure. The job of the mission was to

[24] At Independence, this core area of central Kenya consisted of the coffee and tea growing region between Nairobi and Mount Kenya (Kiambu, Fort Hall, Nyeri, and Kirinyaga in Central Province) as well as the east side of Mount Kenya (highland Meru and Embu in Eastern Province). In addition, limited areas in Western Province had also undergone land reform, including limited areas of Kakamega, Bungoma, Baringo, Uasin Gishi, Elgeyo Marakwet, and Kisii Districts.

> draw up and cost a programme for registering titles to land (at the speed called for by the proposed schemes for agricultural credit) for smallholders and for pastoralists, involving a total of just under £20 million over five years. So the question then becomes one of just why the Kenya government and the aid donors were so determined to tie provision of agricultural credit to individual ownership of land (70-71).

The answer was perhaps deceptively simple. Despite the political untenability of creditors repossessing the land of African smallholders in the event of default, maintaining the fear of land expropriation was sufficient to provide some assurances to donors such as United States Agency for International Development (USAID) and the World Bank, and to further "break down pre-capitalist attitudes and social institutions and replace them with the ideas and incentives of the market" (Leys 1975, 72).

In maintaining the Swynnerton formula of land reform, it was hoped that the combination of the redistribution of settler farms and the employment created through small scale-peasant commodity production on state adjudicated parcels, particularly of high value crops such as tea and coffee, would help to ease the problem of a landless population whose ranks would likely swell following the reform. The problem of surplus labor was exacerbated both by the release of thousands of Kenyans who had been detained by the colonial government during the Mau Mau rebellion as well as those who lost access to ancestral lands during the initial phases of land registration. Thus, just as the initial granting of commercial and titled land rights to Africans near the end of the colonial period was driven by fears of the destabilizing force of a substantial landless population in Central Province, post-colonial land policy was also viewed as a strategy to manage surplus labor.

Colonial state and capital had worked in tandem to expropriate indigenous landholdings for settler production while restricting commercial activities of rural Africans in order to mobilize wage labor for settler production. Post-colonial Kenya was characterized by an expansion of a peasant production systems into former settler zones and new settlement schemes which were to provide access to markets and state infrastructure for small-scale commodity production (Njonjo 1981). *Peasantization* entailed a geographical expansion of small-scale commodity production in agriculture using primarily family labor, a process which was facilitated by the clientelist politics of post-colonial administration whereby political support for local political leaders was exchanged for access to additional land resulting in the expansion of peasant production zones within Kenya (Kitching 1985; Leys 1975).

Land Rights and the Peasantization of the Meru Gradient

The eastern Mount Kenya region provides a salient example of the geographical expansion of peasant production systems from core areas of coffee and tea production, which benefited from the early expansion of commercial rights by colonial authorities, to transitional and semi-arid zones that were on the margins of the cash crop economy (Bernard et al. 1989). In addition to relieving pressure from crowded highlands, settlement schemes were a means of steering Meru agriculture toward national priorities, particularly expanded cotton production. Cotton was grown in the planned settlement schemes created in Tunyai and Nkondi on the edge of the semi-arid zones and on the margin of the areas used extensively by Tharaka agro-pastoralists.

As discussed in greater detail in Chapter Three, the Meru settlement schemes were designed to contribute to easing the stress of surplus labor brought about by land consolidation in the highland zones while also benefiting from extensive state support in terms of input and marketing, both of which were required to sustain cotton production. These settlements represented a downslope movement of a suite of processes of intensification and commercialization of agricultural production that had previously been confined to the areas immediately surrounding Meru Town.

State support for cotton production in the Meru settlements declined drastically between 1985 and 1990 and by the mid-1990's cotton production by smallholders had all but disappeared from this transitional zone (Muriungi 2001). What remained of the peasantization process was individualized tenure absent state resources to support smallholder commercial production. As such, farmers in this transitional zone had reverted to food crop production by the mid 1990's (Gikingo Elders Group Meeting 2001; Turima Elders Group Meeting 2001).

While cotton production receded rapidly as government ministry budgets declined, land tenure reform continued its down slope diffusion, expanding from the transitional zone that separated the commercial highlands and the semi-arid agro-pastoral lowlands. New emphasis on arid and semi-arid lands development policy spurred research beginning in the late 1970's, and an interest in tenurial solutions to the problems of severe poverty within Kenya's ASAL areas were considered (Campbell and Migot-Adholla 1981).

While there was a clear need for such a geographical refocusing of development efforts, the broader context of declining state resources in the context of structural

adjustment and later the suspension of multilateral aid to the Kenya government overshadowed the ostensibly good intentions of policy. Despite fiscal problems, tenure reform maintained its popularity with the government, perhaps due to its association with Kenya's commitment to market reforms, a point that pleased international donors (Deininger and Binswanger 1999). Likewise, the projection of government administrative power to politically marginal semi-arid areas, where the ruling Kenya Africa National Union (KANU) garnered much of its support, was perhaps another impetus that fostered the provision of resources to the Ministry of Lands and Settlement to carry out further reforms in districts similar to Tharaka in the early 1990's.

Thus, even without the state support envisioned by Swynnerton to ensure the success of freehold tenure, state-sponsored adjudication expanded to implement individualization among Tharaka agro-pastoralists within a more complex set of political, cultural, economic, and environmental conditions than had existed in the highland zones and settlement schemes in which the policy was first implemented.[25]

Privatizing the Commons: The Land Adjudication Process in Tharaka

The context of Tharaka's land adjudication program discussed above is partly responsible for incompleteness of the adjudication process in Tharaka. The Ministry of Lands and Settlement began carrying out the adjudication in Tharaka in 1987. However, the process was nearly stalled by the mid-1990's after having completed the adjudication

[25] While there is no administrative record of how the decision was made in favor individual adjudication in Tharaka, it is likely related to the recognition of the broader context of constricted Tharaka herding strategies in the context of the establishment of settlement schemes in the middle zone and the increasing evidence that Tharaka livelihoods were becoming more reliant on crop production. Nonetheless, a farming systems study carried out in advance of the reform recommended group ranching as a means of maintaining Tharaka livestock (Abella et al. 1983).

exercise within only 10 of the 21 locations within the district. The lack of progress was due to two primary factors. First was the sheer lack of financial resources available to the Ministry of Lands and Settlement (Muriungi 2001). In addition to lacking ministerial resources, a border dispute between Tharaka and Imenti communities over a proposed new district boundary served to preempt the beginning of the adjudication exercise in Turima Location. Once Tharaka's designation as a new district was widely expected, local contestation of the district border intensified, resulting in several instances of violent conflict (Karimi 2001).[26] At that time, the adjudication exercise was largely halted within the district. By January 2000, Tharaka had established its own district headquarters and ministry offices. Adjudication activities had restarted by September 2000, though not in the locations that border the newly created highland districts of Meru North and Meru Central.

As explained in Chapter 1, land adjudication entails a series of legal processes intended to bring about the individualization of land rights and the elimination of customary tenure institutions. In Tharaka, the process begins with the demarcation of clan boundaries and ends with the adjudication of rights over individual parcels.[27] Although land adjudication represents the replacement of local, "customary" tenure institutions with those of the state, the process itself involves an interaction of customary

[26] The conflicts themselves were related to the adjudication process. According to Tharaka who live in this area, the registration of land by the Meru Central district authorities resulted in long-term Tharaka residents in communities dominated by Imenti losing all rights to land. Despite their participating in the adjudication exercise, no Tharaka was assigned registered land within predominately Imenti communities. Once the boundary had been proposed, Imentis who found themselves on the Tharaka side of the boundary, sometimes in majority Tharaka communities, protested out of fear of also losing land to which they sought to stake a claim. As such, they continue to appeal to authorities in Meru to have their land included on the Meru Central (i.e., Imenti) side of the border. As of February 2002, the matter was still unresolved. The most recent survey team to visit the area was reportedly held hostage by a local vigilante group until the District Commissioner of Meru Central had been dispatched to a local market to address their concerns.

[27] The consolidation of multiple household parcels into a single parcel, as called for in the Land Consolidation Act, was undertaken in many areas of Kenya. However, the Act was not applied to Tharaka, a factor affecting the initially rapid pace of the adjudication in the district.

and statutory legal frameworks in determining the new distribution of land rights. The Land Adjudication Act of 1968 allows for the appointment of a local land committee[28] by the district Lands Officer for each adjudication section in order to determine "rights and interests in Trust land" (Cap. 284). During the process of recording claims to land, the demarcation or recording officer relies on the land committee to resolve overlapping claims to land "in accordance with recognized customary law" (Cap 284, 20(a)). Therefore, local interpretations of custom and local notions of legitimacy as regards land rights enter into the process of introducing permanent boundaries into a tenure system in which land-use rights were fluid, often based on negotiation, and sometimes involved overlapping use rights on a single piece of land.

The adjudication process begins when the County Council requests the designation of an administrative unit consisting of Trust Land as an adjudication area. The preliminary process of boundary demarcation varies somewhat between districts. In the Tharaka case, officials from the district Land Adjudication Office met first with clan leaders throughout the district to encourage them to undertake an initial land demarcation exercise in a manner that adheres to customary law. Inter-clan boundaries were first to be demarcated through extensive negotiations among neighboring clans. In some instances, such negotiations lead to small clans being absorbed by larger ones (Chiakariga Elders Group Meeting 2001; Marimanti Elders Group Meeting 2001). Once clan boundaries were agreed upon, the more difficult task of establishing individual parcels was

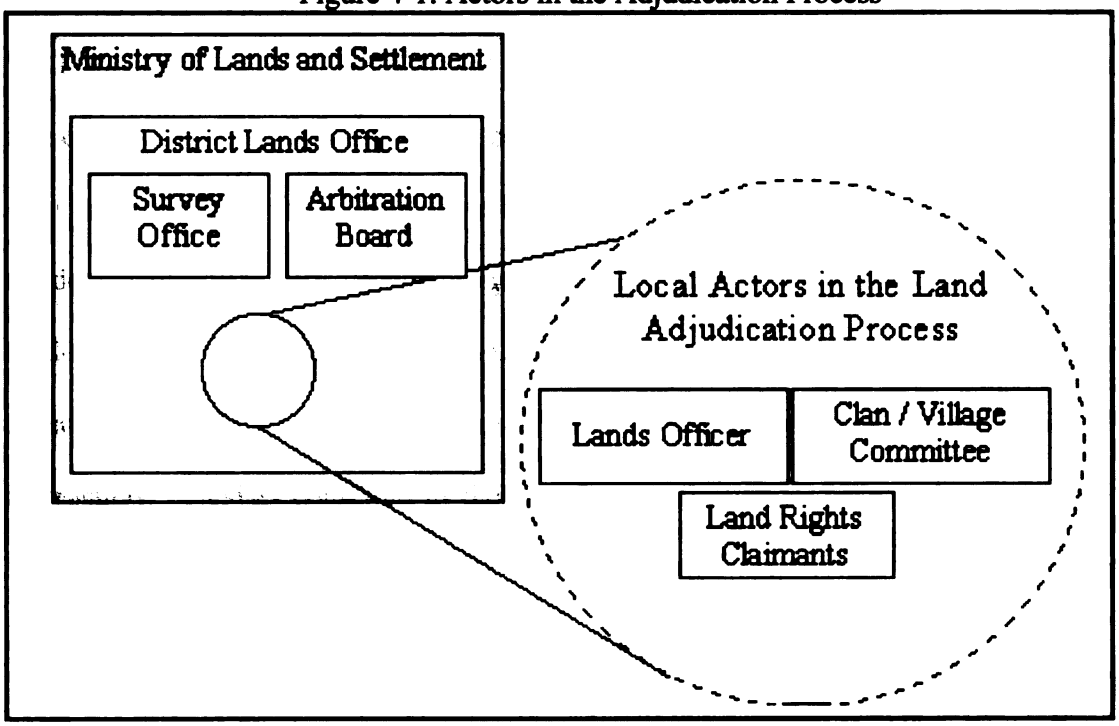
[28] Where they continue to be influential in community land issues, the *de facto* appointment of the committee is often carried out by male clan elders. The committee itself usually consists of a group of senior clan elders who are considered to be gifted orators and knowledgeable of inter- and intra-clan land issues. As Riley and Brokensha (1988) explain: "the adjudication changed both the structure and function of the Mbeere clans, which had never before had such powers, and which will never again exercise any remotely similar degree of authority". This statement holds true in the Tharaka case.

undertaken by the land committees.[29] Such committees are ostensibly elected by local landowners with the locational chief serving as the chairperson. In most cases, existing village and clan land committees were already in place to assist with the demarcation as a means of limiting objections once the district government enters the process.

The subsequent procedures in the adjudication process are standard throughout Kenya. When the local committee is unable to resolve a conflict between two or more land claimants, the case is forwarded to the district Arbitration Board, a committee consisting of district officials and appointed local residents. Once the Arbitration Board has ruled on all cases, a land registry is made available to the public for at least sixty days during which additional objections may be raised. After sixty days, the District Lands Officer conducts hearings in which local testimony is relied upon heavily in order to determine "rights and interests" among disputing parties. The decision by the Lands Officer can only be appealed through the Ministry of Lands and Settlement in Nairobi. Although differences exist between districts in the procedures for involving local institutions in boundary demarcation, the general parameters of the land reform process require that negotiation between local people and village or clan land committees maintains an important role in determining the distribution of landholdings (figure 4-1).

[29] As in other semi-arid areas, such as Makueni, Baringo, and Machakos, the Tharaka land adjudication program did not involve the application of the Land Consolidation Act (Cap. 283). As such, Tharaka has been spared the contentious process of creating single contiguous holdings with agricultural potential equivalent to a group of scattered plots for each household. Consolidation has been seen as a primary source of conflicts and complaints during the adjudication exercise in other districts, and is the primary reason that national adjudication program has lagged far behind its original timetable for completion.

Figure 4-1. Actors in the Adjudication Process



The Context of the Adjudication Process in Tharaka

While the Tharaka commonly refer to the adjudication as a directive imposed on them by district administrators, a number of factors converged to create conditions that were more favorable for individualization of land tenure and the establishment of freehold tenure. The growth of the human population was one factor that encouraged greater sedentarization in Tharaka, where mobility and flexibility of grazing rights had been important aspect of the land-use system. The district population increased by 100% between 1979 and 1999, largely through natural increase (Table 3-1). However, it is important to note that this growth occurred in conjunction with a redistribution of the population to the higher elevation areas of the district, particularly the midland locations of Turima, Gikingo, Nkondi, and Nkarini (AEZ LM4). Such areas constitute a middle

zone between Tharaka and the high potential upland areas of Imenti and Nyambene. Migrants from the lowland areas, particularly Chiakariga and Marimanti, Kamanyaki, and Kamarandi, settled in small groups of households. In the areas of new settlement, the role of the clan was reduced as people settled in clusters irrespective of clan.

As discussed above, by the late 1970's, shifting cultivation became constrained by the density of settlement. Despite bringing additional land under cultivation, the Tharaka land-use system was more sedentary and more reliant on crop cultivation than it had been twenty years earlier. Furthermore, the settlers in the upland areas were, on the whole, increasingly boundary conscious by the time the adjudication took place. Increasingly, secondary rights of grazing or cutting trees on land used by someone else could provoke a case before the local chief. In the LM5 and IL5 agro-ecological zones, the importance of the herding economy was more resilient. Even as households began to invest more labor in crop cultivation, livestock keeping remained central to the household economy. As such, issues related to grazing rights in the context of a growing human population began to emerge.

Group discussions with Tharaka elders in each location revealed that most communities did not experience an increase in land-use conflicts during the period preceding adjudication, which calls into question the strength of the internal demand for tenure change. Furthermore, when overlapping land claims led to more than one household claiming cultivation rights to a given area of land, clan elders or the local land committee most often settled the matter satisfactorily. While it would not be surprising to find that conflicts within a system of flexible and negotiated land-use rights increase under the pressures of population growth and land degradation, local institutions in

Tharaka were not overburdened in resolving local conflicts related to contested claims to land for cultivation and grazing (Marimanti Farmers Group Meeting 2001, Marimanti Elders Group Meeting 2001).

An important factor that encouraged local-level support for demarcation and adjudication within Tharaka communities was the perceived need to protect land from expropriation by outside elites or the government. Several factors contributed to this perception. A research station established by the Kenyan government in Marimanti Location during the 1980's resulted in large-scale displacement, without compensation, of several hundred households. Furthermore, stories of bogus land sales and various forms of "land grabbing" from other parts of Kenya, particularly Kajiado District, circulate widely in Tharaka, creating the fear that outsiders might also attempt to claim Tharaka land. As a result, many reluctantly accepted the idea that the official registration of land was the only means of protecting Tharaka land from expropriation by outsiders and elites (Marimanti Elders Group Meeting 2001).

Determining Rights and Interest in Land

The process of determining "rights and interest in land" has encountered numerous dilemmas in various land-use contexts within Tharaka. One commonality was the primary criteria used to consider a person's right to a given piece of land. The overarching criteria were a history of use and an investment of labor in improving the land. This proved a difficult task given the mobility of households, and the considerable areas of land that were used as pasture but were without permanent structures. In such cases, even very small makeshift structures designed for herders far from the homestead

were used as viable indicators of sustained use of land. A second set of criteria related to the consumption needs and labor supply of households, suggesting that a moral economy of resource distribution played an important role in determining the local-level process of land allocation during boundary demarcation. Third, consideration of one's claim to land was predicated on providing an offering to the clan elders who were serving on the local land committee. As a farmer from Gikingo Location explained, inequality in land allocation could be justified on several grounds:

> Adjudication was not brought to give everyone the same amount of land. Some people got very little, while others got large pieces of land. Some received a parcel of stones, others were given good soils. But people consoled themselves because they knew that if they had not failed to give out a goat to those elders [in charge of demarcating boundaries], then the land allotted them was given to them according to how much they could be expected to use (excerpt from Gikingo Group Meeting July 15, 2001).

Payment of tribute to the land committee was crucial, as was a household's good standing with clan elders more generally. In many cases, significant disputes from the past led to land claims being either ignored or simply given less consideration by the land committee.[30] Unlike areas such as Mbeere and highland Meru, Tharaka were only indirectly affected by colonial land expropriations and the creation of African reserves. Thus, political questions surrounding land tenure that were central to anti-colonial resistance took a different and more moderate form in Tharaka. As a result, contemporary land politics tend to be highly localized and less directly related to questions of collaboration with or opposition to colonial land administration.

[30] In certain cases, adjudication officer were required to accompany the litigating parties to the disputed piece of land in order to gather the testimony of local elders. Such cases rely on the interpretation of events by an adjudication officer who, in some cases, does not speak the local dialect of Kitharaka and may not be familiar with highly localized custom related to the social obligations entailed in a land sale.

The central means of asserting "rights and interest in land" was through the demonstration of sustained use as indicated by either built structure or other transformation of the landscape. However, the interpretation of physical structures on the landscape was only possible through corroboration by one's neighbors and, in particular, local elders who could attest to such sustained use. Such corroboration is essential in the Tharaka context, where few had invested in permanent structures outside the cluster of houses and granaries comprising the immediate homestead.

This was particularly true in the case of scrubland areas that were used as pasture for cattle and goat herding. In many such places, makeshift herding shelters were the only physical evidence offered as proof of use. Such physical indicators, however, solved neither the problems related to the overlapping nature of use rights to a given parcel, nor the problematic nature of establishing absolute boundaries. Both the demarcation of boundaries and the application of the Land Adjudication Act transformed negotiated, overlapping use rights by endowing individuals with rights of use, transfer, and administration. However, this transformation was often a contentious process.[31]

Although secondary use rights on neighboring parcels have clearly declined, the adjudication further accelerated a historical progression toward the individualization of land rights. This progression toward exclusionary land rights has had an effect on the space economy and the way in which the Tharaka manage their environment. In the simplest terms, it has created pressure to do more with less by restricting use rights to resources not immediately within the boundaries of an adjudicated parcel, leading to constraints on the ability to keep livestock. Secondly, individualization has localized the

[31] The contentious nature of the process was variable within Tharaka. Within some communities, tensions regarding land demarcation and adjudication were apparent and had caused considerable rifts among extended families.

effects of environmental management such that the consequences of changing soil quality may have very immediate effects on household productivity and livelihood. In this sense, the adjudication process led to a more permanent state of inequality in resource endowments and sets households on trajectories of different livelihood strategies relative to such endowments.

Disputes and Arbitration

Disagreements during the process of demarcation and adjudication in Tharaka were common, as they have been in many Kenyan districts. Inter-clan boundaries were marked with little difficulty as, in many cases, boundaries had been established decades earlier. In some cases, smaller clans were absorbed into larger clans. In at least one case, a small clan was asked to vacate an area claimed by a larger clan, apparently because the smaller clan would not agree to merge with the larger clan (Chiakariga Elders Meeting 2001).

Disputes between individual households were also common. Such disputes reflected several characteristics of the changing land-use system. As mentioned earlier, pre-adjudication transfers of land were possible, though not common. Land transfers were redeemable such that the seller had the right to annul the sale by repaying all or some amount of the sale price, most often a number of goats. Although land transactions invariably involved several local witnesses, the state of land sales was often the subject of disagreement. Sellers or their male children who attempted to redeem a land sale transacted as long as one generation ago often encountered resistance from the buyer or his heirs. Such disagreements occurred even in cases in which the appropriate witnesses

were assembled to testify to the original terms of the transfer. In such cases, the extent to which the buyer had made investments and the extent to which his household had come to rely on such land was the crux of the justification for the buyer retaining the land. In this sense, an evolving moral economy of land distribution which recognizes the growing scarcity of land and its integral link to household livelihoods guided the decisions made by clan and village land committees in the local process of boundary demarcation and the resolution of conflicts.

An additional important source of conflict in Tharaka boundary demarcation and land adjudication exercises arose in cases where multiple use rights were asserted to the same piece of land. As observed in other cases, exclusive and overlapping land-use rights may coexist in areas in which exclusionary rights are recognized over intensively used land resources while multiple households or groups of households maintain overlapping rights to land of lower agricultural potential. As agriculture became more sedentary, Tharaka exemplified the notion of spatially uneven land rights in that land immediately adjacent to households were initially demarcated while grazing areas with poor or rocky soils remained subject to overlapping uses from multiple households or groups of households.

As population increased during the 1960's and 1970's, fallow periods declined as did the areas to which individuals held individual use rights granted by senior elders from the same household or group of households. The reduction in fallow periods accelerated the atrophy of usufruct rights between fallow periods on land that was not extensively used. As a result, the edges of intensively used core areas for household clusters expanded outward, spurring negotiation, compromise, and occasional conflict in the

process of establishing permanent use rights for one household or group over another. However, this recognition of a more permanent set of rights on the part of one household did not necessarily negate the resilient notion of overlapping use rights over areas reserved for grazing. [32]

Therefore, both the process of boundary demarcation and the official process of adjudication contended with a complex set of overlapping and negotiated rights that were often not spatially delimited. As mentioned above, this led to conflicts in the process of establishing a history of sustained use through investments in land improvements or other physical transformations of the landscape, thus demonstrating "rights and interest in land" as specified by the Land Adjudication Act. Overlapping use rights were most often translated into cases for competing interests, thus creating a difficult procedure of sorting out land rights and delimiting them spatially. The process was made all of the more difficult by the variation in local soil quality and the prevalence of stony patches of land that have very limited production potential.[33]

The participation of the clan or village land committee in the initial demarcation of household boundaries served to limit the number of cases contested during the official adjudication process. Among the 191 parcels which were not adjudicated but for which boundaries have been demarcated, 43 (23%) parcel boundaries were the subject of disagreement. Of these, twenty-nine were reported to be fully resolved: 12 by village land committees, 10 through negotiations between the disputing parties, 4 by the clan, and just 2 by the chief. Of 210 adjudicated parcels, conflict between prospective

[32] Such overlapping rights, however, appear to have undergone greater decline since the official process of land adjudication.

[33] Access to water for livestock was not identified as a source of conflict. The adjudication process in Tharaka called for setting aside all land within 50 meters of rivers and streams as County Council (public) land with public access ways leading to the water sources from major roads and paths.

claimants occurred over 53 (25%) parcels. Among the 43 land disagreements that were resolved as of May 2001, village land committees resolved 15, 10 were resolved through negotiations between the disputing parties, 6 were resolved by the district arbitration board, and 4 were resolved by the clan. In areas that have undergone the adjudication exercise, the arbitration board was responsible for resolving a small fraction of the disputes. In both samples, local institutions succeeded in resolving nearly 70% of the conflicts without the intervention of the arbitration board or the Ministry of Lands and Settlement. Thus despite lingering questions about the fairness of the means of assigning exclusive rights, the local process of reform did succeed in preempting most long-term conflicts and litigation among households.

Changing Perceptions of Land Rights

Following the initial phase of land adjudication, rights of use and transfer of lands differed qualitatively rather than quantitatively between customary and adjudicated tenure systems. Perhaps most important among these are rights of transfer. As in the adjudicated areas, nearly all respondents in areas under customary tenure claimed the right to sell, lease, rent, and bequeath land to which they have been granted use rights by the clan or over which clan or village land committees recognize their use rights based on a history of settlement. Yet, the difference between the rights guaranteed to titleholders under adjudicated tenure and those widely recognized by landholding males in areas of customary tenure is found in the requirement of consultation with elders before exercising such rights. Therefore, a major difference between adjudicated and customary tenure is the possibility of obstruction by elders who could reject either sale or rental,

primarily as a result of appeals from other family members, particularly wives or sons, to restrict such transfers.[34] In Chiakariga, where clan elders remain active in the resolution of land issues, sales must pass through a relatively lengthy process of approval and, once approved, a negotiated portion of the proceeds from the land sale is distributed among senior elders. In Turima, village land committees maintain a crucial role in conflicts within and between households related to land tenure.

Within adjudicated areas, the introduction of statutory tenure and the consolidation of land rights in the hands of primarily male household heads has had the effect of reinforcing the decision-making power of senior males regarding the use and transfer of their own land. The ability to rely on the "security" of statutory tenure rules, in some cases as a means of avoiding imposition or interference from local elders, has to some degree removed the contestation over land sales and others forms of transfer from the broader community setting. Within adjudicated areas, challenges to the land use or transfer decision-making of male title holders have become localized within individual households.

While appeal to elders remains an option, it is a diminished one. As the role of clan elders and village elders continues to diminish with their gradual displacement from decision making on land tenure issues, their ability to enforce norms as related to the customary land rights of elders, wives, and children, is greatly reduced. Thus, while protection from expropriation by clan or village committees is gained through the

[34] It was remarked during the course of the household survey in areas of statutory tenure that wives sometimes became mildly alarmed on hearing discussion of the right to sell land, a factor which research assistants attributed to the greater possibility of land sale without community oversight where the role of community elders has declined.

adjudication, the customary means of recourse by those whose interests may be jeopardized by the title bearer is reduced.

Of further importance is the power of clan elders and village committees to reallocate land or specific land rights (e.g., grazing rights) according to changing circumstances within the community. Drought, settlement of displaced people, or other circumstances can lead to the reallocation of land that had been allocated previously to an individual or household. Such instances are relatively rare, particularly among people in good standing with elders and the community at large. Nonetheless, the power of committees and clans to reallocate land to which one has had use rights in the past remains a dimension of tenure insecurity under customary tenure.

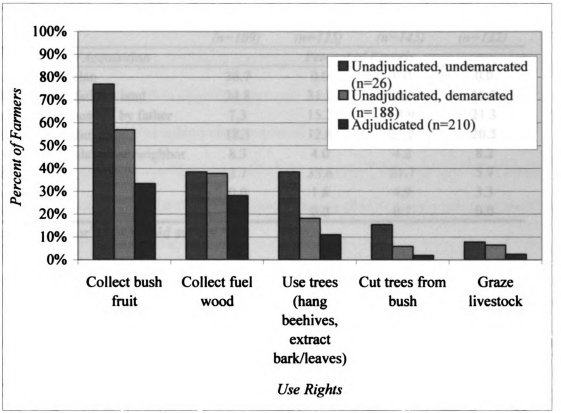
As discussed above, the demarcation of parcel boundaries did not immediately negate secondary use rights on newly demarcated parcels. To the contrary, such secondary use rights were resilient in the short-term.[35] The decline of secondary access to parcels has been gradual. As shown in figure 4-2, the decline of secondary rights has accelerated in areas that have undergone adjudication. Within unadjudicated areas, both clan and lineage affinity as well as the existence of imprecise boundaries may lead to continued secondary resource rights on the margins and edges of cultivated land. For example, elders in Chiakariga continue to use public *barazas* to call on those with sufficient land to relax their right of exclusion of less fortunate neighbors from grazing resources, particularly during drought. The resilience of such a subsistence ethic in the aftermath of tenure reform has been noted in similar cases (Grigsby 2002).

[35] Because the notion of land rights is multidimensional, respondents were given an explanation of rights that related to the notion of rights under law (*raiti*), as well as the notion of freedom to take a given action (*uhuru*), and the notion of legitimacy or justification in taking a given action (*haki*). Group discussions and household survey interviews explored all three dimensions of rights. In this case, the rights in question pertain to a non-household member accessing resources of the household's parcel.

Keeping in mind the contingent nature of rights, figure 4-2 indicates differential perceptions of secondary use rights for parcels of different tenure status. While the exercise of rights of exclusion from the central activities of cultivation and herding are perceived to be increasingly appropriate, wild fruit, plants, and fuel wood are seen as common pool resources by a significant proportion of the population. The perception of such secondary rights is greater for households whose parcels are not adjudicated, suggesting that notions of exclusionary rights evolve from the time of parcel demarcation but are further transformed by the adjudication process itself.[36] Of the resource rights indicated, secondary rights are perceived as less for those important to Tharaka livelihoods. Most important, the grazing of livestock by others on one's own parcel is not recognized as a legitimate practice. This suggests that the elements of the previous tenure system which were important to the flexibility and negotiability of use rights have been fundamentally transformed.

[36] The differences in perceived secondary resource rights between adjudicated and unadjudicated, demarcated parcels is significant at $\alpha = 0.05$ ($Z_{calc} = 14.22$ (collect fruit growing wild), 2.13 (collect fuel wood), 1.98 (use trees), 2.02 (cut trees growing wild), 2.02 (graze livestock); $Z_{crit} = 1.96$.

Figure 4-2. Perceived Secondary Use Rights



Source: Author's household survey, 2001

Modes of Land Access

As indicated in table 4-1, Chiakariga is the only sampled location in which clans continue to exercise the right of allocating land to households.[37] This practice is now confined to areas of low population density. In the other locations, senior males in the immediate household have exercised the right of allocation to adult heirs for at least a generation. In Marimanti, also an area of long-term Tharaka settlement, inheritance of the father's land is the most common mode of land acquisition.

[37] The allocation of land by clan elders remains in practice in the drier zones of Kathangacini, Maragua, Kamarandi, and Kamanyaki.

Table 4-1. Mode of Parcel Acquisition by Location

	Chiakariga (n=109)	*Gikingo (n=125)*	*Turima (n=143)*	*Marimanti (n=122)*
Mode of Acquisition		*Percent of Parcels*		
Allocation by clan	36.7	0.0	0.0	0.0
Inheritance of father's land	24.8	31.2	28.0	39.3
Temporary allocation by father	7.3	15.2	18.9	21.3
Unassisted settlement	18.3	12.8	21.0	20.5
Borrow from relative or neighbor	8.3	4.0	4.2	8.2
Purchase	3.7	33.6	21.7	5.7
Rental	0.0	1.6	4.9	3.3
Gift	0.0	0.0	0.7	0.0

Source: Author's household survey

Throughout Tharaka, current practice holds that the final act of dividing the father's land should not be undertaken until each son is old enough to recognize the value of land and make his case to receive a fair share. As a result, temporary allocation of the father's land to married adult sons is common. Older sons are temporarily allocated land until all sons are able to understand the importance of land and represent their own interests in the permanent division of the father's land. During this period, a married son may make improvements to the land that help to ensure it will be allocated to him, although there is no guarantee he will retain the same parcel. In some cases, the transfer of land from father to son remains temporary until the son's own children are of marriage age. As a result of this ongoing evolution of inheritance procedures, the intergenerational politics of land divisions have intensified and become more complex as the need for tenure security increases.

Although its importance is declining, unassisted settlement has been an important mode of land acquisition throughout Tharaka.[38] Such settlement has occurred in two contexts. First, local households may demarcate parcels on unclaimed land over which they hold overlapping rights but which has not been specifically allocated by the clan. As discussed above, the assertion of such claims may be contested immediately or during the process of demarcation and again in the process of adjudication. In the Tharaka case, such land appropriations can be seen as part of the process of the geographical expansion of intensively used core areas through the incorporation of increasingly marginal areas into the sphere of exclusive rights.

The second form of unassisted settlement has resulted from the large-scale movement over two decades from lowland areas such as Chiakariga to the midland areas of Turima and Gikingo. Initially, given that such land was largely uninhabited, groups with sufficient labor were able to claim large tracts of land. As migration and settlement did not occur along clan lines, clan authority did not play the same role in territorial organization and land allocation in the midland zone as in the lowland zone. As Turima and Gikingo became more densely populated and land more scarce in the 1980's, a land market developed such that households with large landholdings could exchange smaller portions of their land for lowland livestock.[39]

Recent land sales in Tharaka's upper zone can be seen as resulting from consecutive waves of resettlement from lowland to midland zones.[40] With the exception

[38] I use the term unassisted settlement to distinguish unplanned settlement of largely unsettled areas from planned government settlement.

[39] In the face of an influx of migrants, it is quite possible that such landholders would have had difficulty maintaining claims to large unused tracts of land.

[40] The average landholding for Turima households that have sold land is 4.94 acres, considerably less than the overall average of 7.59. However, Gikingo households that have sold land average 7.43 acres as compared to the location's average landholding of 6.44.

of the higher potential areas of Tunyai and Nkondi in the Tharaka's western extreme, the movement into and purchase of parcels in the midland zone (agro-ecological zone LM4) has been uniquely the domain of Tharaka from the low elevation areas. Relatively low rainfall, the prevalence of malaria and water-borne diseases, and Tharaka resistance to settlement by outsiders are cited by Imenti communities as factors that limited the downslope expansion of settlement from highland Meru into the wetter margin of Tharaka, particularly in the absence of government investment.

An additional sub-category of 'unassisted settlement' encompasses those who are squatting on public or abandoned land.[41] Most squatters in Tharaka are victims of any of a series of land-related conflicts in areas bordering Imenti, Tigania, and Meru National Park. In 1998, approximately 5,000 Tharaka fled attacks by administrative police in Ntoroni Location of Tharaka North in an ongoing dispute regarding the extent of Tharaka territory and the rights of Kamba, Tigania, and Tharaka to settle in the area (Karimi 2001). Conflicts on a smaller scale in areas of Turima Location that border Meru Central District have also created squatter settlements on demarcated but otherwise unutilized lands. The resettlement of squatters, who rely almost entirely on assistance from local communities for meeting subsistence needs, remains a divisive issue in Marimanti, Turima, and Gikingo Locations.

Changes in the Distribution of Landholdings

It is difficult to determine whether greater inequality in landholdings has resulted from state-sponsored adjudication. However, it is certain that adjudication has reduced flexibility of allocation and reallocation exercised by customary institutions. Current

[41] This category was not differentiated from other forms of settlement during the data collection.

inequality in landholding can be seen as reflecting patterns of inequality in pre-adjudication landholdings within and between clans, inequality in the allocation of grazing areas during the adjudication process, and redistributions of land brought about through the increase in land sales.

In addition to exclusive use rights, greater concentration of land among the wealthy in Kenya's rural areas was seen by the architects of Kenya's land reform as a necessary step to improve productivity through the allocation of land to the most progressive and innovative farmers. However, it is difficult to compare the distribution of landholdings within Tharaka society before and after land reform due to the changes that have taken place in the means of land allocation and the institutions that regulate land access.

One major change relates to the redistributive role of customary tenure institutions in societies such as Tharaka. Before adjudication, clans and village land committees regularly granted land to landless or land poor residents and outsiders during stress periods. Customary use rights, however, were not permanent and land could be reallocated or temporarily subdivided again in the future. For example, a woman separated from a spouse or an unmarried adult daughter may maintain land rights as part of her father's lineage and may be granted land by clan elders or a village land committee. However, she may lose the rights to such land upon marriage. Likewise, clan elders and village land committees held power to grant land access to alleviate general or household-specific stresses or hardships. The existence of such customary rights and flexibility in the granting of use rights translated into a profile of *de facto* land

access that oscillated through time and provided greater assurance for the land poor and others who might have otherwise faced social exclusion.

In all locations, households with access to between one and ten acres of land constitute more than 70% of households (table 4-2). At the opposite end of the spectrum, fewer than 10% of all households have access to more than twenty acres of land. Gini coefficients[42] of both owned land and total land to which households have access (i.e., including borrowed and rented land) indicate moderate levels of inequality throughout the district. A trend is neither apparent between adjudicated and unadjudicated locations nor between agro-ecological zones LM4 and IL5/LM5.[43]

Table 4-2. Access to Land Per Household†

	Turima (n=92)	*Marimanti (n=93)*	*Gikingo (n=97)*	*Chiakariga (n=97)*
Acres of land	*Percent of Households*			
0	1	1	4	2
1-5	54	47	60	59
6-10	25	23	20	24
11-15	8	6	8	4
16-20	4	11	3	5
21-25	3	6	2	0
> 26	4	7	3	4

† Includes rented and borrowed land
Source: Author's household survey, 2001

[42] The Gini coefficient is a measure of inequality within a population. The coefficient ranges from 0.0 (perfect equality) to 1.0 (greatest inequality).
[43] Hunt's (1996) study of neighboring Mbeere twenty years after land reform indicates similar levels of inequality in landholdings. Household samples from agro-ecological zones LM4 and LM5 in Mbeere had Gini coefficients of 0.49 and 0.62, respectively.

One factor affecting landholding inequality is the existence of a land market. As noted in table 4-1, 34% of parcels in Gikingo and 22% of households in Turima were acquired through purchase. The high rates of land sales in Gikingo and Turima relates primarily to those areas within agro-ecological zone LM4 that were initially claimed by settlers from zones LM5 and IL5. In this case, the impact of a continuing stream of migration from the lowland zone may have had a moderating effect on the inequalities that existed on a larger scale in locations such as Turima and Gikingo. Group discussions in both areas indicate that initial farm sizes among early settlers of Turima and Gikingo were greater than 20 acres, but that land sales served to diminish inequality between early and more recent groups of settlers (Turima Elders Group Meeting 2001; Gikingo Elders Group Meeting 2001). As such, rather than creating greater concentration of landholdings among households, land sales in areas of recent settlement may have had a moderating effect on emerging inequalities. Land sales may have been at least partially responsible for recreating a distribution of landholdings similar to levels of inequality in Tharaka's lower zone. Of further importance is the fact that land sales in zone LM4 preceded land reform.

A land rental market can also affect *de facto* distribution of land to which households have access. In some cases, land rentals provide a means for wealthy households with sufficient labor, money, or livestock to expand household production. In other cases, land rental may be the last refuge of landless farmers. In the Tharaka case, it appears that land rental may play a dual role. Small group discussions confirmed the importance of land rentals among wealthy households in gaining access to additional land for maintaining livestock herds and increasing crop production (Gikingo Farmers Group

Meeting 2001; Marimanti Farmers Group Meeting 2001; Turima Farmers Group Meeting 2001). At the same time, land poor farmers may increasingly be obligated to turn to land rentals as they may no longer be able to appeal to local councils for access to additional land. The difference between the Gini coefficient for owned land and total land access are small, but indicate that inequality decreases when renting and borrowing is taken into account in measuring land access (table 4-3). This suggests that it is the land poor who gain the most through borrowing and renting land.

Table 4-3. Gini Coefficients of Total Land Access

	Tharaka	Turima	Marimanti	Gikingo	Chiakariga
Land Owned	0.52	0.49	0.56	0.48	0.48
Total Land [1]	0.50	0.45	0.50	0.47	0.48

[1] Includes rented and borrowed land
Source: Author's household survey, 2000

Conclusion

This chapter has examined the historical political economy context of Kenya's land tenure reform, its expansion to the semi-arid zones of the eastern Mount Kenya region, and the dynamics of land adjudication within the Tharaka context. The expansion of land reform to lower elevation areas of the Meru gradient occurred concurrent to broader changes in the national political economy, in particular the expansion of government services to the smallholder sector and expanded market access for small-scale commodity production during the first two decades of Independence. As government budgets were increasingly strapped for resources by the early 1990's, the expansion of land reform to the semi-arid zones did not uphold the model of

individualization and state investment envisioned by Swynnerton (1955) as necessary to support the intensification of smallholder agriculture. To the contrary, the initial rapid intensification of cultivation within settlement schemes of Tharaka's upper zone was short-lived. In this case, intensification was followed by disintensification as state resources to support intensive, commercial smallholder agriculture diminished. Land use reverted to the production of food crops and a "subsistence-plus" mode of commoditization.

It is clear that local conditions were not primarily responsible for creating public demand for land adjudication. The gradual sedentarization of Tharaka land use, particularly in the midland zone of recent settlement, contributed to the decline in secondary use rights within localities. As such, the individualization of tenure had begun in advance of the official land reform. However, local institutions maintained a role in managing insecurity and conflicts to the satisfaction of most communities. Rather than the threat of local conflict, Tharaka uniformly cite the possibility of expropriation by powerful outsiders or the state as a reason for supporting the land reform, despite the recognition that individualized tenure has reduced the flexibility and overlapping rights on which local grazing rights were based.

Contemporary perceptions of land rights in Tharaka suggest the importance of interpreting land tenure within the context of evolving social relations (Lund 2001). Although nearly all of the respondents in areas of customary tenure claimed the general right of transfer, the right remains contingent on the approval of local elders or village land committees who monitor and benefit from the terms of the transaction. As such, the breadth of rights within customary tenure has evolved to encompass most of those

secured in principle by statutory tenure. However, the assurance of land rights as it relates to transfers as well as long-term access is the central characteristic which distinguishes customary and statutory tenure in Tharaka District. Absent statutory security, such dimensions of security within unadjudicated areas area attained through the maintenance of relationships with elders, community leaders, and local office holders. State-sponsored adjudication may effectively reduce the power of clan or land committee elders by limiting their ability to sanction or reject the decisions of male title holders regarding inheritance and land access. While further research would be necessary to make more conclusive statements, it is quite possible that the status of women, like those of landless sons and daughters, has diminished as a result of the weakening of their ability to mobilize broader social networks to defend their interests as related to future land access.

The initial impact of land tenure on the distribution of landholding appears to be weak. Land sales are common in the lower midland zone, where more recent settlers have had to purchase land in order to settle, in both adjudicated and unadjudicated locations. The greater number of parcels acquired through purchase in Gikingo may be a result of the greater ease with which land can be purchased in the adjudicated location. Perhaps most striking about the land distribution which has emerged within both locations of the lower midland zone is the extent to which the ongoing process of resettlement has contributed to the creation landholding patterns very similar to those found in the lower zone locations.

CHAPTER 5

LAND ADJUDICATION AND THE DYNAMICS OF AGRICULTURAL INTENSIFICATION IN THARAKA

This chapter examines the impact of adjudication on land use and land management, drawing on secondary data and narratives of recent land-use change in adjudicated and unadjudicated areas. The focus of the analysis is on the process of agricultural intensification, as indicated by the expansion of investment in soil and water conservation techniques, and an assessment of the processes affecting the ability of households to sustainably intensify production in the context of tenure status, settlement history, access to labor, and parcel characteristics. The impacts of adjudication are interpreted in the context of the broader livelihood system based on an evolving form of agro-pastoralism.

Changes in Livestock Land-Use

A number of general changes in livestock land-use have resulted from the land adjudication. Many of these changes were nascent in the decades before the adjudication and been accelerated as a result of tenure reform. The primary implication of the adjudication for livestock-keeping has been the loss of common grazing lands. An earlier and gradual reduction in land available for goat and cattle grazing has been accelerated by rapid population growth and periodic drought, particularly in the years 1984 and 2000. Coupled with greater access to highland markets via traders, this spatial constraint has transformed the role of livestock in the household economy and further intensified Tharaka's subordinate economic relationship with the core highland economy. However,

it should be noted that the decline of grazing areas since the early 1980's in many local contexts occurred parallel to the geographic expansion of permanent settlement and livestock keeping to the midland zone.

There are few empirical measures of long-term change in livestock numbers in Tharaka. However, narratives of elders in nearly all communities, particularly lowland areas of long-time settlement, indicate a gradual decline in per capita livestock numbers beginning in the late 1970's. At the district level, the best available data indicate that there has been a long-term decline in livestock-holdings leading up to the advent of adjudication. Relatively slow decline in per capita livestock holdings in the period 1956-1980 can be contrasted with relatively rapid decline in the 1980's, on the order of a 6% decline per year (table 5-1). A comparison of data from 1979 and 2001 indicate a large increase in the percentage of households that do not own any goats as well as households owning fewer than 10 goats (table 5-2).[44] The percentage of households with large herds has declined significantly over this time period. The change between two years must be considered in the context of fluctuating herd sizes that characterize pastoral and agro-pastoral systems. The 2001 data reflect a moment at which herd sizes had not recovered from the severe drought of 2000. The locations with the highest percentage of households owning no livestock are Gikingo and Marimanti (table 5-3). At least 70% of households sold livestock during the 2000 drought. The extent to which households will succeed in restocking in the context of declining grazing resources is an open question.

[44] A conclusive comparison of the two data sets is difficult due to the differences in sampling techniques undertaken between these two independent studies. The data for the Chege and Ng'ethe (1983) study were collected through a random selection of ten residents in each Tharaka sub-location. The author's household survey represents a random sample of four representative locations within Tharaka.

Table 5-1. Total and Per Capita Livestock Holdings, Tharaka District

	1956	1980	1988
Total Livestock	124,000	207,277	152,557
Livestock per capita	5.8	4.1	2.1

Source: Kenya (1992), cited in USAID/Kenya (2000)

Table 5-2. Goat Holdings Per Household, Tharaka District

Number	1979 [1]	2001 [2]
0	12	44
1-10	32	44
11-20	30	8
21-30	17	2
31-40	3	1
41-50	2	0
>50	5	0

[1] Ng'ethe and Chege (1982), n=142
[2] Author's household survey, 2001, n=384

Table 5-3. Goat Holdings Per Household by Location, Tharaka District

	Turima	Marimanti	Gikingo	Chiakariga
Number of goats	*Percent of households*			
0	38	49	66	29
1-10	53	41	38	51
11-20	5	8	2	20
21-30	3	1	1	4
31-40	0	1	1	3
>40	0	1	0	0

Source: Author's household survey, 2001

That a broad trend toward destocking has occurred is supported by the assessments of changes in household livestock holdings by individual farmers (table 5-4). Goat holdings, for example, were reported to have declined significantly for more than 65% of households in each location. In addition to greater than average land access, households that succeeded in enlarging their herd sizes were more likely to be involved in non-farm wage labor and activities such as trading. In this context, outside income provides both the cash to purchase livestock and, in some cases, rented parcels for grazing.

Table 5-4. Reported Changes in Goat Holdings, 1990-2000

	Households That Own Livestock (%)		
	Significant Increase	*About the Same*	*Significant Decline*
Turima (n=58)	26	7	67
Gikingo (n=39)	13	8	80
Marimanti (n=48)	21	8	71
Chiakariga (n=72)	25	10	65

Source: Author's household survey, 2001

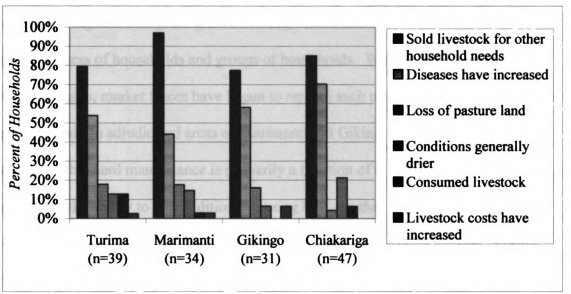
At the level of the larger administrative unit, the adjudication process involves partitioning land once used as common grazing land for individual households, schools, churches, markets, and County Council facilities. As such, the total area available for grazing activities has declined drastically. Although changes in the household spatial economy were nascent following boundary demarcation, the effects are felt more acutely as households increasingly assert their exclusionary rights to specific resources on their parcel or parcels. The immediate result of this has been a continuing process of declining grazing areas for cattle and goats, eventually leading to declining livestock numbers. The

expansion of both unassisted settlement (e.g., Turima and Gikingo) and government-sponsored settlement schemes (e.g., Nkondi) in LM4 reduced pressures on grazing land in the lowland areas. However, out-migration was not sufficient to counter the demographic and evolutionary tenure changes underway by the 1980's.

In Gikingo and Marimanti locations, land adjudication has placed constraints on the ability of households to maintain goat stocks, particularly for those households that were assigned small or degraded plots. The parcels of public land that were set aside during the adjudication are vastly insufficient to provide additional land for grazing during drought periods. As a result, those without the ability to rent grazing land, or those who have not maintained kinship ties with clan members from the higher elevation zones, have little choice but to reduce livestock numbers, a gradual process accelerated by the movement toward individualized land rights and the increased frequency of drought in the last twenty years.

Tharaka farmers associate the decline in livestock holdings with a wide range of factors, including the declining availability of pasture land, the expansion of non-agricultural land-uses (e.g., markets, schools), and the growing frequency of droughts that carry with them a cycle of livestock sales in order to purchase grains (figure 5-2). Approximately 65% of households in the sample claim that their goat herd size has declined significantly since the adjudication took place. The majority of these cite the need for cash during stress periods, with increases in livestock disease and the lack of available pasture also contributing. Thus, goat meat, once central to the Tharaka diet and custom, has become a rare delicacy as the role of livestock becomes a means of ensuring future grain purchases in the event of crop failure.

Figure 5-2. Reported Causes of Decline in Livestock Holding



Source: Author's household survey, 2001

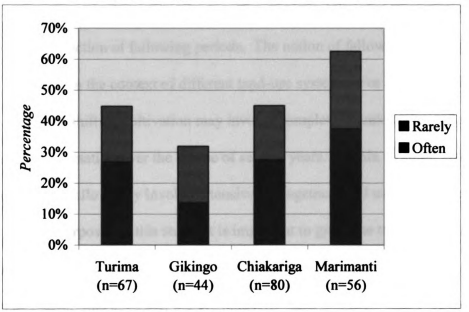
An important recent change is the expansion of the practice of livestock grazing on crop residues. This practice represents a form of intensification as it converts household parcels to grazing land during the period immediate following harvest. While this practice may be seen as a result of the priority of crop cultivation in a new land-use system, the practice itself has placed limits on crop cultivation. First, while livestock manure improves soil fertility, the movement of livestock on agricultural fields may also predispose soils to erosion and invasions of alien weed species propagated by the movement of livestock between watering points and crop parcels. Furthermore, the demand for grazing space has limited the variety of crops grown by Tharaka farmers. Perennial crops, in particular a productive perennial sorghum which was central to Tharaka agriculture less than 20 years ago is now rarely cultivated due to the interruption of the growing cycle by the need to graze livestock. This is one of the changes identified

repeatedly by focus group participants as responsible for declining harvests in many Tharaka communities (Marimanti Farmers Group Meeting 2001).

Pre-adjudication grazing involved negotiation and cooperation to determine grazing access of households and groups of households. With declining secondary resource rights, market forces have begun to replace such negotiation in the allocation of grazing land. In adjudicated areas of Marimanti and Gikingo, focus group discussions suggested that herd maintenance is primarily a function of the size of the adjudicated parcel and the ability to rent additional grazing land. In the absence of sufficient land resources, livestock-keeping households must look to new areas for grazing. Formal borrowing or surreptitious grazing on the parcels of other households remains common, particularly in lower zone of Marimanti and Chiakariga (figures 5-3 and 5-4). With the declining availability of land, land-poor households have few options for maintaining their livestock. Given that all households maintain access to seasonal streams and rivers to water animals, roadside and stream side vegetation have come under increasing pressure of livestock moving between homesteads and water sources. Nonetheless, grazing of public parcels, roadside vegetation, stream banks, and hillsides are not sufficient as an adaptation to the restrictions of individualized tenure as less than 15% of livestock holding households currently access such resources (figure 5-3).[45]

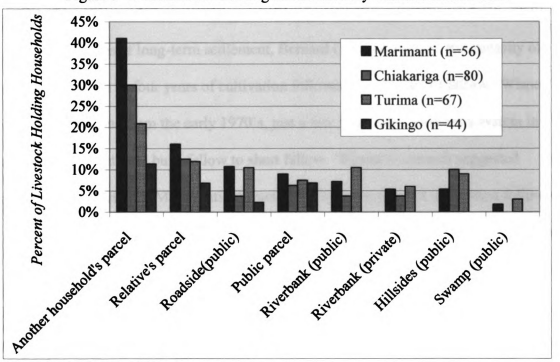
[45] It can be reasonably assumed that the data on grazing apart from one's own parcel are very conservative given that the district administration or the chief of the location may restrict access to these grazing resources. As a result, respondents were likely reluctant to admit engaging in such surreptitious grazing practices.

Figure 5-3. Percentage of Livestock-Holding Households That Access Grazing Resources Apart From Own Parcels



Source: Author's household survey, 2001

Figure 5-4. Additional Grazing Areas Used By Tharaka Households



Source: Author's household survey, 2001

Changes in Agricultural Land-Use

One component of agricultural intensification is an increased frequency of cultivation and reduction of fallowing periods. The notion of fallow can encompass a range of meanings in the context of different land-use systems. For example, fallow within a system of shifting cultivation may involve complete abandonment and regrowth of successional vegetation over the course of several years. Within more intensive crop-livestock systems, fallow may involve intensive management and use of fallowed land as pasture. For the purposes of this study, it is important to grasp the transformation of fallow in the context of land demarcation. In Tharaka, the notions of pasture and fallow appear to be converging, such that the Tharaka term *ng'ũndũ*, which captures the idea of regrowth of successional vegetation, increasingly takes on the meaning of pasture. The loss of extensive grazing areas and increasingly severe space limitations has created a more direct association between a category of land cover and a specific land-use.

Within areas of long-term settlement, Bernard (1969) estimated the intensity of Tharaka cultivation as four years of cultivation followed by 15 years of fallow. Wisner's (1976a) observations from the early 1970's, just a few years later, indicate a system in transition from rotational bush fallow to short fallow. Wisner's research suggested limited variation between Marimanti, characterized by three years of cultivation followed by ten years of fallow, and Chiakariga, characterized by five years of cultivation followed by ten years of fallow in Chiakariga. By 1979, Ng'ethe and Chege (1983) report that approximately 60% of Tharaka farmers continued to practice shifting cultivation, while at least 40% of households indicated no use of fallow.

A comparison of Ng'ethe and Chege's (1983) study with the author's household survey data indicate an acceleration of the intensification of crop cultivation since 1979 (table 5-5). While only 40% of households in 1979 had no land in fallow, more than 75% of sampled parcels reported no area of fallow in 2001. The expansion of crop cultivation was the primary reason for this change. In 1979, 90% of households had less than 30% of their land area under cultivation. By 2001, cultivation covered less than 30% of the area of only 30% of parcels. An additional 30% of parcels have at least 90% crop cover (table 5-6). A transition from bush fallow to permanent cultivation appears to have occurred in as little as twenty years under the multiple pressures described above.

Table 5-5. Changes in the Percentage of Land Under Fallow and Cultivation

	Fallowed Land		*Cultivated Land*	
Percent of land area	*1979* [1]	*2001* [2]	*1979* [1]	*2001* [2]
0	40.1	76.3	28.2	9.4
1-10	10.6	0.4	33.1	3.1
11-20	16.2	2.3	20.1	6.8
21-30	7.7	2.1	12.1	8.2
31-40	9.9	5.4	2.8	10.3
41-50	8.5	3.7	0	11.3
51-60	2.1	1.5	0	5.5
61-70	4.9	2.1	0	5.5
71-80	0	2.7	0	6.6
81-90	0	0	0	2.9
91-100	0	3.5	0	30.4

Sources: [1] Ng'ethe and Chege (1983); [2] Author's household survey, 2001

Table 5-6. Distribution of Major Land Cover Types on Sampled Parcels

	Turima n=144	*Marimanti n=124*	*Gikingo n=125*	*Chiakariga n=110*
Land Cover Types	*Percent of Total Land Area in Sampled Parcels*			
Crop	68	36	59	43
Fallow / pasture	27	17	8	15
Bushland	4	44	30	36
Grassland	2	3	4	5
Average parcel size	3.57	6.09	4.84	5.33

Source: Author's household survey, 2001

While one might assume a trajectory of population growth and declining fallow, these broad indicators of intensification give little insight into the variation in land-use intensification within Tharaka during the 1970's, particularly between agro-ecological zones LM4 and LM5/IL5. Narrative accounts indicate an intensification of land degradation as a result of grazing pressures leading to out-migration from Chiakariga and Marimanti to the midland zone, primarily Gikingo and Turima (Turima Elders Group Meeting 2001; Chiakariga Elders Group Meeting 2001). As such, out-migration may have reduced pressures to intensify production in the lowland areas. In the areas of new settlement, increasingly boundary-conscious farmers marked parcel boundaries and were discouraged from shifting due to the lack of tenure security in a landscape largely lacking in social institutions. Differentiation emerged between the two zones such that farmers in LM5 were increasingly restricted due the abandonment of severely degraded land while rapid population growth and boundary demarcation in LM4 created pressures for intensification.

The current distribution of major land-use types by location indicates that cropped land is the dominant land-use class in each location except Marimanti (table 5-6). The

areas of fallow or pasture land are greatest in Turima, which is also the most intensively cultivated of all locations. This pattern might suggest that fallow as a management technique has emerged in areas of most intensive cultivation. However, Gikingo Location is characterized by a small percentage of the total area under managed fallow. The immediate reason behind this variation within agro-ecological zone LM4 is not apparent. Under less severe land constraints, Chiakariga and Marimanti locations in agro-ecological zone LM5 and IL5 retain the largest percentages of bushland and grassland and smallest percentages of cropland. The differences in the distribution of land-covers between adjudicated and unadjudicated units are not as great as the differences between midland and lowland zones.

With the exception of the driest margins of agro-ecological zone LM5, the Tharaka land-use system can be characterized as a system of permanent cultivation with low rates of adoption of managed fallow. While inconsistencies in data collection do not permit a measurement of recent fallow periods or the adoption of crop rotations, group discussions with residents from each sampled administrative unit confirm that the practice of fallow is increasingly rare. At the same time, people recognize fallow as a key soil management technique.

The lack of adoption of fallow appears to be related to two primary factors. First, with the decline in livestock holdings, households are experiencing greater vulnerability to the effects of drought. Whereas livestock continue to provide protection against selling other key domestic resources during drought periods, the thinness of this protection is increasingly evident. It is hoped that expanding the area under cultivation will provide sufficient crop production in years of low rainfall and low crop productivity.

The factors affecting the use of fallow may also have complex connections with labor supply and agricultural knowledge, as the following narrative of a young female head of household in Gikingo Location attests:

> My parents passed away in 1992 and since then we are just three. I am the first-born and I am living with my two younger siblings. In the ten years we have farmed here, we have never left any land fallow. We are farming on two acres, but we also have two acres covered with bush. I know the crops we are getting are few, but if I tried to change the place where we farm by clearing the bushy areas we might not have vegetation for our few livestock. It is also a lot of work. The youngest one cannot work and the other is in school (excerpt from Gikingo Farmers Group Meeting 2001).

An additional factor in declining fallow may be the growth of a land rental market. Land rentals were described in group meetings as important for the maintenance of goat stocks. Expansion of cultivation through purchase or rental is also seen as an important means of avoiding the adverse effects of drought in the future (Smucker and Wisner, forthcoming). With the redistributive functions of the clan replaced by market forces, sufficient access to cropland may become the privilege of those with access to outside income or remittances. The views of an elder male of the pressures effecting the decision to fallow were representative of most areas of agro-ecological zone LM4:

> Since we rely on our land for food and money to sustain us throughout the year, fallow is rarely practiced in this area. If you leave land fallow, you can expect it to return to its degraded state after only one or two years of use. So it is not really possible to practice the kind of fallow that would allow for a regeneration of soil fertility. On the other hand, you might find someone around who is trying to fallow. Once he has made that decision, he is approached by his land-poor neighbors who pressure him to rent them the land. The temptation of that income is too strong, and he allows the soils to be overworked again (excerpt from Turima Farmers Group Meeting 2001).

Although the changing land-population ratio certainly had a gradual effect on the reduction of fallow periods and the intensification of crop production, boundary demarcation and adjudication have placed new restrictions on resource use and brought about additional pressures to intensify crop production. The transition among households toward greater reliance on crop cultivation has further intensified crop land-use and made the success or failure of a given crop all the more crucial to protecting key domestic assets.

While the dynamics of fallow are complex, the results of more intensive use of soils are relatively straightforward in the minds of farmers. Group meetings in each location confirmed a perception of gradually declining output in the four major staple crops, in addition to pigeon peas (table 5-7). Perceptions of decline were most remarkable for maize, millet, and sorghum and percentage change in perceived output per acre was similar in the lower midland and lowland zones. While the figures presented are mere estimates, they provide an indication of the commonly held view in Tharaka that farmers are encountering few successes in the struggle to balance greater reliance on crop production for both food and cash needs with sustainable management of soil resources.

Table 5-7. Estimate of Crop Output Per Acre in the Absence of Crop Failure (90 Kg bags)

	LM5		*LM4*	
	1970	2001	1970	2001
Maize	7	5	10	8
Millet	10	6	15	10
Pigeon Peas	5	5	12	5
Sorghum	9	6	11	7
Green Grams	4	4	9	4

Source: Devised from farmers' estimates at group meetings in each location

Land Development and Productivity

A widely used indicator of sustainable agricultural intensification is investment in land productivity, particularly soil and water conservation techniques (Reardon et al. 1998, Tengberg et al. 1999). For Tharaka, the sedentarization of agriculture has brought new challenges in terms of adapting indigenous soil management techniques to a context of more sustained use. Improved land management has been a central argument in favor of land tenure reform in Kenya. In this section I investigate both the variations in investments in these measures among parcels of different tenure status and the characteristics of households and parcels that may help to explain the adoption of techniques that may support sustainable intensification in the future.

Because the Tharaka have only recently relied on intensive cultivation for their livelihood, the suite of techniques employed to combat soil erosion are still in transition. Two techniques encompassed the primary investments of the Tharaka in soil and water conservation twenty years ago: log lines and trash lines (Ng'ethe and Chege 1982). Both are basic techniques requiring relatively little labor investment designed to limit run off that. Log lines are merely small logs or branches laid between crop rows on cropped fields in order to reduce sheet erosion. Similarly, trash lines consist of crop residues that are collected after harvest and placed between crop rows as a means of limiting run-off.[46]

While these methods were widely used, there was little incentive for investment of significant amounts of labor in such work under systems of forest or bush fallow. Given abundant land and the possibility of clearing and preparing a new parcel after two

[46] In Tharaka's lower zone farmers typically burned trash lines before replanting, believing that this would improve soil fertility. This is a practice that recent extension efforts have attempted to suppress (Munyao 2001). As such, the frequency of use of trash lines as an anti-erosion measure may have been less than the level reported by Ng'ethe and Chege (1982).

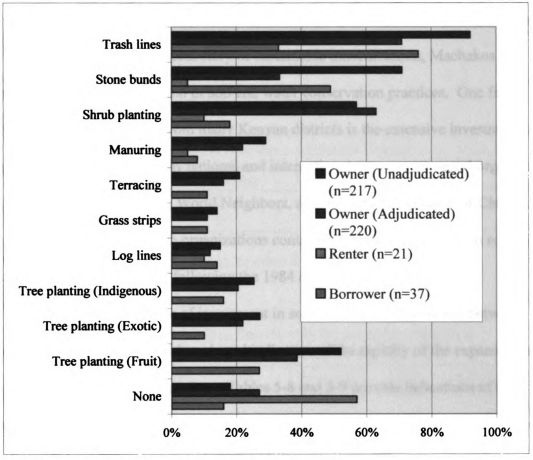
to four years of cultivation, investment of labor in conservation measures were not a necessity for maintaining productivity. However, in relatively short time and with little technical assistance, many Tharaka have adopted a suite of conventional conservation measures. Rates of adoption continue to increase where extension advice is accessible (Karimi 2001).

Figure 5-5 indicates the variation in rates of adoption of major soil and water conservation techniques by tenure status of the parcel. The differences in the rates of adoption between adjudicated and unadjudicated parcels are surprising. The notion that land adjudication spurs greater tenure security and willingness to invest in land productivity does not seem to be supported by the Tharaka case which indicates significantly higher rates of investment on parcels that are not adjudicated, particularly for such core techniques as trash lines and stone bunds.[47]

Since the advent of demarcation in the late 1980's, Tharaka farmers have greatly increased their investments in soil and water conservation as evidenced by rates of adoption of stone bunds, tree and shrub planting, and use of manure to increase soil fertility. This marks a major increase in investments as compared to twenty years ago when trash lines and grass strips alone were widely adopted as a preventative measure against erosion (Ng'ethe and Chege 1983). While the relatively high rates of adoption are encouraging, continued reports of declining output per acre and growing erosion problems are worrying. The differences in rates of adoption of soil and water conservation techniques between adjudicated and unadjudicated areas does not support the idea that land adjudication itself drives such investments.

[47] The differences in rates of adoption of stone bunds, trash lines, and fruit trees are statistically significant at $\alpha = 0.05$ ($Z_{calc} = 8.51$ (stone bunds), 5-89 (trash lines), and 2.86 (fruit tree planting); $Z_{crit} = 1.96$.

Figure 5-5. Frequency Distribution of Investments in Soil and Water Conservation



Source: Author's household survey, 2001

Rates of adoption of soil and water conservation techniques by Tharaka land managers can be favorably compared with those highlighted by Tiffen et al. (1994) in Machakos District. As a success story of sustainable intensification, Machakos has experienced a recent expansion of soil and water conservation practices. One factor which sets Machakos apart from many Kenyan districts is the extensive investment in capacity-building programs by national and international non-governmental organizations such as ActionAid, AMREF, World Neighbors, and the National Council of Christians in Kenya. The activities of such organizations contributed to a rapid increase in soil and water conservation practices following the 1984 drought (table 5-8).

A comparison of rates of investment in soil and water conservation between Machakos and Tharaka provides a broad indication of the rapidity of the expansion of Tharaka investments in comparison. Tables 5-8 and 5-9 provide indications of the percentage of land area and parcels, respectively, on which soil and water conservation investments have been made. Although table 5-8 does not differentiate between the semi-arid and humid zones of Machakos, Tiffen et al. (1994) suggest that parcel characterized by undulating and flat surface consist primarily of dryland areas of the district whereas the steepest slopes ("hilly") are concentrated in the highland zone. The evidence presented by Tiffen et al. (1994) suggests that the semi-arid areas of the district have experienced the most rapid increase in soil and water conservation investments. Such increased investment in conservation measures are a central component underlying the social and environmental recovery often interpreted as the "Machakos miracle" (Zaal and Oostendorp 2000). In comparison, Tharaka households have achieved equally remarkable increases in soil and water conservation investments. Such investments have

not been limited to measures that require little labor commitment; terracing and tree planting as conservation measures occur at rates broadly comparable to those of Machakos farmers.

Table 5-8. Percentage of Arable Land with Some Conservation Measures, Machakos District

Year	Flat	Undulating	Hilly	All classes
1981	44	57	92	69
1985	49	84	97	85

Source: Tiffen et al. (1994)
Note: Includes terraces, bunds, or other field dividers

Table 5-9. Percentage of Parcels with Conservation Measures, Tharaka District

Conservation measures	Flat	Undulating	Hilly	All classes
Any conservation measures	83	89	82	86
Terracing or tree planting	41	47	49	45

Source: Author's household survey, 2001

Explaining the Variation in Investments

The range of factors that may drive such investments is great and may include the slope and condition of the parcel, duration of use, access to extension advice, access to wage and family labor, and dimensions of land tenure. Logit modeling can be used to explore the strength of the relationship between household investments and characteristics of both individual parcels and the households that manage such parcels. Logit is a maximum likelihood estimator that can be used in cases in which the dependent variable is categorical and independent variables are both categorical and continuous (Maddala 1983). Within this model, tenure status is assumed to be exogenous since state

adjudication is compulsory in locations that undergo land reform and voluntary adjudication is not available to individuals who reside in areas under customary tenure. Substantial investment in soil and water conservation is determined by identifying all parcels that have basic low labor investment measures to prevent run off (i.e., stone bunds, log lines, and trash lines) in addition to high labor investment techniques (terracing, manuring, agroforestry). Those parcels that had no investment or only low labor investments were considered as absent substantial investment in soil and water conservation. The model variables are described in table 5-10.

Table 5-10. Description of Variables Used in Logit Model

	Level of Measurement	*Unit of Measurement*	*Measurement*
Dependent Variable			
Conservation investment	Binary	Parcel	Substantial investment in soil and water conservation
Independent Variables			
Adjudication status	Binary	Parcel	Parcel adjudicated
Inherited from father	Binary	Parcel	Parcel inherited from father
Temporary allocation from father	Binary	Parcel	Parcel temporarily allocated by father
Unassisted settlement	Binary	Parcel	Parcel acquired informally
Years of permanent use	Continuous	Household	Years household has used land
Family labor	Continuous	Household	Members of the household above the age of twelve
Hired labor	Binary	Household	Household hired permanent or casual workers regularly the last cropping season
Extension advice	Binary	Household	Household has ever received extension advice
Slope of parcel	Ordinal	Parcel	Slope of the parcel

Table 5-11. Logit Model Results

Dependent variable: Substantial investment in soil and water conservation on parcel(y/n) n=310			
Parameters	Coeffecient	Standard Error	Probability
Inherited land	1.230	0.513	0.017**
Temporary allocation by father	0.963	0.574	0.093*
Unassisted settlement	0.975	0.614	0.112
Adjudicated	-0.826	0.449	0.066*
Years of permanent cultivation	0.047	0.025	0.058*
Family labor	-0.003	0.131	0.979
Hired labor	0.874	0.432	0.043**
Cash Remittances	1.370	1.088	0.208
Extension advice	-0.115	0.582	0.843
Slope of parcel	-0.476	0.282	0.092*

*significant at 90% confidence interval
**significant at 95% confidence interval

The model suggests dimensions of tenure, socioeconomic status, and history of settlement are positively related to investments in the sustainable intensification of crop production (table 5-11). Despite the low pseudo R^2 of .127 for the model, the significance of individual variables is an important result that highlights household and parcel characteristics related to household investment in soil and water conservation measures.

Inherited land is strongly related to investments in soil and water conservation. This is likely a result of the land manager's familiarity with the parcel's soil and slope characteristics as well as the possibility that she may be merely maintaining existing investments. Similarly, greater duration of settlement increases the probability of investment in conservation techniques.

Two aspects of tenure conventionally associated with insecurity also showed positive correlations with investments in soil and water conservation. Adjudicated status does not increase the probability of investment in sustainable intensification. A

straightforward explanation offered by group meeting discussants is that such investments indeed themselves contribute to tenure security by creating physical evidence of labor investment. Such investments, particularly when those that are less ephemeral in their impact on the landscape, can be an important argument for "rights and interest in land" when the adjudication eventually restarts in those areas under customary tenure.

In a similar vein, temporary allocation by the father does tend to increase the probability of investment. While this mode of land acquisition carries with it an element of insecurity, soil and water conservation investments were also described by individuals allotted land on such conditions as a means of proving one's stewardship and potentially influencing the father's decision on the final partition of land for all sons.

The final variable with a high level of significance is that of hired labor. The model results indicate that households with sufficient income to hire wage labor are most likely to be able to adapt to the new mode of intensive cultivation through investments in soil and water conservation. The hiring of labor is a recent phenomenon throughout Tharaka and is the subject of controversy because of its role in changing gender divisions of labor. As discussed in Chapter 3, participation in wage labor is greatest among poor households and is often made possible due to the existence of income sources or remittances from outside the district. As household labor needs increase, not only for weeding that ensures the viability of the current crop but also for the additional labor investment required for increasing investment in soil and water conservation, the most vulnerable of Tharaka households will continue to strike a delicate balance between investments of labor in home and waged production.

Conclusion

This chapter has examined data from diverse sources in an exploration of changes in agro-pastoral land use and livelihoods. It has examined interpretations of the impact of land adjudication on land use and land management in Tharaka based on local narratives and household survey data. I argue that the adjudication has accelerated and further consolidated a transition toward declining grazing resources, a general trend toward destocking, and greater reliance on crop production. If the expansion of smallholder agriculture to the midland zone constituted a constriction of the Tharaka livelihood system at a macro-level (Wisner 1978), the current phase of land tenure change might be seen as underlying localized constriction of agro-pastoral livelihoods.

However, I emphasize that the dynamics of change are neither unilinear nor deterministic; they result from the evolution of a livelihood system dependent on both external and sometimes highly localized, internal adaptations. Perhaps most remarkable is the degree to which Tharaka land managers now invest at high rates in a suite of soil and water conservation measures, including those that require very significant investments of household and waged labor.

The variation in investments in soil and water conservation at the household level is related to aspects of tenure security, though not in ways hypothesized by proponents of land tenure individualization. Farmers are significantly less likely to make substantial investments in soil and water conservation on adjudicated land than they are on unadjudicated land. The importance of the inheritance variable suggests that the broad categories of adjudicated and unadjudicated land may mask internal variation in tenure security that is related to generational dynamics of land transfers. Furthermore, the

importance of labor access seems to be supported by the results of the logit model, the dynamics of which I turn to below.

When interpreted with complementary qualitative data, the results suggest that land adjudication does not contribute to dimensions of security necessary to encourage higher rates of soil and water conservation. Similarly, customary tenure does not appear to inhibit such investments in sustainable intensification. Indeed, there occurred a remarkable increase in such investments within both locations under customary tenure during the past ten years. While a significant correlation between adjudication and substantial investment in sustainable intensification does not exist in the Tharaka case, other aspects of change brought about by land reform may affect the dynamics and patterns of intensification.

Unlike Machakos, changes in land use and livelihood resulting from both land tenure change and the expansion of investments in soil and water conservation in Tharaka have not entailed miraculous or even progressive change. To the contrary, the trend toward destocking and resultant vulnerability to erratic and broadly declining crop productivity is made even more severe by poor terms of trade. The unique trajectory of change in Tharaka underlines the potential difficulty of extrapolation of results from one place or region to another in the development of a generalized notion of the impact of state-sponsored land tenure individualization. Before considering the possibility of generalization in the concluding chapter, I examine a key intersection of social and environmental change and the way in which tenure reform has contributed to changes not only in the exercise of land rights but also in the mobilization of the labor for land management.

CHAPTER 6

THE SOCIAL DIMENSIONS OF LAND MANAGEMENT IN THARAKA

To this point, I have demonstrated the dynamics of intensification of Tharaka land-use and the tenure changes and other societal changes that underlie a transition toward sedentarization, expansion of crop cultivation, and increased dependence on crop cultivation for income and consumption. I have argued that changing land rights have been central to a process of restricting livestock land use and a rapid expansion of labor investments in agricultural intensification as indicated by investments in a suite of soil and water conservation techniques. The analysis of the relationship between tenure change and land management within the broader context of the livelihood system points to the need to reassess these phenomena as components of the social relations of production through a consideration of the political, cultural, and ecological dimensions of recent land use change.

This chapter examines a salient intersection of social and environmental change that is central to recent changes in Tharaka tenure and land use. In the last two decades, agricultural intensification and the evolution and reform of land rights has exposed Tharaka pasture and crop fields to a range of new environmental risks. Widely noted among Tharaka farmers is the invasion of alien weed species, which have become increasingly common in Kenya's dryland areas since the 1980. These have implications for household labor requirements and may create new opportunities to renegotiate inter-household and intra-household divisions of labor (Stadler et al. 1998).

An investigation of the changing labor process is central to understanding the changing material reality of Tharaka livelihoods as reflected in emerging modes of land tenure, land use, and management (Awanyo 2001; Blaikie and Brookfield 1989; Turner 1999). Theorists of intensification have identified the importance of quantities of available labor available to farming systems in the process of intensification (Boserup 1965). However, the narrow focus on population growth neglects great variability in the means by which the labor of land management is mobilized for increasingly intensive crop production. Furthermore, the demographic perspective masks the development of new forms of socioeconomic differentiation that result from unequal access to labor resources as local institutions evolve and social relations of gender and socioeconomic status are reworked. As discussed below, changing land tenure practices in Tharaka resulted in broader changes in the organization of agricultural production. While the land adjudication policy provided a broad framework to guide post-adjudication tenure practices, the labor process reflects a more fluid domain within which previous divisions of labor by age, gender, and socioeconomic status must adapt to the demands of growing labor requirements (Netting 1993).

The analysis draws from narrative accounts of changing weed ecology collected during group discussion in each of the four locations. In addition to perceptions of vegetation change, the discussions covered perceptions of the factors leading to the invasion of perennial and annual grasses and bushes, and the way in which growing labor requirements in crop production have intersected with changes in land tenure and land management to shape differentiated responses within Tharaka communities. Important aspects of these changes relate to social relations of age and gender and, in particular, the

waning control of elders over the allocation of both land and labor resources. The struggle to redefine the roles of women, men, youth, and elders within a new context of relatively fixed resource endowments constitutes a central dynamic in an emerging land use system.

New Risks: Alien Invasive Weeds

As Tharaka agriculture becomes more sedentary and intensifies, the conditions for weed propagation and management are changing. The transition from shifting cultivation to sedentary agriculture and the demarcation of parcel boundaries have played important roles in creating conditions conducive to the expansion of alien weeds. Group discussions in each location revealed a similar narrative: changing livestock production strategies and declining soil fertility have created a landscape more vulnerable to invasion of alien weeds species which in turn has contributed to declining productivity and a significant increase in labor needs at peak times during the growing season. This vulnerability to rapid propagation of a range of new weeds was increased by the extensive flooding that resulted from the 1997 El Niño phenomenon.[48]

State-sponsored land reform has reduced common grazing areas (Marimanti Group Meeting 2001; Marimanti Farmers Group Meeting 2001). Most farmers have responded by grazing livestock on crop residues following the harvest. As livestock continue to move between watering points and the homestead, they become vehicles for the diffusion of a range of new weeds that had not previously been a problem on the parcel. The spatial compression of farming and herding activities has brought about new

[48] I remind the reader that what follows is based on Tharaka perceptions of changing weeding ecology rather than a systematic analysis of changing successional vegetation dynamics and modes of propagation of alien invasive species.

risks, as livestock that graze on crop residue are an additional vehicle for transporting seed to cropped fields, thus increasing the speed of propagation. These conditions have resulted in a rapid increase in the diversity of weeds that are found on Tharaka fields, and the introduction of species that were not recognized as problematic weeds until the late 1990's. There is also agreement that shortened fallow periods are having an effect on soil chemistry and moisture content, thus changing the plant communities that thrive in them. While they are generally unfamiliar with many of the new annual and perennial grasses that have recently invaded their parcels, participants in group meetings suggested a clear pattern of invasion that has most severely affected those areas identified as degraded.

There are striking similarities in the adaptation to growing labor demands among the locations within Tharaka in which data were collected. In all locations, farmers report changing divisions of labor within the household and, most notably, the expansion of women's participation in waged farm labor. While the participation of women in wage labor had created household and community tensions in each location, the practice has expanded within all of the locations except Chiakariga. In Marimanti and Gikingo, the replacement of the authority of local elders in land tenure decision-making was cited as a development that permitted the renegotiation of other components of production relations (Gikingo Elders Group Meeting 2001; Marimanti Farmers Group Meeting 2001). In Turima, women's participation in weeding is more widely accepted, though still a source of tension within households. In Chiakariga, the preeminent role of clan elders in community affairs, particularly their central role in land and labor allocation in the

absence of tenure reform, may serve to limit the expansion of wage labor activities by women.[49]

LM4 Lower Midland Zone: Turima and Gikingo

Tharaka's upper zone was cleared and settled recently, the first groups of permanent settlers having arrived from the lower zones near Tana River in 1964. Through the early 1980's, a stream of migration from lowland Tharaka developed which lead to the rapid settlement of this wetter margin of the semi-arid zone. The motivations were diverse, but most claim to have fled localized degradation resulting from overgrazing in their home area. A primary concern upon settlement was the danger posed by wildlife, including buffalo, elephant, and hyena, which presented a threat to crops and humans. The high yields of maize and beans crops reaped in the first five years of settlement outweighed the hazard of living in proximity to large wildlife populations (Kirema 2001).

Weeding was done from May to July, and generally required little labor investment. Labor was organized on an extended family level and women tended to dominate the job of weeding, though men also contributed significant labor in some communities. Weeding groups emerged in the mid 1980's in the upper zone as households expanded crop production. In most cases, groups of women from the same neighborhood were engaged in weeding the fields for all households within a single

[49] It is difficult to make definitive statements about the variation in participation in such groups. The conclusions I draw about such variation are based on group discussions with young farmers and elder males that highlighted the contested nature of the groups within communities and households. Nevertheless, their continued presence is accepted as a permanent reality in Turima, Gikingo, and Marimanti. The groups of elders interviewed in Chiakariga declined to discuss the matter, proclaiming they preferred to not discuss such politics (*siasa*).

ntũũra. The function of the group was both one of reciprocal labor sharing and a means for wealthier individuals to fulfill a social obligation of food provision. When men were also mobilized for weeding, locally produced honey beer was a means of compensating laborers.

By the late 1980's, as sedentary agriculture became more established, a greater diversity of weeds began to limit crop productivity. This continued until the most common agricultural weeds, *Commelina bengalensis* and *Lactuco capensis*, had ceased to exist near cultivated areas. In their place, a new group of weeds emerged, particularly on degraded parcels. The changing species composition had immediate effects on household labor. By the early 1990's, the single round of weeding practiced by most households had doubled to two rounds of weeding. The appearance of a new and a more diverse group of weeds was widely noted, particularly the appearance and growing prevalence of *Oxygonum sinuatum*, various *Graminae sp.*, and *Clemantis simensis* (Table 5-1). In both upper and lower zones, the new weeds are diverse. General characteristics of weeds that have been identified by farmers as invasive species include:

- Variable dormancy, requiring multiple rounds of weeding to eradicate weeds at various stages of growth
- Tough stem and complex root structures that farmers have found very difficult to fully eradicate in the absence of plowing

Table 6.1: Invasive Weed Species That Have Increased Labor Demands in Crop Production Since the late 1980's

Local name	*Botanical Name*	*Characteristics*
Agro-Ecological Zone LM4 (700-1200m)		
Cong'e	*Oxygonum sinuatum*	Deep underground root system makes it very difficult to eradicate; sprouts after first and second rounds of weeding; plow often required to uproot; thorny seeds;
Ciagacond'e	*Gramineae spp.*	Often visible after the second or third weeding; tough stem, difficult to uproot;
Mũgũndũgũndũ	*Clematis simensis*	Often sprouts immediately after first active phase of weeding; stem becomes firm when not quickly eradicated;
Agro-Ecological Zone LM5/IL5 (400-700m)		
Kariaria	*Euphorbia tirucalli*	Large number of seeds; stems difficult to uproot; grows well in degraded soils; milky juice causes temporary blindness if it enters eyes;
Mũtongu	*Solanum incanum*	Strong root attachment, difficult to eradicate;
Kaimba na ncĩngĩĩrĩ	*Gramineae*	Does well in degraded soils; increasingly prolific, difficult to eradicate;

Many households report weeding as many as four times per crop cycle in order to limit the stunting effect of weeds on crop growth. Weed diversity has increased significantly, to the point that six recent entries in the upper zone noted in group discussions have not been given a local name in Kitharaka. In order to address the problem in the context of growing scarcities of labor during the growing season, plowing was introduced in the early 1990's and has spread gradually. Household survey data indicate that 20 percent of Tharaka households own a plow, and an additional 40 percent in the upper zone rent plowing services for their fields (Author's household survey 2001). Relatively wealthy families adopted plowing as a means of reducing dependence on casual labor, which had become a major expense by the mid-1990's. Plowing is carried out between crop rows either before planting or immediately after weeds germinate.

Rather than absorbing labor during a specific period of the cropping season, weeding is now seen as a nearly continuous task which intensifies during the months of April and January. Within group meetings, there was general agreement that progressive improvements in productivity can be attained by weeding as many as four times in a single cropping season. The rapid propagation of weeds during rains in January and April have led to parcel abandonment as a result of weed infestation as the household is unable to mobilize sufficient labor for land preparation. Farmers also noted that the February to early March dry spell does not provide sufficient time to clear a parcel before planting is to take place again, indicating another labor constraint on maintaining productivity levels.

LM5 Lower Midland and IL5 Inner Lowland Zone: Marimanti and Chiakariga

The transition from shifting cultivation to permanent settlement occurred earlier in the lower zone due, in part, to the efforts of the colonial government to encourage sedentarization, particularly in Chiakariga. This has been a difficult transition for lowland communities whose agricultural system was based on short-term exploitation of small patches of relatively fertile soils. Just as the role of clan elders increased in the management of boundary and land use conflicts as customary tenure evolved, senior males initially dominated decision-making related to labor mobilization under conditions of increasingly severe labor shortages during the growing season.

Before sedentarization, weeding did not represent a significant investment of labor. Through the end of the 1970's, farmers describe weeding as a chore that was done

incidentally when traversing a cropped field. Few people are able to recall the names of the annual and perennial grasses and bushes that sprouted.

The mobilization of labor for weeding was not necessary until at least the early 1980's. The formation of weeding groups within *matũũra*, often consisting of extended family, was driven both by the expansion of area under cultivation and the emergence of new weeds. Groups were formed on a neighborhood basis and were organized by senior males. Where labor requirements were high, men's work groups were also organized. The groups were similar to those in the lower midland zone in that they served the dual role of sharing labor resources and fulfilling the social obligations of wealthier households to provide food for poorer households. The timing of the weeding usually fell within the time at which poorer households were most likely to be vulnerable to dwindling food stocks from the previous season's harvest.

The timing and perceived causes of the expansion of alien weed species in the lowland zones was similar to that in the middle lowlands described above. Farmers recall the appearance of new weeds affecting crop productivity beginning in the mid-1980's. The first reaction in both Marimanti and Chiakariga was to petition the Ministry of Agriculture to provide plows and weeding implements. Receiving no support, several wealthy farmers purchased plows and began offering plowing services for a fee. As weed diversity and labor requirements continued to increase in the late 1980's, farmers began planting late as they waited for the weeds to germinate with the first rains in order to perform a single plowing. It is now a matter of debate among farmers as to whether this is a wise practice, particularly given the unreliability of the short rains (March-May) in recent years. The new variety of weeds and their individual and collective

characteristics are an additional component of risk in meeting the moisture requirements of major crops.

Changing Labor Dynamics

While there are differences between the two agro-ecological zones as well as the individual locations within each zone, a general progression has been noted among farmers in each location of growing demands for weeding labor. When considered in the context of the expansion of soil and water conservation techniques discussed in the previous chapter, it is clear that the expenditure of labor per unit of land has increased sharply. The question of land management, and particularly sustainable intensification through the investment in conservation techniques to improve long-term productivity, must be considered in the context of other agricultural tasks that require labor to maintain productivity for each growing season. The responses to changing labor needs for crop production vary according to the local context. A central difference is the participation of women in wage labor in Chiakariga, where clan elders are more central to the organization of both land and labor.

The intersection of land tenure change with growing labor needs for crop cultivation have created numerous openings for renegotiating the social relations of production in Tharaka. The situation of each community differs to some degree in terms of the influence of elders, land availability, and external sources of income. However, group discussions and workshops throughout the study area indicate that the renegotiation of the labor of weeding in the context of intensified production has been remarkably similar in the adjudicated areas of Turima and Gikingo. As observed

elsewhere, control of and negotiation for weeding labor has become a crucial dimensions of household livelihood strategies as land use intensifies (Awonyo 2001; Rocheleau 2000).

From Work Groups to Wage Labor

Based on group discussions and community feedback workshops, a series of responses to weed invasions were outlined by people in each of the locations studied. Most surprising in each case were the similarities in terms of the diagnosis of the problem of weed invasions as well as the similarities in the responses via the reorganization of weeding labor. The initial response to the greater labor requirement was to redirect the work of children toward weeding. One of the changes has been a diversion of children's' labor from the tasks of tending livestock, carrying water, or scaring birds from crop fields. A second change, as discussed above, has been the expansion of plowing before and after planting. Plowing at the beginning of the growing season is seen as an effective means of reducing labor needs through the rest of the growing season. For wealthier households that hire labor, plowing constitutes a savings as compared to the wages that would be paid for weeding in the absence of plowing. As such, it reduces the amount of labor expended during the rest of the growing season.

The above two responses have helped to meet new labor demands. However, more important in terms of response and the implications for the social relations of production is the transformation that has taken place within the organization of women's weeding labor. At least until the early 1980's, women and children made the largest contribution to household weeding labor. Where significant labor was required for

weeding, groups of women undertook the weeding of all of the fields of extended family, or in some case, of a local neighborhood of parcels. Local work groups were often paid with prepared food and beer.

By the late 1980's, several factors contributed to change in the groups' activities. The weeding groups began to come under pressure from local chiefs and ruling party officials on two grounds. Local leaders sought to carry out President Moi's decree banning homemade beer by suppressing the exchange of beer between households, an exchange which remained a particularly important ceremonial aspect of labor exchange in many Tharaka communities. Although President Moi announced the ban soon after coming to power in 1979, the suppression of local beers was haphazard throughout the country and particularly in isolated rural areas such as Tharaka (Haugerud 1993). Second, in the wake of a growing political opposition to the ruling party within many parts of the country, the government had directed local leaders to enforce the Public Order Act, a colonial-era ban on unauthorized meetings. As reciprocal work groups were relatively static in terms of membership and often entailed large gatherings, the groups attracted the ire of local political leaders as a potential venue for the organization of oppositional politics.

Suppression by local leaders lead to a decline in the activities of such groups and contributed to a gradual monetization of labor exchanges between individual families. This was in part due to the demand of wages on the part of male casual workers, many of whom had lost access to wage labor opportunities in the highland towns. Men increasingly demanded wages rather than food or beer in exchange for labor. Many

continued to see the notion of wage labor as essentially a means of redistribution and a form of social obligation of wealthy members of society to the poor.

By the mid 1990's, with labor demands continuing to increase and the perception that the government had relaxed its enforcement of the Public Orders Act, women began to form self-organized weeding work groups with a dual agenda: the provision of reciprocal labor exchanges and earning wages (Marimanti Farmers Group Meeting, 2001). Among younger women, the purpose is primarily social and involves mutual assistance in order to weed all of the farms of the participants. Schedules are coordinated such that all fields are weeded at appropriate times. Older women's groups have succeeded in entering the wage labor market over the objection of elders in each community, with the exception of Chiakariga. Groups of senior women have an advantage in weeding for cash payment as they are known for impeccable work, are more skilled in negotiations, and often succeed in attaining a higher wage than the groups of young women.

The advent of women's weeding groups that work for wages remains a controversial and contested development. Several key characteristics of the new women's groups are indications of their contested nature. Perhaps most remarkable about the weeding groups is their fluid organizational structure. Most of the groups are organized through meetings with fellow church members where individuals have a forum for networking with those other than immediate neighbors. Church meetings are one of the few spaces in Tharaka society in which women have freedom to communicate and plan activities of mutual interest. Using church as a forum, the groups are no longer organized on a neighborhood basis. More often, they are organized according to the

specific objectives, social networks, and time commitments of individual women at the beginning of the growing season. The groups normally stay together for the course of a single growing season before disbanding. Groups form again at the onset of the next growing season, often with changes in membership composition. As such, the individual groups are ephemeral, a characteristic that precludes registration with local authorities. While women are encouraged by government officials to register such groups in order to benefit from potential government assistance, women throughout Tharaka have resisted such formalization. Similarly, they have resisted association with the Tharaka chapter of the national women's organization *Maendeleo ya Wanawake*.

A second characteristic that indicates the contested nature of women's groups is the organization of payment. In order to shield wages from claims by males in the household, payment to women's groups is often made on a rotating basis such that a different woman receives the entire payment each time the group works together.[50] Through rotating payments, women have flexibility in determining when they will be paid and how money will be used. In many cases, the group will agree to purchase items for common use, such as agricultural implements, water storage tanks, or livestock.

The groups are contested primarily by males within the household setting and by elders in many communities who have lost the power to mobilize and allocate household and extended family labor. Whereas in the past working groups carried out a simple reciprocal labor exchange relationship that spread available labor among extended family households, the current groups divert labor from production on home farms to the farms of wealthy, non-kin households. The decision of diverting labor is a particularly difficult

[50] The urgent need to purchase food during drought periods or when food stocks are low greatly reduces such flexibility in organizing the payment of wages.

one. For elders, the mobilization of extended family working groups is increasingly rare in the absence of cash payment. Among poor households with little labor, repeated pleas for assistance, particularly directed at local youth, are often made within extended families. Such pleas increasingly go unheeded in the absence of wages.

Drought, Social Relations, and the Labor of Land Management

The changing dynamics of wage labor in Tharaka agriculture are closely linked to Tharaka's bi-modal rainfall pattern and the stratification of households based on access to non-farm income. When rains are abundant, work groups of relatively poor women can be confident of meeting subsistence needs through home crop production and, therefore, demand higher wages in order to do the weeding of a wealthy neighbor. Wages increase by as much as 100 percent, from 75 Kenya shillings (US$1) per day during the course of a season of low rainfall, to 150 Kenya shillings (US$2) per day when rainfall is abundant. During drought years, weeding labor is plentiful as poor households (including men), lacking livestock to sell, seek wage opportunities in order to purchase food during the dry season. During extended drought periods, wealthy households are often called upon to feed the destitute. In most cases, the poor contribute labor to wealthy households in exchange for food. Work for food arrangements have become increasingly common as options for wage labor in highland Meru have declined.

Along with sales of surplus crops, livestock sales and non-farm income have been the dominant sources of cash for Tharaka households. Recently however, the emergence of greater demand for weeding labor and the decline of clan and extended family authority in the context of the reform of customary land tenure have created an opening

for women to reconfigure the place of weeding groups in an evolving livelihood system in which crop production is increasingly important. The renegotiation is delicate with high stakes for the household. Poor households face the difficult choice of diverting labor from their own fields at critical times by selling labor in order to purchase food or other household need, thus endangering their own productivity. At the same time, in years of low rainfall, crop failure may be inevitable regardless of the labor invested in weeding, leaving the household with the need for cash to purchase food. Thus, the dynamics of this reconfiguration are complex and the strategies of groups vary based on social and economic background and age.

Conclusion

This chapter provides narrative evidence of a salient intersection of social and environmental change that clarifies the complex linkages between changing land tenure, local social relations of gender and seniority, and the rapidly changing demands of land management for crop production. The narratives suggest a qualitative link between the decline of customary institutions, particularly the role of the elders in allocating land and labor, and the dynamics of agricultural intensification. This relationship has direct implications for the ability of households to invest labor in greater productivity and sustainable forms of intensification. As land resources are increasingly fixed, labor resources have become the source of negotiation and contestation within households and communities adapting to the new requirements of intensive crop production.

Chapter 3 discussed elements of risk inherent in crop production in the semi-arid environment. These included the risk of inadequate rainfall and other hazards that can be

responsible for erratic levels of productivity among smallholder farmers. This chapter has introduced a relatively new societal dynamic of risk that has emerged within Tharaka agricultural production. Yet, the above illustration indicates that technical and managerial approaches to understanding the evolution of land management are insufficient in that they do not take into account the way that resource access and use are closely tied to the evolution of social relations of age, gender, and socioeconomic status. Changes in tenure practice have entailed a broader reconfiguration of the social relations through which agricultural production is organized. Combined with rapidly increasing labor requirements for production, such changes have created a space for renegotiating the power to make decisions about the allocation of their own labor as well as taking responsibility for the risks that are undertaken in meeting subsistence needs.

CHAPTER 7

SUMMARY AND CONCLUSIONS

This study has examined the dynamics of land tenure change and the effects of land tenure reform on land use, land management, and livelihoods in a semi-arid district of eastern Kenya. The analysis begins from the assumption that the interpretation of the effects of state-sponsored land adjudication on agricultural intensification must be based in the broad context of evolving human-land relations, including the historical political economy of land use and tenure change, the changing dynamics of crop and livestock production, and parallel changes in the social relations of production. A central challenge in places such as Tharaka is the transition toward more exclusive land rights, both customary and statutory. A transition toward sustainable intensification of crop and livestock production will likely be a key component of local adjustments to such conditions.

Considerable research has examined linkages between the reconfiguration of land rights undertaken by state-sponsored land adjudication and subsequent changes in land use and land management. The dominant approach has limited its consideration of changing tenure to a characterization of new aspects of tenure security within individual households and the resulting incentives for investments in agricultural productivity and, more specifically, sustainable intensification. The results of this research suggest that tenure reform should be considered as constituting a broader social intervention that not only transforms the land rights of households, but also impacts local institutions and the social relations on which they are based. Therefore, the impact of reform is not limited to

the introduction, atrophy, or changing terms of specific categories of rights and the economic incentives created, but additionally entails a broader transformation of local institutions and relationships through which land and labor are allocated and controlled and production carried out.

Overview of Land Use and Livelihood Change

An important element of changing land use in Tharaka is the redistribution of population through both planned and spontaneous settlement of the lower midland zone. Settlement schemes at Tunyai and Nkondi constituted the first expansion of intensive crop cultivation to the footslopes of Mount Kenya that had served as dry season and drought refugee grazing areas for livestock from lowland Tharaka communities. Even as subsidized cotton production declined the late 1980's in tandem with the declining resources of the Kenyan government, spontaneous settlement by farmers from lowland Tharaka continued. By 1989, the midland locations of Turima and Gikingo supported fully one quarter of the Tharaka population. This redistribution of Tharaka population represented a new dimension of differentiation in Tharaka agriculture and society in that much of the population occupied a new social setting in which clan organization and authority structures were less central in land use and tenure arrangements.

In addition to this redistribution, the dynamics of the Tharaka's exchange relationship with the regional economy of Mount Kenya are closely related to Tharaka vulnerability to variable rainfall and erratic crop productivity. Most households grow primary staple crops for home consumption while selling surplus production in order to purchase livestock and domestic needs. In drought years, the sale of livestock is a

common means of attaining money to purchase crops in local markets. Rather than specialized commodity production, the integration of Tharaka smallholders into the regional economy has been characterized by a process of "subsistence-plus" commoditization whereby the production of food crops provides both subsistence and the means of exchange for domestic items available in local markets. This increased engagement with the market represents a greater integration with the regional political economy and greater pressure on food crop production to provide for both household consumption and aspects of market exchange that have become central to Tharaka livelihoods. Nonetheless, the historical trajectory of Tharaka integration into the regional and national economies sets it apart from those areas that have been the major focus of research on the tenure impacts on land management in Kenya (e.g., Carter et al. 1993; Place and Migot-Adholla 1998; Tiffen et al. 1994).

Past research on the Meru gradient has suggested a down slope expansion of processes of land tenure individualization and commoditization of agriculture (Bernard 1993). It has been further suggested that these processes have lead to a progressive marginalization of Tharaka agro-pastoral land use systems due to reduced flexibility in access to the wetter margins of the semi-arid areas (Wisner 1976a). However, the evidence from this study indicates a more complex spatial pattern of change which is related not only to the pattern of agro-ecological potential and expansion of the reach of government bureaucracies from their base in highland Meru, but also the complex histories in which notions of the spatial extent of ethnic home areas has played a role in restricting the process of expanding the frontier of down slope migration. To the contrary, the last three decades in Tharaka has seen the expansion of a modified version

of Tharaka agro-pastoral production with patterns of landholdings and production strategies similar to the lowland zones, though less dependent on livestock.

Dynamics of Evolution and Reform of Tenure

An argument in favor of land reform is that customary tenure systems do not provide security of land tenure and therefore constrain investments in agricultural productivity and soil and water conservation. Statutory tenure, on the other hand, offers security from expropriation by local institutions as well as "land grabbing" by outside elites (Klopp 2000). The land adjudication process in Tharaka has provoked high rates of contestation and conflict in the demarcation of boundaries and establishment of "rights and interests in land". By most accounts, pre-adjudication Tharaka society was not characterized by widespread land-use conflicts. Where conflict emerged, local institutions managed land-use conflicts satisfactorily in the absence of reform. While conflicts of access to land may have increased in advance of the demarcation and adjudication exercise, clan adjudication of land rights appears to have solved such conflicts satisfactorily.

However, the processes of boundary demarcation and adjudication of "rights and interests in land" were problematic in Tharaka. This research has found that both demarcation and the adjudication process provoked considerable contestation of boundaries among individuals and households. These were resolved primarily by local institutions using multiple criteria in allocating land over which multiple households in a given area had held overlapping use rights.

The analysis indicates that Tharaka customary tenure maintains the same breadth, or robustness of rights guaranteed under reformed tenure. The breadth, or robustness, of rights among households in areas of adjudicated and customary tenure differs little in absolute terms. In the household survey, nearly all primary landholders claimed to possess basic rights of transfer, including rights to sell, rent, grant temporarily, and bequeath to sons or daughters. As such, the breadth of rights is roughly similar between statutory and customary tenure systems.

The difference between adjudicated and unadjudicated land rights is found in the assurance of rights and, in particular, the role of elders in sanctioning or potentially restricting the decision-making of the male household head. Both clan elders and land committees can serve as a forum for wives and children to appeal a decision made by a male household head. A decision to sell, for example, must be justified with reference to the well-being of children and a spouse or spouses. Absent such a justification, the sale may be restricted. Women and children may appeal to clan elders in order to seek restrictions to decision-making of the male landholder. Within adjudicated areas, households have become more important sites of negotiation over inter-household land-related disputes. Although women and children may appeal to local elders to influence the decision-making of husbands and fathers, there is increasingly little means of enforcing the views of elders within adjudicated areas. The examination of changing land rights through the prism of local social relations is central to understanding how land reform is affecting the livelihoods of differentiated communities in Tharaka.

Thus, the assurance of rights is highly variable within customary Tharaka tenure. Indeed, the potential reallocation of land during periods of stress remains a form of

uncertainty. Yet, it is clearly an uncertainty that is reduced through good relations with the community at large and, particularly, with influential elders. Investment in one's social standing can be seen as a means of enhancing tenure security (Berry 1992).

The examination of the evolution of Tharaka customary tenure reveals that considerable change has taken place in the allocation of land and the recognition of secondary rights within areas under customary tenure. Throughout Tharaka, secondary use rights are increasingly restricted, particularly those use rights most central to the Tharaka livelihoods such as grazing livestock.

Change in the distribution of landholdings is difficult to measure through time due to changes in the redistributive mechanisms that exist within customary tenure systems in Tharaka. The adjudication seems to have cemented the inequalities that existed due to inequality in land claims between lineages and clans. Land borrowing and renting appear to be components of the strategies of poor households. When rented and borrowed parcels are accounted for, inequality is less than it is for the distribution of land ownership. As such, the development of a land market that would permit greater land concentrations and, in turn, pave the way to greater commercialization does not appear likely. To the contrary, even in recently settled Turima and Gikingo, a distribution of landholdings has developed that closely resembles that of areas of long-term Tharaka settlement.

Land Reform and Sustainable Intensification

An additional argument in favor of the reform of customary tenure proposes tenure individualization as an impetus for agricultural intensification and improved land

management. In Tharaka, where the existence of overlapping rights to grazing resources has been a major component of livelihood strategies, land reform has brought about the demarcation of common grazing lands for private and government development and contributed to the decline in secondary resource access. In the adjudicated areas of Marimanti and Gikingo, it has reduced the flexibility that Tharaka communities enjoyed under localized customary tenure. However, even in unadjudicated areas, the process of demarcation and evolutionary change in customary tenure are creating greater exclusivity and less flexibility in land rights.

Such flexibility was important to maintaining livestock herds as it allowed local institutions to regulate resource access to grazing resources that are spatially and temporally variable in Tharaka's semi-arid landscape. As residual secondary rights decline throughout Tharaka, it can be expected that destocking will continue or even accelerate in the absence of significant government or NGO intervention. As such, a general transition away from livestock keeping and toward more intensive crop production has characterized the majority of households throughout the district. This transition has been most apparent in the adjudicated areas of Gikingo and Marimanti, which exhibit the highest rates of households that do not own livestock.

An important finding is the rapid expansion of investments in soil and water conservation that has occurred in the last two decades, such that rates of investment are now comparable to areas such as Machakos and Mbeere that are often cited as success stories of smallholder adaptation. However, the study supports the conclusions of earlier research that in the absence of state investment in extension, infrastructure, and credit, individualization of land tenure is unlikely to create the conditions necessary to be the

key to a transition toward sustainable intensification (Migot Adholla and Place 1998). What seems crucial is to understand how the relations of production in Tharaka agriculture, and particularly the related changes in the organization of both land and labor, create possibilities to make progress in areas of soil management and crop productivity. Such an analysis must consider both external and internal factors that have accumulated and played important roles in structuring the societal context in which Tharaka farmers manage crop fields and pasture.

Adjudication status does not increase the probability of investment, suggesting the need to examine more closely other social and environmental factors that may drive some to invest in such techniques while inhibiting others. For example, investments in conservation measures and other forms of landesque capital are often important to establishing sustained use of a parcel and can be grounds for asserting exclusionary land rights under both statutory and customary tenure. The dynamics of state-sponsored adjudication may encourage investments in soil and water conservation techniques as a means of creating physical evidence of "rights and interest" on the landscape before the official adjudication process commences in a given area.

Furthermore, the generational politics of land tenure remains a complex aspect of tenure security. The custom of postponing the final transfer of land from father to male children leaves many young households in an uncertain state regarding the amount and quality of land that they will ultimately inherit. More importantly it may discourage investment in soil and water conservation techniques due to the possibility that part or all of the land to which he has access could be reallocated to a sibling.

All of the above are important indicators of change in the Tharaka land-use system, and more broadly within the livelihood system. The implications of land adjudication for sustainable, intensive agriculture and, in turn, for long-term food security are many. For example, the trend toward destocking limits the possible responses of Tharaka households during drought periods, thus increasing vulnerability to selling key domestic assets such as land. Furthermore, without improvements in crop productivity, stress-related migration to wealthier highland areas may increase, effectively reducing the labor available for the increasingly intensive labor of weeding and soil and water conservation.

The Tharaka case study illustrates the intersection of societal and environmental factors in driving change in a semi-arid area. State-sponsored land adjudication has brought about a new logic of tenure security in communities where reform has been implemented such that local institutions are no longer the primary forum for ensuring security of land access. Nonetheless, state adjudicated land rights must still be seen in the context of their interpretation within local communities, whereby rights of exclusion to certain resources may remain difficult to assert where there exist multiple stresses on local communities. At the same time, as the eventuality of land reform looms over the extensive unadjudicated areas of semi-arid Kenya, strategies for asserting exclusive land rights and making land claims during the adjudication process may rely on investments in various forms of landesque capital as indicators of "rights and interest in land". As such, the evolutionary theory of customary tenure change is relevant to the extent that it recognizes areas under customary tenure as part of wider political and cultural spaces in which ideas about land as exclusive property and local notions regarding the legitimacy

of local distributions of resource rights interact with broader changes in the regional political economy.

Furthermore, internal variation in the adaptation of the Tharaka land-use system is also shaped by local agro-ecology. While the agro-ecological potential of Kenya's semi-arid zones is by no means fixed, there are greater limitations of crop productivity and pasture regeneration in Tharaka's marginal lowland zone (Marimanti and Chiakariga) than in midland areas of recent settlement (Turima and Gikingo). Great variability in soil fertility, including extensive areas of sandy and rocky soils, translates into great variability in resource endowments despite relatively moderate inequality in landholdings. Thus, the returns from additional investments of labor in crop productivity are likely to vary greatly both within and between agro-ecological zones.

The Tharaka case study has implications for both population-driven and market demand-led theories of intensification. The Tharaka case study demonstrates that the effects of population growth and market forces are highly dependent on local social variables and the role of a locality within the regional and national political economy. Patterns of state investment and disinvestment are important for creating the parameters of possible intensification trajectories. For example, such investment created the conditions of market access for Tharaka cotton farmers during the 1980's. Likewise, as Boserup (1985) acknowledges, rapid population growth may not allow enough time for successful adaptation of the mode of production in order to sustain increases in productivity. While the temporal dimension is certainly important, the reconfiguration of local social relations and the broader political economy relationships which shape agricultural production appear to be the central determinants of intensification pathways.

The analysis of root causes of land-use and cover change requires an approach that considers the interaction of societal groups and their adaptation to internal and external drivers of change. This research explores place-specific adaptations in Tharaka, examining the relationship to changing tenure practices and broader processes of change within Kenya. The case study supports the notion that although the evolution of land tenure practices represents an important intersection of Tharaka politics, culture, and environment, the existence of state-sponsored land rights alone does not account for variations in land-use and management in Tharaka. As communities continue to struggle with critical social and environmental challenges related to their own livelihoods, the rules of resource access might continue to evolve and adapt to emerging needs. As such, a political ecology of livelihood change in semi-arid Kenya must recognize the multiple pressures that influence land management decisions and the multiple arenas in which land rights are asserted, contested, and maintained.

Implications for Policy

A difficulty facing many social science researchers is the translation of research results into specific policy suggestions. While this research does not suggest specific changes to land tenure policy in semi-arid Kenya, it does suggest broader lessons relevant to tenure and resource management policy that may be useful to the formation of new policy approaches. These relate to the need to open the process of policy formation to local participation, a development that would require new thinking within the Kenya government's approach to semi-arid areas. Such a process would constitute a first step toward identifying the potential for a new working framework and principles for reform.

One approach suggested is the codification of customary land law through the creation of written customary law and its integration with statutory law (Okoth Ogendo 1999). Such formal state recognition of the power of customary tenure institutions may help reduce the uncertainty associated with the fear of expropriation. However, the evolutionary nature of customary law and the power invested in local tenure institutions to uphold community norms would be difficult to codify within broader legal frameworks. Furthermore, the appropriate territorial units over which such legal systems would be established would be a considerable dilemma given variation in tenure practices and institutions within ethnic groups and between localities.

A general suggestion for tenure policy is to investigate local-level natural resource management issues in designing interventions related to land tenure. In the Tharaka case, this could lead to new and innovative approaches to maintaining or reviving key aspects of livelihoods systems. Such approaches might examine possibilities for reclamation of severely degraded land or improvement of land with low potential for crop productivity using many of the techniques found to be successful in Machakos, most importantly the planting of forage grasses (Tiffen et al. 1994). The identification of new tenure solutions must address the inherently precarious nature of dependence on crop cultivation in the absence of new opportunities for income diversification.

A reassessment of Kenya's land tenure policy must also take into account the increasingly complex and differentiated nature of rural livelihoods. While women's groups continue to navigate and reshape the agricultural division of labor, few options exist for acting to ensure security of resource access. Current policy does not restrict

women from ownership of titled land. However, in practice, the few women in any of Kenya's major rural communities hold titles to land. Furthermore, women's inheritance rights are very tenuous and remain subject to the interpretations of local custom. Future policy should establish universal standards of inheritance through principle of co-ownership of household property by male and female household heads. With the likelihood of a major increase in adult mortality in the coming decade due to the Acquired Immune Deficiency Syndrome (AIDS) pandemic, the inheritance rights of women must be a major consideration for future policy.

A broader approach would consider redressing the historical process of Tharaka's marginalization by considering other resources that might improve future livelihoods. Recent national and international interest has developed around the reestablishment of wildlife populations and tourism within neighboring Meru National Park. Such developments may offer possibilities for local community participation in community game ranching for commercial production of game meat. Providing Tharaka communities access to such opportunities opens numerous possibilities for addressing the difficulties of diversification and reduces dependence on crop production. While participation is certainly not a panacea, it is a necessary requirement for understanding the likely effects of future approaches to resource management and tenure.

A limited step in this direction of greater consultation was undertaken by the government-appointed Njonjo Commission of 2000. Although the commission traversed Kenya collecting local testimony on experiences with land policy and tenure change, the central question explored by the commission was the unscrupulous allocations of public land through the Ministry of Lands and Settlement which had become a national symbol

of corruption in Kenya's civil service. As such, the particular problems of tenure in arid and semi-arid lands have not received the attention that they deserve. A new commission to reconsider the problems of current adjudication policies within semi-arid areas seems an initial, appropriate step.

Implications for Political Ecology

Several implications can be drawn from this study for the broad concerns of political ecology research on African land use and tenure systems. Although concern with land tenure has become a central focus within political ecology since the early 1990's, new ways of researching the impacts of changing tenure practices are needed. More specifically, it seems that the interpretation of changing tenure practices and their impacts on resource use generally must be placed within the context of the broader set of social relations that organize production within societies. A focus on the terms through which the labor of men, women, and youth is mobilized ought to be an additional focus where tenure change and resource management are the central concern. The labor process in resource management has been the focus of recent political ecology work (e.g., Turner 1999) and merits further attention as it may be the most fluid component of changing production relations. It is therefore a process around which groups and individuals position themselves to minimize the risks and limitations of new rules of tenure.

The renegotiation of divisions of labor during the process of agricultural intensification suggests the important role of human agency in the process of land use change. Rocheleau (2001) suggests that political ecologists temper their Cartesian

geographies of resources and rules of access with an understanding of the "uncertainty, surprise, and transformation" that differentiated communities confront daily. While it remains essential to analyze rural communities such as those in Tharaka as engaged in a wider set of political economy relationships, the extraordinary ability of local people to the adapt to new structural constraints will continue to constitute the "surprises" in the study of the dynamics of land use and cover change and natural resource management (Taylor 1997).

However, efforts to understand elements of human agency within complex livelihood systems raise difficult methodological quandaries. Given the subtle local relationships of solidarity, cooperation, and rivalry that are often the basis for local forms of collective action, the everyday relationships that structure peoples' daily lives are often well beyond the understanding of non-local researchers. Important questions remain as to role of the researcher's nationality, gender, and perceived socioeconomic status in determining which information is shared by study participants and which remain hidden livelihood strategies. Such researcher-subject dynamics are important to understanding the forms of power with which political ecologists are able to concern themselves.

Although political ecology has rediscovered the importance of complex local processes of change activated by human agency, field-based research is also well-suited to address theoretical questions. For example, society-environment research in the political ecology tradition seems well suited to revisit important theoretical discussions of the political economy of agrarian change in the developing world. Enthusiastic theoretical discussions of Kenya's agrarian development proliferated during the 1970's and 1980's, particularly from the Marxist and dependency perspectives (e.g.,

Anyang'Nyongo 1981; Kitching 1980; Leys 1975; Njonjo 1981). Political ecologists often reject commitment to larger theoretical frameworks, perhaps rejecting the structural determinism of some political economy perspectives. Nonetheless, common processes of change affecting many rural areas of the developing world suggest a need to theorize the development of wage labor, the commoditization of production, and the extension of market relations into the sphere of resource access (Bernstein and Woodhouse 2001). Such theorization can be complementary to the concern for human agency by situating complex local articulations within a framework of general processes affecting the rural social systems and the dynamics of natural resource management.

The Relevance of the Case Study

When combined with household surveys that characterize livelihood systems, small group discussions and community workshops can be powerful tools for exploring the complexities of land use change processes. The use of multiple methods is important to conceptualizing the interaction of forces at different scales that affect land use change. In particular, they can contribute to the growing recognition of the broader importance of social and cultural factors that are often relegated to the local in analyses of the driving forces of land-use and land-cover change (Turner 1999), as well as a recognition of the way in which broader political economy and environmental change is mediated within local contexts. For example, insights from other areas in semi-arid East Africa and elsewhere suggest a similar set of processes related to the renegotiation of divisions of labor and the means of labor allocation under pressures of increasing demands for labor during the process of agricultural intensification (Awonyo 2001; Rocheleau 2001).

Particular attention should be paid to areas that have recently undergone tenure reform, as the ripple effects of reorganizing land rights will likely impact the labor dynamics of land management and land use.

The use of triangulation as a methodological strategy proved to offer numerous strengths in the examination of society-environment interaction. Triangulation relies upon several data sources collected in the course of different kinds of interactions with participants in the research. Of particular importance were the complementarities of quantitative and qualitative data and the experiential dimension of engaging in different kinds of data collection formats.

Household survey data provided the essential capability to generalize and differentiate basic patterns of livelihood activities, land use, and tenure practices. Furthermore, it permitted statistical analyses that identify relationships between tenure practices and changes in land use and management. The analysis of qualitative data was essential to interpreting the complex processes that underlie such relationships and to understand the implications of such relationships for local communities. Equally important was the timing of the collection of qualitative data after the completion of the household survey. This made it possible to include of local interpretations of changes identified by the household survey and permitted further exploration of the geographically and socially differentiated nature of change in Tharaka.

Much recent research on tenure systems in Africa has been framed by the hypothesis that state-sponsored adjudication would create security of tenure and encourage of both labor and capital investments more intensive production. This study did not support this hypothesis. Instead, it suggests additional complex dimensions of the

relationship. Despite the central focus on the tenure-intensification relationship, qualitative research permitted the exploration of unforeseen linkages between land tenure change and land management. It permitted a less structured exploration of peoples' narratives with the objective of understanding interrelated changes in Tharaka livelihoods. In this sense, it permitted an examination of the role of human agency in the response to changing land tenure in the context of other, concurrent changes in society-environment interaction. The ability to explore the broader set of social relations that were effected by land adjudication, and in turn explore the indirect effects on land management, permitted the development of a more integrative view of land tenure within the Tharaka livelihood system.

The implications of the case study are most easily transferable to other parts of semi-arid Kenya in which communities are mediating similar pressures of individualization, intensification of crop production, and declining livestock holdings. However, there is a broader relevance to investigations of land use change processes in other regions. A striking aspect of Tharaka's land use system is that major transformation have been triggered at least in part by political economy changes and political decision-making that were largely unpredictable ten years previous. For example, the collapse of cotton production in Tharaka's upper zone was driven by the expansion and subsequent weakening of a developmental state in Kenya which was itself a product of deepening clientelist politics and corruption, declining terms of trade, and the suspension of multilateral aid to Kenya in the early 1990's. Such broad-scale political and economic changes set the stage for the local adaptation of human-environment interaction. As such, an approach to land use change that considers not only

the position of regions within broader political economies but also the way that power relationships at different scales reshape regional trajectories of land use change seems crucial.

As political ecology continues to move in diverse directions and contribute to diverse and multidisciplinary fields, including the study of land-use and cover change, it seems important to return to certain foundational, yet complex, dimensions of human-environment relations. Questions of power and scale remain fundamental to linking the concerns of political ecology with regional modeling and other activities of the broader land use and cover change community and bringing to bear multiple approaches to the study of the human impact on the Earth via complex political, cultural, and economic processes. In this task, agreement on a broad set of categories of investigation may be as important as the direct transferability of the results of individual studies between places and across regions.

APPENDIX A

ENGLISH AND KITHARAKA VERSIONS OF THE SAMPLE SURVEY QUESTIONNAIRE

QUESTIONNAIRE FOR SAMPLE SURVEY OF HOUSEHOLD LAND USE, LAND TENURE, AND SOCIOECONOMIC CHARACTERISTICS IN THARAKA, KENYA

(English Version)

Tom Smucker, Michigan State University
ILRI/ICRAF/KARI Intensification Project
Tharaka, Kenya

Questionnaire N°:	Date:
Enumerator:	Time Started:
Notes:	Time Finished:

A. Basic Respondent and Household Data

A1. Location:

A2. Sub-location:

A3. Village:

A4. Respondent's gender
1. Male 2. Female

A5. Age of respondent:_____

A6. Respondent is:
1. Married Male Head 2. Single Male Head 3. Married Female Head 4. Single Female Head 5. Son/daughter of head 6. Parent of head 7. Brother/Sister of head 8. Other (specify)

A7. Ethnic group of male household head:
1. Tharaka 2. Cuka 3. Mwimbi 4. Tigania 5. Muthambi 6. Igembe 7. Imenti 8. Mbeere 9. Kikuyu 10. Kamba
11. Other (specify):

A8. Clan of male household head:_____

B.Household Labor and Economic Activities

B1. Which activities provided the most cash for the household in the last year?
LIST IN ORDER OF IMPORTANCE: 1. Farming; 2. Herding; 3. Beekeeping; 4. Jua kali; 5. Trading; 6. Waged farm work 7. Waged non-farm work 8. Selling charcoal 9. Selling wood/firewood 10. Selling manure 11. Selling handicrafts 12. Other (specify)

1. _____ **2.** _____ **3.** _____

B2. Age, gender, marital status, education and economic activities of household members.
(INCLUDE RESPONDENT IN ALL COUNTS);
FOR HOUSEHOLD MEMBERS >16 YRS, INDICATE:
***EDUCATION LEVEL:** 1. University 2. Secondary 3. Polytechnic 4. Primary 5. None
****PRIMARY ACTIVITIES:** 1. Farming; 2. Herding; 3. Beekeeping; 4. Jua kali; 5. Trading; 6. Waged farm work 7. Waged non-farm work 8. School 9. Making charcoal 10. Collecting firewood 11. Making handicrafts

(M)ale/ (F)emale	Age	(S)ingle/ (M)arried	Education Level*	Primary Activities**	Currently Resides On Farm?(Y/N)

B3. Did anyone send remittances from outside to the household in the last year (year 2000)?
1. Often 2. Rarely 3. Never

B4. If remittances were sent, were they paid in cash or in kind?
1. Cash 2. Kind 3. Both

B5. If there were cash remittances, what were they used for? Rank in order of importance.
1. To purchase food 2. To pay school fees 3. To pay health fees 4. To pay for agricultural inputs 5. To purchase or care for livestock 6. To purchase land 7. To hire farm labourers 8. To purchase clothing 9. Other: (specify)

1. _____ **2.** _____ **3.** _____

B6. Did you employ permanent workers on your farm in the last year?
1. More than two 2. Two 3. One 4. None

B7. Did you employ casual workers on your farm in the last year?
1. Often 2. Rarely 3. Never

C. Agricultural Land Use

C1. a. Which crops did the household grow last season? **b.** Intercropped with what other crop? **c.** How many acres of each did you plant? **d.** Did you grow the crop for food, cash, or both. **e.** Has the acreage under cultivation increased, decreased or stayed about the same in the last 10 years? **f.** Did you apply manure, fertilizer, or pesticide?

a. Crop	b. Intercropped with	c. Acres	d. (F)ood/ (C)ash/ (B)oth	e. (I)ncreased/ (D)ecreased/ About the (S)ame	f. (M)anure/ (F)ertilizer/ (P)esticide

C2. Did you receive advice in the last year on agricultural production?
1. Agricultural extension agent 2. NGO 3. Friends or relatives 4. None

D. Livestock Land Use

D1. Indicate the total for each kind of livestock and change as compared to 10 years ago.
***LIVESTOCK COSTS: INDICATE WHICH OF THE FOLLOWING YOU HAVE PAYED FOR IN THE LAST YEAR:** 1. Spray 2. Dip 3. Veterinary Drugs 4. Feed

Livestock	Current Number	(I)ncreased/ (D)ecreased/ About the (S)ame	Livestock Costs*
Local cattle			
Exotic cattle/cross breed			
Goats			
Sheep			
Chicken			
Donkeys			

D2. If the number of cattle or shoats has **increased**, is it because **(LIST IN ORDER OF IMPORTANCE):**
1. Gained access to additional land for grazing 2. Fewer diseases among livestock 3. Bought livestock with income from other activities 4. Bought livestock with remittances sent from outside 5. Natural increase / breeding 6. Other (specify)

1. _____ **2.** _____ **3.** _____

D3. If the number of cattle or shoats has **decreased**, is it because **(LIST IN ORDER OF IMPORTANCE):**

1. Conditions are generally drier 2. Less pasture available due to the adjudication of boundaries 3. Sold livestock to pay for other household needs 4. Diseases are more than in the past 5. It has become too expensive to care for livestock 6. Consumed livestock 7. Other (specify)

1. _____ **2.** _____ **3.** _____

D4. For what purposes are livestock most important to the household? **(CIRCLE ALL THAT APPLY)**

1. For selling when cash is needed (e.g., for food, health fees, school fees) 2. For consumption at important times (wedding, funerals, etc.) 3. For domestic consumption of meat 4. For consumption of milk 5. For payment of dowry 6. For producing manure for crops 7. For draft power 8. Other (specify)

D5. How often do you purchase livestock?

1. At least once per month 2. At least once per year 3. Less than once per year 4. Never

D6. How often do you sell livestock?

1. At least once per month 2. At least once per year 3. Less than once per year 4. Never

D7. Do you graze livestock anywhere apart from your own parcels?

1. Often 2. Rarely 3. Never

D8. If so, where do you graze livestock apart from your own parcels?

1. public parcel 2. a relative's parcel 3. another household's parcel 4. swamps (public) 5. swamps (private) 6. roadsides (public) 7. riverbank (public) 8. river bank (private) 9. hillsides (public) 10. Other (specify)

E. Land Tenure Status and Land Management

E1. How many parcels does the household have access to?_____

E2. How many parcels did the household use this year for cultivation or grazing?_____

E3. Has the primary landholder ever sold a parcel?

1. Yes 2. No

E4. If so, did s/he sell to: **(INDICATE NUMBER OF PARCELS AND TOTAL ACRES):**

1. Relations/Kin
   (Number of parcels:_____; Total acres:_____)
2. Other
   (Number of parcels:_____; Total acres:_____)

E5. Has the primary landholder transferred any land to sons?

1. Yes 2. No 3. Not sure

E6. If yes, was the land registered in the name of the son?

1. Yes 2. No 3. Not sure

E7. Has the primary landholder transferred any land to daughters?

1. Yes 2. No 3. Not sure

E8. If yes, was the land registered in the name of the daughter?

1. Yes 2. No 3. Not sure

Parcel 1 (Repeat For Each Parcel)

E9. Location of the parcel:_____

E10. Sub-location of the parcel:_____

E11. Slope of the parcel:
1. Steep slope 2. Moderate slope 3. Flat 4. Valley

E12. Walking time from the homestead to the parcel:
1. Adjacent to homestead 2. less than 30 minutes 3. 30 minutes-1 hour 4. 1-2 hours 5. More than 2 hours

E13. How many acres is this parcel:_____

E14. Last season, how many acres were:

Crops_____ Fallow_____ Bush_____ Grassland_____

E15. How many years ago did you begin using this parcel permanently?_____

E16. Describe the ground cover of the parcel at the time your household began using it permanently:
1. Bush 2. Regrowth or grazing land 3. Crops 4. Grassland 5. Other (specify)

E17a. Have you planted trees since you started using this parcel permanently? **(CIRCLE ALL THAT APPLY)**
1. Fruit trees 2. Non-fruit trees (indigenous) 3. Non-fruit trees (exotic) 4. None

E17b. Why did you plant trees? **(CIRCLE ALL THAT APPLY)**
1. Soil and water conservation 2. Domestic needs 3. For produce 4. To mark boundaries 5. Other: (specify)

E18a. Have you planted shrubs since you started using this parcel permanently?
1. Yes 2. No

E18b. Why did you plant shrubs **(CIRCLE ALL THAT APPLY)**?
1. Soil and water conservation 2. Domestic needs 3. For produce 4. To mark boundaries 5. Other: (specify)

E19. Do you use this parcel as:
1. Owner 2. Renter 3. Borrower

↓ IF OWNER, CONTINUE WITH QUESTION E20.
↓ IF RENTER, SKIP TO QUESTION E41.
↓ IF BORROWER, SKIP TO QUESTION E43.

E20. Did you acquire this parcel through:
1. Inheritance or subidivision of father's land 2. Allocation by clan 3. Government-sponsored settlement 4. Purchase
5. Temporary allocation by father 6. Unassisted settlement

E21. Does this parcel have a title deed?
1. Yes 2. No

↓IF TITLED, CONTINUE WITH QUESTION E22.
↓ IF NO TITLE, SKIP TO QUESTION E28.

E22. How many years ago was title issued?_____

E23. In whose name is the title?_____
1. Father of male household head 2. Mother of male household head 3. Male household head 4. Female household head 5. Son 6. Daughter

E24. Was there a disagreement between households over the adjudication?
1. Yes 2. No 3. Not sure

E25. Was the disagreement resolved?
1. Yes 2. No

E26. If so, how was the disagreement resolved?
1. by parties involved in the disagreement 2. by the clan 3. by the arbitration board 4. by the chief or assistant chief 5. by the village land committee 6. by the land board 7. in court

E27. Has your use of this parcel changed since the land was titled? If so, how?
(PROBE FOR INFORMATION ON : 1) importance of crops versus livestock 2) changes in grazing and watering livestock (on parcel/crop residues; river banks, roadsides etc.) 3) soil and water conservation, use of fallow)

↓ SKIP TO QUESTION E43.

E28. Has this parcel been adjudicated?
1. Yes 2. No 3. Not sure

↓ IF ADJUDICATED, CONTINUE WITH QUESTION E29.
↓ IF NOT ADJUDICATED, SKIP TO QUESTION E34.

E29. How many years ago was it adjudicated?_____

E30. Was there a disagreement between households over the adjudication?
1. Yes 2. No 3. Not sure

E31. Was the disagreement resolved?
1. Yes 2. No

E32. If so, how was the disagreement resolved?
1. by parties involved in the disagreement 2. by the clan 3. by the arbitration board 4. by the chief or assistant chief 5. by the village land committee 6. by the land board 7. in court

E33. Has your use of this parcel changed since adjudication? If so, how?
(PROBE FOR INFORMATION ON : 1) importance of crops versus livestock 2) changes in grazing and watering livestock (on parcel/crop residues; river banks, roadsides etc.) 3) soil and water conservation, use of fallow)

↓ SKIP TO QUESTION E43.

E34. Do you know the boundaries of this parcel?
1. Yes 2. No

↓ IF BOUNDARIES ARE KNOWN, CONTINUE WITH QUESTION E35.
↓ IF BOUNDARIES ARE NOT KNOWN, SKIP TO QUESTION E43.

E35. Who has demarcated the boundaries?
1. Demarcated cooperatively by neighbors 2. Clan 3. Village land committee 4. Chief's committee 5. the Chief

E36. How many years ago were the parcel boundaries demarcated?_____

E37. Was there a disagreement between households over the demarcation of boundaries?
1. Yes 2. No 3. Not sure

E38. Was the disagreement resolved?
1. Yes 2. No

E39. If so, how was the disagreement resolved?
1. by parties involved in the disagreement 2. by the clan 3. by the arbitration board 4. by the chief or assistant chief 5. by the village land committee 6. by the land board 7. in court

E40. Has your use of this parcel changed since the boundaries were demarcated? If so, how?
(PROBE FOR INFORMATION ON : 1) importance of crops versus livestock 2) changes in grazing and watering livestock (on parcel/crop residues; river banks, roadsides etc.) 3) soil and water conservation, use of fallow)

↓ SKIP TO QUESTION E43

E41. How many years ago did you first rent this parcel?_____

E42. Do you pay to use the parcel in:
1. Cash 2. Crops 3. Other (specify)

E43. Do non-household members use this parcel?
1. Yes 2. No

E44. If so, do they use the plot as:
1. Renter 2. Owner 3. Hired worker

E45. Which of the following rights do you (head of hh) hold on this parcel?
CIRCLE ALL THAT APPLY
INDICATE WHO MUST BE CONSULTED IN THIS DECISION: 1=Owner; 2=Spouse; 3=Parent; 4=Son; 5=Daughter; 6=Clan; 7=Government; 8= Neighbor;
INDICATE ("YES", "NO", OR "N/A") IF ANYONE NOT IN THE HOUSEHOLD HAS THIS RIGHT ON THIS PARCEL

Rights		"X"	Who must be consulted?		Do non-household members have these rights:
Sell to anyone	Owners Only			Every one	
Sell to kin					
Transfer to son/daughter					
Lend/Grant temporary use rights					
Rent/lease					
Plant perennials	Renters and Borrowers Only				
Plant annuals					
Graze livestock					
Water livestock					
Collect fruit					
Collect fruit growing wild					
Collect firewood					
Use trees growing wild (including, hang beehives)					
Cut trees growing wild					
Build permanent structures					
Build temporary structures					

E46. Which implements did you use for crop production on this parcel this year
(CIRCLE ALL THAT APPLY)
1. Stick 2. Jembe (hand hoe) 3. Draft power – own 4. Draft power – hired 5. Tractor – own 6. Tractor – hired
7. Other (specify)

E47. Have you constructed any permanent structures on this parcel?

Permanent Structures	How many?	How long ago constructed?
Concrete house, metal roof		
Mud house, thatch roof		
Mud house, metal roof		
Granary, concrete foundation		
Granary, mud foundation		
Fencing, bush or live		
Fencing, barbed wire		
Water tank		

E48. a. Have you done anything on this parcel to conserve soil and water? **b.** Has your use of these techniques increased or decreased on this parcel since you began cultivating? **c.** Who is usually responsible for these activities? **d.** How many years ago were they adopted?

CIRCLE TECHNIQUES USED

INDICATE WHO DOES IT: 1= Male head; 2= Female head; 3=Sons; 4=Daughters; 5=Other Adult Males; 6=Other Adult Females; 7= work groups; 8= hired labor; 9= Everyone

INDICATE NUMBER OF YEARS AGO ADOPTED OR E=EXISTED AT THE TIME OF ACQUISITION.

a. Technique	b. (I)ncreased/ (D)ecreased/ About the (S)ame	c. Who does it?	d. How long ago adopted? (PLACE ESTIMATES IN PARENTHESES)
Stone bunds			
Log lines			
Fanya juu			
Erosion trench			
Grass strips			
Contour farming			
Trash lines			
Terrace			
Ridging			
Mulching			
Tree/shrub planting			
Water harvesting			
Chemical fertilizer			
Manuring			

E49. Why did you invest in the above techniques on *this* parcel?

E50. Do you know of other techniques that would preserve soil fertility and conserve water?

E51. If so, do you plan to use them in the future? Why or why not?

E52. Do any of these techniques help establish your right to use this land in the future?

F. Responses to Drought

F1. Did you produce enough food for your family last year?
1. Yes 2. No

↓ **IF YES, SKIP TO QUESTION F4.**

F2. How did you obtain food during the period of shortage last year.
(CIRCLE ALL THAT APPLY)
1. Harvest 2. Bought food with savings 3. Sold livestock to buy food 4. Obtained food from relatives 5. Obtained famine relief from government 6. Obtained relief from government, WFP, NGO or religious organization 7. Hunted animals 8. Gathered wild berries or other wild foods 9. Other (specify)

F2a. Did you receive any assistance from an organization during the last year?
1. food 2. seed 3. food and seed 4. other (specify)

F2b. If so, from whom did you receive assistance?
1. the government 2. the World Food Program 3. a church organization 4. Not sure 5. other (specify)

F3. How severe was the shortage last year compared with others in the past?
1. Worse 2. About the same 3. Not as bad

F4. Did you give food to any friends or relatives last year?
1. Yes 2. No

F5. Did anyone move to this household as a result of the drought?
1. Friends 2. Relatives 3. Neighbors 4. None

F6. Did you sell any food crops last year?
1. Yes 2. No

F7. What are the ways that this household has adjusted to the recent drought? Which ways of dealing with past droughts does the household no longer rely on?

Type	Adjustment	Current Practice	Discontinued Practice
Affect rainfall source	Pray		
	Consult rainmaker		
Increase moisture	Plant before 1st rain		
	Plant with 1st rain		
	Irrigate		
	Invest more in soil/water conservation techniques		
	Cultivate low, wet places		
	Move livestock elsewhere for grazing; **INDICATE:** 1. To another of the household's parcel; 2. To relatives' parcel; 3. To public land 4. To clan land 5. Other (specify)		
Reduce moisture needs	Plant drought resistant crops		
	Weed more		
Diversify	Sell charcoal		
	Sell wood/firewood		
	Sell manure		
	Sell handicrafts		
	Seek wage work nearby		
	Seek wage work away from home		
	Work for food nearby		
	Work for food away from home		
	Hunt		
	Gather edible plants, berries		
Distribute or share loss	Ask for help from kin: **INDICATE:** 1. livestock 2. money 3. food		
	Ask for help from the government or a local organization		
	Move to extended family's farm		
Bear the loss	Buy food		
	Eat stored food		
	Sell livestock		
	Consume livestock		

F8. Did any household members leave home as a result of the drought? What activities did they undertake in the new place?

INDICATE WHO HAS LEFT HOME: 1= Male head; 2=Female head; 3=Sons; 4=Daughters; 5=Other Adult Males; 6=Other Adult Females

	Nairobi	Mombasa	Meru Town	Embu Town	Nanyuki	Other:
Jua Kali						
Trading						
Waged farm work						
Waged non-farm work						
Other: (specify)						

F9. Has the amount of remittances increased from those who normally stay outside since the beginning of the drought?

1. Yes 2. No

F10. Are you doing anything to protect yourself from the effects of drought in the future?

1. Yes 2. No

F11. If yes, what are you doing to protect yourself from the effects of drought in the future?

1. Saving money 2. Buying more land 3. Planting drought-resistant crops 4. Increasing soil and water conservation 5. Keeping more animals 6. More household members working away from the farm 7. Storing food 8. Other (specify)

SAMPLE SURVEY OF HOUSEHOLD LAND USE, LAND TENURE, AND SOCIOECONOMIC CHARACTERISTICS IN THARAKA, KENYA

(Kitharaka Version)

Tom Smucker, Michigan State University
ILRI/ICRAF/KARI Intensification Project
Tharaka, Kenya

Questionnaire N°:	Date:
Enumerator:	Time Started:
Notes:	Time Finished:

A. Basic Respondent and Household Data

A1. Location:

A2. Sub-location:

A3. Ntũũra:

A4. Ũra agũcokia I:
1. muntũ mũrũme 2. mũka

A5. Ũkũrũ bwa ũra agũcokia bĩũria:_____

A6. Ũra agũcokia bĩũria nũũ:
1. mũkũrũ mwene mũciĩ 2. muntũ mũrũme atarĩ na mũka arĩ na mũciĩ 3. mwekũrũ mwene mũciĩ 4. mũka arĩ na mũciĩ atarĩ na mũrũme 5. mũthaka / mwarĩ wa mwene mũciĩ 6. mũciari wa mwene mũciĩ 7. mũruagina / mwaragina wa mwene mũciĩ 8. baangĩ (ibarĩkũ)

A7. Kabira ya mwene mũciĩ:
1. Imũtharaka 2. Imũchuka 3. Imũmwĩmbĩ 4. Imũtigania 5. Imũmũthambĩ 6. Imũĩgembe 7. Imũimenti 8. Imũmbeere 9. Imũgĩkũyũ 10. Imũĩkamba 11. Ciingĩ (ni irĩkũ):

A8. Mwĩrĩga wa mwene mũciĩ:_____

B.Household Labor and Economic Activities

B1. I ngũgi irĩkũ ciaretire mbeca imbiingĩ kĩrĩ mũciĩ ũjũ mwanka mũthĩru (2000)?
LIST IN ORDER OF IMPORTANCE: 1. Ũrimi; 2. Ũrĩithi; 3. Ũtegi bwa mĩatũ; 4. Jua kali; 5. Biacara; 6. Ngũgĩ cia munda cia kwandĩkwa; 7. Ngũgĩ cia kwandikwa itari cia munda 8. Kwendia makara 9. Kwendia mĩtĩ kana/na nkũ 10. Kwendia mborea (thaamu) 11. Kwendia mĩgeka, ikabũ, itĩ, miatũ, n.k. 12. Biingĩ (uga)

1. _____ **2.** _____ **3.** _____

B2. Ũkũrũ, gender, marital status, kĩthomo, na mantũ ma economy ma antu ba mũciĩ.
(INCLUDE RESPONDENT IN ALL COUNTS);
FOR HOUSEHOLD MEMBERS >16 YRS, INDICATE:
***KĨWANGO GĨA KĨTHOMO:** 1. University 2. Sekondarĩ 3. Polytechnic 4. Primary 5. Ti mũthomu
****NGŨGĨ IRA CIRĨ GĨTŨMI:** 1. Ũrimi; 2. Ũrĩithi; 3. Ũtegi bwa mĩatũ; 4. Jua kali; 5. Biacara; 6. Ngũgĩ cia munda cia kwandĩkwa; 7. Ngũgĩ cia kwandikwa itari cia munda 8. Cukurũ 9. Gwakĩa makara 10. Kuuna nku 11. Kutuma mĩgeka, ikabũ, itĩ, miatũ, n.k.

(M)ale/ (F)emale	Ũkũrũ	(S)ingle/ (M)arried	* Kĩwango gĩa kĩthomo	**Ngũgĩ ira cirĩ gĩtũmi	Currently Resides On Farm?(Y/N)

B3. Kurĩ muntũ watũma gĩntũ kuuma nja kĩrĩ mũciĩ ũjũ mwanka mũthiru (year 2000)?
1. rĩonthe 2. rĩmwe na rĩmwe 3. gũtiri rio

B4. Kethĩra kũrĩ gĩntũ gĩatũmwa rĩ, I mbeca kana niinto?
1. mbeca 2. into biingĩ 3. bionthe

B5. Kethĩra I mbeca bwatũmĩĩrwe rĩ, bwacitũmĩĩre kurutha ata? **(RANK IN ORDER OF IMPORTANCE.)**
1. kũgũra irio 2. kũrea biici cia cukuru 3. kũrea cibitaarĩ na ndaawa 4. kugura into bia ũrĩmi 5. kugura kana kumenyeera into bia ndiithia 6. kugura ithaka 7. kũrea antũ ba ngũgĩ 8. Kũgũra nguo 9. Maangi (I marĩkũ)

1. _____ **2.** _____ **3.** _____

B6. Bũraandĩka antũ ba ngũgĩ ba gũkara mũndaani wenu mwanka mũthiru?
1. nkũrũki ya baĩrĩ 2. baĩrĩ 3. ũmwe 4. gutirĩ gwe

B7. Bũraandĩka antũ ba ibaarũa mũndaani wenu mwanka mũthiru?
1. rĩonthe 2. rĩmwe na rĩmwe 3. gutirĩ rĩo

C. Agricultural Land Use

C1. a. Ni irio birikũ bwaandire mbura nthiru? **b.** Ibiaungene na biingĩ **c.** Bwaandĩte ĩka igana cia kĩra kĩmera? **d.** Bũbiandaga nontũ bwa kũrea kana nontũ bwa kwendia kana ibionthe. **e.** Ĩka ira bwandaga irio bibu iciongerekete, icinyiĩte kana ikarĩte bũmwe ndeeni ya mĩanka ikũmi mĩthiru? **f.** Ũratumira mboreo, fertilizer, kana ndaawa cia kũbuĩrĩĩra?

a. Crop	b. Intercroppe d with	c. Acres	d. (F)ood/ (C)ash/ (B)oth	e. (I)ncreased/ (D)ecreased/ About the (S)ame	f. (M)anur e/ (F)ertiliz er/ (P)esticid e

C2. Kũri utethio bwũna bwa kurima kana kurethia mwanka jũũ mũthiru kũmanio na:
1. Agricultural extension agent 2. bĩama bĩti bĩa thirikari (NGO) 3. acore kana andũ ba mũcĩ 4. gutiri

D. Livestock Land Use

D1. Onania namba ya kĩra mũthemba wa nyamũ na ũgarũku bwacio ndeeni ya mĩanka ĩkũmi mĩthiru.

***LIVESTOCK COSTS: INDICATE WHICH OF THE FOLLOWING YOU HAVE PAYED FOR IN THE LAST YEAR:** 1. Kũbuĩrĩĩra 2. Dip 3. Ndaawa 4. Irio

Livestock	Current Number	(I)ncreased/ (D)ecreased/ About the (S)ame	Livestock Costs*
Ng'ombe cia kitharaka			
Ng'ombe cia ngirĩndi			
Mbũri			
Ng'oondu			
Ngũkũ			
Mang'oi			

D2. Kethĩra namba ya ng'ombe, mbũri na ng'oondu nĩongerekete, nontũ bwa: **(LIST IN ORDER OF IMPORTANCE):**
1. wagwatire ithaka bia kurĩithia 2. mĩrimo yanyianyia 3. bwagũrire nyamũ na mbia kuuma ngũgĩni ciingĩ 4. bwagurire nyamu na mbia ira bwatũ mĩirwe kuuma nja 5. ciaciaranire 6. naata buringi (uga)

1. _____ **2.** _____ **3.** _____

D3. Kethĩra namba ya ng'ombe, mbũri na ng'oondu nĩanyiĩre, nontũ bwa: **(LIST IN ORDER OF IMPORTANCE):**

1. gũntu igũgũtuĩka kũũmo 2. ndĩĩthia nĩnyiĩte nontũ bwa kũgitangwa kwa mianka 3. ibwendiirie nyamũ nontũ bwa mahitaji ma mucĩ 4. mĩrimo nĩongerekeete 5. kwaiga nyamũ igũtuĩkĩĩte goro mono 6. kurea / kuthinja 7. itũmi biingĩ (uga ibirĩkũ)

1. _____ **2.** _____ **3.** _____

D4. Nyamu inu ciigagwa nontũ bwa itũmi birĩkũ mũciĩ ũjũ? **(CIRCLE ALL THAT APPLY)**

1. kwendia rira mbeca ikwendekana (e.g., kugura irio, kurea biici) 2. kurea igita ria biatho (miranu, mathiko, etc.) 3. nontũ bwa kũrea nyama 4. nontũ bwa kũnyua ĩria 5. kuraayia 6. nontũ bwa mboreo 7. nontũ bwa kurima 8. itũmi biingĩ (uga ibirĩku)

D5. Ita maita magana ũgũraga ndĩĩthia?

1. ta rĩmwe kwa mweri 2. ta rĩmwe kwa mwanka 3. ruungu rwa rĩmwe kwa mwanka 4. gũtirĩ rio

D6. Ita maita magana wendagia ndĩĩthia?

1. ta rĩmwe kwa mweri 2. ta rĩmwe kwa mwanka 3. ruungu rwa rĩmwe kwa mwanka 4. gũtirĩ rio

D7. Igũntũ kũngi kurĩku urithagia tatiga mũndani waku?

1. rĩonthe 2. rĩmwe na rĩmwe 3. gũtiri rio

D8. Kethira nĩũ, ĩnaa ũrithagia **(CIRCLE ALL THAT APPLY)**

1. kĩthakaani gĩa public 2. kithakaani kĩa antu ba mũcĩ 3. kithakaani kĩa antũ bangi 4. mariani (public) 5. mariani (private) 6. ntere cĩa barabara (public) 7. ntere cĩa miuro (public) 8. ntere cĩa miuro (private) 9. irĩmani (public) 10. Kũũngĩ (uga)

E. Land Tenure Status and Land Management

E1. I mĩnda ĩgana mũciĩ ũjũ gũũmba gutũmĩra?_____

E2. I mĩnda ĩgana mũciĩ ũjũ gwatũmĩĩre mwanka mũthiru kũrĩma kana kũrĩĩthia?_____

E3. Muntũ ũra aari wa mbere mũũndani ũjũ aracuendia?

1. Yĩĩ 2. Arĩ

E4. Kethĩra aracuendia, nũũ eenderie? **(INDICATE NUMBER OF PARCELS AND TOTAL ACRES)**

3. Muntũ wa mucĩ
   (Mĩĩnda igana:_____; Ika cionthe:_____)
4. Baangi
   (Mĩĩnda ĩgana:_____; Ika cionthe:_____)

E5. Muntũ wa mbere mũũndani ũjũ aragaĩra nthaka mũnda?

1. Yĩĩ 2. Arĩ 3. Ntikũmenya

E6. Kethira arabagaĩra mũnda ũjũ uraandĩkithua na rĩĩtwa ria mũthaka?

1. Yĩĩ 2. Arĩ 3. Ntikũmenya

E7. Mũntũ wa mbere mũundani ũjũ aragaĩra aarĩ mũnda?_____

1. Yĩĩ 2. Arĩ 3. Ntikũmenya

E8. Kethira arabagaira, munda ũjũ uraandikithua na riĩtwa rĩa mwarĩ?

1. Yĩĩ 2. Arĩ 3. Ntikumenya

Parcel 1 (Repeat For Each Parcel)

E9. Mũnda ũjũ urĩ location ĩrĩkũ?:_____

E10. Mũnda ũjũ urĩ sub-location ĩrĩkũ :_____

E11. Mũnda ũjũ ũrĩ mwĩndamanoni ũkari ata?
1. kamwĩndamano kaathũĩku / mparani 2. kamwĩndamano gatarĩ kathũũku 3. tambararĩ 4. mũguuru

E12. Ũjũkagia kagiita kagana ata kuuma muciĩ kuthi mũndani?
1. mũnda ũrĩ aakubĩ na mũciĩ 2. ruungu rwa nusu ithaa 3. gatigati ka nusu ithaa na ĩthaa rĩmwe 4. gatĩgatĩ ka ĩthaa rĩmwe na mathaa maĩrĩ 5. Nkũruki ya mathaa maĩrĩ

E13. Mũnda ũjũ nwa ĩka igana:_____

E14. Nĩ ĩka igana cirĩ:

Ndĩme_____ Ng'ũũndũ_____ Kithaka_____ Nyaki_____

E15. I mĩanka ĩgana ĩthirĩte kuuma bũkwambĩĩria gũtũmĩra mũnda ũjũ bweega?_____

E16. Bũkianjĩĩria gutũmĩra mũũnda ũjũ wakara kari ata?
1. kĩthaka 2. ng'ũndũ kana gũntũ wa kurĩĩthia 3. irio 4. nyaki 5. nata buungĩ (uga)

E17a. Buraanda mĩtĩ kuuma bũkwanjĩĩria gũtumĩra mũnda ũjũ **(CIRCLE ALL THAT APPLY)**?
1. mĩtunda 2. mĩtĩ ĩtarĩ mĩtunda ya kĩenyeji 3. mĩtĩ ya kigeni 4. gũtirĩ yoo.

E17b. Ikĩ nontũ bwaandire mĩtĩ **(CIRCLE ALL THAT APPLY)**?
1. kumenyeera muthetu na rũũjĩ 2. gũtũmira mucĩ 3. nontũ bwa gũtũmĩra maciaro maayo 4. kũonania mĩankâ
5. naata bungi (uga)

E18a. Buraanda macikaciki / makumbi (tũmĩtĩ tũũniinĩ) kuuma bũkwanjĩĩria gũtumĩra mũnda ũjũ **(CIRCLE ALL THAT APPLY)**?
1. Yes 2. No

E18b. Ikĩ nontũ bwaandire macikaciki / makumbi (tũmĩtĩ tũũniinĩ) **(CIRCLE ALL THAT APPLY)**?
1. kumenyeera muthetu na rũũjĩ 2. gũtũmira mucĩ 3. nontũ bwa gũtũmĩra maciaro maayo 4. kũonania mĩankâ
5. naata bungi (uga)

E19. Ũtũmagĩra mũnda ũjũ urĩ taũ:
1. mwene 2. mũkombori 3. mũrombi

↓ IF OWNER, CONTINUE WITH QUESTION E20.
↓ IF RENTER, SKIP TO QUESTION E41.
↓ IF BORROWER, SKIP TO QUESTION E43.

E20. Wagwatangire mũnda ũjũ ata:
1. Gũtigĩrwa / kugaĩrwa kĩthaka kĩa abaagu 2. Kwegwa imwĩrĩga 3. Kwegwa ithirikaarĩ 4. Kũgũra
5. Kugaĩrwa ntũmagira ni baba 6. Kũgwata (ngwatô)

E21. Mũnda ũjũ ũrĩ na taito deed?
1. Yĩĩ 2. Arĩ

↓IF TITLED, CONTINUE WITH QUESTION E22.
↓ IF NO TITLE, SKIP TO QUESTION E28.

E22. I ta mĩanka igana ĩthirĩte kuuma taito ĩkwejanwa?_____

E23. Taito ino yaejanirwe na riĩtwa rĩaũ?
1. Ĩthe wa mwene mucĩ 2. Ng'ina wa mwene mucĩ 3. Mũkũrũ mwene mucĩ 4. Mwekũrũ mwene mucĩ 5. Muthaka 6. Mwari

E24. Ikwarĩ na nkarari gatĩ keenu na atũũri rĩra mĩanka yarutagwa?
1. Yĩ 2. Arĩ 3. Ntikumenya

E25. Nkarari iciathiriirue?
1. Yĩ 2. Arĩ

E26. Gwegua iciathiriirue, ciathirangiirue ata?
1. Ibara baari na thiina ĩnu 2. Imwiriga 3. I board ya magamba ma ithaka 4. chief / sub-chief 5. kamĩti ya ithaka ntũũra 6. I board ya mĩnda 7. koti (court)

E27. Ũtũmĩri bwaku bwa munda ũjũ ibũgarũkĩte kuuma bukwegwa taito deed? Kethira ibũgarũkĩte, bũgarũkite ata?
(PROBE FOR INFORMATION ON : 1) importance of crops versus livestock 2) changes in grazing and watering livestock (on parcel/crop residues; river banks, roadsides etc.) 3) soil and water conservation, use of fallow**)**

↓ SKIP TO QUESTION E43.

E28. Mũnda ũjũ nũmũthime?
1. Yĩ 2. Arĩ 3. Ntikumenya

↓ IF ADJUDICATED, CONTINUE WITH QUESTION E29.
↓ IF NOT ADJUDICATED, SKIP TO QUESTION E34.

E29. I mianka ĩgana mĩthiru kuuma mũnda ũjũ ũkũthimwa?_____

E30. Ikwarĩ na nkarari gatĩ keenu na atũũri rira mĩanka yarutagwa?
1. Yĩ 2. Arĩ 3. Ntikumenya

E31. Thĩĩna ĩnu niathiriirue?
1. Yĩ 2. Arĩ

E32. Kethĩra nĩathiriirue yathirangiirue ata:
1. Ibara baari na thĩĩna ĩnu 2. I mwĩriga 3. I'board ya magamba ma ithaka 4. chief / sub-chief 5. kamĩti ya ithaka ya ntũũra 6. I'board ya mĩnda 7. koti (court)

E33. Ũtũmĩri bwaku bwa mũnda ũjũ ibũgarũkĩte kuuma mũnda ũkũthimwa? Kethĩra ibugarũkĩte naata?

(PROBE FOR INFORMATION ON : 1) importance of crops versus livestock 2) changes in grazing and watering livestock (on parcel/crop residues; river banks, roadsides etc.) 3) soil and water conservation, use of fallow**)**

↓ SKIP TO QUESTION E43.

E34. Nwijĩ mĩanka ya mũnda ũjũ?

1. Yĩ 2. Aĩ

↓ IF BOUNDARIES ARE KNOWN, CONTINUE WITH QUESTION E35.
↓ IF BOUNDARIES ARE NOT KNOWN, SKIP TO QUESTION E43.

E35. Nũũ eekĩĩre mĩanka?

1. Ngwataniro ya atũũri 2. Mwĩrĩga 3. Kamĩtĩ ya ithaka ya ntũũra 4. Kamiti ya chief 5. Chief

E36. I mĩanka ĩgana mĩthiru kuuma munda ugwĩkĩrwa mĩanka?_____

E37. Ikwarĩ na nkarari gati keenu na atũũri rĩra mĩanka yeekagĩrwa?

1. Yĩ 2. Aĩ 3. Ntikumenya

E38. Nkarari inu iciathiriirue?

1. Yĩ 2. Aĩ

E39. Kethĩra iciathiriirue ciathirangirue ata?

1. Ibara baari na thĩĩna ĩnu 2. I mwĩriga 3. I'board ya magamba ma ithaka 4. chief / sub-chief 5. kamĩti ya ithaka ya ntũũra 6. I'board ya mĩnda 7. koti (court)

E40. Utumĩri bwaku bwa munda ũjũ ibũgarũkĩte kuuma mĩnda ĩgwĩkĩrwa mĩanka. Kethĩra ibũgarũkĩte rĩ, naata?

(PROBE FOR INFORMATION ON : 1) importance of crops versus livestock 2) changes in grazing and watering livestock (on parcel/crop residues; river banks, roadsides etc.) 3) soil and water conservation, use of fallow**)**

↓ SKIP TO QUESTION E43

E41. Imwanka urĩkũ wakomborire mũnda ũjũ rĩa mbere?_____

E42. Uriaaga mũnda ũjũ nambi:
1. Mbeca 2. Irio 3. Biingĩ (uga)

E43. Antu batari ba mũciĩ ũjũ ibatũmagĩra mũnda ũju?
1. Yĩ 2. Arĩ

E44. Kethĩra ibatũmagira rĩ, batũmagĩra ta:
1. Akombori 2. Eene 3. Aruti ngũgĩ

E45. I haki irikũ gati ka ino urĩ nacio mũndani ũjũ?
CIRCLE ALL THAT APPLY
ONANIA URA URINGAGĨRWA RIBOTI MANTŨŨNI MAMA: 1=Mwene; 2=Mwekũrũ / Mũkũrũ; 3=Mũciari; 4=Muthaka; 5=Mwari; 6=Mwĩrĩga; 7=Thirikaari; 8= mũtũũri
ĨKĨRA ("YES", "NO", KANA "N/A") KWONANIA MUNTŨ ATARĨ WA MUCIĨ EENA HAKI INO MUUNDANI ŨJŨ

Haki		3	Ũra wonagwa?		Antu batari ba mucĩĩ beena haki ino?
Kwenderia muntu wonthe	Owners Only			Everyone	
Kwenderia muntũ wa mucĩĩ					
Kugaira muthaka kana mwari					
Gukobithania kana kunenkanira munda kagiita kaniini					
Gukomborithania					
Kwaanda into bia nkũrũki ya mbura ciĩrĩ	Renters and Borrowers Only				
Kwaanda irio bia mbura ciĩrĩ					
Kurĩĩthia					
Kunyuithia ng'ombe					
Kũoja matunda					
Kũoja matunda ma kithaka					
Kuuna nku					
Gũtumĩra mĩtĩ ya kithaka (e.g., gũtega mĩatũ)					
Gutema miti ya kĩthaka					
Gwaka nyomba cia gutũũra/kudumu					
Gwaka nyomba itarĩ cia gutũũra/kudumu					

E46. Ni into birĩkũ bwatũmĩĩre kũrĩma mũndani ũjũ mwanka ũjũ? **(CIRCLE ALL THAT APPLY)**

1. Muti 2. Icembe 3. Ng'ombe cia mũraũ ciaku 4. Ng'ombe cia mũraũ cia gukombora 5. Tractor yaaku 6. Tractor ya gukombora 7. Imbi yĩĩngĩ (uga)

E47. I mĩako ĩrĩkũ gwaakĩte mũndani ũjũ?

Miako ya gutũũra	Nĩigana?	Yaakirwe rĩ?
Nyomba ya iiga yiimbĩtwe na ibati		
Nyomba ya ntaga yiimbĩtwe na nyaki		
Nyomba ya ntaga yiimbĩtwe na ĩbati		
Ĩkũmbĩ rĩa iiga		
Ĩkũmbĩ rĩa ntaga		
Rwinci rwa kwanda kana rwa mainci		
Rwinci rwa cinenge		
Itangi bĩa rũũjĩ		

E48. a. Kurĩ bu ũrũthĩte mũndani ũjũ kũmenyeera muthetu na rũũjĩ? **b.** Utumiri bwaku bwa mbinu cia kumenyeera muthetu na ruuji mundani ũjũ ibwongerekeete kana kabunyiĩte kuuma ukwanjĩĩria kurĩma mũnda ũjũ? **c.** Nũũ gwe urutaga wĩra inu cia kumenyeera muthetu na rũũjĩ? **d.** Mbinu inu waanjĩĩrie gũcitũmira rĩ?

CIRCLE TECHNIQUES USED

INDICATE WHO DOES IT: 1= Male head; 2= Female head; 3=Sons; 4=Daughters; 5=Other Adult Males; 6=Other Adult Females; 7= work groups; 8= hired labor; 9= Everyone

INDICATE NUMBER OF YEARS AGO ADOPTED OR E=EXISTED AT THE TIME OF ACQUISITION.

a. Mbinu	b. (I)ncreased/ (D)ecreased/ About the (S)ame	c. Nũ?	d. Ciambiirie gutumika ri? (PLACE ESTIMATES IN PARENTHESES)
mĩtaro ya maiga			
mĩtarũ ya migogo			
fanya juu			
Kamuguuru			
Nyaki			
kurima ugiitenie kirima			
mĩtarũ ya rũũa			
Mĩtaro			
Tumĩguuru			
mulching			
kwanda mĩtĩ kana macikaciki / makambi			
water harvesting			
gwikĩra fertilizer cia ndaawa			
gwĩkĩra mboreo			

E49. Imbi nontũ wabangire gũtũmĩra mbinu inu mundani ũyũ?

E50. Nwijĩ mbinu ciingĩ gũũmba gutũmĩra kũmenyeera mũthetu na rũũjĩ?

E51. Kethĩra nũciijĩ nubaangĩte gũcitũmĩra kagiita kaajĩte. Ikĩ nontũ ugacitumĩra / utagĩcitũmĩra?

E52. Ũtũmĩri bwaku bwa mbinu inu bwaũmba gũgũteetheria kuuga kaama mũnda ũjũ nwaku?

F. Responses to Drought

F1. Nwakethete irio bia kũgana mwanka mũthiru?
1. Yĩ 2. Aĩ

↓ IF YES, SKIP TO QUESTION F4.

F2. Naata wagwatangire irio kagita ka jũũra mwanka mũthiru?
(CIRCLE ALL THAT APPLY)
1. Maketha 2. Kugura irio na akiba 3. Kwendia ndĩĩthia kũgũra irio 4. Kwegwa irio naantũ ba mucĩ 5. Mucaanda wa thirikaari 6. Mucaanda wa World Food Program kana NGO 7. Kũgwĩma nyamũ 8. Kũrea matunda ma kĩthaka kana irio biingĩ bia kithaka 9. Naata buungĩ (uga)

F2a. Kuri kĩama kiabwaa utethio mwanka muthiru?
1. irio 2. mbeũ 3. irio na mbeũ 4. Biingi (uga)

F2b. Kethira niu, kiama kiu ni: **(CIRCLE ALL THAT APPLY)**
1. thirikari 2. World Food Program 3. kiama kia kanisa 4. Ntikumenya 5. Biingi (uga)

F3. Jũũra rĩa mwanka mũthiru riakari ata ũkĩbuanaania na maangĩ mara woona?
1. Mbaya saidi 2. Ta bumwe 3. Ti mbaya

F4. Bũrarũmia acoore kana antũ ba mũciĩ irio mwanka mũthiru?
1. Yĩ 2. Aĩ

F5. Kurĩ muntu waja mucĩ ũjũ nontũ bwa jũũra?
1. Acoore 2. Antu ba mucĩ 3. Atũũri 4. Gũtirĩ gwe

F6. Kũrĩ biakũrĩa bweendia mwanka mũthiru?
1. Yĩ 2. Aĩ

F7. I njĩra irĩkũ mũciĩ ũjũ ũtũmĩrĩte gũkabiriana na jũũra rĩa mwanka muthiru? I njĩra irĩkũ cia gukabĩriana na jũũra muciĩ ũjũ waatumagira itatũmagĩrwa ĩĩndĩ ũgu.

Muthemba	Njĩra ya gũkabiriana	Untu bwa kĩĩndĩ	Untu bũra buteetwe
Kureta mbura	Kuromba		
	Kuona kiroria kia mbura		
Kuongeera kithitha	Kuanda mbere ya mbura ya mbere		
	Kuanda na mbura ya mbere		
	Gũkundia rũũjĩ		
	Kuongeera kumenyeera muthetu na rũũjĩ		
	Kurima mabondeni ma rũũjĩ		
	Kuira nyamu guntu kuungi ikarie noo. **INDICATE:** 1. kĩthakaani kĩĩngĩ kia mucĩ ũjũ; 2. kĩthakaani kĩa muntũ wa mucĩ; 3. kĩthakaani gĩa public 4. kĩthakaani kĩa mwĩrĩga 5. kũũngĩ (uga)		
Kugaura mahitaji ma rũũjĩ	Kũanda irio bi mwathũ		
	Kurimĩra nkuruki		
Diversify	Kwendia makara		
	Kwendia mĩtĩ kana/na nkũ		
	Kwendia mborea (thaamu)		
	Kwendia mĩgeka, ikabũ, itĩ, miatũ, n.k.		
	Gucwaa ibaarua karibũ		
	Gucwaa ibaarua kuraaja		
	Kũrũta wira ũkaegwa irio, karibu		
	Kũrũta wira ũkaegwa irio, kuraaja		
	Kũguĩma		
	Kuoja matunda na miti ira ĩrĩjagwa		
Gutethania hasara	Kuuria uteethio kuuma kiri antu ba muciĩ		
	Kuuria uteethio bwa thirikari na ikundi bia gintuura		
	Kuthaamira kĩrĩ antũ ba muciĩ		
Bear the loss	Kugura irio		
	Maketha		
	Kuria nyamoo		
	Kuendia nyamoo		

F8. Kuri muntu wa muciĩ auma muciĩ nontũ bwa jũũra rĩrĩ? I mantũ marĩkũ baathire kurutha naara baathire?

INDICATE WHO HAS LEFT HOME: 1=Male head; 2=Female head; 3=Sons; 4=Daughters; 5=Other Adult Males; 6=Other Adult Females

	Nairobi	Mombasa	Meru Town	Embu Town	Nanyuki	Iingĩ:
Jua Kali						
Biacara						
Ngugi cia munda						
Ngugi ite cia munda						
Ciingi: (uga)						

F9. Antũ ba mũciĩ wenu bara nja iboongeere into bira babũtũmagĩra kuuma jũũra rĩkwambĩĩria?
1. Yĩĩ 2. Aĩ

F10. Kũrĩ bu ukũrũtha kwĩrigĩĩria na majũũra maangi mara maũmba kũũja ntugũ ciĩjĩĩte?
1. Yĩĩ 2. Aĩ

F11. Wegua I yĩĩ, naata ũkũrũtha kendo wĩrigĩĩria kuumania na majũũ na mamu?
1. Kwaiga mbeca 2. Kugura ithaka biingĩ 3. Kwanda irio bira biũmagĩĩria mwathũ 4. Kuongeera kumenyeera muthetu na rũũjĩ 5. Kwaĩga nyamũ imbiingĩ 6. Kuruta wĩra kuraaja na mũcĩĩ 7. Kwiga irio 8. Naata bũũngĩ (uga)

APPENDIX B

CHARACTERISTICS OF AGRO-ECOLOGICAL ZONES

Table B-1. Characteristics of Agro-Ecological Zones, Tharaka District, Kenya

Agro-Ecological Zone	*Moisture Classification*	*Vegetation Types*	*Altitude (m)*	*Temperature (C°)*	*Average Annual Rainfall (mm)*	*60% Reliability of Rainfall, Second Rains (mm)*	*60% Reliability of Growing Period, Second Rains (days)*
Lower Midland Zone (LM4)	Transitional	*Combretum* savanna / *Acacia* woodland	760 - 1220	23.7 - 21.0	800 - 1200	250 - 450	75 - 85
Lower Midland Zone (LM5)	Semi-Arid	Thorn bushland and thicket	700 - 910	24.0 - 22.9	800 - 900	180 - 200	65 - 75
Inner Lowland Zone (IL5)	Semi-Arid	Thorn bushland and thicket	610 - 700	24.7 - 24.1	500 - 750	140 - 200	40 - 55

Source: Jaetzold and Schmidt (1983)

APPENDIX C

AGENDA FOR SEMI-STRUCTURED GROUP MEETINGS

I. Agenda for Meeting with Elders and Members of Village Land Committees

A. Clearing, settlement, and land use history:

1. Factors affecting sedentarization in upper and lower zones
2. Resettlement of clans from Tana River to the higher zones of Turima and Gikingo
3. Driving forces of resettlement in Turima and Gikingo
4. Settlement in LM4: processes of demarcation, establishment of village committees, and other factors affecting tenure practice
5. Practice of shifting cultivation in LM4/LM5
6. Drought history, changing responses, and impacts on the land use system

B. Chronology of recent droughts and major impacts of each on the land use system

1. Relations with Kamba, Mbeere, Embu, Gikuyu, Cuka, Imenti, and Tigania
2. Changing role of the clan and individual households in drought response decision-making
3. Role of crop and livestock purchase/sales, wage labor, food aid

C. The evolution of clan authority over land access and land use

1. What relationship/interaction did people in the lower zones have with clan members in higher zones. What exchanges were common?
2. In what ways did the clan regulate land use in the higher zones? Were new clan mergers forged in Turima and Gikingo independent of those in the lower zones?
3. Did the clan play a role in deciding where people cultivated and grazed or did it simply restrict land access under certain circumstances?
4. What special categories of land existed as pertaining to restricted use/access (e.g., hillsides, stream banks, groves)?
5. Was it possible for a clan to expand its territory? Did the settlement of clan members near clan borders ensure the extent of clan territory.
6. How did the role of the clan in land tenure practices change during the colonial period? How did it / will it change after land adjudication?

D. Demarcation of boundaries and changing notions of property and inequality

1. What was considered individual wealth, family wealth, extended family wealth, and clan wealth?
2. Did inequality exist in landholding, livestock holdings in the pre-colonial and colonial eras? What differentiated a wealthy individual/family from a poor one?
3. When were boundaries between clans first marked? How were borders decided upon? Could a clan expand its territory by settling clan members on unused land?
4. When were boundaries between households first marked in this area? How did the marking of boundaries impact grazing and cultivation practices?

5. What influence did colonial land policy have on land rights?
6. Other impacts of colonial period: restrictions on land use; soil conservation workgroups; Chief's Acts, etc.

E. Land adjudication and impacts on the land use system

1. What impact did adjudication have on the way people cultivate and graze livestock in this area? What impact on land management practices? How do people in your area make do with limited space for pasture?
2. What role did the clan or village land committees play in the adjudication process?
3. What problems / conflicts arose during the adjudication process? What problems / conflicts arose as a result of the distribution of land rights brought about by adjudication?
4. What do people in your area consider to be just/fair in terms of land distribution? Is it acceptable for some to have a lot of land and others to have too little?

II. Agenda for Meeting with Young Men and Women Farmers

A. Driving forces of LUCC

1. What are the major changes that have occurred in this area?
2. Who/What is responsible for those changes: internal and external forces of change?
3. Have these led to conflict among certain groups? Which groups? Why?
4. Changes in the administration and politics of the regulation of land use – breakdown of control/restrictions on certain land uses, and uses of certain kinds of land
5. What are the forces affecting future land uses? What changes do you anticipate in the livelihood system of this area? On what will people rely in the future (wage labor, diversification, crop sales, etc.)?

B. The labor and ecology of land and livestock management

1. Soil and water conservation measures
2. Work groups
3. SWC requirements during the post-colonial era
4. Changes in divisions of labor, the breakdown of kin labor sharing arrangements and the emergence of wage labor
5. Weed ecology and management
6. Changes in divisions of labor, kin labor sharing arrangements (How was/is kin labor mobilized for weeding and other agricultural tasks? How has the emergence of wage labor in weeding effected agricultural productivity for wealthy and poor households?)
7. Changing labor requirements
8. Crop selection and seed sharing

9. Land clearing and land preparation (the use of fire)
10. Management of crop pests and diseases

C. Changing Natural Vegetation/ Floral Biodiversity

1. What are the general changes that you have noticed over the past 20 years in availability of plants for your bees/ medicines?
    a. What general changes have occurred
    b. What plants have become scarce—note individual plants, and groups of plants (e.g., bushes, trees, herbs)
    c. Where did they used to be found? Note types of landscapes, and specific locations
2. When did the decline occur?
3. What are the causes of the changes?
4. Have the changes affected your ability to produce honey / provide medicines? How?

D. Perceptions of land degradation / productivity

1. Has the soil productivity of this area been changing (both improving and deteriorating)?
2. How severe is the change?
3. Where is it changing (both improving and deteriorating), and where is it not changing?
4. Certain areas, certain land uses (e.g., grazing vs. cropped areas)
5. Location on the hillside
6. Distance from people's homes
7. When: What has been the trend during the past 30 years?
8. Why has the productivity been changing?
9. Changes in:
    a. soil inputs (manure, fertilizer, compost, crop residues, etc.)
    b. soil management techniques
    c. soil conservation practices
    d. crops grown
    e. use of fallow
    f. what is the cause of those changes
10. Over cultivation, or erosion, and why
11. Changes in farm or family characteristics: e.g., farm size, labour availability
12. Changes in land use / cover in the region affecting inputs, erosion, etc.
13. Are there differences between families in soil degradation? Is there a difference between rich and poor people? Why?
14. Have there been external factors affecting soil management?
15. Government agricultural programs
16. Land tenure changes
17. Factors affecting availability of inputs, etc.

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