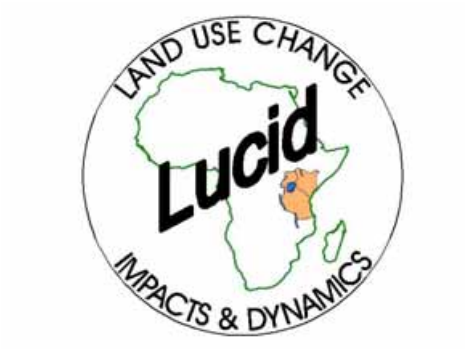

LUCID's Land Use Change Analysis as an Approach
for Investigating Biodiversity Loss and Land Degradation Project

Globalization and Local Heterogeneity: An Overview of Diversity in Land Use and Development Issues in Loitokitok Division, Kajiado District, Kenya

LUCID Working Paper Series Number: 21

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July 2003

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Globalization and Local Heterogeneity: An Overview of Diversity in Land Use and Development Issues in Loitokitok Division, Kajiado District, Kenya

Land Use Change, Impacts and Dynamics Project
Working Paper: 21

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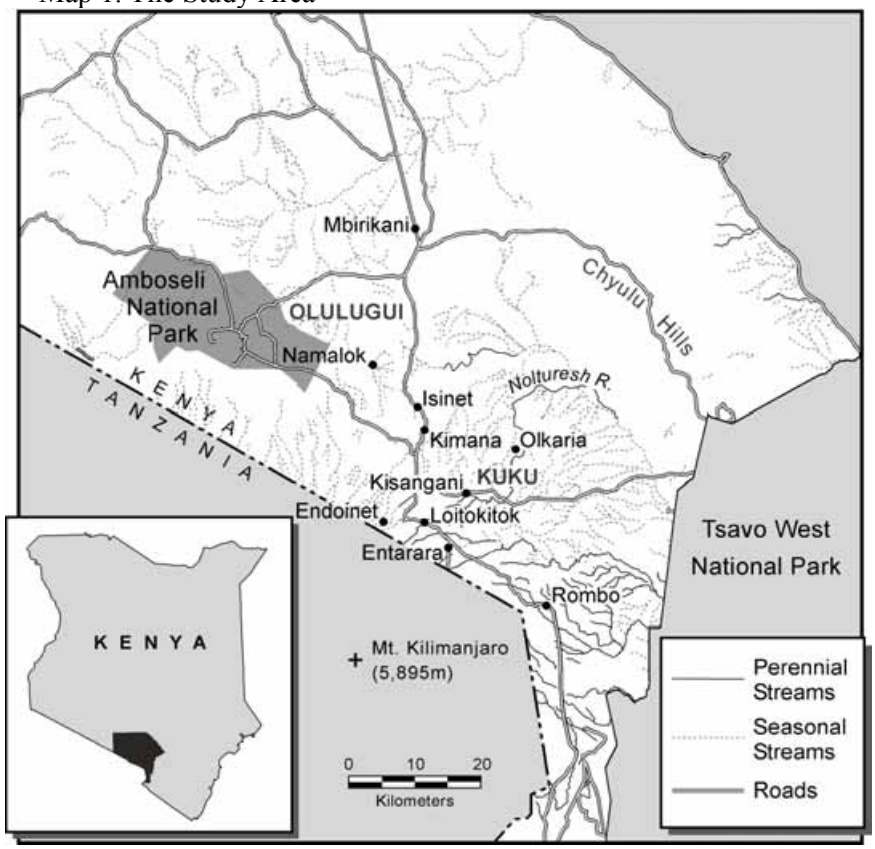
A. INTRODUCTION

Globalization is increasingly understood as a set of forces that homogenizes formerly heterogeneous social landscapes. This homogenisation reflects the impact of an increasingly generic set of external processes that driving change. However, a myriad of case studies have indicated that a wide range of outcomes of such processes are mediated in different ways in local contexts as people in local communities face emerging issues in the context of existing social relations and land use systems (e.g., Peluso 1992; Schroeder 1993; Wangari et al. 1996). Rather than the emergence of greater homogeneity, recent research indicates the persistent complexity of local responses. In terms of environmental impacts of human activities, the complexity of social relations and the specificity of local situations may prove more pervasive than the increasingly generic set of external forces bringing about change.

This working paper provides an overview of data collected during a 1996 household survey in Loitokitok Division, Kajiado District, Kenya (Map 1). The survey comprised 227 herders and 332 farmers. Results are reported individually for the Kilimanjaro Farming Zone, Rombo Group Ranch, Kuku Group Ranch, Kimana Group Ranch, and Imbirikani Group Ranch. The data cover a range of issues, including perceptions of agricultural conditions, household responses to drought, conflict between farmers and herders, and human-wildlife interaction.

Map 1. The Study Area



The objective of the paper is to provide a descriptive background to the Loitokitok area by indicating the broad context of land use change and development issues within local settings. The data indicate a diversity of local land use and environmental issues and a diversity of perceptions about how they are changing[1]. The overview of issues provided in this document points to the interacting trajectories of farming and herding systems in southern Kenya and their economic, political, cultural, and environmental connections to groups and processes outside the immediate study area.

It is striking that in this small area of about 4000 km^2 there is such a diversity of economic activity, and of linkages to the broader economy that have given rise to differences in the patterns and processes of land use between livelihood systems, and between localities. Thus farming and herding systems have had different and interacting development paths in response to the dynamic interactions between societal and biophysical processes over the past 30 years. Places in close proximity, such as Rombo, with strong commercial relations selling horticultural products to Mombasa, and Kimana-Isinet, with similar links to Nairobi and export markets, have developed differently within the overall dynamics of Kenya's political economy. Together with differences in soil and water endowments and settlement history, this has led to significant differences in their contemporary land use patterns (Campbell et al. 2000, 2003).

The results presented here are part of a larger project of identifying and analysing root causes of land use and cover change in the Loitokitok area (Campbell et al. 2000; 2003) and in East Africa generally (Mugisha 2002; Olson 2003; Smucker 2003; Tukarhiwa 2002; Wangui 2003).

B. ASPECTS OF DIFFERENTIATION IN LOITOKITOK DIVISION

The tables that follow in Sections C-G of this working paper provide a detailed portrait of conditions on the slopes of Mt. Kilimanjaro and in the group ranches in the surrounding lowlands. Even within this small area great differences exist illustrating the impact of a variety of factors including settlement history, ecological conditions, location relative to the national economy. This section illustrates the differences that exist from one place to another within the study area through a concise discussion of the characteristics of major land use categories – rain fed agriculture, irrigated agriculture, livestock herding, and wildlife.

B.1 Rainfed Agriculture

Rain fed agriculture is currently distributed on the slopes of Mt. Kilimanjaro extending northwards from the Tanzanian border into the lowlands at the foot of the mountain. Until the 1930s the Maasai herders dominated the region and they saw the mountain slopes as vital to their herding economy providing critical grazing and water during dry seasons and particularly during recurrent droughts. The beginnings of crop agriculture can be traced to the establishment of the British colonial administration in Loitokitok and the founding of a mission hospital at Illassit in the 1930s. The original farmers were Kamba and Kikuyu who moved to work for the British and at the mission (Campbell and Migot-Adholla 1981).

The cropped area increased after World War II as a number of Maasai married Kamba, Kikuyu and Chagga wives who cleared plots to farm. Over time they invited relatives to move to the area and farm. Adjudication of the land on the upper slopes of the mountain as Individual Ranches, beginning in the 1950s and accelerating in the 1960s, resulted in the subdivision of Individual Ranches by their Maasai owners and the sale of plots to immigrant farmers from elsewhere in Kenya.

[1] The descriptive information presented in this paper is complemented by the discussions at workshops held by the research team in the communities of the area. These workshops provided an opportunity for residents of the area to discuss the patterns and processes affecting land use change. (see Campbell, David J., Thomas Smucker and Jennifer Olson. Forthcoming 2003. "Community workshops in the study of land-use dynamics: Examples from Kenya." LUCID Working Paper 22)

The pattern of expansion of agriculture since the 1970s has been described by Campbell et al. (2003). By the early 1970s rain fed agriculture was practiced in a considerable area around Loitokitok Town. By the 1980s it had extended west towards Endoinet and east beyond Illassit towards Rombo. The spatial distribution reflected the rainfall distribution on the mountain slopes where the rains are heavier and more reliable in the east than in the west and in the south more than in the lower areas to the north, location relative to the market at Loitokitok, and the road pattern emanating from Loitokitok. In the last 20 years the pattern of expansion is one of infilling in areas previously farmed, and a scattered distribution in the lowlands to the northeast of Loitokitok and to the north of Rombo. The move into the lowlands where the rainfall is lower and more irregular from season the season entails significant risk of crop failure.

The historical sequence of cultivation is reflected in contemporary differences in agricultural practices. While production of maize and beans dominates, the field sizes and conditions of production differ from area to area. On the upper slopes there has been considerable intensification of production. Fields are small, stall-feeding of cattle is a recent innovation that is gaining popularity, and cash crops are commonly grown. Further, as these areas have been farmed continuously for over three decades there are indications of a reduction in soil fertility. Fields are larger on the lower slopes that came into production in the late 1970s and early 1980s. They are often plowed using tractors and there is little production of cash crops or stall-feeding of livestock. The scattered farms on the lowlands produce maize and cow peas, together with some sorghum and millet reflecting the drier conditions.

The differences outlined above reflect both local and external conditions. The migration to this area of farmers from elsewhere in Kenya is a symptom of the land shortage experienced by poorer households in their home areas. Migration to the area was stimulated by the success of the farmers who initially settled the slopes of the mountain where volcanic soils and adequate and reliable rainfall favoured crop production. Contemporary rain fed agriculture varies from place to place as production systems face different ecological constraints and marketing opportunities.

B.2 Irrigated Agriculture

The streams that flow off the slopes of Mt. Kilimanjaro and the swamps that lie at its base sustained the wildlife and herding systems that dominated the area's land use prior to the expansion of rain fed agriculture described above. The demand for farmland that accelerated after independence in 1963 first gave rise to expansion of cultivation on the mountain slopes and then by the mid-1970s to the beginning of irrigated agriculture at Kimana, Namelok, and Rombo. As Campbell and Lusch (2003) have documented from satellite imagery and field study, the area under irrigated cultivation has continued to expand since then to encompass the swamp at Isinet, and extend along the Nolturesh River and the Rombo River.

Irrigated agriculture is an intensive activity requiring costly inputs, labor in construction and maintenance, and fertilizer and pest control. In this area the presence of wildlife results in frequent crop damage. Compensation from wildlife authorities has seldom been considered reliable or adequate by farmers, and attempts at controlling wildlife through fencing and culling have had mixed success.

The economic viability of irrigated cultivation varies considerably from area to area depending upon the reliability of access to water and particularly upon access to markets. Crops produced along the Rombo River, and to some extent the Nolturesh River, are marketed in Mombasa, where along with tomatoes there is a high demand for "Asian vegetables" such as valoo and karela. In 2001 net returns from tomatoes were estimated at nearly $700 per hectare (Senior Chief Anthony Mepukori, personal communication).

Initially the crops grown at Namelok and Kimana were marketed at Loitokitok and to the hotels of the area serving the tourist trade. With structural adjustment, improved ground transportation and the emergence of the European market for horticultural products, production at Kimana and Isinet expanded to meet the opportunities in Nairobi and Europe. The ability of the Namelok producers to take advantage of these opportunities was limited by the atrocious condition of the few kilometres of road linking Namelok to the main transportation artery to Nairobi.

B.3 Livestock

The long-standing system of livestock production practiced by the Maasai has been severely affected by the development of rain fed and irrigated agriculture in the Loitokitok area. The access to the water and grazing resources that provided for the livestock in dry seasons and during drought has diminished as a result of the expansion of crop production. The effect has been similar for wildlife populations, except those in the Amboseli and Tsavo national parks that contained adequate water and grazing. The creation of these parks enclosing water sources exacerbated circumstances for the Maasai herders (Campbell 1993).

The reduced availability of critical water and grazing resources coincided with a growth in the Maasai population since the 1960s. The dangers of a situation of greater demand for resources at a time when access to them was declining were clearly experienced during the droughts of the 1970s, 1980s, and 1990s. Established coping strategies based on flexibility of geographical movement, diversification of livestock between cattle and sheep and goats, and effective social relationships that provided for sharing of resources provided insufficient security under the changed conditions (Campbell 1984, 1999).

In response the Maasai have adapted. While many established strategies continue, flexibility and diversification have been enhanced through migration to towns in search of employment, and through the widespread addition of crop production to livestock production. Many Maasai are now engaged in cropping, particularly in the areas of irrigated production. The swamps and rivers where irrigation has developed are located in the Group Ranches, where land is owned by the Maasai on a communal basis by members of the ranches.

The expansion of irrigation has been facilitated by informal arrangements between individual Maasai and immigrants from farming areas who have settled, come as seasonal sharecroppers, or as day laborers to cultivate the fields. The Group Ranches are now undergoing subdivision to individual plots owned by individual Maasai members of the ranches. The security of access to land of the immigrant farmers is currently in doubt though will probably be formalized through the purchased of land as a land market emerges post-subdivision.

The involvement of Maasai in irrigated crop production, and their engagement in the mixed crop-livestock economy, is far more widespread in the west of the area around Isinet and Namelok, than in the east at Rombo. In the latter area, and to the north in Mbirikani there remain many who continue with their livestock-based economy. These Maasai are questioning the future viability of this economy because subdivision may leave them with insufficient grazing and will likely amplify restrictions on access to water. Further, they tend to be poorer than those who have diversified, and they are more vulnerable to recurrent drought.

The pattern of land use practiced by herders has therefore become differentiated in response to recent changes in demographic, economic, and ecological conditions. The established livestock economy continues in areas remote from the irrigated areas of Namelok, Isinet and Kimana around which many have adopted a mixed livestock-crop livelihood. In Rombo relatively few Maasai engage in crop production.

B.4 Wildlife Conflict

The distribution of wildlife has been influenced by the establishment of Amboseli and Tsavo National Parks, and by the transformation of access to browse and water consequent upon the expansion of rain fed and irrigated agriculture. While many wildlife populations reside inside the parks, there is considerable seasonal dispersal and the majority of wildlife in the study area is in fact located outside the protected areas.

The increase in the human population, and its location in areas where water is available, results in greater opportunity for crop damage. With the increase in the value of crops produced under irrigation, the impact of wildlife damage is now both on the subsistence and cash crop activity (Campbell et. al. 2002; Norton Griffiths and Butt 2004).

The change in the distribution of human activity since the 1970s has affected the distribution of wildlife. This is reflected in changes in the intensity of conflict between people and wildlife and in the species of wildlife involved (Worden et al 2003).

Table 1. Wildlife species involved in conflict 1996 at different sites by number and percent of respondents reporting conflict.

	TOTAL		RANGELAND		SWAMP		LOWER MOUNTAIN		UPPER MOUNTAIN	
Number of Respondents: herders &/or farmers	n=392	%	n =136	%	n=118	%	n =104	%	n =34	%
Antelope (SM)	291	74	68	50	113	96	81	78	29	85
Elephant (SM)	261	67	62	46	117	99	70	67	12	35
Hyena (RS)	223	57	103	76	80	68	22	21	18	53
Monkey (SM)	176	45	44	32	79	67	39	38	14	41
Zebra (all)	151	39	61	45	39	33	41	39	10	29
Buffalo (S all)	147	38	36	26	82	69	22	21	7	21
Porcupine (MS)	119	30	14	10	52	44	28	27	25	74
Lion (SR)	108	28	52	38	50	42	5	5	1	3
Leopard (SM)	105	27	24	18	59	50	14	13	8	24
Baboon (SM)	94	24	20	15	39	33	24	23	11	32
Wildebeest (S)	70	18	12	9	38	32	16	15	4	12
Wild Dog (S)	56	14	10	7	29	24	13	13	4	12
Giraffe (MMS)	36	9	3	2	12	10	13	13	8	24

B. 5 Conclusion

Things differ from one area to another, in a small region of Kenya that is influenced by the same external processes that influence development and by similar local ecological conditions and settlement history. This demonstrates that in an age of globalization when structures defined globally or nationally come to bear on the whole population, local agency mediates these to create a mosaic of circumstances that belies the notion of uniformity as an outcome of globally defined policy objectives and uniform development strategies such as SAPs.

C. KILIMANJARO FARMING ZONE

C.1. Major Features (topography, drainage: rivers, swamps, principal economic activities, towns, roads, etc)

This area represents the zone where rain fed agriculture is possible on the slopes of Mt. Kilimanjaro north of the frontier with Tanzania. This area has had agricultural settlement since the 1930s. The area under cultivation has expanded since then and particularly after independence when many people from Machakos and Central Province moved to the area to buy or rent land on the individual ranches that were being subdivided.

This area is now almost entirely under crops, and respondents complain of the difficulty of finding fodder for their livestock, most which are stall-fed. The principal crops grown are maize, beans and potatoes. The respondents complain of declining soil fertility and soil erosion, factors which may account for over 20% of respondents growing millet and cassava.

Many farmers own livestock, though most are kept in the rangelands rather than on the farm. Average holdings are 13 cattle and 16 sheep and goats.

C.2. Survey Results:
The majority of the farmers on the slopes of the mountain express the view that agricultural conditions have worsened under the past five years. Nearly 60% report that soil erosion has increased, 75% that soil fertility has decreased and 66% that the area of woodland has declined. Further, 74% report that the area under crops has declined. (See below on number of people in the area). The major problems in the area for farmers are soil erosion, hunger, infertile soil; lack of pasture, drought, animal disease, and lack of land. There is also an important issue of access to water. Access to water is reported by 81% of respondents as having been a problem in the year preceding the survey. Education is an important expenditure for many households. Seventy-three percent of boys and 61% of girls in the sample attended school.

C.2.a. Change in Agricultural Conditions Over the Last Five Years

Table 2. Changes in Agricultural Conditions with Farmers over the Last Five Years

	Increased	*Decreased*	*No change*
Area under cultivation	21	74	5
Soil erosion	59	34	7
Soil fertility	14	75	11
Woodland	24	66	10

C.2.b. Drought
The market and famine relief are the most frequently reported source of food, though stored food and assistance from relatives are common. Saving money is the most commonly reported means of offsetting future shortages and in this area the options of keeping more animals and buying more land are less available than in other parts of the survey area. Fifty-eight percent of farmers believe that drought will be a problem in the future.

Table 3. Main Source of Food by Farmers

	Percent
Market	88
Famine Relief	65
Relatives	48
Stored Food	44
Savings	29
Harvest	13

Table 4. What Farmers are Doing to Protect Against Future Effects of Drought

Future Effects	*Percent*
Save money	79
Keep more animals	33
Buy more land	20

C.2.c. Problems with Farmers

Problems with other farmers are reported by 36% of respondents. In this dominantly cropping area the most frequent issues are associated with livestock - trampling and grazing crops, and access to grazing. The fact that most of the land is now cultivated, and that much of the woodland has been removed means that free-ranging livestock have few areas to graze and when poorly supervised easily find their way into fields, while stall-fed livestock pose a problem of access to sufficient fodder. Only 37% report that conditions have become worse over the past five years and only 26% expect things to worsen over the next five years.

Table 5. Issues Identified by Farmers

Issues	*Percent*
Cattle eat crops	64
Access to land	42
Trample crops	39
Access to grazing	27
Payment of rent	24
Access to water	18

Table 6. Resolved by Farmers

How Resolved	*Percent*
Discuss	79
Chief	24
Court	15
Police	12

Table 7. Cause of Problems by Farmers

Cause of Problems	*Percent*
Poor supervision	59
Herder too young	56
Drought	60
Lack grass	47
Population Pressure	32
Overgrazing	18

Table 8. Frequency of Problems Last Five Years for Farmers

Frequency Last Five Years	*Percent*
Increase	37
Decrease	52
No Change	11

Table 9. Situation in Next Five Years for Farmers

Situation in Five Years	*Percent*
Better	59
Worse	26
No Change	15

C.2.d. Problems with Herders among Farmers

Only one-third of the sample of farmers reported problems with herders over the past five years. The major issues are access to grazing and water, and theft of crops. Drought and lack of grass are seen as the cause and most issues are resolved through discussion. About half state that the problem has worsened over the past five years and 40% expect this trend to continue. This level of conflict with herders is less than in other areas surveyed and reflects the fact that with the almost complete cultivation of the upper and middle slopes of the mountain, few herders find their way into the area.

Table 10. Issues with Herders Identified by Farmers

Issues	*Percent*
Grazing crops	89
Access to water	46
Theft of crops	39
One person has too many animals	31
Trample crops	30

Table 11. Means of Resolving Problems Between Herders and Farmers

How Resolved	*Percent*
Discuss	72
Chief	24
Violence	24
Court	14
Police	10

Table 12. Problems Caused with Herders by Farmers

Cause of Problems	*Percent*
Lack grass	75
Drought	68
Herder too Young	39

Table 13. Frequency of Problems between Herders and Farmers During the Last Five Years

Frequency Last Five Years	*Percent*
Increase	52
Decrease	38
No Change	10

Table 14. Problems Between Herders and Farmers During the Next Five Years

Situation in Next Five Years	*Percent*
Better	40
Worse	40
No Change	20

C.2.e. Problems with Wildlife

Wildlife continues to pose a significant problem for the farmers on the mountain slopes, even though access to plains wildlife is restricted by the almost complete cultivation of the area. Antelope and porcupine pose the major threat, followed by hyena, monkey, elephant baboon, buffalo and leopard. Eighty-two percent of all farmers in the sample reported problems with wildlife. Scaring animals away and building fences are the most frequently reported means of protection. A majority of farmers report that the situation has worsened over the past five years and expect it to get worse in the near future. Only 5% of farmers have ever been compensated for economic losses due to wildlife.

Table 15. Wildlife Issues Identified by Farmers

Issues	*Percent*
East Crops	99
Trample Crops	41
Bother People	36
Spread Disease	27

Table 16. Means of Resolving Wildlife Issues by Farmers

How Resolved	*Percent*
Scare	100
Fences	89
Hunt	26
Report to Warden	24

Table 17. Frequency with Wildlife Last Five Years by Farmers

Frequency Last Five Years:	*Percent*
Increase	66
Decrease	131
No change	3

Table 18. Situation with Wildlife in the Next Five Years by Farmers

Situation in Next Five Years:	*Percent*
Better	35
Worse	49
No change	17

Table 19. Which Wildlife by Farmers

Which Wildlife	*Percent*
Antelope	85
Porcupine	67
Hyena	54
Monkey	44
Elephant	42
Zebra	32
Baboon	30
Buffalo	30
Leopard	26
Lion	3

C.2.f. General Situation

Over 80% of respondents state that the area has too many inhabitants and only 30% think that the area will support their children in 20 years time. The alternatives envisioned include buying more land, moving from the area and giving up the keeping of livestock.

Table 20. Number of People in the Area

Farmers	*Percent*
Too many	82
Too few	6
Just right	11

Table 21. Alternatives for Children

Farmers	*Percent*
Buy land	89
Move to another area	32
Become farmers	18

C.2.g. Future Conditions in the Area

Table 22. Future Conditions in the Area Better for Farmers

Better Because	*Percent*
Education	94
Development	86
Improved extension	68
Commercial farming	38
Mixed farming	30

Table 23. Future Conditions in the Area Worse for Farmers

Worse Because	*Percent*
Overpopulation	85
Subdivision	84
Greater cultivated area	63
Decline in herding	19
Overgrazing	49

D. ROMBO GROUP RANCH

D.1. Major Features (topography, drainage: rivers, swamps, principal economic activities, towns, roads, etc)

Rombo is the easternmost Group Ranch in the survey area. The area is well provided for in terms of perennial streams that flow off the mountain and the water they provide has supported irrigated agriculture since the mid-1970s.

The majority of residents are Maasai, and a variety of other ethnic groups are represented in the population including Chagga and Kikuyu.

Those who report themselves to be herders have an average of 36 cattle, and 36 sheep and goats. This figure conceals the fact that 45 percent reported not owning at least one class of livestock.

The most important crops are maize and beans, grown for subsistence and cash crops including bananas, tomatoes, onions, okra, peppers and watermelon. Many farms have stall-fed livestock and apply the manure to the fields. The average among those reporting owning animals was 22 cattle, and 14 sheep and goats. Many of these animals are kept off-farm.

D.2. Themes

The major problems in the area for farmers are: drought, poor harvest, hunger, and poor health - particularly malaria. These problems are associated with a lack of security of tenure, insufficient water for the numbers that wish to irrigate, and poor quality of water due to chemical pollution, declining soil fertility, and the marketing of crops due to the poor roads.

Specific issues reported include:

- Those who had bought land concerned that effort may be made to overturn purchases.
- General problem is lack of market for agricultural produce.
- Access to irrigation water is a problem as the shares are not enough for everyone.
- Population growth set up a demand for water in excess of that available
- Rombo River is drying up and reducing flow to those downstream.
- Pollution by chemicals is bad.
- Incidence of malaria high in the irrigated areas. Also amoebic dysentery and typhoid due to poor hygiene in use of water (confirmed by medical doctor in Loitokitok.) Associated lack of health centre - the catholic health centre serves a big area.
- Felling of trees, particularly on river banks is a problem
- Animal and crop diseases are prevalent and little attention from Ag or Vet Officers
- Marketing of horticultural products a problem due to poor transport.
- Stall feeding seen as a means of improvement but limited by lack of dairies to which to sell milk.

The major problems in the area for herders are lack of land and of pasture, and food shortage. These issues are linked to uncertainty over the future of the Group Ranch and subdivision - a fear that the distribution will not be fair in terms of amount and quality of land. Many have settled and taken up farming or rented the land in an attempt to pre-empt the distribution after subdivision; there is also a concern with environmental quality including declining soil fertility, soil erosion, deforestation; and declining access to water.

Specific issues reported include:

- Stall feeding seen as a means of improvement but limited by lack of dairies to which to sell milk.
- Major problem is diversion of water for agriculture, particularly irrigation, leaving less for watering livestock.
- Pastoralists value wildlife. But, once start to cultivate wildlife, particularly elephant, become a real problem.
- Hunting and killing proscribed yet no real compensation. There was once compensation but do not understand why it has ceased.
- Population growth resulted in fewer resources. Group ranches will not be sufficient in the future.
- Some say subdivision will take place but not convinced it will mean a better future.
- No longer move homes from place to place, just their animals.
- Many have turned to farming as lack the pastures to keep large numbers of livestock. Farming poses problems due to wildlife eating crops.
- During the dry season cannot grow crops, as the water that might be used for irrigation is needed for the livestock.
- Seventy-eight percent of farmers report problems with access to water in the year preceding the survey
- Seventy-eight percent of farmers and 72% of herders predict that drought will be a problem in the future.
- Eighty-two percent of farmers and 95% of herders report problems with wildlife
- Forty-two percent of farmers and none of the herders in the sample have received compensation due to damage caused by wildlife
- Thirty-six percent of farmers and just 8% of herders believe that the area will support their children after twenty years.

D.2.a. Change in Agricultural Conditions in the Last Five Years

Table 24. Changes in Agricultural Conditions for Farmers in the Last Five Years

	Increased	*Decreased*	*No Change*
Area under cultivation	39	48	13
Soil erosion	25	45	31
Soil fertility	9	77	8
Woodland	9	84	8

Table 25. Changes in Agricultural Conditions for Herders in the Last Five Years

	Increased	*Decrease*	*No change*
Area under cultivation	35	52	13
Soil erosion	48	16	36
Soil fertility	7	58	36
Woodland	3	82	15
Change in access to water	0	59	41

D.2.b. Drought

Table 26. Main Source of Food with Drought

	Farmers	*Herders*
Stored food	63	15
Famine relief	23	59
Market	61	79
Relatives	18	3
Harvest	31	15
Savings	21	-

Table 27. What Doing to Protect Against Future Effects (percent responding)

	Farmers	*Herders*
Save money:	43	43
Work off-farm:	24	31
Keep more animals:	22	43
Buy more land:	18	-
Nothing:	15	-

D.2.c. Problems with Farmers

Table 28. Issues (percent of respondents reporting each issue)

	Farmers	*Herders*
Access to water	49	35
Cattle eat crops	28	47
Access to land	25	24
Trample crops	21	35
Payment of rent	21	29
Access to grazing	18	24
Sale of land	10	-

Table 29. How it was Resolved with Farmers and Herders

	Farmers	*Herders*
Discuss	84	94
Violence	13	18
Court	16	-
Burn Crops	13	-
Nothing	13	-
Chief	-	18
Police	-	12

Table 30. Cause of Problems for Farmers and Herders

	Farmers	*Herders*
Drought	58	76
Lack of grass	30	47
Farmers enclose water	19	-
Population Pressure	52	-
Farmers move to grazing land	19	-
Poor supervision	16	-

Table 31. Frequency in the Last Five Years:

	Farmers	*Herders*
Increase	22	41
Decrease	57	41
No change	22	18

Table 32. Situation in Next Five Years:

	Farmers	*Herders*
Better	56	35
Worse	23	35
No change	20	29

D.2.d. Problems with Herders

Table 33. Issues with Herders

	Farmers	*Herders*
Grazing crops	86	55
Trample crops	50	44
Theft of animals	42	59
Access to grazing	24	79
Theft of crops	32	-
One herder has too many stock	22	-
Access to water	21	-

Table 34. How Herders Resolved

	Farmers	*Herders*
Discuss	71	93
See chief	19	17
Police	13	14
Nothing	26	-
Violence	-	17

Table 35. Cause of Problems for Herders

	Farmers	*Herders*
Drought	79	83
Lack grass	62	69
Herder too young	33	36

Table 36. Frequency Past Five Years

	Farmers	*Herders*
Increase	27	33
Decrease	33	38
No change	40	29

Table 37. Situation in Next Five Years

	Farmers	*Herders*
Better	41	35
Worse	30	38
No change	28	28

D.2.e. Problems with Wildlife

Table 38. Issues with Wildlife

	Farmers	*Herders*
Eat crops	87	60
Trample crops	81	51
Bother people	47	76
Spread disease	47	0
Predation	27	86
Access to grazing	19	19

Table 39. How Problems with Wildlife Were Resolved

	Farmers	*Herders*
Scare	74	87
Report to Warden	36	73
Hunt	12	26
Fences	36	11

Table 40. Frequency of Conflict in Past Five Years:

	Farmers	*Herders*
Increase	62	89
Decrease	36	0
No change	3	11

Table 41. Situation with Wildlife in Next Five Years:

	Farmers	*Herders*
Better	26	0
Worse	65	78
No change	9	22

Table 42. Which Wildlife Were Involved in Conflict

	Farmers	*Herders*
Antelope	76	60
Elephant	60	83
Leopard	39	60
Lion	9	46
Monkey	30	36
Wildebeest	26	19
Zebra	23	6
Baboon	21	36
Hyena	9	76
Porcupine	41	0
Buffalo	17	43

D.2.f. General Situation

Table 43. Number of People

	Farmers	*Herders*
Too many	45	80
Too few	24	3
Just right	47	18

Table 44. If too many, how will people adapt?

	Farmers	*Herders*
Buy land	60	53
Move to another area	57	55
Move to town	42	13
Become farmers	38	32
Divide herd	-	23
Divide land	-	26

Table 45. Education

	Farmers	*Herders*
Boys in school	67	74
Girls in school	68	77

D.2.g. Future Conditions in the Area

Table 46. Better Conditions in the Area Because

	Farmers	*Herders*
Education	71	83
Development	48	33
Improved extension	30	-
Commercial farming	-	38
Mixed farming	-	38

Table 47. Worse Conditions in the Area Because

	Farmers	*Herder*
Overpopulation	54	94
Subdivision	31	41
Greater cultivated area	31	25
Decline in herding	29	63
Overgrazing	29	-

E. KUKU GROUP RANCH

E.1. Major Features (topography, drainage: rivers, swamps, principal economic activities, towns, roads, etc)
Kuku is characterized by a semi-arid savanna landscape of hills, plains and valleys. The Noolterish River flows through the ranch providing opportunities for irrigated agriculture. In Kisanjani irrigation has been under way for over fifteen years and for over ten years in Olkaria.

The majority of residents are Maasai pastoralists, while many Maasai and Chagga, Kikuyu and Luo farm in the Group Ranch. The average number of livestock held by herders is 36 cattle and 46 sheep and goats. Among farmers the average is 10 cattle and 11 sheep and goats, though this conceals the fact that many farmers own few or no livestock.

The principal crops grown are maize and beans for food and onions, tomatoes and cabbage as cash crops.

E.2. Survey Results:
The data were collected February 11-23, 1996. Interviews were carried out with 40 herders and 37 farmers. The transect passed through the farming area at Entarara, north through the farms in the newly cleared bush, to the swamp at Kisanjani then continued north across rangeland to the irrigated agriculture along the Noolterish river. This transect links southward to the transect up the mountain from Entarara.

Both farmers and herders surveyed reported a decline in the area under cultivation over the last five years. In a region where the area cultivated has been on an increase for over 20 years, this may appear surprising. The reason is however very clear. It is due to the decline in the availability of water for irrigation consequent upon the diversion of water into the new water pipeline that moves water from the slopes of Kilimanjaro to Machakos, Athi River and other areas in northern Kajiado District. Soil fertility and the area under woodland are reported to have declined, while many report that soil erosion has decreased in intensity. Just 8% of farmers and 43% of farmers believe the area will support their children in twenty years.

Specific issues reported during the survey include:
- Rainfall shortage main problem.
- Recognition of the impact on the pastoral economy of land being set aside for farming.
- Some respondents, particularly Kikuyu are concerned that the survey was designed to prepare the way for them to be moved from the area.
- Resistance due to time-consuming nature of the exercise.
- Maasai in support of subdivision (Kuku). Once have own land can dig boreholes, build homes, cultivate etc.
- Subdivision is being resisted by the big men who feel that they will be restricted in access to pasture if each member gets a small parcel of land.
- Subdivision does not take into account needs of future generations.

E.2.a. Change in Agricultural Conditions Last Five Years

Table 48. Change in Agricultural Conditions for Farmers in the Last Five Years

	Increased	*Decreased*	*No change*
Area under cultivation	11	62	27
Soil erosion	19	43	38
Soil fertility	3	65	32
Woodland	3	68	30

Table 49. Change in Agricultural Conditions for Herders in the Last Five Years

	Increased	*Decreased*	*No change*
Area under cultivation	19	44	36
Soil erosion	18	38	44
Soil fertility	26	31	43
Change in access to water:	9	12	79

E.2.b. Drought

Recurrent food shortage, induced by low rainfall, is identified as a problem by the majority of residents interviewed at Kuku. The main sources of food reported by b0th herders and farmers are the market and famine relief. Farmers also report recourse to stored food and to some harvested products, while nearly 25% of herders report seeking assistance from relatives, a practice reported by 16% of farmers. The majority expect future shortages. Measures to offset future losses reported by farmers include saving cash (50%), keeping more animals (31%) and acquiring more land (22%), while herders see saving cash as the most common response (51%). Seventy-five percent of farmers and 81% of herders believe that drought will be a problem in the future.

Table 50. Main Source of Food

	Farmers	*Herders*
Market	53	51
Famine Relief	41	46
Stored Food	34	17
Harvest	29	15
Relatives	16	24

Table 51. What Doing to Protect Against Future Effects

	Farmers	*Herders*
Save Cash	50	49
More Animals	51	
Buy More Land	22	

E.2.c. Problems with Farmers

The degree of conflict with farmers reported in Kuku is low compared with other areas surveyed. The most common issues reflect the continued strength of animal raising in the area, particularly issues related to the trampling and grazing of crops blamed on poor supervision of livestock. Access to grazing areas is also a central theme as farmers put grazing areas under cultivation. Both herders and farmers indicate that the level of conflict has increased over the past five years and while farmers see a future improvement, herders expect it to get worse in the next five years.

Table 52. Issues with Farmers

	Farmers	*Herders*
Access water	44	18
Access to grazing	21	46
Sale of land	21	18
Trample crops	44	
Payment of rent	35	
Cattle eat crop		48

Table 53. How it was Resolved with Farmers

	Farmers	*Herders*
Discussion	45	68

Table 54. Frequency with Farmers over the Past Five Years

	Farmers	*Herders*
Increase	60	82

Table 55. Situation with Farmers in the Next Five Years

	Farmers	*Herders*
Better	67	15
Worse	32	75

E.2.d. Problems with Herders

Conflict with herders as reported by both farmers (68%) and herders (72%) is high. Grazing and trampling of crops, particularly during drought, are the dominant issues. Whereas conflicts with farmers are reportedly dealt with mainly by discussion, those with herders frequently lead to violence and the intervention of the chief. Herders report that these conflicts have become more common over the past five years and anticipate continuing worsening of the situation, while the farmers see the frequency as not having changed over the past five years and as likely to remain at present levels.

Table 56. Issues with Herders

	Farmers	*Herders*
Trample crop	32	33
Graze on farm	23	76
Eat crop	75	-
Access to water	20	-

Table 57. How Issues with Herders were Resolved

	Farmers	*Herders*
Violence	35	35
Discuss	24	44
Chief	31	-

Table 58. Cause of Problems with Herders

	Farmers	*Herders*
Drought	70	48
Lack grass	37	38
Herder too young	33	-
Owners take animals to shamba	-	30

Table 59. Frequency with Herders Over the Past FiveYears:

	Farmers	*Herders*
Increase	22	62
Decrease	22	14
No change	56	24

Table 60. Situation with Herders Over the Next Five Years:

	Farmers	*Herders*
Better	14	24
Worse	14	76
No change	-	-

E.2.e. Problems with Wildlife

The vast majority of both farmers (85%) and herders (92%) report problems with wildlife. Farmers are most concerned with their eating and trampling of crops, the spread of disease, predation and the bothering of people, while eating and trampling of crops and to a lesser extent predation, are the concerns of herders.

Farmers and herders report different wildlife species as posing threats to them. Elephant and antelope, and to a lesser extent, zebra, monkeys and hyena, dominate farmers' concerns while herders report problems with a wider variety of wildlife including antelope, hyena, zebra, buffalo, elephant, baboon, lion and leopard.

Both herders and farmers report scaring of wildlife and the building of fences as common ways of trying to deal with the situation, while farmers also report hunting and herders seeking the help of game wardens. There is a consensus that the situation has become worse over the past five years and that it will either remain at this level or worsen over the next few years. More than half (52%) of farmers have been compensated for wildlife-related damages. Just 3% of herders have received compensation.

Table 61. Issues With Wildlife

	Farmers	*Herders*
Eat crop	97	88
Trample crop	94	50
Predation	50	38
Spread disease	70	5
Bother people	32	18
Access to grazing	22	5

Table 62. How Issues With Wildlife was Resolved

	Farmers	*Herders*
Scare	59	56
Fences	38	28
Hunt	29	13
Report to Warden	3	28

Table 63. Cause of Problems With Wildlife

	Farmers	*Herders*
Drought	100	72
Lack grass	94	72

Table 64. Frequency With Wildlife Over the Past Five Years:

	Farmers	*Herders*
Increase	94	88
Decrease	6	5
No change	0	5

Table 65. Situation With Wildlife in the Next Five Years:

	Farmers	*Herders*
Better	6	2
Worse	65	51
No change	29	44

Table 66. Which Wildlife

	Farmers	*Herders*
Elephant	94	35
Antelope	85	60
Zebra	44	53
Hyena	35	58
Monkey	41	58
Wild Dog	27	5
Buffalo	3	38
Baboon	-	33
Lion	11	28
Leopard	-	20

E.2.f. General Situation

Table 67. Number of People in the Area with Wildlife

	Farmers	*Herders*
Too many	62	44
Too few	0	2
Just right	38	54

Table 68. If No, What Will They Do

	Farmers	*Herders*
Move	61	67
Buy land	24	67
Become farmers	-	50

Table 69. Education

	Farmers	Herders
Boys in school	74	54
Girls in school	90	56

E.2.g. Future Conditions in the Area

Table 70. Future Conditions in the Area are Better Because

	Farmers	*Herders*
Development	100	67
Education	68	72
Commercial Farming	34	33
Better herding	34	-
Mixed Farming	29	-

Table 71. Future Conditions in the Area are Worse Because

	Farmers	*Herders*
Decline in herding	34	-
Overgrazing	-	60
Subdivision	-	35
Greater cultivation in the area	-	-

F. KIMANA GROUP RANCH

F. 1. Major Features (topography, drainage: rivers, swamps, principal economic activities, towns, roads, etc)
Kimana Group Ranch is located on the lower slopes of Mt. Kilimanjaro. The Kimana and Isinet rivers flow into swamps. These rivers and the swamps support irrigated agriculture, as does the swamp at Namalok.

The majority of the Group ranch members define themselves as herders even though many of them farm. There are also many full time farmers, some of whom are Maasai, but most are from other ethnic groups such as the Chagga, Kamba and Kikuyu.

Average reported herd sizes among herders are 38 cattle and 31 sheep and goats. Among farmers average herd sizes are smaller, many owning few or no livestock, at 8 cattle and 14 sheep and goats. Manure is important, and 64% of farmers report applying manure to their fields. The principal crops are maize and beans for food and tomatoes, onions, peppers and some fruit for cash.

F.2. Survey Results:
Compared with other areas surveyed, the responses from Kimana indicate that overall agricultural conditions have not changed significantly over the past five years. A majority of both farmers and herders report that the area under woodland has declined, both increases and decreases in soil erosion and soil fertility are reported, and the expansion of the cultivated area, so dramatic in the 1970s and 1980s, appears to be slowing down. The major problems in the area *for farmers* are drought, hunger, poor health; and *for herders* lack food, lack of land and of pasture, and population pressure.

Major issues that were identified during the survey included:
- Farmers and many herders complain of wildlife damaging crops;
- Main problems are drought, lack of land and wild animals.

F.2.a. Change in Agricultural Conditions Last Five Years

Table 72. Change in Agricultural Conditions for Farmers Over the Last Five Years

	Increased	*Decreased*	*No change*
Area under cultivation	42	32	-
Soil erosion	32	44	24
Soil fertility	34	43	23
Woodland	15	70	15

Table 73. Change in Agricultural Conditions for Herders Over the Last FiveYears

	Increased	*Decreased*	*No change*
Area under cultivation	21	33	45
Soil erosion	48	30	23
Soil fertility	24	44	32
Woodland	22	64	14
Change in access to water:	5	10	85

F.2.b. Drought

While a vast majority of respondents report experiences with food shortage, the opportunities to offset these difficulties are different for farmers and herders. Purchases at the market and access to famine relief are the dominant responses for herders, who also ask relatives for help, and report using harvested food. Farmers' responses indicate similar means of dealing with shortage, though the proportion of respondents reporting them is less, and farmers also use savings and stored food.

Future shortages are anticipated but many farmers (31%) do not report doing anything to offset future shortages, and those that do see buying more land (29%) and keeping more livestock (21%) as the most important means. More herders report proactive measures, including buying more land (51%), keeping more animals (43%) and saving cash (43%). Future droughts are anticipated by 63% of farmers and 24% of herders.

Table 74. Main Source of Food

	Farmers	*Herders*
Market	66	84
Famine relief	47	82
Harvest	12	30
Relatives	13	41
Stored food	24	-
Savings	23	-

Table 75. What is Being Done to Protect Against Future Effects?

	Farmers	*Herders*
Buy more land	29	50
Keep more animals	21	43
Nothing	31	-
Save money	-	43

F.2.c. Problems with Farmers

Compared with other areas the degree of conflict reported with farmers is low, only 7% of herders and 32% of farmers reporting such incidents. The few situations reported by herders reflect access to water, grazing and agricultural land and associated grazing and trampling of crops. These are also issues between farmers who also conflict over payment of rent and sale of land.

The most important causes of the problems are drought, which exacerbates the impact of growing populations at the interface between these two land uses. Such issues are usually resolved through discussion, and the chief and the local court, but herders also report violence. Herders see the future incidence of conflict as likely to decline, while the majority of farmers see them increasing in the next five years.

Table 76. Issues with Farmers

	Farmers	*Herders*
Access to water	38	71
Trample crops	30	86
Access to grazing	22	86
Cattle eat crops	22	57
Access to land	16	100
Payment of rent	14	43
Sale of land	20	-

Table 77. How it was Resolved with Farmers

	Farmers	*Herders*
Discuss	72	100
Violence	17	50
Court	17	43
Nothing	17	-
Burn Crops	10	-
Chief	-	67

Table 78. Cause of Problems for Farmers

	Farmers	*Herders*
Drought	60	83
Population Pressure	30	83
Lack of grass	33	-
Overgrazing	30	-
Farmers move to grazing land	20	-
Poor supervision	19	-

Table 79. Frequency with Farmers Over the Past Five Years

	Farmers	*Herders*
Increase	59	14
Decrease	35	57
No change	22	29

Table 80. Situation With Farmers in the Next Five Years

	Farmers	*Herders*
Better	58	38
Worse	35	13
No change	20	50

F.2.d. Problems with Herders

Problems with herders are reported by over 75% of farmers but less than 10% of herders. Herders are most concerned with the spread of disease, theft of animals and grazing of crops. The more numerous issues between herders and farmers concern grazing and trampling of crops as animals seek grazing during drought, often with the herders being too young to provide adequate supervision of the livestock, and the theft of crops. Most occurrences are settled through discussion and the intervention of the chief.

Herders see the situation as not having become much more difficult in the recent past and improving in the future, while farmers are less optimistic. Twenty-seven percent of farmers and 51% of herders believe that the area will support their children in twenty years.

Table 81. Issues with Herders

	Farmers	*Herders*
Grazing crops	71	75
Theft of animals	28	-
Trample crops	38	-
Grazing on farm	22	-
Theft of crops	21	-
Access to grazing	20	-
Disease spread	-	87

Table 82. How it was Resolved with Herders

	Farmers	*Herders*
Discuss	53	88
Chief	12	88
Court	18	-
Nothing	14	-

Table 83. Cause of Problems for Herders

	Farmers	*Herders*
Drought	53	100
Lack of grass	43	88
Herder too young	21	75
Take animals to shamba	22	-

Table 84. Frequency with Herders for the Past FiveYears

	Farmers	*Herders*
Increase	49	25
Decrease	25	50
No change	25	25

Table 85. Situation with Herders in the Next Five Years

	Farmers	*Herders*
Better	29	69
Worse	29	23
No change	41	7

F.2.e. Problems with Wildlife

Wildlife is a problem for the residents of Kimana, with over 90% of farmers and nearly 60% of herders reporting problems. Both groups report eating and trampling of crops and bothering of people as important issues, while herders are also concerned with predation, access to grazing and the spread of disease. Herders are more likely than farmers to report to the game wardens, farmers reporting that they try to scare the wildlife and build fences to keep them out of their fields.

Elephants are the species most frequently reported by both herders and farmers. Farmers report other species that damage crops - herders report antelope, zebra, monkeys and baboons while predators including hyena, lion and leopard.

Both groups report that the incidence of problems with wildlife has increased over the past five years and is likely to worsen in the future. Twenty-nine percent of farmers and 19% of herders have been compensated for wildlife-related damage.

Table 86. Issues with Wildlife

	Farmers	*Herders*
Eat crops	91	46
Trample crops	90	51
Bother people	73	62
Predation	17	69
Access to grazing	15	42
Disease spread	29	42

Table 87. How it was Resolved with Wildlife

	Farmers	*Herders*
Scare	79	52
Fences	54	37
Report to Warden	36	63
Hunt	10	18

Table 88. Frequency with Wildlife for the Past Five Years

	Farmers	*Herders*
Increase	81	78
Decrease	18	19
No change	1	4

Table 89. Situation with Wildlife in the Next Five Years

	Farmers	*Herders*
Better	27	39
Worse	64	31
No change	9	31

Table 90. Which Wildlife

	Farmers	*Herders*
Elephant	72	72
Antelope	71	42
Monkey	44	42
Zebra	40	23
Lion	16	46
Leopard	15	46
Baboon	29	19
Wildebeest	19	27
Hyena	20	54
Buffalo	34	39

F.2.f. General Situation

Table 91. Number of People in the Area

	Farmers	*Herders*
Too many	71	51
Too few	7	15
Just right	22	34

Table 92. If too many, how will people adapt?

	Farmers	*Herders*
Buy land	53	39
Move to another area	38	31
Become farmers	17	
Sell land		23
Divide herd		23

Table 93. Education

	Farmers	*Herders*
Boys in school	56	63
Girls in school	66	65

F.2.g. Future Conditions in the Area

Both farmers and herders are concerned that the population of the area may be too great and that the resources of the area may be insufficient to support their children in the future. A higher proportion of farmers than herders reflected these concerns.

Both groups look to education and development activities as a basis for an improved future along with innovations in farming to include mixed cropping/herding and greater commercial linkages. People are concerned that population growth and overgrazing will make things worse, and herders in particular are worried about the potential impact of subdivision of the ranch. Farmers anticipate buying more land and moving to a different area as options. Herders concur though some see dividing their herds and selling land as options.

Table 94. Future Conditions in the Area are Better Because

	Farmers	*Herders*
Education	77	90
Development	69	78
Mixed farming	33	34
Commercial farming	32	49
Traditional life continues	28	
Improved herding	25	
Improved extension	23	

Table 95. Future Conditions in the Area are Worse Because

	Farmers	*Herders*
Overpopulation	61	59
Overgrazing	49	49
Decline in herding	20	27
Subdivision	20	42

G. MBIRIKANI GROUP RANCH

G.1. Major Features (topography, drainage: rivers, swamps, principal economic activities towns, roads, etc.)

The numbers of livestock owned vary among the owners and between those whose principal occupation is herding and those who define themselves as farmers, herders own on average 48 cattle and 19 sheep and goats, while farmers own on average 22 cattle and 11 sheep and goats.

The majority of cultivation is around swamps, though small plots are irrigated along the main road from Loitokitok to Emali using water from the pipeline. The principal crops grown are tomatoes, onions and cabbage for sale and maize and beans for food. Fifty-nine percent report using manure as fertilizer.

G.2. Survey Results:
Farming and herding in Mbirikani are perhaps more spatially discreet activities than elsewhere in the survey area. Farming is limited to Namalok and Isinet while herding activities extend into these areas and also over the vast semiarid rangeland area that comprises the majority of the group ranch.

In examining agricultural conditions, herders and farmers provide very different responses. Farmers report cultivation and woodland as having decreased in area over the past five years, and they are equally divided over the observation of increases/decreases in soil fertility and erosion.

By contrast, herders report decreases on woodland and soil fertility and an increase in soil erosion, and are divided over increases/decreases in the area cultivated. This probably represents a concurrence with farmers over the reduction in cultivation around swamps, and observed increases in cultivation where water is available along the water pipeline that passes through the ranch.

Specific issues that were reported during the survey included:
- Age differences in attitudes to subdivision - old oppose, young support. Perhaps young support it, as do not have families.
- Wildlife is a serious problem, especially lack of compensation for damage and predation.
- Farming seen as a good option but lack of fertile land.

- Women sometimes refused to answer on grounds that questions addressed "men's" issues.
- In remoter areas concerned that questions re number of children and size of herds reflected an a priori attitude that something was wrong with their way of life.
- Differences in attitudes between people of different ages. Majority of the younger want subdivision, older did not.
- Benefit of subdivision is that each has some land, can reduce overgrazing. On the GR it is the office bearers who benefit from the resources of the ranch. Also complaints about the accountability of the GR committee. Older ones fear that once subdivided the GR will not be able to support future generations.
- Recognize the benefits of farming and complain that they are not allowed to use water from the pipeline.
- Increase in number of people without animals who have to depend on relatives.
- Need more people to be educated.
- Some refused to answer as saw the survey as precursor to people taking their land from them.
- Nineteen percent of farmers and 25% of herders believe that the area will be able to support their children
- Forty-eight percent of farmers reported having difficulty gaining access to water during the year preceding the survey

G.2.a. Change in Agricultural Conditions Last Five Years

Table 96. Change in Agricultural Conditions with Farmers in the Last Five Years

	Increased	*Decreased*	*No change*
Area under cultivation	23	51	26
Soil erosion	29	37	34
Soil fertility	34	39	27
Woodland	18	69	13

Table 97. Change in Agricultural Conditions with Herders in the Last Five Years

	Increased	*Decreased*	*No change*
Area under cultivation	37	37	25
Soil erosion	68	21	10
Soil fertility	7	43	10
Woodland	6	84	14
Change in access to water	13	36	51

G.2.b. Drought

Herders report a high dependence upon famine relief and purchases at the market, while farmers report these and a variety of other options including use of stored food, help from relatives, and the gathering of wild foods. This is one area where "traditional coping strategies" are still reported to be in use.

Both groups anticipate future shortages, but many herders (42%) report that they are doing nothing proactive to offset such an event, while others report keeping more animals (31%), saving money (20%) and buying more land (20%). This may reflect dependence on famine relief. Eighty percent of farmers and 72% of herders anticipate drought in the future.

Farmers by contrast report a variety of measures to offset future deficits, including buying more land (53%), working off-farm (48%), saving money (47%), and keeping more animals (44%).

Table 98. Main Source of Food

	Farmers	*Herders*
Market	69	71
Relatives	41	18
Stored food	54	23
Harvest	28	
Famine relief	51	82
Wild Food	26	

Table 99. What is Being Done to Protect Against Drought in the Future?

	Farmers	*Herders*
Buy more land	53	20
Save money	47	20
Keep more animals	44	31
Work off-farm	48	
Nothing		42

G.2.c. Problems with Farmers

More farmers report difficulties with other farmers (39%) than do herders with farmers (17%). For farmers issues of access to land and sale of land, and payment of rent are reported most frequently, with other issues relating to grazing of crops and access to water and grazing. It is these issues of access to resources that herders report as creating problems with farmers. Discussions between the parties, and involvement of the chief are the most frequently reported means of resolving the difficulties, though 20% of farmers report incidents of violence.

Farmers report drought as a common cause of the difficulties while specific issues include overgrazing, poor supervision of herds, cultivation of grazing lands and the enclosure of water points.

More farmers than herders see the situation as having worsened over the past five years, but there are indications that many in both groups envisage the situation as stabilizing in the future.

Table 100. Issues with Farmers

	Farmers	*Herders*
Access to land	50	63
Cattle eat crops	36	56
Access to grazing	32	69
Access to water	32	63
Sale of land	46	
Payment of rent	37	

Table 101. How it was Resolved with Farmers

	Farmers	*Herders*
Discuss	65	100
See Chief	40	59
Nothing	40	
Violence	20	
Burn crops	20	

Table 102. Cause of Problems for Farmers

	Farmers	*Herders*
Drought	70	88
Lack of grass	30	71
Farmers move to grazing land	40	-
Population Pressure	60	-
Farmers enclose water	35	-
Overgrazing	45	-
Poor supervision	-	71

Table 103. Frequency with Farmers for the Past Five Years

	Farmers	*Herders*
Increase	56	29
Decrease	31	59
No change	12	12

Table 104. Situation with Farmers in the Next Five Years

	Farmers	*Herders*
Better	57	35
Worse	38	29
No change	5	35

G.2.d. Problems with Herders

Reports of difficulties with herders are more common among both farmers (67%) and herders (49%). Farmers are most concerned with the grazing and trampling of crops, access to water, and the theft of crops and livestock by herders. Herders too are concerned with the trampling of crops, but more so with access to grazing and the spread of disease among herds.

Drought, lack of grass and the employment of young herdsmen are seen as the principal causes of these issues, and discussion between aggrieved parties is the most commonly reported means of dealing with the situation.

Table 105. Issues with Herders

	Farmers	*Herders*
Grazing crops	82	45
Trample crops	71	27
One herder has too many stock	37	29
Theft of crops	44	-
Theft of animals	26	-
Access to water	37	-
Access to grazing	-	62
Disease spread	-	46

Table 106. How it was Resolved with Herders

	Farmers	*Herders*
Discuss	85	94
Chief	26	32

Table 107. Cause of Problems for Herders

	Farmers	*Herders*
Drought	78	85
Lack of grass	63	78
Herder too young	26	32

Table 108. Frequency with Herders for the Past Five Years

	Farmers	*Herders*
Increase	78	33
Decrease	15	38
No change	7	29

Table 109. Situation with Herders in the Next Five Years

	Farmers	*Herders*
Better	29	58
Worse	48	42
No change	24	-

G.2.e. Problems with Wildlife

Almost all farmers (89%) and herders (91%) report problems with wildlife. The dominant concerns of farmers are that wildlife eat and trample crops, bother people and kill livestock, while those of herders are predation, the spread of disease, bothering people and access to grazing.

Farmers complain most about elephant (85%), antelope (82%), monkeys, buffalo, porcupine, affecting crops and people, and predation by hyena, lion and leopard. herders complain most about predation by hyena and lion, and conflict over grazing and disease spread by buffalo, wildebeest, antelope and zebra.

Both groups care the animals, build fences and report to the game warden. They report that conflicts with wildlife have become worse over the past five years and they anticipate that they will be worse in the future. Only 19% of farmers and 3% of farmers have ever been compensated for damage caused by wildlife.

Table 110. Issues with Wildlife

	Farmers	*Herders*
Eat crops	87	32
Trample crops	82	28
Bother people	63	45
Predation	45	88
Spread disease	44	68
Access to grazing	34	22

Table 111. How it was Resolved with Wildlife

	Farmers	*Herders*
Scare	87	85
Fences	69	53
Report to Warden	54	57
Hunt	7	24

Table 112. Frequency with Wildlife for the Past Five Years

	Farmers	*Herders*
Increase	84	65
Decrease	14	6
No change	3	28

Table 113. Situation with Wildlife in the Next Five Years

	Farmers	*Herders*
Better	19	5
Worse	65	50
No change	16	45

Table 114. Which Wildlife

	Farmers	*Herders*
Elephant	85	34
Antelope	82	35
Hyena	54	91
Lion	31	47
Wildebeest	28	34
Zebra	28	31
Monkey	56	20
Porcupine	41	20
Leopard	39	25
Baboon	21	9
Wild dog	18	4

G.2.f. General Situation

Table 115. Percent Children in School

	Farmers	*Herders*
Boys	82	84
Girls	76	68

Table 116. Number of People in the Area

	Farmers	*Herders*
Too many	84	88
Too few	11	6
Just right	4	6

Table 117. If too many, how will people adapt?

	Farmers	*Herders*
Buy land	74	43
Become farmers	25	22
Move to another area	55	
Divide land		53
Divide herd		39

G.2.g. Future Conditions in the Area

Table 118. Future Conditions in the Area are Better Because

	Farmers	*Herders*
Education	79	87
Development	60	81
Improved extension	60	33
Commercial farming	44	25
Mixed farming	44	23
Improved herding	40	

Table 119. Future Conditions in the Area are Worse Because

	Farmers	*Herders*
Overpopulation	83	81
Overgrazing	76	66
Decline in herding	46	71
Greater cultivated area	33	
Subdivision	28	

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