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RESPONSE TO DROUGHT IN MAASAILAND:  
PASTORALISTS AND FARMERS OF THE  
LOITOKITOK AREA, KAJIADO DISTRICT.

by

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ABSTRACT

This paper examines the effects of the 1972-76 period of drought upon the people of the Loitokitok area of Kajiado District. The relationship between changing land use patterns, social systems, resource availability and the ability of people to cope with drought is discussed for Maasai pastoralists, Maasai agro-pastoralists and non-Maasai farmers. The paper concludes that if contemporary trends in land use are permitted to continue unchecked then the vulnerability of both farmers and pastoralists to future drought will increase.

## 1. INTRODUCTION

This paper examines the effects of the period of low rainfall from 1972-76 upon the people of the Loitokitok area in Kajiado District, Kenya.<sup>1</sup> This is an area in which major changes in land use have taken place in the recent past as increasing cultivation and the gazetting of National Parks and Reserves have made an impact upon the traditional pastoral system of the area. The relationship between changing patterns of land use, resources availability and the ability of the people to cope with drought is the focus of this study.

The data presented was gathered from a questionnaire survey conducted just prior to the heavy rains which signalled the end of the drought in March 1977.<sup>2</sup> A total of 391 people were interviewed of whom 166 (42%) stated that they were Maasai pastoralists, 90 (23%) Maasai farmers and 135 (34%) non-Maasai farmers. The questionnaire data was supplemented by information provided at field seminars at which the survey findings were discussed with people of the area (Campbell and Mbugua, 1978).

A review of the process of land use change prior to the onset of the drought provides the context within which its impact upon the farmers and pastoralists of the area and their response to it will be examined. Their vulnerability to drought will be assessed and their capacity to adjust to future drought conditions discussed.

## 11. REVIEW OF CHANGING LAND USE PATTERNS IN THE LOITOKITOK AREA PRIOR TO 1972

The area of what is now known as the Loitokitok Division of Kajiado District was included in the land allocated to the Maasai Reserve under the agreements between the British Colonial Government and Maasai elders in 1911 which were amended in 1912 to include the area east of Loitokitok town around Rombo which had formerly been assigned to Coast Province (Great Britain, 1934, p.190).

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1. This is a revised version of IDS Working Paper No.337. I am grateful to my colleagues at the IDS for comments on this paper and also to Prof. Brian Von Arkadie and Dr. David Western for their detailed comments. The author is responsible for any errors which may remain in the paper.

2. The short rains of 1976 had been quite heavy in the area but with the long rains of 1977 it became clear that the drought had finally ended.



The Loitokitok area includes a variety of ecological zones. The slopes of Mt. Kilimanjaro support forest vegetation and the streams which flow off the mountain and the swamps in the plain permit the growth of a denser vegetation than in the dry plains which constitute the rest of the area. Traditionally the hillsides, riverine areas and swamps afforded year-round water and grazing and were areas in which the Maasai concentrated their herds during dry seasons and droughts. During the rains the Maasai dispersed over the plains, grazing their livestock on the vegetation which grows there following the seasonal rainfall. The seasonal patterns of concentration and dispersal was, and continues to be, followed by the wildlife of the area. In the past thirty years the access of the Maasai herders to these resources has been curtailed as cultivation of the slopes of the mountain and of the river valleys and swamp margins has increased and large areas have been gazetted as National Parks and Reserves.

Cultivation and wildlife conservation activities commenced in the area prior to World War II but it was only after the war that they began to impinge upon the pastoral resources. The majority of the legislation to protect wildlife before 1945 was concerned with the regulation of hunting and the protection of particular species (Casebeer 1975). In 1954 however the National Parks Ordinance was passed allowing for the demarcation of specific areas as National Parks and Reserves. The purpose of the Act was to encourage Wildlife conservation and management by controlling the land use in areas of high wildlife concentration. National Parks were gazetted exclusively for the use of wildlife while land use policy within the Reserves was the responsibility of the relevant county councils. In 1948 Tsavo West National Park on the eastern boundary of Loitokitok Division, was gazetted and the Chyulu Hills and Amboseli areas were designated as Reserves. Although the Maasai continued to have access to the Reserves they were denied access to the water and grazing resources of the Tsavo National Park.<sup>3</sup> Pressure for the Reserves of the area to be designated as Parks resulted in the 1974 gazetting of Amboseli Reserve as a National Park from which the Maasai were excluded

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3. The Maasai were very concerned because the boundaries of Tsavo Park were drawn such that water points important to the Maasai were enclosed within the Park. In September of 1948, a year in which the rains failed, the authorities did permit the Maasai to graze and water their livestock with the Park (Kenya, 1949).

in 1977<sup>4</sup> and the future status of the Chyulu Hills is currently under discussion.

Cultivation has a long history in the area. In the nineteenth century an agro-pastoral group of Maasai grew crops until they were expelled by the adjacent pastoral Maasai during the civil wars at the end of the century (Low 1963). During the early years of the colonial period farming recommenced around Loitokitok as labourers employed by the colonial administration cleared small plots (Kenya, 1930) and the area increased in the 1930s when, largely in response to the droughts of the period, a number of Maasai opened land for crop production, the cultivation being carried out either by Chagga wives of the Maasai or by Chagga hired by them for this purpose. The AIC Mission established at Illasit also commenced farming at this time (Tignor, 1976). Prior to World War II the area under crops remained relatively small and posed little threat to the pastoral resources, though occasional conflict did occur when livestock damaged the crops.

After the war however, the cultivated area increased rapidly as government officials, usually non-Maasai, and some local Maasai cleared small farms and invited relatives to join them. Land shortage due to land alienation by the Europeans and due to population growth in the higher potential areas of central and western Kenya provided the impetus for many people to migrate to the wetter margins of the semi-arid areas including the Maasai rangelands such as the Ngong Hills and the slopes of Mt. Kilimanjaro (Mbithi and Wisner 1972). Although the Maasai expressed concern over the extension of the area under cultivation by non-Maasai, and despite the attempts by Section Committees and the Local Native Council to control immigration, the number of non-Maasai farmers increased because many were related to Maasai by marriage and were thus permitted to settle in the area (Kenya 1947). The situation whereby relatively few cultivators were encroaching upon the pastoral areas led to the passing of the Maasai Council Land Usage By-Laws in 1950 (Kenya 1951). The by-laws enabled the local council to successfully control farming by defining limits to cultivation but with the declaration of the Emergency the majority of the non-Maasai farmers were repatriated to their home districts and cultivation in the area declined.

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4. Prior to the gazetting of Amboseli as a National Park it had been agreed that a water pipeline taking water outside the boundaries would be provided to compensate the herder for the loss of access to the water supplies within the park. As the pipeline was not completed by 1974 the herders were permitted to continue grazing within the park until June of 1977 when the pipeline came into operation.

The area under crops did not expand again until after Independence when people were able to move freely and land adjudication enabled individuals to own title to land and to cultivate under conditions of relatively secure tenure. The process of land adjudication was such that some land was demarcated as individual holdings and the remainder as group ranches. The first areas to be adjudicated in 1966 and 1967 were in the higher potential area on the slopes of Mt. Kilimanjaro. It is in this area that the majority of individual holdings are located. The original land owners were Maasai leaders, government officers and others who realised the value of obtaining title to land, and many acquired large tracts. Initially the Maasai cultivated small portions of their land but once its monetary value became apparent as immigrant farmers from other districts offered to buy and rent it, sub-division into small farms took place. Over the past fifteen years the lower slopes of Mt. Kilimanjaro have been taken over almost entirely by cultivation and farmers are increasingly buying or renting land in the better-watered localities in the plains e.g. at Kimana and Rombo. As population increases so this process of cultivation of isolated areas with favourable soil and water conditions will accelerate. The extension of the area under crops over the past fifteen years has severely depleted the range of dry season water and grazing resources available to the herders of the area. In some areas though, this has been to some extent offset by the provision of water supplies in formerly dry localities thus permitting year round grazing (Western 1975).

Land adjudication has also taken place in the plains. The original intention of the government in adjudicating pastoral areas was to create a situation in which range management practises which would maintain the grasslands in good condition could be encouraged. Each ranch was intended to include both wet season and dry season resources and it was hoped that group ranch members would adjust the size of their herds to the carrying capacity of their ranches. In practice few ranches enclosed sufficient dry season resources and movement beyond ranch boundaries has continued (Davis, 1971; Hedlund 1971; Halderman 1972).

Wildlife management, cultivation and land adjudication have contributed to a recent decline in the dry season grazing resources available to the pastoralists. This is clearly recognised by the Maasai (Table 1) but its full impact was delayed by the adequate rainfall of the late 1960s and early 1970s which led to good range conditions. With the relative failure of the rains in 1972-76 animals were concentrated

around the remaining areas offering dry season grazing resources and the effect of the loss of access to the areas occupied by farmers and in Tsavo Park became apparent.

Table 1. Reasons for a decline in the access to dry season grazing areas since 1970 - Maasai Pastoralists

(by number and percent of respondents giving each response.  
N=110,

CAUSE OF DECLINE	NO.	%
Land used for cultivation	76	69
Land is part of national park	56	51
Land is part of holding ground	50	45
Land is part of individual or group ranch	13	12
Other responses	0	0

Source: Own Compilation:

The response of the farmers and pastoralists of the Loitokitok area to the years of low rainfall between 1972 and 1976 should be analysed in the context of the conditions prevailing in the years prior to the drought. In the post-independence period access to and control over land resources in the area had changed as farmers began to cultivate the wetter margins of the rangelands. The relatively good rainfall conditions of the period enabled the farmers to continue with the cropping patterns to which they were accustomed, planting crops not well-adapted to the uncertain rainfall regime of the area. The onset of the drought resulted therefore in drastically reduced harvests and a threat of famine. The changes in the land use pattern during the 1960s had not resulted in a critical situation for the herders as adequate rainfall and investment in rangeland improvements such as water supplies had reduced their need to have access to the lands which were being bought or rented by farmers. With the onset of the drought, however, the productivity of the rangelands decreased and the dire implications of having handed over much of their dry season grazing lands to farmers and of the enclosure of water sources in the National Parks became apparent.

### III THE DROUGHT YEARS 1972-76

Although the available climatic data suggests that the period 1972-1976 did not represent a particularly severe drought, the people of the area regard its effects as having been harsh. Ninety-one percent of

the pastoralist respondents stated that the drought was the worst they remembered, and though this may be partially explained by the fact that it was the most recent, it does indicate that its impact was great. For the majority of the non-Maasai farmers interviewed (96%), it was the first drought they had experienced since they had begun farming in the area and the low rainfall drastically reduced their harvests.

The impact of the drought affected people in different ways. For the Maasai, both pastoralists and farmers, the greatest problems concerned their animals while for the non-Maasai farmers, water supply and shortage of food and land constituted the greatest difficulties (Table 2). While the responses to the survey revealed specific problems, it became clear during discussion of the survey results at field seminar (Campbell and Mbugua 1978) that the drought was a period of general social

Table 2. Principal problems faced by respondents from Loitokitok 1976  
(by number and percent of each group giving each response)

PROBLEM	MAASAI PASTORALISTS (N=164)		MAASAI FARMERS (N=90)		NON MAASAI+ FARMERS (N=135)	
	No.	%	No.	%	No.	%
Drought/Water Supply	89	54	52	58	78	58
Loss/lack/disease of animals	50	30	67	74	8	6
Lack of food	25	15	22	24	38	28
Land shortage	0	0	34	38	84	62
Health	8	5	8	9	15	11
Clothing	0	0	1	1	12	9
Soil Erosion	0	0	30	33	25	19
Lack of Pasture	38	23	0	0	0	0
Other	1	1	5	6	3	2

Source: Own Compilation

malaise and unrest in the area. It has been noted in other areas also that drought causes social breakdown indicated by depression, irritability, an increase in theft, assault and disagreement between people (Vogel-Roboff 1977).

The respondents' perceptions of the cause of the difficulties which they faced demonstrate that while lack of access to water and loss of animals are the major causes, a large proportion of respondents attached

some blame for their problems on less tangible forces e.g. God, the laibon or nature (Table 3). While many respondents speak of the drought as commencing in 1972, the full impact in terms of major livestock losses and reduced harvests was felt in 1976. Discussion of the pre-drought events, therefore, refers usually to the period prior to these major losses.

Table 3. The main cause of problems faced in 1976  
(by percent of each group giving each response)

CAUSE	MAASAI PASTORALIST' (N=164)	MAASAI FARMERS (N=89)	NON MAASAI FARMERS (=133)
Lack of rain	98	100	96
Loss of animals	43	0	0
God/ <u>Laibon</u>	26	29	29
Nature	0	25	25
Other	2	0	1

Source: Own Compilations

III. A. i. The Impact of Drought on Maasai Pastoralists

An explanation of the impact of the recent drought upon the pastoral population must be set in the context of the reduction in the availability of dry-season grazing and water resources which had taken place in the years prior to the drought as cultivation and National Parks had replaced pastoralism as the dominant land use in many better-watered locations. Table 4 demonstrates the importance of swamps and rivers as dry season sources of water and as these are the type of area favoured by farmers and enclosed by national parks, the impact of these other land uses on the

Table 4. Seasonal water sources for Maasai Pastoralists  
(by percent of respondents giving each response N=166)

SOURCE	WET SEASON	DRY SEASON
River/Stream	87	84
Swamp	7	28
Still Pool	11	5
Small dam	9	2
Well/borehole	8	7
Spring	2	4
Other	1	3

Source: Own Compilation

pastoralists' drought-period resources is evident. During the recent drought a number of smaller swamps became dry and livestock concentrated upon the large ones at Kimana and Amboseli and also in the area around Rombo where rivers continued to flow. The recent exclusion of the Maasai herders from Amboseli Park and the ongoing process of bringing land under cultivation around Kimana Swamp and at Rombo will create even more severe problems for Maasai pastoralists in the event of a return of drought conditions.

The principal effect of the drought upon the Maasai herders was the loss of livestock which resulted in a decline in the food supply of the population. The numbers of animals were reduced both by death (due to disease and starvation) and by sales of animals in order to raise cash (Table 5 and 6).

Table 5. Livestock deaths during the drought - Maasai Pastoralists  
(By percent of respondents, N=166)

LIVESTOCK	0	PROPORTION OF HERD DIED				ALL	PERCENT WITH DEATHS
		$\frac{1}{4}$	$\frac{1}{2}$	$\frac{3}{4}$			
Cattle	4	72	19	5	0	0	96
Sheep	23	67	10	0	0	0	77
Goats	23	66	10	1	0	0	77

Table 6. Livestock sales during the drought-Maasai Pastoralists

LIVESTOCK	0	PROPORTION OF HERD SOLD				ALL	PERCENT WITH SALES
		$\frac{1}{4}$	$\frac{1}{2}$	$\frac{3}{4}$			
Cattle	3	81	15	1	0	0	97
Sheep	38	58	11	2	0	0	62
Goats	14	66	10	1	0	0	86

Source: Own Compilation.

Both sales and deaths for most herders account for less than one-quarter of their pre-drought herd but the combined losses represent a substantial reduction in herd size. A sub-sample of 63 respondents provided actual numbers of livestock sold and those that died and from these estimates, average losses per herder can be obtained (Table 7). The losses due to sales should not, of course, be read as total losses but rather as liquidated

0.115

Mean

8.00



Table 7. Sales and deaths of livestock reported by respondents giving actual numbers (N=63)

	CATTLE		SHEEP		GOATS	
	Deaths	Sales	Deaths	Sales	Deaths	Sales
Mean	17.64	8.86	7.73	4.46	7.14	7.92
Standard Deviation	8.31	9.86	3.22	3.34	3.63	3.18
Maximum	50	60	50	12	30	30
Minimum	2	0	1	0	0	0

Source: Own Compilation

assets. The average income from the sale of livestock for pastoral Maasai was Ksh 2976 in 1976, sufficient to buy substantial amounts of grain.

On the basis of the sub-sample, an estimate of the total livestock losses in Loitokitok Division and of their value can be made; Table 8 demonstrates that on average Maasai herders lost livestock valued at over Ksh 4000 due to death while their sales averaged Ksh 2400. Of a total estimated decline in the value of the herds of KShs. 17,402,820, deaths accounted for 64 percent and sales for 36 percent.

Table 8 Livestock losses - Loitokitok Division - Estimate

ANIMAL	ESTIMATED LOSSES	AVERAGE PRICE 1976 - (KSHS)	ESTIMATED VALUE (KSHS)		AVERAGE VALUE (KSHS)	
			DEATHS	SALES	DEATHS	SALES
Cattle	66,825	200/=	4,468,400	8,896,600	1,719	3,422
Sheep	23,810	90	748,170	1,394,730	288	536
Goats	31,582	60	1,049,460	845,460	403	325
TOTAL	122,217	350	6,266,030	11,136,790	2,410	4,283

Source: Own Compilation.

One measure of the severity of the problems is clearly the monetary loss due to death of animals. The losses may also be examined in terms of the ability of the residual herd to provide sufficient food to meet the family's subsistence needs. A traditional strategy of pastoralists is to build up the numbers of livestock in good years in anticipation of the losses which will occur during a drought. Herders will attempt to enter a period of drought with sufficient animals to enable them to provide for their subsistence needs despite animal deaths and sales or loans of animals to others. In order to assess the success of the pastoralists in accomplishing these objectives it is necessary to evaluate the potential subsistence production of the residual herd vis a vis the needs of the family.



Pratt and Gwynne (1977,p.35 ff) present data concerning the herd size required to provide total subsistence <sup>5</sup> under good range conditions (2.5 Standard Stock Units (SSU)/Adult), and poorer conditions (3.5 SSU/Adult).<sup>6</sup> It is possible to calculate an adequate herd size to meet the average residual herd of the pastoralists surveyed in the Loitokitok area (Table 9).

Table 9. Estimated Post-Drought Herd Size and Subsistence Needs Maasai Pastoralists (N=166)

	SUBSISTENCE NEEDS	
	2.5 SSU/ADULT	3.5 SSU/ADULT
Mean family size	13.8	13.8
Adult equivalent	11.1	11.1
Cattle required	75	105
Mean Cattle herd	77	77
Percent of required herd	103	73
Sheep & goats required	102	143
Mean no. sheep & goats	68	68
Percent of required herd	67	48

Source: Own Compilation

The above table demonstrates that at the time of the survey the average rancher had insufficient livestock to produce his subsistence needs even under good conditions (2.5 SSU/Adult). Had the drought continued,

5. The following discussion examines the ability of a herd to supply total subsistence needs of the family. The availability of alternative foodstuffs at the market and from famine relief meant that the livestock were not the only source of food but the dominant strategy among the Maasai of the area was to keep sufficient stock to meet their needs. The discussion indicates therefore the degree to which this strategy was successful during the drought.

6. One Standard Stock Unit (SSU) is equivalent to an animal of liveweight 450Kg. It therefore represents approximately two herd of Maasai Cattle. In order to obtain total subsistence needs from livestock it is estimated that each adult requires approximately 6.75 cattle and 9.0 small stock. For the purposes of their calculations a child under the age of 15 years is assumed to be equivalent to 0.667 adults.

the situation would have become much more serious. The greatest deficit was in the number of sheep and goats which are important source of food in a period of drought when the milk production of the cows decreases. Given the return of favourable conditions which occurred soon after the survey was completed the Maasai should have had enough animals to rebuild their herds and rapidly be able to fulfil their subsistence needs. This has indeed been the case but at the time of the survey the situation was very serious.

The above discussion is in terms of average herd sizes and does not take into account the wide divergences in both family size and herd size among the pastoral Maasai. The impact of the drought upon respondents of different wealth (defined by the number of cattle owned prior to the drought) can be measured by analysis of those 63 respondents for whom actual numbers of cattle losses are available.<sup>7</sup> In Table 10 each of these respondents is assigned to a quintile of the population on the basis of the number of cattle owned prior to the drought and the average herd size, percent of animals owned and provision of subsistence for each quintile before the full impact of the drought in 1976 and at the time of the survey, is shown.

The decline in the size of the cattle herds of all but the bottom quintile amounted to about 30 percent of the pre-drought herd. The herders in the bottom quintile lost over 40 percent of their cattle and the poorest of these lost over 50 percent. Losses include both sales and deaths and among the poorest twenty percent of respondents deaths of cattle and smallstock and sales of small stock were proportionately higher than for those with larger herds. Those who entered the period of drought with larger herds may have sold more livestock and had more animals die than those with smaller herds; but the losses were proportionately less and their residual herds afforded greater opportunities for recovery.

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7. The subsequent discussion focuses mainly on CATTLE. As shown in Table 9 sheep and goat herds produced less than their share of average subsistence requirements at the time of the survey and thus they could not be expected to make up for deficits in cattle numbers. A discussion in terms of cattle while incomplete is clearly indicative of the circumstances faced by the Maasai.

TABLE 10 Maasai Pastoralists -- Cattle Losses and Subsistence Needs by Size of Cattle Herd. (N=63)

PRE-DROUGHT						POST-DROUGHT				
PERCENT OF POPULATION IN QUINTILES <sup>1</sup>	AVERAGE FAMILY SIZE IN ADULT EQUIVA- LENTS	AVERAGE NUMBER OF CATTLE	PERCENT OF TOTAL CATTLE		PERCENT OF SUB- SISTENCE NEEDS PROVIDED	AVERAGE NUMBER OF CATTLE	PERCENT OF TOTAL CATTLE		PERCENT OF SUB- SISTENCE NEEDS PROVIDED	POST-DROUGHT HERD AS A PERCENTAGE OF PRE-DROUGHT HERD
			%	cum. %			%	cum. %		
Poorest					.					
1-20	9.0	38	8.4	8.4	62	22	6.7	6.7	26	58
21-40	8.2	66	14.3	22.7	119	49	15.0	21.7	63	74
41-60	6.8	84	18.2	40.9	181	58	17.9	39.6	90	69
61-80	8.9	103	22.2	63.1	172	74	22.8	62.4	88	72
81-100	11.8	169	36.9	100.0	218	122	37.6	100.0	109	72
Wealthiest										

- Note:
1. Respondents are assigned to quintiles on the basis of the number of cattle they owned prior to the drought.
  2. Pratt and Gwynne (1977p. 35 ff.) state that 3.5 SSU/Adult Equivalent is a minimum for the provision of subsistence from livestock.

Source: Own Compilation

Table 10 also permits an examination of the ability of different classes of herder to provide for their subsistence needs. Even prior to the major drought losses the poorest 20 percent had insufficient cattle to meet their requirements, though the majority had sufficient animals, with some of the wealthiest herders having more than twice the number required for subsistence. At the time of the survey, just prior to the end of the drought, the situation had altered. By that time the poorest 30 percent of the population had insufficient cattle for their subsistence even at the lower rate of 2.5 SSU/Adult Equivalent associated with more favourable range conditions. At the higher rate of 3.5 SSU/Adult Equivalent only those who originally had very large numbers of cattle were able to provide for their families. Table 11 shows that while 25.4 percent of families had insufficient cattle to meet their needs prior to the drought that proportion had risen to 49.2 percent or 63.5 percent by the time of the survey depending upon which range condition is specified.

Table 11. Percent of subsistence needs met by cattle herd prior to the drought and at the time of the survey (N=63)

PERCENT OF SUBSISTENCE	PRE-DROUGHT good range conditions 2.5 SSU/Adult		Good range condition 2.5 SSU/Adult		POST DROUGHT Poor range condition 3.5 SSU/Adult	
	No.	%	No.	%	No.	%
50 and less	3	4.8	12	19.0	17	27.0
51 - 100	13	20.6	19	30.2	23	36.5
101- 150	19	30.2	12	19.0	15	23.8
151- 200	7	11.1	11	17.5	5	7.9
Over 200	21	33.3	9	14.3	3	4.8

Source: Own Compilation

A comparison between those who could meet their subsistence needs under the more difficult conditions (N=23) and those who could not (N=40) demonstrates that the former had larger herds prior to the drought and also a larger animal/adult equivalent ratio (Table 12).

Table 12. Pre-drought family and cattle herd sizes - subsisters and non-subsisters compared. (N=63).

	SUBSISTERS (N = 23)	NON-SUBSISTERS (N = 40)
Mean no. of cattle	118.5	74.5
Mean family size (adult equivalent)	5.8	10.6
Cattle/adult ratio	20.4	7.0

Source: Own Compilation.

TABLE 13. Maasai Pastoralists - Herd Characteristics and Subsistence Needs by Size of Family (N=63)

			PRE-DROUGHT								
PERCENT OF POPU- LATION IN QUINTILES  SMALLER FAMILIES	MEAN FAMILY SIZE IN ADULT EQUIVA- LENT	CUMULATIVE PERCENTAGE OF POPU- LATION	AVERAGE CATTLE HERD SIZE	CUMULATIVE PECENT OF CATTLE	CATTLE: ADULT EQUIVA- LENT RATIO	PERCENT OF SUB- SISTENCE AT 3.5 SSU/ADULT EQUIVA- LENT	AVERAGE CATTLE HERD SIZE	CUMULATIVE PERCENT OF CATTLE	CATTLE: ADULT EQUIVA- LENT RATIO	PERCENT OF SUB- SISTENCE AT 3.5 SSU/ADULT EQUIVA- LENT	POST-DROUGHT HERD AS A PERCENTAGE OF PRE-DROUG HERD
1-20	3.9	8.6	81	17.8	21	222	59	18.1	15	163	73
21-40	6.7	23.3	90	37.6	14	143	61	37.0	9	98	68
41-60	8.5	42.1	102	60.2	12	121	68	57.9	8	81	66
61-80	10.6	65.5	69	75.4	7	68	51	73.7	5	50	74
81-100	15.6	100.0	111	100.0	7	74	85	100.0	5	57	77
LARGER FAMILIES											

Source: Own Compilation.

The question of the relationship between numbers of cattle owned and size of family is clearly an interesting one. Table 13 shows that there is a slight tendency for herds to increase in size with size of family but that the animal/adult equivalent ratio decreases with increasing size of family. Thus though large families may have large herds, they may not be overstocked in relation to their subsistence requirements. It is more common to find herds which are overstocked in relation to subsistence among smaller families - of the 23 families which could supply their subsistence under poor conditions (Table 12) 70 percent had families in the smallest 30 percent of this sub-sample and 84 percent of the smallest thirty percent of families could meet their subsistence.

Only 13 percent of families had herds of a size sufficient to produce more than 1½ times the family's subsistence needs in the post-drought period at a ratio of 3.5. SSU/Adult Equivalent and their characteristics are shown in Table 14. The principal difference lies not in the herd size of these families but in the size of the families themselves and thus they are overstocked in relation to subsistence needs.

Table 10 provides information regarding the distribution of wealth, measured by size of cattle herd, among Maasai pastoralists. While there is a tendency both prior to and after the drought for the wealthy to hold a disproportionate share of animals, the pastoralists have more even

Table 14. Characteristics of herders able to produce more than 150% of subsistence needs under poor range conditions (N=8)

	PRE DROUGHT CATTLE NO.	POST DROUGHT CATTLE NO.	ADULT EQUIVALENT
Mean	155	110	4.9
Median	97.5	80	3.9
Maximum	380	300	8.8
Minimum	73	56	2.6
Sample Mean (N=63)	90.5	64.5	8.9

Source: Own Compilation.

distribution of wealth than both Maasai farmers, also measured in terms of cattle owned, and Kenya as a whole, measured in terms of income distribution. (Campbell 1978 p.14).

It is of note that the effect of the drought on the proportional distribution of cattle among pastoralists was very slight, only the poorest 20 per cent losing more than 35 per cent of their animals while the

remainder lost between 20 per cent and 30 per cent. This picture clearly conceals the impact of drought on individual herders. Of the 63 respondents 36.5 per cent of the sub-sample had lost more than one-third of their animals. Of these, the range of pre-drought herd size was from 17 to 300 with a median value of 57, demonstrating again that those with smaller herds entering the drought were more likely to lose a higher proportion of their herd than those with larger herds. Some of the highest actual losses were however, incurred by large herd owners including one who saw his cattle herd decrease from 300 to 130 head.

111 A. ii. Maasai Pastoralists Response to Drought

Most societies subject to recurrent natural hazards have developed strategies which permit them to reduce the mal-effects of such hazards. Among the Maasai such traditional strategies for coping with drought include: the movement of livestock, usually in the care of the younger men and morans, away from the boma in search of pasture and water; increased intra-family assistance in terms of livestock loans and the calling upon of reciprocal grazing arrangements; prayer; increased use of alternative food supplies such as grains and wildlife meat. These strategies are not mutually exclusive and thus offer a wide range of alternatives to those affected by drought. An additional source of assistance in more recent droughts has been famine relief provided by government, missions and international agencies. Information provided by respondents as to their activities during the drought demonstrates that not only did the Maasai pastoralists resort to traditional coping strategies but also that they are continually reviewing the situation and assessing the viability of these coping mechanisms.

Movement of People and Herds. The intensity and frequency of movement of livestock and people is related to the distribution of available resources. As a drought intensifies so pasture deteriorates and water becomes increasingly scarce and movement is necessary to obtain access to these resources. In the early stages of drought it is unusual for whole families to move their location, it being more common at this stage for the young men to move away with the herds in search of pasture and water. Only when the resources available become totally insufficient will whole families move. In the survey area some grazing and water resources remained available among the lower slopes of Mt. Kilimanjaro and thus there was relatively little need for people to move widely. Only 16.4 per cent of respondents from Loitokitok stated that they had moved in 1976 and half of these had

only moved their animals.<sup>8</sup> There was no major movement of Maasai pastoralists from the area towards Nairobi or other main towns.<sup>9</sup>

Reciprocal arrangements for sharing livestock. An important strategy designed to reduce the probability that all livestock will be lost during a drought is to split up the herd and move a proportion of the animals to a different area to be looked after by relatives and friends. This strategy is also a means by which those who have insufficient livestock may 'borrow' animals to help meet their subsistence needs. Table 15 shows that these reciprocal arrangements were common during the drought being more frequent between relatives than between friends.

Table 15. Respondents sharing livestock with relatives and friends -(N=164)

	No.	Percent
Sent livestock to relative	75	45.7
Sent livestock to others	37	22.6
Cared for relatives' livestock	79	48.2
Cared for others' livestock	14	8.6

Source: Own Compilation.

8. This pattern was not true of all areas of Kajiado District however. Many herders from Kaputiei section moved with their livestock to the lower slopes of Mt. Kilimanjaro while in the Ngong area pasture became so scarce that fully half of the people interviewed in the area had moved with their herds in 1976.

9. While many Maasai have visited the main towns of S.E. Kenya few from the Loitokitok area have relatives living in towns (7.2%) and few express an inclination to move. The majority of the Maasai who moved to Nairobi during the drought came from other areas of Maasailand.



An interesting aspect of the sharing of animals is that the process involves a higher percentage of individual ranch owners than members of group ranches in the Loitokitok area. In view of the general consensus among Maasai that individual ranchers tend to give up traditional behaviour patterns and of the findings of Hedlund (1971 p.27), that "There is an explicit reluctance among individual ranchers to take part in any cattle exchanges with friends and even close relatives", this degree of participation in reciprocal cattle sharing is surprising. Many individual ranchers were able to graze their animals on group ranches of which their sons are registered members and thus their individual ranches may have been in better condition than group ranch areas due to lighter grazing pressure. As the drought intensified it is not unlikely that communal pressure was brought to bear to encourage individual ranchers to share their resources with relatives and friends.

Assistance from Relatives. The exchange or loan of animals is not the only form of assistance between family members during periods of hardship. As Table 16 indicates gifts or loans of animals, food and money are not infrequent and many other forms of assistance take place.

Assistance from other sources. A number of respondents stated that they gave to, and received from other members of the community and many obtained famine relief from the government and the Roman Catholic Mission, mostly in the form of posho (Table 17).

Table 16. Intra-family assistance during the drought (N=164)  
(by number and percent of respondents giving each response)

Item	Assistance Received		Gave	
	No.	Percent	No.	Percent
No. giving/receiving	103	62.8	109	66.9
Cattle/Cow	26	25.2	35	32.1
Sheep/Goat	27	26.2	37	33.9
Other Animal	3	2.9	5	4.6
Total Animal Related	56	54.3	77	70.6
Money	10	9.7	23	21.1
Food	37	35.9	20	18.3
Other(Including: Seeds. Labour, clothing)	10	9.7	7	6.4

Source: Own Compilation.

Table 17. Assistance from non-family sources during the drought. (N=164)

SOURCE	NO. RECEIVED	PERCENT RECEIVED
Non-Relatives	27	16.5
Government/Mission	110	67.1

Source: Own Compilation

The Maasai relied heavily upon grains to supplement their diet during the drought, often mixing posho with blood. The principal item of famine relief was posho, and an average of 53 per cent of expenditures made in 1976 was to buy food crops. Many Maasai have taken up cultivation in recent years and more are likely to do so as a response to their experiences during the drought, but few areas of good cultivable land remain. A second source of food available to the Maasai is wildlife. Twenty-nine percent of respondents stated that they secured wildlife as a food source during the bad years - a frequent comment being that it is better than nothing. The most favoured meat is that of eland and of antelopes. The farmers of the area do not eat wildlife meat.

Prayer Over 90 per cent of respondents had prayed for rain while payments to the laibon, in the form of sheep and goats or money, so that he might intercede to end the drought were common. 85 percent of respondents from Loitokitok had made such contributions.

111 A iii Expectation of Future Drought and Precautions Against its Effects - Pastoral Maasai

Although the interviews were conducted at the end of a prolonged period of drought and many respondents remembered the drought of 1961 (and a few those of the 1940s and 1950s) surprisingly few stated categorically that they expected droughts in the future (Table 18), though none said that would take no precautions against future droughts (Table 19).

Table 18. Respondents Expectations of Future Droughts  
(N=163)

	No.	Percent
Do not expect drought	15	9.1
Don't know	8	4.8
God knows	50	30.3
Expect drought	92	55.8

Source: Own Compilation

It is clear both from the responses to the survey and from discussions with pastoralists at follow-up seminars (Campbell and Mbugua 1978) that they are aware of a number of actions which they can take to reduce the impact of future droughts (Table 19). The most frequently stated precautions are associated with the building up of reserves through keeping more animals, growing and storing of crops and the saving of cash.

The traditional pastoral system was based upon the keeping of a variety of livestock and upon access to a variety of resources which allowed them to cope with the seasonal changes in the distribution of water and grazing. Changes in land use have reduced the effectiveness of this strategy and the Maasai are adopting to altered circumstances by diversifying their sources of subsistence.

Table 19. Precautions against future droughts - Maasai Pastoralists  
( by number and % of respondents stating each precaution, N=158)

PRECAUTION	NUMBER	PERCENT
Increased herd size	103	65.2
Grow crops	90	57.0
Save cash	81	51.3
Store food	69	43.7
Decrease herd size	33	20.9
Decrease family size	22	13.9
Fence land	13	8.2
Other (e.g. work in town sell old animals)	9	5.7

Source: Own Compilations

Discussion at field seminars of the practicability of implementing these objectives has raised a number of difficulties. In some areas, increased cultivation is incompatible with the keeping of larger herds due to the scarcity of land for cultivation and dry season grazing. At Rombo Group Ranch, the committee has decided to institute a seasonal rotational grazing system to preserve dry season grazing, and is carefully monitoring cultivation in the area. The problems associated with food storage and saving of cash are not as easily resolved within the community. There is a need for the government to provide adequate grain storage facilities and a bank in the area so that savings may be effective.

In the Loitokitok area increasing herd size is the most favoured precaution overall. This is not surprising given the experience of the drought in which those with a high cattle adult ratio were the most successful

in coping with its effects. Cultivation is another strategy which is frequently mentioned by the people of the area and an increase in the participation of Maasai herders in cultivation may therefore be anticipated in the future.

An unexpected outcome of the survey was that over one-fifth of respondents stated that they would decrease the size of their herds. Examination of these respondents reveals that they are among the younger members of the community, a group which favours the growing and storing of crops and the saving of cash more than increasing herd size as precautions against drought (Table 20). Pastoralists favouring reduction in livestock number tend to be members of individual ranches rather than group ranches, own more sheep and fewer cattle than most Maasais and have recently begun to cultivate part of their land. They also have higher incomes and expenditures than the average Maasai herders.

Table 20. Precautions against future drought by age of respondent  
(by rank and percent of respondents in each age class  
giving each response)

Precaution	AGE													
	Under 20		20 - 30		31 - 40		41 - 50		51 - 60		61 - 70		Over 70	
	%	Rank	%	Rank	%	Rank	%	Rank	%	Rank	%	Rank	%	Rank
Increased herd size	27	5	37	3	59	1=	83	1	86	1	65	1	69	1
Decrease herd size	64	2=	37	3=	18	5	25	5	25	4=	22	5	23	3=
Grow crops	73	1=	57	1	59	1=	75	2	61	2	48	3=	23	3=
Save Cash	73	1=	47	2	59	1=	50	3	46	3	52	2	15	5
Store food	64	2=	33	5	50	4	37	4	25	4=	48	3=	31	2

Source: Own Compilation.

It would appear that some younger Maasai hold very different views about the future of the pastoral economy from the rest of the society. They see a mixed agro-pastoral economy as being more viable and their higher incomes and expenditures suggest greater participation in the livestock trade. It has been noted that some younger Maasai are even selling cows at the livestock markets, and activity traditionally seldom engaged in (White and Meadows 1979). Further monitoring of the activities of the younger Maasai should be made to discover how widespread such changes are and what impact they may have on the future socio-economic development of the Maasai.

### Summary

The years prior to the onset of the drought witnessed the loss of dry season grazing areas to cultivation and to national parks. The range of resources available to the Maasai herders during the drought was less than in previous droughts. In consequence, livestock herds declined as animals died or were sold to raise cash to buy food and other commodities. About twice as many animals died as were sold and the value of livestock lost by death in Loitokitok Division is estimated at over 1.4 million dollars.

The proportion of sales and deaths of livestock was higher among those with smaller herds prior to the drought. The distribution of livestock by size of herd owned, altered very slightly in favour of those with larger herds during the period of the drought and there was no major redistribution in terms of animals owned though loans between herders were common.

At the time of the survey, done at the end of the drought, over 60 per cent of herders had insufficient livestock to provide their subsistence needs. Those that were able to do so had a larger cattle adult ratio; a family of six adult equivalents owning 120 cattle prior to the drought would be representative of those which had least difficulty. For the survey population to have been at this cattle: adult ratio of 20:1 prior to the drought the pre-drought cattle population would have had to have been twice as great as it was. It is not surprising therefore that increasing herd size is the most frequently stated precaution against future droughts.

The maintenance of a large herd is one of a number of traditional coping mechanisms which are still used and some new ones are being adopted particularly among younger Maasai. There is a propensity among these younger respondents to accept that reduced livestock numbers, increased cash savings and cultivation will reduce the ill-effects of drought. Should these views become more generally accepted, then a reduced emphasis on herding and a greater emphasis on cultivation may lead to the emergence of a mixed agro-pastoral economy in Maasailand. While it may be possible for the Maasai to reduce the size of their herds they may not be able to find sufficient productive agricultural land to produce crops to make up the deficit in their subsistence. Measures will have to be taken to limit the expansion of non-Maasai cultivation if they are to have sufficient agricultural land to develop a viable mixed economy.

Reduction of livestock numbers is clearly not practicable in Maasailand unless alternative sources of subsistence are available. Any policy designed to reduce grazing pressure on the rangelands must recognise the rationality and effectiveness of the traditional Maasai herding system in providing subsistence for its population and will have to provide an equally effective alternative source of subsistence if it is to succeed. It is urgent that such an alternative be developed as the continuing reduction in the dry season resources will not allow the expansion of cattle numbers to a level sufficient to meet the subsistence needs of a growing pastoral population without the probability of severe depletion of grazing resources. The experience during the recent drought suggests that alternatives are currently unavailable in the area, though the pastoralists are actively seeking ways of improving their situation.

There are indications that the herders are becoming increasingly involved in the wider economy by selling more livestock and consuming greater amounts of purchased grains etc. (Meadows and White 1979). Low livestock prices, irregular stock sales and unreliable supplies of grains are identified as important constraints to the greater commercialisation of the livestock economy while in the longer term there will be a need for off farm employment opportunities as the ranches will be unable to absorb the growing population in productive activities. The possibility of developing a local based livestock industry which would provide employment and keep the value added in processing within Maasailand should be investigated.

The evidence from peoples' responses to drought is that they are ready to change selected aspects of their traditional way of life. If advantage can be taken of this readiness to change, then development of Maasailand may be possible. If no action is taken soon however, the incentive to change may weaken, particularly in view of the excellent range conditions which prevail at present and the rapid increase in livestock numbers, and a great opportunity for encouraging the development of Maasailand may be missed.

### III.B. Maasai Farmers.

The majority of the ninety Maasai respondents who declared themselves to be farmers practise a mixed economy - herding animals and growing mainly subsistence crops such as maize and beans. Cultivation is not new to the Maasai of the area, though it is usually organised by their wives of Kikuyu or Chagga origin. The designation of Maasai as "farmer" is however, a recent phenomenon, most of them growing primarily

subsistence crops (Table 21) and continuing to rely heavily upon livestock. Mixed farming by Maasai is therefore a developing activity in which, as yet, few depend entirely upon cultivation. This contrasts with the non-Maasai farmers of the area who keep very few animals (Table 22) and for whom crop production is the basis of their economy.

Table 21. Crops grown by Maasai farmers - Loitokitok Area.  
( by number and percent of respondents. N=89)

Crop	No.	Growing %	Food Crop No.	Food Crop %	Cash Crop No.	Cash Crop %	Food and Cash No.	Food and Cash %
Maize	87	98	42	47	0	0	45	51
Beans	84	94	39	44	1	1	44	49
Potato	40	45	36	40	0	0	4	5
Millet	16	18	6	7	1	1	9	10
Peas	12	14	10	11	0	0	2	2
Coffee	7	8	1	1	4	5	2	2
Banana	6	7	3	3	1	1	2	2
Onions	6	7	1	1	3	3	2	2
Cotton	5	6	0	0	5	6	0	0
Cassava	3	3	3	3	0	0	0	0
Sorghum	2	2	0	0	0	0	2	2
Other crops	4	5	1	1	2	2	2	2

Source: Own Compilation

Table 22. Livestock ownership by farmers - Loitokitok area.

	MAASAI FARMERS (N=90)		NON-MAASAI FARMERS (N=134)	
	No.	Percent	No.	Percent
No livestock owned	4	4.4	48	35.8
No cattle owned	13	14.4	126	94.0
No sheep owned	18	20.0	121	90.3
No goats owned	10	11.1	96	71.6
CATTLE				
No. owning cattle	77	85.6	8	6.0
Mean no. owned	48.4		15.5	
SHEEP				
No. owning sheep	72	80.0	11	8.2
Mean no. owned	20.2		6.9	
GOATS				
No. owning goats	80	88.9	38	28.4
Mean no. owned	29.6		5.7	

Source: Own Compilation.

III B: The impact of drought upon Maasai farmers.

For most of the Maasai farmers the period 1972-76 was the first in which they had had to cultivate under drought conditions. The most frequently stated problems during that period concerned the loss of animals, drought/water supply, land shortage, soil erosion and lack of food (Table 22). Thus though they view themselves as farmers their most severe problems concerned their animals.

The livestock continue to provide the bulk of the Maasai farmers' subsistence needs, though their herds are in general smaller than those of the pastoralists. Prior to the drought the average herd was of sufficient size to meet the subsistence needs of the average family but the losses during the drought reduced the herds below the subsistence level (Table 23).

Table 23. Average herd size and subsistence needs - Maasai farmers before/after the drought. (N=90)

	Before drought	Post - Drought	
	2.5 ssu/adult <sup>a</sup>	2.5 ssu/adult	3.5 ssu/adult
Mean family size	9.5	9.5	9.5
Adult equivalent	7.4	7.4	7.4
Calories per day	17072	17072	17072
Cattle required	50	50	70
Mean Cattle herd	84	49	49
% of required	168	98	70
Sheep and Goats required	68	68	95
Mean sheep & Goat herd	68	43	43
% of required	100	63	45

Note: a.. Calculations based upon information given in Pratt and Gwynne 1977p. 35 ff. 2.5 SSU/Adult represents good grazing conditions and 3.5 SSU/Adult poorer conditions.

Source: Own Compilation

A Comparison of farmers with different herd sizes (Table 24) demonstrates that only the largest (20 per cent of herd) contained sufficient animals to feed the people dependent upon them at the time of the survey, though prior to the drought 70 per cent of the herds had been sufficient.

The losses incurred during the drought varied remarkably little according to herd size though the smallest and largest herds suffered the



TABLE 24. MAASAI FARMERS - Cattle losses and subsistence needs by size of the herd. (N=90)

Percent of Population in deciles Poorest <sup>1</sup>	Average Family Size in Adult Equivalents	PRE- DROUGHT				POST - DROUGHT					Post-Herd Percent Drought
		Average No. of cattle	Percent of Total Cattle		Percent of subsistence Needs provided <sup>2</sup> at 2.5 SSU/Adult	Average No. of Cattle	Percent of Total Cattle		Percent of Subsistence needs provided <sup>2</sup>		
			% cum %	% cum %			% cum %	% cum %	2.5 SSU/Adult	3.5 SSU/Adult	
1-10	4.82	9.10	1.1	1.1	27.9	5.40	1.1	1.1	16.6	11.9	
11-20	7.13	19.13	2.3	3.4	39.6	11.38	2.4	3.5	23.6	16.8	
21-30	6.74	28.50	3.5	6.9	62.5	19.13	4.1	7.6	42.0	30.0	
31-40	5.21	35.63	4.4	11.3	100.9	21.75	4.6	12.2	61.5	44.0	
41-50	7.05	46.50	5.7	17.0	97.5	26.25	5.6	17.8	55.0		
51-60	9.52	59.88	7.4	24.4	93.0	42.63	9.0	26.8	66.2	47.3	
61-70	7.38	71.88	8.8	33.2	143.8	55.88	11.9	38.7	111.8	79.8	
71-80	8.64	94.50	11.6	44.8	161.5	58.25	12.4	51.1	99.5	71.1	
81-90	7.97	147.75	18.2	63.0	273.6	95.12	20.2	71.3	176.1	125.8	
91-100	9.27	299.88	36.9	99.9	477.5	135.75	28.8	100.1	216.2	154.4	

Wealthiest

Notes:1. Respondents are assigned to deciles on the bases of number of cattle owned prior to the drought. Wealth is measured in terms of numbers of cattle owned.

2. Subsistence needs are calculated according to data provided by Pratt and Gwynne (1977p.35ff)  
- 2.5 Standard Stock Units (SSU)/Adult equivalent represents good range conditions and  
3.5 SSU/Adult equivalent poorer conditions.

Source: Own Compilation.

greatest percentage losses. Not all the decline in the herd should be interpreted as a loss, however, as livestock sold represents liquidated assets rather than losses (Table 26). In terms of the contribution of livestock to cash income, for the average family, it amounted to 31 per cent compared with 17 per cent for crops.

Table 25.

Average drought sales and death of livestock - Maasai farmers (N=90)

	CATTLE		SHEEP		GOATS	
Pre-drought herd size	83.7	100%	26.7	100%	41.0	100%
Sales	10.7	11.6%	1.7	6.5%	5.4	13.2%
Deaths	25.3	29.5%	8.8	33.0%	8.2	200%
Post drought herd size	58.9	49.3%	16.1	60.42%	27.4	66.8%

Source: Own Compilation.

Table 24 demonstrates also that the losses incurred in the drought altered the distribution of wealth (measured in numbers of cattle owned) slightly towards a more equal distribution. It is probable therefore that as with the Pastoral Maasai, the effect of drought conditions upon the distribution of wealth has been very slight, although in both groups the poorest and richest fared worst.

The second source of subsistence for Maasai farmers is crop production. While some crops are sold, most of the production is for home consumption. The Maasai have a very similar cropping pattern to that of non-Maasai farmers, though they pay less attention to growing sweet potatoes, a drought resistant crop. Throughout the area crop production was below normal, the deficit being more severe for farmers in the drier, lower areas. It is estimated that crop production contributed only one-third of the subsistence needs of the Maasai farmers in the lower areas. In the absence of their herds which continued to provide a substantial proportion of the subsistence needs (Table 22) the Maasai farmers, particularly those in the lower zones, would have been in severe difficulty. In the event, the combination of livestock and crop production appears to have been more successful in overcoming drought - related shortages than either activity practised alone.

As will be shown later, while the Maasai farmers did call upon traditional strategies for reducing the effects of drought, they received famine relief proportionally less than other people, demonstrating an ability to provide for most of their own subsistence needs. While the major

specific effects of the drought were felt in livestock losses and in reduced harvests, the Maasai farmers, and all farmers, complained of a general feeling of unease and social disturbance during the period of the drought.

111 B ii Maasai Farmers' Response to Drought.

The majority of Maasai farmers retain close links with the pastoral community both through relatives and through the ownership of shares in group ranches. The responses of the farmers to drought conditions reflect the importance of livestock in their economy and the continued links with the pastoral Maasai, in that many of the strategies adopted by the pastoralists were also followed by the farmers.

Movement of people and herds. As explained previously, the Maasai move their livestock in response to the availability of water and grazing resources. This remains true of the farmers as well as the pastoralists. At the time of the survey over 30 per cent of the farmers' cattle and 20 per cent of their sheep and goats were away from the farm (Table 26) being cared for either by relatives and friends or by members of the family who had moved with the livestock. Twenty-three percent of Maasai farmers reported that members of their family (Usually Sons) had moved away with the livestock in search of pasture, particularly to swampy areas eg. Kimana and Olkaria where pasture and water was available.

Table 26. Proportion of herd kept at the farm during drought-Maasai farmers.

	CATTLE	SHEEP	GOATS
Percent on farm	63.8	79.2	78.3
Percent elsewhere	36.1	20.8	21.7

Source: Own Compilation.

Reciprocity among relatives and friends. The movement of livestock away from the farm reflects the continued willingness of Maasai to allow livestock from other, less-favoured areas, to graze on their kind. This is particularly well-developed among the pastoral Maasai, while sharing of foodstuffs is also important for the farmers. Forty-two percent of Maasai farmers stated that they had given food to relatives and 19 per cent that they had received food from relatives, while 37 per cent of pastoralists said they had received food from relatives. It appears likely therefore that the relatively advantageous position enjoyed by the Maasai farmers due to their mixed resources enabled them to provide a great deal of assistance to their less fortunate relatives during the drought.

Assistance from other sources. The principal off-farm sources of food during the drought were purchases at the market, gifts from relatives and famine relief (Table 27). In order to raise cash with which to buy food at the market, the Maasai farmers engaged in a number of activities. Thirty-six per cent of the average cash income came from 'biashara',<sup>10</sup> 31 per

Table 27. Source of food in 1976 - farmers of the Loitokitok area  
( by no. and percent of respondents giving each response)

SOURCE	MAASAI (N=90)		NON-MAASAI (N=135)		TOTAL (N=225)	
	No.	%	No.	%	No.	%
Market	87	97	123	91	210	93
Stored food	46	51	63	47	109	48
Famine relief	37	41	71	53	108	48
Relatives	17	19	21	16	38	17
Used cash savings	7	8	16	12	23	10
Other	0	0	5	4	5	2

Source: Own Compilation.

cent from the sale of livestock and only 10 per cent from the sale of crops. The type of activity differs from one member of the family to another: the head of household is most likely to trade (particularly in livestock), the sons to work in town and the wives sell food.

It is noteworthy that fewer Maasai farmers (41%) than non-Maasai farmers (53%) and Maasai pastoralists (67%) received famine relief, an indication that their mixed economy enabled them to cope relatively well during the period of drought. The Maasai farmers continue to maintain strong links with the pastoral economy and to respond to drought in traditional ways. However, their mixed economy appears to allow them more versatility in time of drought as they are dependent on neither livestock nor crops for their entire subsistence needs.

III B ii Expectation of future drought and precautions against its effects - Maasai farmers.

The years 1961 and 1972-76 stand out clearly in the minds of Maasai farmers as being years of drought. Drought is not an unexpected event for them and it is anticipated again by many, although they are uncertain as to when it might occur. A surprising number of respondents (44%) stated however, that they do not anticipate drought in the future.

10. 'Biashara' is a general term used to describe a variety of trading activities including the sale of beer, milk, grain etc.

That Maasai farmers should be so optimistic may reflect the fact that the most recent drought affected them less than other groups in the area. Their optimism does not lead to complacency, they have a good idea of the strategies they will use to reduce the impact of future droughts and no respondent said that he/she would take no precautions. (Table 28).

Table 28. Precautions against future droughts - Maasai farmers (N=57)

PRECAUTION	NUMBER	PERCENT
None	0	0
Increase herd size	41	72
Save cash	37	65
Cultivate more land	17	30
Store food	10	18
Work off farm	2	4
Other	7	12

Source: Own Compilation

That keeping more livestock is the most frequently mentioned precaution particularly by those living in the drier areas emphasises the continued importance of herding to the Maasai farmer. The mixed nature of their economy is indicated by the 30 per cent of respondents who said they would cultivate a greater area - a response common among Kikuyu and other non-Maasai farmers in the area.

The saving of cash is also seen as being a useful precaution against drought and is the most frequently mentioned response among those occupying the agriculturally higher potential land. People of the area, particularly Maasai, had great difficulty raising cash to buy food during the drought as their savings (livestock) were devalued against the commodity they wished to buy (food). As the quality of livestock declined giving a poor selling price the scarcity of food drove the prices up. Cash saved from the sale of healthy livestock would thus buy more food than that realised from the sale of low-quality animals. A number of problems affect the viability of this precaution however. Most people cannot afford to save money as, school fees, clothing and day to day costs use up most of peoples' available cash, and even if they did have money to save, there is no bank in the Loitokitok area at which they could do so.

A feature of the precautions listed by Maasai and other farmers in the area is that most concern activities which the people can implement themselves with little assistance being required from outside sources, such

as the government. It became apparent at the follow-up field seminars (Campbell and Mbugua 1978) that people did recognise that there was much which they could do themselves to alleviate drought-related problems but that they also realised their own limitations. For example while they can increase herd size or plant different crops without external help they could not open a bank without such assistance.

#### Summary

Farming by Maasai represents a recent departure from traditional herding activities and Maasai farmers still have a strong attachment to their livestock which may increase as a consequence of their experience in the most recent drought. Maasai farmers appear to have coped more successfully with drought conditions than either the pastoralists or the non-Maasai farmers. Their mixed economy offers a range of inputs to their subsistence needs and while both their animals and crops could provide subsistence prior to the drought neither was able to do so alone at the time of the survey. The combination of livestock and crops did however offset major difficulties and permitted many farmers to help less fortunate Maasai relatives. Whether a mixed economy is a feasible alternative for all the people of the area is doubtful as there is insufficient arable land for the farmers who are already there (52% stating land shortage to be a major problem) and the area into which cultivation might expand, without threatening the viability of the pastoral size of the economy, is limited.

#### III C Non-Maasai Farmers.

The Majority of non-Maasai farmers in the Loitokitok area are Kikuyu and Kamba people who are recent arrivals in the area (Table 29) having come from many parts of Kenya (Table 20) but primarily from Central and Rift Valley provinces. About one-fifth of the farmers in the survey had come to the area from Tanzania, many being of Kenyan origin who moved due to various policies enacted by the Tanzania government.

Table 29. Date of commencement of farming in the Loitokitok area-non-Maasai farmers (N=123)

DATE	KIKUYU		KAMBA		OTHER		TOTAL	
	No.	%	No.	%	No.	%	No.	%
pre-1962	2	3	1	3	2	9	5	4
1962-1966	7	9	2	6	4	18	13	10
1967-1971	31	39	8	25	7	32	46	35
1972-1976	39	49	21	66	9	41	69	52

Source: Own Compilation.

The early years of rapid immigration in the post-independence period - 1967-1972 - were characterised by favourable rainfall conditions and the farmers tended to plant crops best-suited to areas with relatively high rainfall. The decline in rainfall amounts after 1972 resulted therefore in a more severe reduction in harvests than might have been the case had crops more suited to the area's environmental conditions been planted. For most of the non-Maasai farmers 1972-1976 was the first period of drought which they had experienced in the Loitokitok area, though many had done so in their areas of origin.

Table 30. Origin of non-Maasai farmers in the Loitokitok area  
(percentages are of column totals)

LOCATION	KIKUYU		KAMBA		OTHER		TOTAL	
	No.	%	No.	%	No.	%	No.	%
	(N=69)		(N=28)		(N=13)		(N=115)	
<u>Central Province - total</u>	48	69.6	1	3.6	0	0.0	49	42.6
Nairobi	13	18.8	0	0.0	0	0.0	13	11.3
Kiambu	28	40.6	1	3.6	0	0.0	29	25.2
Murang'a	3	4.3	0	0.0	0	0.0	3	2.6
Nyandarua	2	2.9	0	0.0	0	0.0	2	1.7
Nyeri	2	2.9	0	0.0	0	0.0	2	1.7
<u>Coast Province-total</u>								
Taveta	0	0.0	1	3.6	1	5.6	2	1.7
<u>Eastern Province-total</u>	0	0.0	10	35.7	0	0.0	10	8.7
Kitui	0	0.0	3	10.7	0	0.0	3	2.6
Machakos	0	0.0	7	25.0	0	0.0	7	6.1
<u>Nyanza Province -total</u>	0	0.0	0	0.0	3	16.7	3	2.6
Kisumu	0	0.0	0	0.0	3	16.7	3	2.6
<u>Rift Valley Province -total</u>	11	15.9	13	46.4	5	27.8	29	25.2
Eldoret	1	1.4	0	0.0	0	0.0	1	1.0
Kajiado	8	11.6	13	46.4	5	27.8	26	22.6
Nakuru	2	2.9	0	0.0	0	0.0	2	1.7
TANZANIA	10	14.5	3	10.7	9	50.0	22	19.1

Source: Own Compilation.

The non-Maasai farmers concentrate on growing maize and beans but also cultivate a variety of crops both for subsistence and for sale (Table 31) but unlike the Maasai they keep very few animals (Table 22).

Table 31. Crops grown by non-Maasai farmers-Loitokitok area.  
(by number and percent of respondents - N=135)

CROP	NO. GROWING		FOOD CROP		CASH CROP		FOOD & CASH	
	No.	%	No.	%	No.	%	No.	%
Maize	135	100	57	42	0	0	78	58
Beans	130	96	61	45	7	5	62	46
Potato	86	64	69	51	2	1	15	11
Millet	42	31	14	10	4	3	24	18
Banana	20	15	14	10	1	1	5	4
Onions	14	10	2	1	10	7	2	1
Cassava	13	10	11	8	2	1	0	0
Peas	12	9	7	5	0	0	4	3
Cotton	9	7	0	0	9	7	0	0
Sorghum	7	5	2	1	3	2	2	1
Coffee	1	1	0	0	0	0	1	1
Other Crops	27	20	7	5	10	7	10	7

Source: Own Compilation.

The non-Maasai farmers are found in two main zones in the area. The Kikuyu are predominantly in the "buffer zone" immediately below the Tanzanian border while the Kamba are found mainly around Kimana where they cultivate under irrigation.

### III C i The impact of drought on non-Maasai farmers.

The most frequently mentioned problems affecting these farmers during the period of drought were water supply, land shortage and lack of food which are clearly interrelated (Table 2). These specific issues arose within a context of general unrest in the area exemplified in an increase in robbery, assault and disagreement between people.

In the absence of significant numbers of livestock, crop production is the mainstay of the non-Maasai farming economy. The majority of farmers have small plots (Table 32) and are thus able to produce a surplus only in good years, while during the drought hunger was widespread.



Table 32. Area of farm - non-Maasai farmers. (N=135)

AREA	NO	PERCENT
Under 2 hectares	84	62
2 - 4 hectares	40	30
4 - 6 hectares	8	6
Over 6 hectares	3	2

Source: Own Compilation

The ability of farmers to produce crops depended upon the location of their fields and the area under cultivation. Those farms located higher on the mountain slopes received more rainfall than those in lower lying areas and others located along river valleys or round the swamp margins were also able to produce crops. Those who planted a larger area were also more successful than those who planted smaller ones.

In general however the non-Maasai farmers faced a more difficult situation than either the Maasai farmers or pastoralists during the drought as they depended only upon crop production for their livelihood. The farmers in the low-lying drier areas encountered the most severe problems illustrating the difficulties associated with expanding the area under crops into the less well watered parts of the region.

#### III C ii The response to drought among non-Maasai farmers.

In areas prone to recurrent drought the population has usually developed mechanisms for reducing the impact of the drought. Such mechanisms, or strategies, are integrated within the socio-economic framework of the society but increase their importance once drought threatens the system. People become more vulnerable to drought when their society is undergoing a process of adjustment to altered social, political, economic or environmental conditions as, particularly if good rainfall conditions prevail, they are more likely to concentrate on adaptation to meet immediate needs than on those required to alleviate a less immediate situation.

The majority of non-Maasai farmers are recent immigrants to the Loitokitok area and the period 1972-76 was the first in which they had experienced inadequate rainfall, as the years prior to 1972 had been ones of adequate precipitation. Prior to 1972, therefore, the farmers had concentrated upon settling into the area and developing their farms to produce sufficient crops to meet their subsistence and cash requirements. The crops planted by the farmers did not yield sufficient harvests to meet subsistence needs during the drought and though many people had stored

some food, it was insufficient to offset the deficit in the harvest. Discussion with farmers as to precautions which they could take to reduce the impact of future droughts (Section III C iii) demonstrated that while they know what precautions might have been useful, they had not taken them prior to the drought though after the experience of the drought period more drought-resisting strategies are likely to be implemented.

In order to overcome the food shortages the non-Maasai farmers had to depend upon purchases at the market, the use of stored food and famine relief. The purchase of food was the largest cash expenditure of most farmers, accounting for 46 per cent and 41 per cent of the average a Kikuyu and Kamba cash expenditures respectively. The principal source of income to pay for this food for the Kikuyu were off-farm business activities such as shopkeeping, and remittances from wage earners in town, though crop sales accounted for about one quarter of the average income. Crop sales were also an important source of income for the Kamba respondents who, unlike other groups also earned cash through wage labour.

Assistance from relatives is not as well-developed among the non-Maasai as among the Maasai. This is probably due to their having fewer relatives in the immediate area and any that were there were also affected by the drought. Thus as Table 38 shows relatively few non-Maasai farmers gave or received help from relatives.

Table 33. Assistance between relatives - farmers Loitokitok area.

	MAASAI FARMERS (N=89)		NON MAASAI FARMERS (N=135)	
	No.	%	No.	%
Received Assistance	17	19	21	16
Gave Assistance	37	42	23	17

Source: Own Compilation.

The lack of nearby relatives is also reflected in the low number of people who moved to stay with relatives. Only one Kamba family reported a move (and that was of a lady who went to cultivate in another area) while about 10 per cent of Kikuyu families reported that a member of the family (usually sons) had moved away to stay with relatives. Most of the latter left the Loitokitok area and returned to the districts from which the family originally came.

Assistance from sources other than relatives was restricted mainly to famine relief provided by the government and by the Roman Catholic Mission. It was distributed according to need by the leaders of the community. The greatest need was felt by the pastoralists and the non-Maasai farmers (Table 34) who lacked the variety of resources available to the mixed farmers. The necessity for famine relief was such that it was second to the market place in importance as a source of food.

Table 34. Respondents receiving famine relief.

	Maasai Pastoralists (N=164)	Maasai Farmers (N=90)	Non Maasai Farmers (N=135)
No.	110	37	70
Percent	67.1	41.1	51.9

Source. Own Compilation.

Off-farm activities. The range of off-farm activities practised by non-Maasai farmers is shown in Table 35. Not all farmers had off-farm income, however, and the table reflects the responses of the 45 per cent of the sample that declared such income. It demonstrates a variety of activities, based principally upon local resources, which are engaged in to diversify the farmers' sources of income, though sales of food crops was the most frequent response.

Table 35. Source of off-farm income - non-Maasai farmers (N=61)

	NUMBER	PERCENT
Sold food/crops	26	43
Work in town	25	41
'Biashara' (trade)	13	21
Sold charcoal/firewood	11	18
<u>Duka</u> (Shop)	8	13
Sold beer	6	10
Labour on another farm	6	10
Other	7	11

Source: Own Compilation.

The non-Maasai farmers had to rely heavily upon their own agricultural resources during the drought. Intra-family ties were weak as most had only recently moved to Loitokitok from other parts of the country

and famine relief was of great importance in offsetting deficits in crop production.

III C iii Expectations of future droughts and precautions against its effects non-Maasai farmers.

As the recent drought was the first many respondents had experienced in the area, it is not surprising that they are uncertain as to the possibility of drought conditions recurring in the future. (Table 36).

Table 36. Expectations of future drought - non-Maasai farmers (N=135)

	NUMBER	PERCENT
Do <u>not</u> expect drought	39	29
Expect drought	40	30
God/laibon knows	43	32
Do not know	13	10

Source: Own Compilation

This uncertainty does not prevent them from having clear ideas as to which precautions might be effective in reducing the impact of any future drought. The responses from the survey (Table 37) and discussion at field seminars <sup>11</sup> indicate that a wide range of responses are under consideration. Many of these are implementable by the people themselves but they realise that for others to be successful assistance from outside sources will be required.

Table 37. Precautions against future drought - non-Maasai farmers (N=103)

PRECAUTION	NUMBER	PERCENT OF RESPONDENTS
Save cash	86	83.5
Cultivate more land	47	45.6
Store food	24	23.3
Work off-farm	9	8.7
Nothing	2	1.9
Other	7	6.8

Source: Own compilation

11. In addition to the strategies indicated in Table 37 the field seminars concluded that activities to improve water supply, food storage facilities and the planting of a variety of drought - resistant or evading crops would reduce the farmers' vulnerability to any future drought.

The most widely accepted response is that of saving cash with which to buy food during a drought. They recognise a number of difficulties which this strategy namely the ability of people to save cash and the lack of a bank at which they might save. Most peoples' earnings are gained directly after the harvest when purchasers pay low prices and much of what is earned is spent on immediate needs such as school fees and clothing. Discussion at field seminars indicated that farmers might receive better prices for their produce if they organised themselves into seller-cooperatives so that they could negotiate a higher price for their crops. Many suggested that the planting of cash crops e.g. coffee would be a way of raising their incomes. The need for a bank to be established at Loitokitok was accepted by most people at the seminars but they realised that government action would be needed to accomplish this.

A second strategy is that of cultivating more land. It became clear during the drought that those who planted the greater area had more food and since the drought many people have planted the entire area of their farm, leaving no land fallow, while others have bought or rented more land for cultivation.<sup>12</sup> The cultivation of wider areas in the higher land and of greater areas in the lower lands<sup>13</sup> may increase soil erosion already a problem identified by one-third of the respondents as being serious in the area, may increase the farming population risking drought as those in drier areas were less able to cope with the drought, and may curtail the resources available to herders thus increasing their vulnerability. This strategy therefore, thought it may appear practical in view of the drought experience, may in the long term increase the difficulties faced by the area's population.

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12. The areas in which most new land is being cultivated are Rombo and Kimana. These were areas of livestock concentration during the drought as they are well-watered. Expansion of cultivation into these areas may reduce the problems of the farmers but will increase the difficulty for the pastoralists as it further reduces the area available for dry-season (or drought) grazing.

13. Farmers cultivating around the swamps were able to produce crops such as beans, Katumani maize, bananas and onions throughout the drought period. Although they were frequently troubled by wildlife, their relative success in crop production during this period has acted as an incentive for others to move into the margins of the swamps. These farmers are at less risk to drought than those farming less well-watered land.

Many farmers also expressed an interest in storing food crops. The amount available for storage is, however, limited as many have to sell any surplus to raise cash and thus this may not be a viable strategy for many farmers. For those who do have sufficient surplus to store there are difficulties which arise in the storage process due to losses to the activities of vermin and insects. The people of the area recognise a need for the government to construct a suitable storage facility in the area to which they could contribute surpluses for use in time of drought.

A number of other strategies were suggested including: the growing of drought - resistant crops with which the people are familiar from their experience of drought in their areas of origin; the construction of a reliable water supply - in both Kimana and Kilelelwa the people have attempted to improve their water supply but failed. In Kimana the dams which they constructed could not hold water while in Kilelelwa the funds contributed for a water scheme have disappeared; family planning; and migration to towns - the viability of this alternative is limited by the low probability of migrants obtaining work in the town.

It is clear that the farmers of the area are actively seeking ways of reducing their vulnerability to drought. Many strategies can be accomplished with their own resources, but government assistance is required on specific projects such as the provision of a bank, a grain store and in the creation of a reliable water supply.

#### SUMMARY

Non-Maasai farmers are, in general, recent immigrants to the Loitokitok area and the years 1972-76 represent the first period of drought faced by these people in the area. Most cultivate small areas of land and prior to the drought little specific attention had been paid to the growing of drought resistant crops as a precaution against drought. During the drought period, particularly 1976, poor harvest led to severe shortage of food and famine relief played an important role in preventing widespread difficulties.

Farmers on the drier lower slopes had more severe problems than those on the upper slopes. As contemporary expansion of cultivation tends to be towards the drier areas there is a possibility that should drought conditions return a larger number of people farming in the drier lands will be at risk. Farmers, like the pastoralists, are actively seeking ways of reducing their vulnerability to drought conditions. While many such

strategies can be accomplished using local resources there are others which require assistance from government if they are to be effective.

#### IV CONCLUSION AND RECOMMENDATIONS

The period of 1972-76 was one of reduced rainfall in the Loitokitok area resulting in severe shortages of food for the population due to reduced harvest and deaths of livestock. The severity of the impact of the drought was in part due to the inability of the societies of the area to cope adequately with the conditions as they were adjusting to altered social and economic conditions which reduced their capability to deal with drought.

The pastoralists' dry-season resources had been severely curtailed prior to 1972 through the creation of national parks and particularly due to the expansion of cultivation. While some pastoralists had adjusted to the situation by taking up cultivation themselves, the majority had continued with their traditional pastoral economy. When the drought came the area available for grazing was limited and deaths of livestock were widespread. As the process of expansion of the area under cultivation is continuing, as the grazing and water resources of the Amboseli National Park are now unavailable and as the Maasai human and animal populations increase, so the pressure on grazing resources will become greater, and the pastoral population will become more vulnerable to future drought. There is some indication that younger Maasai herders are looking to a mixed agro-pastoral economy in the future but in the absence of some form of land use planning they may be prevented from realising this objective by the expansion of non-Maasai agriculture.

The non-Maasai farmers of the region are new to the area and are in a process of adjusting to its socio-economic and environmental conditions. The farming population is already large enough to create a situation of land shortage, which, together with soil erosion, is seen as giving rise to major problems in the near future. In response to this shortage of land many farmers are moving to the lower-lying drier areas and cultivating land along river valleys and around the edges of swamps. The evidence from the recent drought suggests that those farming in the drier areas were least able to meet their subsistence needs and required famine relief to assist them. Any increase in the numbers of people farming in the drier areas will not only reduce the dry season grazing resources of the pastoralists but may increase the farming population at risk to drought.

For both pastoralists and farmers the situation is serious. There is room for expansion of agriculture - particularly along river valleys where irrigation may be possible - but it is limited and can provide only a short-term respite from the area's problem of land shortage. The use of such areas for agriculture would certainly interfere with the pastoral system of the area, and further reduce its viability. Some form of land use planning is required for such areas, planning which will evaluate the regional costs and benefits of each land use and the importance of these riverine and swamp resources to each. Uncontrolled or ill-conceived land use changes in the area will only serve to increase the vulnerability of the population to drought.

Both the pastoralist and farming people of the area are actively seeking ways to reduce their vulnerability to drought. Most of these strategies can be accomplished with local resources, though some require specific help from the government. The emphasis upon local efforts to reduce the impact of drought is to be encouraged but the government should be consciously seeking ways in which it can assist local people in meeting these objectives:

"a relatively low cost and high benefit approach for the government in dealing with drought problems is to build upon the local patterns of adjustment to drought which have grown up in the different ecological zones of the country, fostering those which seem to be effective, discouraging some which seem wasteful, introducing new ones....."

(Wisner and Mbithi, 1972, p. 14).

Among the specific activities which the people view as important in reducing the impact of drought but which cannot be implemented without government assistance are:

1. The provision of grain storage facilities at Loitokitok
2. The provision of a bank at Loitokitok
3. Technical assistance with the creation of a reliable water supply in the region
4. Technical assistance with the choice of drought - resistant or evading crop species suitable for the area.

While the provision of these facilities would certainly improve the ability of the people of the area to cope with drought only effective land use planning can provide a long-term solution to the problems of the area. Contemporary trends suggest that the gradual reduction in the dry-season grazing resources will continue as cultivation expands in the area. Its consequences for both farmers and pastoralists are likely to be that both groups become more vulnerable to drought. A development plan should therefore



be prepared for the area which aims to reduce the pressure on the land resources while improving the peoples ability to meet their subsistence needs. Such a plan should assess contemporary trends in land use in terms of their continued viability, examine possibilities for off-farm employment in the area e.g. in livestock-based industries and should propose changes compatible with local aspirations as well as national goals. In the absence of careful planning contemporary trends will continue and the costs to the national economy of recurrent famine relief will increase and outmigration to Nairobi of people seeking alternative means of support is likely. In view of the severe problems already facing the city such a situation is clearly undesirable.

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