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Land use conflict in Kajiado District, Kenya

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Abstract

This study explores land use conflict in S.E. Kajiado District, Kenya. The conflict reflects ongoing competition over access to scarce land and water resources between herding, farming and wildlife, that has been conspicuous for over 30 years and is intensifying. While the complexity of the dynamic interactions and land use conflicts can be described, and significant driving forces identified, future outcomes are uncertain. The existing land use pattern represents the contemporary imprint of these interactions and it sets the basis for the future. Understanding the conditions that have created the present should, therefore, assist in devising future development strategies.

Keywords: Kenya; Land use; Political ecology; Rural development; Maasai

Introduction

The foothills of Mt. Kilimanjaro in Kenya provide an excellent example of land use systems in Africa's arid and semi-arid lands (ASAL) where relatively small areas with greater water availability than adjacent dry grasslands are the focus of intense competition from different land uses. This competition is long standing. In pre-colonial times pastoral people forcibly controlled access to water and grazing areas to reduce their vulnerability to seasonal rainfall, and recurrent drought. Colonial rule diminished the power of herding societies and restricted their control of these areas. It encouraged expansion of cultivation, and demarcated areas for wildlife conservation. This altered access to these strategic wetter margins, which, being critical to a variety of land users, became the locus of competition in ASAL. Over much of the continent, farmers fared better than herders and wildlife.[1]

The ASAL of Kenya have for decades been a focus of livestock development programmes, expansion of farming, and creation of national parks to promote wildlife conservation and tourism. Land alienation for European settlement and demarcation of Native Reserves by the British resulted in land pressure in African agricultural areas. After independence some relief was provided in the rangeland margins by government-sponsored resettlement and irrigation schemes and, as in the study area, by spontaneous resettlement (Campbell, 1981a).

Prior to the colonial period, Maasai herding cattle, sheep, and goats dominated the area. Wildlife was abundant and tolerated by the Maasai. Under the colonial land demarcation the area became part of the Maasai Reserve. However, since the 1930s cultivation has expanded into areas suitable for rainfed production.

[1] The outcome of this competition for resources over much of the continent has been detrimental for herders and wildlife and to the advantage of farmers. Agricultural expansion has impinged upon the territories of herders and wildlife and only the designation of protected areas has afforded some measure of protection to remaining wildlife populations. This finding of differential benefits to land use competition has been demonstrated by research in different parts of the continent. In West Africa a number of French scientists identified the implications for land use and the viability of production systems arising from the transfer of power from herders to farmers during the colonial period (see for example Dresch, 1959; Raynaut, 1975; Nicolas, 1963). These warnings became reality during the 1968–1974 Sahel drought (see for example Bugnicourt, 1974; Laya, 1974; Meillassoux, 1974; Franke and Chasin, 1980). Interest in the role of these wetter margins of the rangelands in ASAL development policy, and the potential for conflict over them between different land uses, has continued (for example, Campbell, 1981a; Bassett, 1988; Raynaut, 1997). It has recently re-emerged through the application of ecological research on "non-equilibrium environments" in semi-arid lands (Scoones, 1992, 1995). Understanding of these issues can contribute to policies that promote more effective drylands management (Øygard et al., 1999).

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Colonial rural development policy encouraged this, and the creation of national parks and reserves.

A similar policy environment continued after independence. By the mid-1970s competition existed between herding, cultivation and wildlife/tourism (Campbell, 1981b, 1986). It intensified as economic returns to tourism and irrigated agriculture increased and as political changes altered the relationships within and between different economic activities and cultural groups (Campbell, 1993; Krugmann, 1996; Southgate and Hulme, 1996).

This paper examines change in the interactions between herding, farming and wildlife management over the past 20 years in S.E. Kajiado District, Kenya (Fig. 1). It argues that the land use patterns arise from complex interactions between societal processes and the natural resources of the area. The driving forces of change are both local and external, and have altered in their nature and intensity over time (Campbell and Olson, 1991). They include international initiatives, for example biodiversity conservation and structural adjustment programmes (SAPs); national policy, including the ASAL development programme (Kenya, 1979; Campbell and Migot-Adholla, 1981; Bernard, 1985) and wildlife management (Western, 1982, 1989, 1994); and local processes, such as immigration of farmers, institutional and economic change among herders, economic opportunities in horticulture and tourism, population growth and revision of land tenure rules. These interact in complex ways with each other and with the resource base.

Policy initiatives are mediated by these complex interactions, and land use outcomes are thus difficult to predict, and are not uniform spatially or socially. Analytical frameworks that explicitly address complexity, such as political ecology, can inform policy discussions. Initiatives that recognize uncertainty and that foster flexibility in future outcomes may be more effective in promoting sustainable land use.

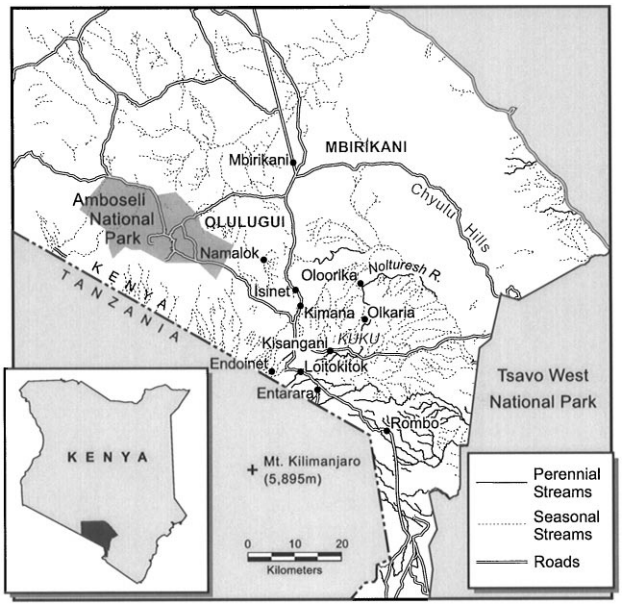

Fig. 1. S.E. Kajiado District, Kenya.

Methods

The paper adopts political ecology as a framework for analysis of resource access and conflict (Bryant, 1992, 1998). It addresses society-environment issues as outcomes of interactions over time between and among societal and biophysical processes. It asserts the centrality of the land manager whose decisions are shaped by access to resources, social and economic status, and the opportunities and constraints defined by the national institutional and policy context (Blaikie and Brookfield, 1987).

The results of household surveys conducted in 1977 and 1996 to examine changes in land management strategies are described and compared. Discussion of the driving forces of change is structured around four broad categories, the institutional, economic, cultural, and environmental. This discussion indicates that land managers' options and responses are not uniform as they are grounded in relations of gender, age, resource access, socio-economic status, and power (Peet and Watts, 1996; Bryant, 1998). This paper also demonstrates that, while externally driven policies are designed for the whole area, the responses vary from location to location as a result of different resource endowments, settlement history, and market access.

The organization of the discussion of driving forces by category has the potential to conceal the interactions among and between driving forces. Specific themes including land tenure, competition over access to resources, and wildlife management, recur across categories and thus the impact upon them of different driving forces is shown. In the concluding discussion, the issue of land tenure is examined to illustrate the complexity of interactions among driving forces that contribute to the dynamics of land use change.

A variety of complementary methods provide the diverse information required by this approach. Household surveys were conducted in 1977 and 1996 using the same sampling methodology and similar questionnaire. The 1977 survey interviewed 225 farmers and 166 herders and that of 1996 130 herders and 299 farmers[2]. These provide information on economic and demographic characteristics, resource competition, changes in the quality of the

[2] In 1996 a total of 227 herders and 332 farmers were interviewed. Some of these interviews took place in areas of Mbirikani Group Ranch that were not surveyed in 1977. These were omitted from the analyses comparing the situation in 1977 with that of 1996.

resource base, and attitudes towards conditions in the area.[3]

In both 1977 and 1996 the results of the surveys were discussed at community workshops (Campbell, 1984b, 1987, 1999). These, and key informant interviews, provided opportunities to present and discuss the survey results and assess interpretations directly with the people of the area. Their insights were invaluable and clarified a number of issues that might otherwise have been misinterpreted.

Land use competition, 1977–1996

> Conflicts over water were also reported to be on the increase. The farmers were saying, "Herders are destroying our crops as they look for water." The herders on the other hand were saying, "Farmers are using up our water." Both groups were saying, "Wildlife is a problem." (Minutes of Feedback Workshop, in Rombo 8/8/1996)

The most significant land cover changes are a consequence of the expansion of the area under cultivation. This has occurred sequentially over time down the ecological gradient of Mt. Kilimanjaro. Farming began in the 1930s on the mountain slopes north of the Tanzanian border, which have adequate rainfall and volcanic soils. With rapid population growth resulting from immigration from other parts of Kenya (Table 1), these rainfed areas have become settled, and today farming extends down into the wetter margins of the rangelands, along rivers, and around swamps. This has reduced the area available for grazing, and the ease of access to water for both domestic stock and wildlife.

Altered resource use is a basis for land use conflict. All the land use systems are dependent upon access to these wetter margins. Their rainfall and irrigation potential make crop agriculture possible. For the wildlife and livestock they provide water and grazing in dry seasons and during recurrent droughts. Reduction in area and accessibility increases the vulnerability of herders and wildlife to drought (Campbell, 1999). This is more critical for herders, as Tsavo and Amboseli Parks enclose secure water and grazing for wildlife.

Table 1
The population of Kajiado district 1969–1999

Census (Year)	Kajiado district			Kenya
	Population	Inter-census growth (%)	Avg. annual growth (%)	Avg. annual growth (%)
1969	85,093[a]			
1979	149,005[a]	75.1	5.76	3.8
1989	258,659[a]	73.6	5.67	3.4
1999	405,000[b]	56.6	4.58	2.9[a]

[a] Kenya, Central Bureau of Statistics, Population Census 1969, 1979, 1989.
[b] Ministry of Finance and Planning, February 2000. Provisional Results of the 1999 Population and Housing Census.

Competition between and among herders and farmers

In 1977 expansion of cultivation into the wetter margins of the rangelands was in a very early stage. Only those herders whose territory was being put under cultivation experienced difficulties with farmers, while most farmers were occupying former grazing land and thus were in direct contact with herders.

By 1996 the situation was more complicated. There were more non-Maasai farmers and many former Maasai herders had diversified into cultivation. The cropped area had expanded beyond the slopes of Mt. Kilimanjaro. Irrigated horticulture had been stimulated by opportunities following the implementation of structural adjustment policies (SAPs). These land use changes altered herders' options for water and grazing. They also disrupted the access of wildlife to sources of water, fragmented habitat, and crops were attractive sources of food for wildlife.

The competition for the resources at the wetter margins had intensified, both between and among herders and farmers, and with wildlife. A variety of land managers, herders, farmers, wildlife conservationists, and operators of tourist facilities, together with government agencies, now seek to resolve these competing interests.

Herder conflict with farmers, 1977–1996

The percentage of herders reporting conflict with farmers rose from 8 to 24 between 1977 and 1996. Conflict is related both to the expanded cultivated area and to the greater involvement of herders in cultivation. The proportion of herders who did some farming increased from 20% in 1977 to 37% in 1996. By 1996 the negative impact of cultivation on access to critical water and grazing resources for herding, anticipated by Maasai as early as the 1940s, was threatening the livelihood of many herders.

[3] Separate questionnaires were written to be administered to farmers and to herders. The choice of which questionnaire was used at any particular household was made on the basis of whether the respondent identified herself/himself as a herder or farmer. This correspondence between this self-identification and dominant economic activity was closer in 1977 when most people practiced either farming or herding than in 1996 when many Maasai respondents were involved both in crop production and livestock raising. This reflects the diversification of the economy of many Maasai over the past 20 years as they have adapted to the opportunities and constraints of changing economic and political circumstances, and in access to the physical resource base (Kituyi, 1990; Spear and Waller, 1993).

In 1996 the dominant issues were crop damage by cattle, access to land and water, and those related to the sale of land and payment of rent (Table 2). Ironically, most of this conflict occurred on group ranch land owned and controlled by herders. However, individual herders were leasing land to farmers, some herders were cultivating, and other farmers were squatting on ranch land.

There are local variations in the significance of issues. Around swamps over 75% of those reporting friction identify access to land and water, and damage to crops. The main causes are poor supervision of livestock, lack of grass and overgrazing, and overpopulation. In the rangelands drought is the most commonly identified cause. During periods of low rainfall pasture and water for livestock are scarce and many areas where they were once available are cultivated.

Farmer conflict with herders 1977–1996

The percentage of farmers reporting difficulties with herders increased from 36 in 1977 to 54 in 1996. In 1977 most expected conditions to improve. This optimism was not reflected in the 1996 survey. It showed greater numbers reporting conflicts, and 44% indicating that the situation had worsened in the recent past. Further, only 31% expected an improvement over the next five years.

There were more issues at stake in 1996 for both Maasai and non-Maasai (Table 3). In both surveys damage to crops was most frequently reported, but in 1996 access to water and grazing, and theft of crops and animals were also identified. In both surveys drought and lack of grazing were principal causes. Additional factors included young herders failing to adequately supervise animals, and deliberate grazing on fields.

Farmer conflict with farmers, 1977–1996

The percentage reporting incidents between farmers increased from 24 in 1977 to 32 in 1996. In 1977 the key issue was access to grazing (Table 4). The survey was completed at the end of a drought period when pasture was scarce. The other issue of concern, access to land, remained important in 1996, when the main issues were access to water and crop damage.

All farming areas experienced problems with water in 1996, though the specifics differed from area to area. On the slopes of Mt. Kilimanjaro irregularity of rainfall was the issue. At the swamps and along the river at Rombo concerns were raised about access to irrigation water and water quality due to run-off of fertilizers and pesticides (Krugmann, 1996; Southgate and Hulme, 1996). Farmers along the Nolturesh River in Kuku Group Ranch at Kisangani, Olkaria and Oloorika have experienced a reduced flow of the river as a result of diversion of water into a pipeline serving areas near Nairobi.

Crop damage by livestock occurs both when the herds of pastoral Maasai move through cropped lands in search of water and grazing, and when the domestic herds of farmers enter fields. Drought and lack of grass were seen as exacerbating this situation, along with the expansion of cultivation, and poor supervision of livestock by young herders.

Table 2
Issues over which herder–farmer conflict is reported, 1977 and 1996 (by percent of those reporting conflict)

Issue	1977 $N = 13$ (8%)	1996 $N = 31$ (24%)
Cattle eat crops		45
Access to water		36
Access to land	Too	32
Payment of rent	Few	26
Trampling of crops	Responses	23
Access to grazing		13
Sale of land		10

Table 3
Issues over which farmers report conflicts with herders, 1977 and 1996 (by percent of those reporting conflict)[a]

Issue	Total		Maasai		Non-Maasai	
	1977 $N = 82$ (36%)	1996 $N = 160$ (54%)	1977 $N = 33$ (29%)	1996 $N = 76$ (54%)	1977 $N = 49$ (37%)	1996 $N = 68$ (48%)
Grazing on crops	94	87	94	91	94	84
Trampling crops	62	48	73	41	55	53
Spread of disease	4	10	9	11	0	10
Access to water	5	18	12	18	0	18
Access to grazing	0	12	0	12	0	15
Grazing on individual land	0	8	0	12	0	4
One has too many animals	0	22	0	28	0	16
Theft of animals	0	19	0	25	0	13
Theft of crops	0	24	0	25	0	25

[a]Total 1977–96, df = 8. X^2 of 76 is significant at the 0.001 level. Maasai 1977–96, df = 8. X^2 of 39 is significant at the 0.001 level. Non-Maasai 1977–96, df = 8. X^2 of 44 is significant at the 0.001 level.

Table 4
Issues over which farmer–farmer conflict is reported, 1977 and 1996 (by percent of those reporting conflict)[a]

Issue	Total		Maasai		Non-Maasai	
	1977 $N = 82$ (36%)	1996 $N = 160$ (54%)	1977 $N = 33$(29%)	1996 $N = 76$ (54%)	1977 $N = 49$ (37%)	1996 $N = 68$ (48%)
Access to grazing	72	16	68	17	76	16
Access to land	27	22	34	15	20	27
Access to water	7	39	14	40	0	34
Trampling of crops	0	23	0	23	0	23
Cattle eat crops	3	39	7	49	0	30
Payment of rent	0	22	0	19	0	25
Sale of land	0	11	0	13	0	9

[a]Total 1977–96, df = 6. X^2 of 97 is significant at the 0.001 level. Maasai 1977–96, df = 6. X^2 of 47 is significant at the 0.001 level. Non-Maasai 1977–96, df = 6. X^2 of 50 is significant at the 0.001 level.

Herder conflict with herders, 1977–1996

The percent of herders indicating difficulties with other herders rose from only 7 in 1977 to 36 in 1996. The most frequently mentioned issues in 1996 were crop damage, access to grazing, and the spread of disease (Table 5). The importance of crop-related issues reflects the change in Maasai economy between the two surveys. In 1996 more herders cultivated increasing the opportunities for livestock to damage crops.

In 1996 the herder-to-herder concerns varied from area to area, and according to economic activity (Table 6). Access to pasture and animal theft were the most important for those who did no farming. The lack of forage had increased grazing and trampling of crops, issues of disquiet to herder–farmers in the mixed farming/herding areas, and particularly around swamps. The major issues in the rangeland areas were access to grazing (63%), grazing on crops (41.5%) and the spread of disease (37%).

Table 5
Issues over which herder–herder conflict is reported, 1977 and 1996 (by percent of those reporting conflict)

	1977 $N = 12$ (7%)	1996 $N = 47$ (36%)
Issue		
Grazing on crops		62
Access to grazing		57
Trampling crops	Too	40
One has too many animals	Few	11
Spread of disease	Responses	4
Theft of crops		15
Grazing on individual land		17
Access to water		2
Theft of animals		38

Table 6
Issues over which conflict is reported, by herders and herder–farmers, 1996 (by percent of those reporting conflict)[a]

Issue	Herders $N = 19$ (38%)	Herder–farmers $N = 28$ (78%)
Grazing on crops	53	70
Access to grazing	79	44
Trampling crops	32	48
One has too many animals	0	19
Spread of disease	7	4
Theft of crops	26	7
Grazing on individual land	32	7
Access to water	5	0
Theft of animals	58	26

[a]df = 8. X^2 of 16 is significant at the 0.05 level.

Conflict with wildlife reported by herders and farmers

Wildlife-based tourism is a major contributor to Kenya's foreign exchange earnings. The two National Parks in the area, Amboseli and Tsavo West account for about 15% of all visits to Kenya's parks and they are of great economic significance to the nation. The Kenyan government, international and national conservation groups, and investors in the tourist industry have common interests in wildlife conservation and management.

The revenues from wildlife-based tourism accrue at the national level, but people adjacent to the parks who tolerate wildlife seasonally or year-round bear the direct costs from disease, predation, crop damage, and personal safety (Norton-Griffiths, 1996; Norton-Griffiths and Southey, 1995). The potential direct costs from crop damage have increased as remunerative horticultural production has expanded into areas of wildlife concentration. This expansion arises from opportunities afforded by recent changes in national economic and agricultural policy, whose implementation has not been effectively coordinated with policy on tourism and wildlife conservation.

In 1977 one-third of herders reported conflicts with wildlife. The problems were competition between livestock and buffalo, elephant and other range species for

water and grazing, and predation by lion and leopard. The majority of the farmers interviewed in 1977 lived on the higher slopes of Mt. Kilimanjaro and in the irrigated areas at Kimana and Rombo. All areas were accessible to wildlife and 61% cited problems with them. The issues were crop damage and fear of wildlife, the most significant being buffalo, antelope, elephant and monkey.

For those who remained predominantly in the livestock economy the issues were the same in both surveys. However, as many herders in 1996 cultivated, they were also concerned with the impact of wildlife including elephant, antelope, buffalo, monkeys, and baboons, upon their crops.

In 1996 the issues differed from area to area. In rangelands predation by hyena, lion and leopard, access to water and grazing, and the spread of disease were most frequently reported. In the mixed herding/farming locations damage to crops was the most frequently identified, while at swamps both crop damage and the spread of disease were important. Elephant, antelope, buffalo, monkeys, baboons and porcupine were recognized as the perpetrators. All respondents identified drought and lack of grazing resources as the principal causes of the conflict with wildlife.

Conflict resolution

The intensity of conflict, and means for resolution, varied by location and land users involved. In 1977 conflict between herders and farmers was greatest where land use change involved expansion of cultivation. By 1996, with immigration of cultivators and the diversification of herders into cropping, it also included conflicts among farmers. In 1996, while many reported an increase in difficulties over the previous five years, most anticipated that conditions would not worsen. The exception were herders dependent upon livestock who anticipated further curtailment of access to water and grazing consequent upon continued expansion of cultivation.

In both surveys resort to "discussion" through established community institutions was the most frequently reported means of resolving conflicts. In 1996, however, many of the immigrant farmers sought redress from civil authorities. For example, farmers in conflict with herders reported resort to chiefs (20%), the courts (15%) and the police (9%) — and to violence (19%).

Despite significant efforts by KWS and others to reduce conflicts between communities and wildlife, both farmers and herders reported increased incidence between 1977 and 1996. Two processes contributed to these changes, a larger population of farmers and an extension of cultivation into areas where wildlife congregate, adjacent to swamps and along rivers that was not farmed in 1977. These areas now lie in the path of wildlife moving to water, and the crops offer tempting food en route. Further, as the number of Maasai who farm has grown, so too has that of small domestic stock vulnerable to predation.

In 1977 reporting to the game warden and retaliatory killing were the major options for herders to cope with the situation.[4] Reporting to the warden had limited value as little action was taken and few were compensated (Campbell, 1984a). By 1996 killing had ceased and to reduce conflict herders and farmers were scaring the animals and fencing. Many, including over 80% of respondents in swamp areas, recounted reporting to the warden. Few of those reporting to the authorities had received compensation.[5] Neither herders nor farmers were optimistic that the incidence of problems with wildlife would decline in the near future.

Land use reflects the competing interests of wildlife managers, herders, farmers, and the horticultural industry. In response to the hostility expressed by land users towards wildlife (Campbell et al., 1999), an important focus of contemporary wildlife management policy is to increase economic returns to local communities and thus offset the losses to wildlife depredation. While agricultural and wildlife management policies remain uncoordinated however, competition between these local and national interests is likely to remain.

Driving forces of land use conflict

Between 1977 and 1996 interaction between land uses had altered and increased in intensity. The complexity of these interactions, and their dynamism, requires an analytical approach that can offer a measure of simplification without obscuring the complexities (Blaikie, 1994). The following discussion is based on broad categories of processes that contribute to an explanation, while recognizing that interactions occur between categories.

Economic driving forces

Economic processes are fundamental to understanding resource competition. Over the past 20 years opportunities for the area's economy in international tourism and trade in horticulture have grown more rapidly than from rainfed agriculture and, particularly from herding. Production systems have responded to these opportunities in different ways in different locations.

The herding system has experienced important changes. The population of herders has grown while critical sources of water and grazing have been lost to competing

[4] Hunting was banned the same year, 1977, so in 1996 hunting was not a legal option.

[5] The Government no longer provides compensation for crop damage or losses, only for injury and death. Compensation is paid through the Ministry of Tourism and Wildlife and not the Kenya Wildlife Service (KWS).

Table 7
Average livestock holdings among herders and farmers 1977 and 1996

Average number of livestock	1996 Farmers with more than 3 cattle ($N = 271$)	1996 Herders who farm ($N = 50$)	1996 Herders who do not farm ($N = 75$)	1977 Herders who do not farm ($N = 160$)
Cattle	8.1	26.2	28.6	72
Sheep	3.0	10.8	3.0	25
Goats	7.1	14.0	3.0	39

land uses. Total livestock numbers have not declined, but with more families average livestock holdings are smaller. In response, many herders have diversified into farming. For many this diversification has improved their circumstances. The data indicate that those who cultivate have more animals than those who do not, the major difference being in the number of sheep and goats (Table 7).

The long-standing rainfed agricultural system on the slopes of Mt. Kilimanjaro north of the Tanzanian border is under stress from depleted soils and soil erosion. Some farmers are planting the more resilient cassava and millet alongside the dominant maize and beans. On the lower slopes, recent arrivals are confronted by the greater irregularity in rainfall.

Irrigated horticulture has expanded rapidly in riparian zones over the past decade stimulated by economic liberalization and improved access to markets in Mombasa, Nairobi, and Europe. Some estimate that this area is Kenya's foremost producer of horticultural crops (Krugman, 1995 pers. comm.). This activity depends upon availability of water in sufficient quantity and quality to assure production. Increased local demand for water, diversion of an estimated half of the flow of the Nolturesh River to a pipeline serving areas near Nairobi, and concerns about water quality, combine to challenge the viability of horticulture under existing management practices.

The tourist industry is of national economic importance. Tsavo and Amboseli parks are among the most popular in Kenya. Local opportunities for income from tourism are being promoted by the government and are sought by local institutions and entrepreneurs. However few (17% of farmers and 8% of herders in 1996, compared with 5 and 6%, respectively, in 1977) report income from wildlife- or tourism-related activity. The industry depends on wildlife viewing. This has implications for land use policy, resource allocation, and acceptance of wildlife by herders and farmers. Trends in local income generation, agricultural expansion, fragmentation of ecological units, fencing, and decline in water quality and quantity, pose problems for future wildlife conservation (Campbell et al., 1999).

Overall, economic opportunities have changed dramatically. Land use systems have responded but the transition has involved, and continues to involve, contention over rights of access and use of key water and grazing resources. While access to land was the main concern 20 years ago, current concern centers on access to land with water of quality and quantity sufficient to sustain livelihood systems.

Political, policy and institutional driving forces

The economic opportunities that have emerged over the past 20 years are related to the policy and institutional environment of the area and the nation, and to global conditions. Global initiatives include conservation of biodiversity, sustainable development, and SAPs. These have combined with national initiatives on ASAL, wildlife management, and land tenure regulations to create a policy context that stimulates land use change and/or conflicts in use.

SAPs have focused on privatization, market liberalization, removal of subsidies, currency devaluation, and promotion of exports (Juma et al., 1995). In the study area market liberalization, and support for export-oriented policies have stimulated horticultural production in the wetlands. Middlemen and some of the farmers have gained considerably while others whose access to land and valuable resources has been limited by the expansion of horticulture are worse off.

Local institutions, culture, and resource management mediate these external policies. Implicit in this process is that allocation of resources is determined by the exercise of power, through negotiation, fiat or legal structures. Power is vested in people and institutions with different political, economic, and social status, and different influence over civil authorities and public policy (Juma and Ojwang, 1996; Bryant, 1998).

This can be illustrated through one subject of great uncertainty and potential friction, land tenure. After independence the land on the upper slopes of Mt. Kilimanjaro was adjudicated for individual ownership, and much was rapidly subdivided and sold to meet the demand for farmland. The remaining area, outside the parks, was adjudicated as group ranches (Hedlund, 1971; Halderman, 1972; Ayuko, 1981; Olang, 1982). Over the past 20 years there has been considerable tension in the group ranches over insecurity of land tenure for younger people (Ole Pasha, 1986). This created demands for subdivision of the land, a process that is under active consideration (Galaty, 1992, 1994; Fratkin,1994; Fratkin and Sher-Mei Wu, 1997). Meanwhile, on all ranches, some individuals have defined portions as their own, individual property. Some have fenced the land, some have leased to immigrant farmers, and others cultivate it themselves. A de facto subdivision has begun in advance of any legal redefinition of the land tenure status of the group ranches.

While ranch members have a valid expectation that they will acquire some land under subdivision, the outcome for non-members is uncertain. Many immigrants have been farming on group ranches under informal agreements for over a decade. Subdivision and the parceling of land to ranch members may result in them losing access to land. This raises a charged policy question about whether these farmers should have claims to land.

These ongoing changes in policy and institutional arrangements raise broader questions about the future of livelihood systems. The community is not homogenous. Economic and ethnic diversity, issues of gender and age, and of access to power will be involved in future decision-making. Various stakeholders will pursue their own objectives and many voices will contribute to the debate over land management and resource allocation (Western, 1994). Some will gain more than others, and there will be losers. Development approaches that adopt simplistic notions of "community" will fail to represent the reality of local conditions in their considerations of policy.

Social and cultural driving forces

Significant social and cultural changes have accompanied economic and institutional ones. While still accepted as "Maasailand" the area's ethnic composition, economy, and social institutions have changed markedly and influenced land use patterns.

Colonial interventions and policies, many of which have been reinforced since independence, altered Maasai society and production systems (Spear and Waller, 1993; Kituyi, 1990). In 1977 livestock raising was still the dominant activity of the majority of Maasai. Approaching a majority now includes some cultivation, and many are traders. Further, institutional structures have changed, with younger men asserting their influence, and women establishing formal and informal organizations to promote their objectives.

The population has grown rapidly through natural increase and immigration. Immigration reflects the lack of perceived opportunity elsewhere in Kenya where land pressure has existed since colonial land alienation. Of non-Maasai farmers interviewed, 68% in 1977, and 60% in 1996 reported moving to the study area because of land shortage in the place of origin. The next most frequent cause of migration, drought, was indicated by 7% in 1977 and 38% in 1996.

The ethnic composition is diverse, and by 1989 the Maasai were a bare majority in the District (Kenya, 1994). The issue of ethnicity will be important in resolving land tenure disputes after subdivision of the group ranches. Group ranch members are Maasai, yet many non-Maasai have settled the ranches. Some have lived on ranch land for over a decade yet have no land rights. Reports of violence in response to conflict have increased between 1977 and 1996, and the role of ethnicity in recent land disputes in Narok District provides a warning for the area.

The processes contributing to the local struggle for land in SE Kajiado also involve changes in traditional symbolic attributes, such as the cultural view of land, concepts of what constitutes wealth, and the political structure based on age-sets.

The Maasai have sought legal title to land, either as individuals or groups, because of a perceived need to protect Maasai land from external pressures like farming by non-Maasai people, and undesirable government interventions. People still recall with fear the annexation of Amboseli National Park. Traditional Maasai attitudes to cultivation and expressions of wealth are weakening. Increasing numbers define wealth in terms of cash rather than numbers of livestock and children. There is greater Maasai participation in trading and other non-traditional economic activities, including tourism development. A view of farming as being undesirable is changing and cultivation is now generally culturally acceptable. Many Maasai are cultivating themselves, although a significant proportion is leasing land or using share cropping to tap the expertise of farmers.

The struggle for control over access to land has also affected the cohesion of the age-set structure that traditionally controlled decision-making among the Maasai. Internal pressures also exist over which age group controls short- and long-term land use decisions — including group ranch subdivision if and when it does take place. Young men have become politically active and a number of younger better-educated men have been elected to ranch committees. Some in the Kenyan government, or with political ambitions, have allied themselves with these younger people as they see them as potentially better informed and able to articulate the issues facing their communities. However, this has not proved universally the case and concerns over the willingness of younger people to represent the broader group have arisen. The ways in which these internal political challenges to the established order are resolved will greatly influence future land management decisions.

While the role of women has not formally changed within the Maasai cultural system, they have begun organizing themselves into formal and informal groupings to improve their economic condition. Women are important land managers and through these groups they are challenging their marginalized economic and political status.

Contemporary processes re-emphasize the reality that communities are not homogenous. They are diverse in terms of social and economic status, and in access to power and authority of institutions. In addition, issues of gender and age influence decision-making. These factors are embedded in current land use structures and patterns of access to resources.

Environmental implications

External, structural policy debates have had a direct impact on local land use. These include SAPs, and policies to promote tourist income through wildlife conservation. Land use change has had a major impact upon the biophysical resources. Respondents throughout the area indicate that woodland has declined due to widespread clearing of trees for cultivation, building, fencing and fuel, though with scarcity some report planting trees. Many state that plant, soil, and water resources are degrading. This results in altered use, and increasing competition for remaining high-quality resources. Farmers on the upper slopes of the mountain, where farms are small and cultivation has been practiced for over 50 years, report declining soil fertility and increased soil erosion. In response some have increased the use of fallow and many are planting less environmentally demanding crops such as cassava and millet.[6]

An important issue that underlies most competition over resources is access to water in a quantity and of a quality to support the different land uses. Population growth has increased the demand for water for domestic purposes, for livestock and for crop production. Competition and conflict is reported over control and allocation of irrigation water, and many are concerned with chemical pollution. These findings confirm those of Krugmann (1996) in Rombo, and Southgate and Hulme (1996) in Kimana.

Biodiversity conservation programmes seek to maintain characteristics of the landscape that foster wildlife management. While the national parks offer a measure of security, many of the wildlife species disperse over the study area during wet seasons, and others reside permanently on the communal lands. The loss and fragmentation of habitat due to human settlement and cultivation has serious implications for the viability of some wildlife populations.

Wildlife managers are concerned that subdivision of ranches and expansion of cultivation will disturb migration patterns and access to water, and encourage habitat fragmentation. They are promoting incentives to increase economic returns from wildlife to reduce these trends. For example, the Kimana Group Ranch has created a Wildlife Sanctuary that generates revenues from wildlife viewing. Group ranch members who see its potential to generate significant income are protecting this land unit from subdivision and encouraging the ranch to continue to operate as a political unit, even though informal subdivision around wetlands continues. Whether this apparently paradoxical approach to land ownership can be sustained bears watching, particularly as neighboring ranches are considering similar investments based on wildlife viewing.

The Kenya Wildlife Service (KWS) and a variety of local, national and international NGOs support these initiatives. Many area residents have a positive attitude towards biodiversity conservation due to the economic gains already received or expected from these projects. If the benefits are shared equitably, the potential for conservation will remain high. However, some community members perceive conservation as only benefiting a few. Were this to become a widespread attitude, the pressure for subdivision will continue. Significant investments in community capacity building for better natural resource and financial management are needed to ensure the viability of these conservation initiatives to maintain a wildlife sector that is vulnerable to changes in societal process and to alterations in the resource base.

Environmental issues including biodiversity conservation, land degradation, and declining water quality are related to land use change. The principal livelihood systems are dependent on land and water resources. The complex interactions between economic, political and social/cultural processes over the past 20 years have altered land cover, modified the distribution and composition of wildlife populations and habitats, and contributed to changes in access to water, and its quantity and quality. By altering fundamental components of the area's ecology, they have modified the resource base of people and of wildlife.[7] This challenges policy-makers to consider environmental management in terms of the interactions between biophysical and societal processes.

Discussion

Conflict over resources in this area, as in other parts of Kenya, and indeed Africa, is not new. Kenya has recently restated its commitment to the development of ASAL, and policy will have to address these issues. The economic value of the wetter margins of rangelands is increasingly seen as greater under activities other than herding, like horticultural production. Herders are joining farmers in such activities. This represents

[6] In the study area there is both concern with land degradation and evidence of conservation. Studies elsewhere in East Africa indicate that under increasing population people make efforts to safeguard the resource base (Olson,1994; Tiffin et al., 1994; Castro, 1995). This is a complex issue that requires careful consideration of ecology, history of land use, and of the interactions over time between locations and the broader economy in terms of economic policy, migration, trade, and peace and war (Olson, 1998).

[7] For example in Rombo farmers complain of the increasing salinity of the soils, and of drinking water. Increased cultivation involves deforestation, and locally there are concerns about waste management at tourist lodges and camps. From the perspective of wildlife, there is a need to investigate the extent to which land use change has affected the diet and quality of water available, and altered the distribution and composition of wildlife communities.

a diversification that in the study area has increased the wealth herders who have adopted agriculture alongside herding relative to those who have eschewed cultivation.

Sandford (1995) has argued for policies that would better equip herders to compete with others. An emphasis on one group is questionable, however, as different groups of local land managers, often affiliated with powerful individuals and institutions, local and external, seek to acquire the economic returns from horticulture, wildlife-based tourism, and engage in land speculation. Meanwhile, the government is concerned with food security and emphasizes agriculture and livestock production. International organizations and local NGOs with interests in wildlife seek to influence both national policy and local decisions on wildlife management. All the while, social and cultural changes are altering ways in which decisions are made, and the involvement of different age, gender and ethnic groups. Contemporaneously, the impact of past decisions is affecting the quality, quantity and availability of plant, soil and water resources.

Political ecology is a framework that facilitates understanding of this complexity. This is clearly illustrated by the processes that have contributed to land tenure transformation from communal to individual ownership through subdivision of group ranches, and by its implications for livelihood systems. This has its roots in the 1960s policy of land adjudication when group ranches were established with the objective of improving land management in rangelands. Membership rights were vested in male elders, and excluded younger people and women.

As young men proceeded through the age set system and became junior elders, they sought land rights. The prospect of a larger population having such rights led to resistance among many existing ranch members, and to calls from younger people in particular for subdivision to individual holdings. To achieve this, younger people have challenged the established authority structure based on age sets. Some young people have been elected to group ranch committees giving them influence in decisions over land rights.

The potential subdivision, and the altered authority structure, have provided opportunities for powerful Maasai, and others from outside the area, to promote their interests by supporting particular factions on the ranches. For example, prominent politicians have sought rights to land with potential for revenue from tourism in exchange for their political support, and KWS has aligned itself with younger people because it perceives them as having greater support for its wildlife management policies than older people.

When these divergent Maasai interests, and those of people from outside the area, are added to those of immigrant farmers and horticulturists, then the issue of land tenure provides a focus where the concerns of a variety of land managers intersect. Political alliances have emerged among land managers to gain or maintain control of critical land and water resources, and to influence policy on agriculture, wildlife and tourism, and land tenure. Such exercise of power is a critical issue and demands attention by those who devise policy and legal instruments that affect resource management and influence conflict over resources (Juma and Ojwang, 1996).

Control of key resources would be facilitated were a land market to emerge following subdivision allowing groups to acquire prime land. It remains to be seen whether subdivision will result in land sales. The evidence of both the existing pattern of informal land claims, and the history of the land market on the slopes of Mt. Kilimanjaro after adjudication in the 1960s, suggests that a land market will emerge quickly.

There will be winners and losers. Early indications are that among the winners will be those who have already established claims on riparian land who will avail themselves of opportunities from irrigated agriculture and wildlife-based activity. Losers will include those without claims to land, including women, immigrant farmers who lease or sharecrop, and those herders who receive the poorest quality land, that with no access to water. Wildlife managers are concerned that habitat fragmentation, fencing, and water pollution will accelerate after subdivision and that this will adversely affect wildlife and related tourism.

This discussion of land tenure has illustrated that the focus of political ecology, interactions between societal and biophysical processes, may best be seen as a "complex system" (Vandermeer, 1995). Blaikie (1994) has argued that such a system can be effectively examined through linkages between critical components of the system. Thus land tenure may be seen as a key component through which a number of links intersect. For example, government adjudication policy and population dynamics initiated the call for subdivision. It received support from farmers who benefit from secure land rights as individuals. Farms however, involve land clearance, fencing, and the application of chemical inputs to the soil. These have the potential to affect wildlife distribution and migration through habitat fragmentation, fencing, and pollution of water. Similar illustrative linkages can be identified in the preceding discussion of the driving forces behind land use change.

The paper has also illustrated one of the current critiques of political ecology in that a number of the societal–biophysical linkages that are identified require more detailed examination to elucidate their specific properties. These include habitat fragmentation and water pollution. A number of authors have pointed to the fact that many political ecology studies have given insufficient attention to ecological processes (Campbell, 1998; Vayda and Walters, 1999). Some have addressed this directly and incorporated concepts of non-equilibrium

dynamics and stochastic models from contemporary ecology (Zimmerer, 1994, 2000; Zimmerer and Young, 1998). However, Vandermeer (1995) questions whether existing approaches from either the social sciences or ecological sciences are effective. He ponders whether "an understanding of ecosocio relations is truly a new field that requires new methodologies, and those methodologies need not have anything to do with the standard methodologies of either ecology or the social sciences".

While theoretical and methodological discussions continue, studies conducted within the political ecology framework demonstrate its effectiveness in elucidating changes in land use and their implications for society and environment. As this study illustrates, a variety of driving forces contributes to land use change, and their relative importance and interactions change over time. They are not independent from each other but combine in complex and often subtle ways to determine land use patterns.

The complexity of the interactions between driving forces of land use changes calls for planning procedures that cut across bureaucratic lines and recognize that the goal of achieving specific future outcomes involves uncertainty (Faucheux and Froger, 1995). The contingencies and constraints upon effecting future conditions are great, and the ability of society to manage its interactions with the environment for desired ends through the application of science, technology, and of social and political power is limited. A more humble approach that recognizes how uncertain future outcomes are would recognize these limitations and seek to facilitate maintenance of flexibility in future options.

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