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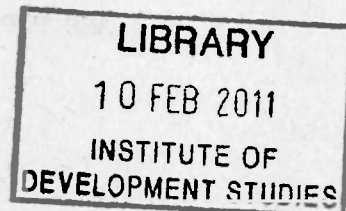
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DEVELOPMENT OR DECLINE : RESOURCES, LAND USE  
AND POPULATION GROWTH IN KAJIADO DISTRICT

By

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ABSTRACT

This paper examines the nature of the relationship between the increasing subsistence demands of the growing population of Kajiado District and the capacity of the environment to support these demands. It concludes that under existing patterns of land use and levels of technology Kajiado District will be unable to support its population by the turn of the century. The emphasis of contemporary development strategies in the area is upon improving the subsistence economy but this will not result in an economy which is able to support the population in the long term. There is an urgent need to stimulate employment opportunities outside the subsistence sector, particularly in activities built upon the principal resources of the area, livestock and wildlife. While planning for the wildlife/tourism sector is well advanced little attention has been paid to the possibilities of developing integrated livestock-based industries in the District, the potential for such industries is examined.

INTRODUCTION

This is a paper provoked by research findings rather than a report on original research. Its original purpose was to provide a first-approximation of a quantitative assessment of some of the effects and implications of the current trend in semi-arid areas for cultivation to increasingly displace pastoralism as the dominant land use at the more humid margins of the rangelands. The author's research in Kajiado District (Campbell and Mbugua 1978; Campbell 1978) indicates that there is increasing competition over access to and control of the available land and water resources of the district between farmers and pastoralists, a situation highlighted during the recent drought years.

It became apparent during the preparation of the paper that the expansion of cultivation in the higher potential areas of Kajiado District was having a negative effect upon the pastoral economy as it denied herders access to the best dry season grazing lands. In attempting to quantify these effects on terms of numbers of farmers displacing pastoralists and to project these figures to the turn of the century it became evident that a second, underlying process was at work which, even in the absence of the spread of cultivation, would lead to problems. This process is the increasing subsistence demands of a growing population within the limits of the environment to support these demands. A second purpose of this paper therefore is to explore these limits.

The methodology used in this paper is rudimentary and refinement will be necessary. However it does illustrate how available information can be used to assess land use potentials in semi-arid areas. It is hoped that a more precise analysis using more specific estimates of carrying capacity based upon measures of primary productivity will follow on the present analysis.

The analysis presented in this paper indicates that, probably by 2000 AD, Kajiado District will be unable to support its population even at a subsistence level under present economic conditions and at the current level of technology. The demands of a growing pastoral and farming population will outstrip the district's productive capacity by the turn of



the century. The problem is seen as being more acute, the crisis will occur perhaps a decade earlier, if the contemporary patterns of conflict over land and water resources between herders and farmers continue.

There is an urgent need for the preparation of development plans which aim to provide employment opportunities outside the subsistence sector, particularly in industries based upon the principal resources of the area - livestock and wildlife. While wildlife-related activities are well-developed there is a need to encourage livestock-related activities. The time in which preparation and implementation of such plans can be made is limited. Immediate action to reduce the conflict over access to and control over resources through the enactment of zoning regulations designed to yield a more flexible land use pattern may buy sufficient time for an integrated development plan for the district to be prepared and implemented. In the absence of such developments increasing emigration from the District to Nairobi and other urban areas can be expected, an eventuality which will further exacerbate existing urban problems.

#### ASSUMPTIONS AND METHOD

The paper concerns itself exclusively with Kajiado District, though the conclusions may be valid for other semi-arid areas of Kenya. While the analysis proceeds at the District level the data is also presented at the sub-district level in order to indicate regional differences. The basis of the subdivision is shown in Table 1.

In the absence of detailed information on the soil and water resources it has been necessary to make assumptions about the productivity of the land relative to the needs of pastoralists and farmers. The work of Pratt and Gwynne (1977) has provided the bases for many of the assumptions but the author accepts full responsibility for the manner in which he has used their information. Other assumptions have been derived from the author's own research in Kajiado District.

The paper presents an assessment of the capacity of Kajiado District to provide for the subsistence demands of a growing population protected to 2000 AD under different patterns of land use and land productivity. It is assumed that the current levels of technology will not change.

A great optimist might look to an improvement of the carrying capacity by 25%, the land use system permitting grazing the whole area except Zones II and III, a reduction in the stocking rate to 2.0 SSU/Adult and the population growth rate being 2.5% p.a. Under these conditions 2025 would be the date at which demand would exceed supply.

A more feasible scenario for the next 10 years would be: population growth 2.5% p.a., stocking rate reduced to 3.5% p.a., range productivity increased by 25% and herders retaining access to all land except Zone II and III. The year 2001 would be the estimated break even point under such conditions.

The parameters most likely to affect the balance between supply of and demand for resources are the stocking rate and the rate of population growth. The latter is most difficult to influence and thus the most effective strategy is to reduce the stocking rate.

As the Working Paper points out this will involve major transformation in the economy of the area and if the commercial potential of the livestock industry of the area is to be maintained then the objective of development strategies should be to reduce the population directly dependent upon livestock for its subsistence.

Alternative non-farm employment opportunities as stressed in the Working Paper are clearly required and it is in this context that the debates between centralisation and decentralisation of economic activity and over the most appropriate non-farm activities should take place.

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Livestock capacity, a seasonal measure, is estimated in Table 3. It is assumed that pastoralists will concentrate their grazing activities in the rangelands (Ecological Zones IV and V) during the wet seasons and thus the higher potential areas (Ecological Zones II and III) are not grazed at this time. In the dry seasons, however, these higher potential areas assume greater importance as the quality of the grazing and water resources in Ecological Zones IV and V declines. It will be apparent that the estimates presented in Table 3 assume the mean annual carrying capacity of Table 2 but allow for seasonal variations. The seasonal variations are no more than estimates made by the author and are not based upon any specific fieldwork or analysis of rangeland productivity. A more accurate assessment of seasonal range productivity will of course improve the quality of the presentation,<sup>3</sup> but it is felt that the assumptions made at this point are not so unrealistic as to undermine the validity of the conclusions. It is essential however that the data presented here be seen as representing a trend and not as being a precise picture of the situation.

In order to assess the carrying capacity and the livestock capacity of Kajiado District and of each unit, the area of each Ecological Zones in each unit was calculated using the Map on p 29 in the Atlas of Kenya amended where necessary according to Pratt and Gwynne 1977 Map 1. The area in each Ecological Zone, Table 4, was then multiplied by its carrying capacity and livestock capacity to give average and seasonal number of livestock which can be supported in each unit and in the District as a whole (Tables 5, 6 and 7).

The projections of the population and of the demands for livestock and farmland are more firmly grounded in empirical research. The baseline for population projections is the 1969 census Table 8 and the annual rate of increase for projections to 2000 AD (Table 9, 10) have been based on

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3. The principal restriction upon the dry season utilization of the range lands by livestock is not grazing but water. Western (1975) has shown that some of the Ecological Zone IV and V laid in Kajiado District has sufficient water both from natural sources such as swamps and from boreholes to enable it to have a higher carrying capacity than would otherwise be the case. This factor would need to be considered when in preparing a more accurate measure of seasonal carrying capacity.



currently accepted rates of 2.2% per annum for pastoralists and 3.3% per annum for farmers.<sup>4</sup>

The minimum number of livestock required per adult is taken at 3.5 SSU, which is equivalent to about 7 cows per adult in Maasailand. That this figure is a minimum may be ascertained not only by asking Maasai their view but also more empirically; Campbell (1978, p 13) found that the average pre-drought cattle/adult ratio of a group of herders unable to meet their subsistence needs during the 1974-76 drought in Kajiado District was 7:1. The projected minimum livestock requirements are shown in Table 11.

The farm size for the purposes of this paper is taken to be the average farm size of those farmers in the Ngong and Loitokitok areas interviewed by Campbell in 1977 (Campbell and Mbugua 1978) which was 3.5 ha. The total area required by farmers projected to 2000 AD is shown in Table 12.

Table 1. Kajiado District - Units for Data Analysis

Unit	Locations
West	Magadi, Lodokelani, Keekonyokie, Ngong, Kitengela
North	Kaputiei, Ildamat, Dalalekutuk, Purko, Matapato
South	Kisongo, Chyulu, Amboseli

Table 2. Hectares Required Per Livestock Unit by Ecological Zone

	ZONE II	ZONE III	ZONE IV	ZONE V
No. of Hectares	0.8	1.6	4.0	12.0

Source: Pratt and Gwynne, 1977, p.43.

4. The figure of 2.2% per annum for pastoralists is an estimate made by Dr. Roy Shaffer of the African Medical and Research Foundation, Nairobi, who has spent many years studying health-related issues in Maasailand. The 3.3% figure for farmers is an estimate of natural increase. As such it may be an underestimate as there has also been a major immigration of farmers to the District in the past 15 years (Campbell 1978). To accommodate this an additional 7000 adult equivalent farmers are included in the base population for 1980 in Table 10.



Table 3. Hectares Required Per Livestock Unit by Ecological Zone  
by Season

	ZONE II	ZONE III	ZONE IV	ZONE V
Wet Season	Not grazed	not grazed	2.5	6.0
Dry Season	0.6	1.2	5.5	18.0

Table 4. Area in each Ecological Zone by Unit (ha)<sup>1</sup>

UNIT	ZONE II	ZONE III	ZONE IV	ZONE V	TOTAL
West	15800	13900	337800	518600	886100
North	0	0	289100	252200	541300
South	6250	0	156172	619776	782200
DISTRICT	22050	13900	783072	1,390578	2,209600

1. Areas from Atlas of Kenya p.29 amended according to Pratt and Gwynne 1977, Map 1.

Table 5. Carrying Capacity by Unit and by Ecological Zone<sup>1</sup>  
(Standard Stock Units - SSU)

UNIT	ZONE II	ZONE III	ZONE IV	ZONE V	TOTAL
West	19750	8688	84450	43217	156105
North	0	0	72275	21017	93292
South	7813	0	39043	51648	98504
DISTRICT	27563	8688	195768	115882	347901

1. Capacity by zone from Pratt and Gwynne 1977 Table 8, p.43

2. One SSU equals 450 kg liveweight. In Maasailand about 2 head of cattle

Table 6. Wet Season Livestock Capacity by Unit and Ecological Zone (SSU)

UNIT	ZONE II	ZONE III	ZONE IV	ZONE V	TOTAL
West	not utilized		135120	86433	221553
North	not utilized		115640	42033	119843
South	not utilized		62469	103296	165765
DISTRICT	not utilized		313229	231762	544991

Table 7. Dry Season Livestock Capacity by Unit and Ecological Zone (SSU)

UNIT	ZONE II	ZONE III	ZONE IV	ZONE V	TOTAL
West	26333	11583	61418	28811	128145
North	0	0	52564	14011	66575
South	10417	0	28295	34432	73244
DISTRICT	36750	11583	142377	77254	267964

Table 8. Rural Population Kajiado District 1969<sup>1</sup>

Adult	42,800
Children	39,800
Adult Equivalent <sup>2</sup>	69,347
Maasai <sup>3</sup>	52,010 adult equivalents
Non-Maasai <sup>4</sup>	17,337 adult equivalents

## Notes:

1. Source: 1969 Census.
2. A child is equivalent to 0.66 adults.
3. For the purposes of this paper all rural Maasai are assumed to be pastoralists.
4. For the purposes of this paper all rural non-Maasai are assumed to be farmers.

Table 9. Maasai Population Projected<sup>1</sup> to 2000 A.D. by Unit  
(Adult Equivalents)

UNIT	1980	1990	2000
West	25,858	32,144	39,958
North	24,478	30,429	37,827
South	17,467	21,713	26,992
DISTRICT	67,803	84,286	104,777

1. Rate of increase of 2.2% per annum.

Table 10. Farming Population Projected<sup>1</sup> to 2000 A.D. by District.  
(Adult Equivalent)

	1980 <sup>2</sup>	1990	2000
POPULATION	31,779	43,969	60,834

1. Rate of increase of 3.3% per annum.
2. 1980 Population is taken to be the 1969 population projected at 3.3% per annum plus a total of 7,000 adult equivalents representing immigrants to the area. This figure is based upon date of arrival in Ngong and Oloitokitok given by respondents to a survey in 1977 (Campbell and Mbugua 1978).

Table 11. Minimum Livestock Numbers Required to Maintain Subsistence  
Projected to 2000 AD (in SSU)

UNIT	1980	1990	2000
West	90,503	112,504	139,853
North	85,673	106,502	132,394
South	61,135	75,996	94,472
DISTRICT	237,311	295,002	365,719

Table 12. Minimum Cultivated Area Required to maintain Subsistence of Farmers Projected to 2000 A.D.<sup>1</sup>

YEAR	POPULATION	NO. OF FARMS	AREA (ha)
1980	31,779	4965	17,378
1990	43,969	6870	24,045
2000	60,834	9505	33,268

1. Average family size assumed to be 6.4 adult equivalents  
 Average farm size assumed to be 3.5 ha.  
 Rate of population increase 3.3% per annum.

MAASAI PASTORAL POPULATION AND LIVESTOCK REQUIREMENTS PROJECTED TO 2000 A.D.

Table 9 indicates that at a conservative population growth rate of 2.2% per annum the pastoral population will be more than double from 52,010 adult equivalents in 1969 to 104,777 adult equivalents in 2000 A.D. Assuming a minimum livestock requirement of 3.5 SSU/adult the minimum livestock numbers required to maintain the pastoral population at a subsistence level can be calculated (Table 11).

Comparison of these estimates with the carrying capacity of Kajiado District (Table 5) provides an indication of the capacity of the environment to meet these demands on an average annual basis Table 13. It can be shown that if

- i. the population continues to grow at only 2.2% per annum
  - ii. the cattle: adult ratio is only 3.5 SSU:1
  - iii. the whole land area is available for grazing
- then : in the District as a whole the minimum requirements of the population will almost exactly balance the carrying capacity by 2000 A.D., though the northern sub unit will be unable to meet the demands by 1990.

Table 13. Capacity<sup>1</sup> to Meet Grazing Demand 1980-1990-2000 based on the District's Carrying Capacity

UNIT	1980	1990	2000
West	42.0	27.9	10.4
North	8.2	-14.2	-41.9
South	37.9	22.8	4.1
DISTRICT	31.8	15.2	- 5.4

1. Capacity is measured by the surplus capacity as a percent of total carrying capacity:

$$\text{Capacity} = \frac{\text{Carrying Capacity} - \text{Demand}}{\text{Carrying Capacity}} \times 100$$



The above calculation of excess capacity is based upon the measure of CARRYING CAPACITY which indicates the average annual capacity to support livestock. In semi-arid areas with seasoned rainfall patterns it may be more appropriate to calculate the SEASONAL LIVESTOCK CAPACITY as a measure of the seasonal ability of areas with different potential to support livestock. Such a measure reflects the seasonal adjustments of the livestock distribution by the Maasai herders in response to seasonal differences in the availability of pasture and particularly water.

SEASONAL LIVESTOCK CAPACITY of Kajiado District is estimated in Tables 6 and 7 which show that the DRY SEASON Livestock Capacity is much lower than the WET SEASON Livestock Capacity and indeed lower than the Carrying Capacity (Table 5). The limiting factor upon livestock number is access to dry season grazing and water.

Table 14 demonstrates that even if herders limit their grazing activities to Ecological Zones IV and V during the wet season Kajiado District has sufficient resources to meet the projected demand beyond 2000 AD.

Table 14 Capacity<sup>1</sup> to Meet Grazing Demand 1980-1990-2000  
- Wet Season Utilizing only Ecezones IV and V

UNIT	1980	1990	2000
West	59.2	49.2	36.9
North	28.5	11.1	-10.5
South	63.1	54.2	43.0
District	56.5	45.9	32.7

1. Capacity is given by the percent of surplus over the SEASONAL LIVESTOCK CAPACITY.

In the dry season however the picture is very different. Table 15 indicates that a shortage of dry season resources relative to demand will occur before the turn of the century in Kajiado district. The worst affected area is likely to be the northern area; it is from this area that many livestock are taken, particularly during drought, in search of pasture in other locations of the District. (Halderman 1972; Campbell 1978).



Table 15 Capacity to Meet Grazing Demand 1980-1990-2000  
- Dry Season Utilizing All the Land Area

UNIT	1980	1990	2000
West	29.4	12.2	-9.1
North	-28.7	-60.0	-98.9
South	16.5	- 3.8	-29.0
District	11.4	-10.1	-36.8

SUMMARY

The total number of SSU which can be supported in Kajiado District on the basis of average annual Carrying Capacity is 347901 (Table 5) but the Maximum Dry Season resources are thus a limiting factor to pastoral development in the District.

The number of Adult Equivalents that can be supported at a rate of 3.5 SSU/Adult Equivalent during the dry season is 76561. At a rate of population increase of 2.2% per annum this figure will be exceeded in the year 1986.

The Maasai of Kajiado District will thus reach the maximum expansion of their population at a low population growth rate of 2.2% p.a. and at a low livestock ownership rate of 3.5 SSU/Adult Equivalent well before the turn of the century under "average" climatic conditions even if the whole land area of Kajiado District is available to them.

Kajiado district can support 76,561 pastoralist adult equivalents. If the ratio of adults to children of the 1969 census is maintained this will equal 44,784 Adults and 48,147 children.

The assumption above that all land is available for grazing is however unrealistic. Much of the better-watered area is under cultivation and cultivation is extending into Zone III and Zone IV land as much of Zone II is already cultivated.

THE IMPACT OF CULTIVATION.

Land in Ecological Zones II and III in Kajiado District has potential for rainfed agriculture and on the slopes of the Ngong Hills and of Mt. Kilimanjaro there is extensive cultivation. Land shortage is already in evidence in these areas (Campbell 1978) and expansion of the area under crops is taking place into adjacent land in the drier Ecological Zone IV area. There is also an increasing amount of cultivation of land in Ecological Zone IV and

V in locations which have favourable moisture conditions e.g. at the edges of swamps or along the valleys of perennial streams. Much of this cultivation e.g. at Kimana and Namalok swamps is practised under irrigation.

The primary focus of agricultural activity is however the land which can be classified as Ecological Zone II. This area includes the area on the slopes of Mt. Kilimanjaro immediately north of the Tanzanian border; the eastern slopes and northern shoulder of the Ngong Hills and the Summits of the Chyulu Hills. The total area is about 22,000 hectares (Table 4) but much of it is unavailable for cultivation: the Summits of the Chyulu Hills are incorporated in a National Reserve, the area along the Tanzanian border on the slopes of Mt. Kilimanjaro is forested and cultivation is discouraged, as it is on the upper slopes of the Ngong Hills where the District administration has had to take action to evict farmers.

Table 12 shows that by 1990 the demands of the farming population for land, at an average farm size of 3.5 ha. will be about 24,000 ha. The area in the highest potential land, Ecological Zone II, is about 22,000 ha., while about 14,000 ha. of land in Ecological Zone III is available. If the restrictions upon the cultivation of all the available land in Ecological Zone II remain then it is clear that movement of farmers into the less productive land will occur. This is already the case and is likely to increase.

The impact of population growth and the consequent increasing demands for productive agricultural land is felt by the pastoralists as well as by the farmers. The nature of the landholding system in Kajiado District is such that farmers either own or rent their land. Due to the landholding ethos which prevails in Kenya once a farmer has acquired access to a piece of land he assumes total control over the land use of the plot. In consequence land which comes under cultivation is no longer available to herders as a grazing resource. The occupation of Zone II land by farmers therefore reduces the dry season grazing resources available to the pastoralists. The impact of this loss is such that the dry season livestock capacity in the District is reduced by 13.7% from 267964 SSU to 231214 SSU (Table 16). The maximum population that can be supported at a level of 3.5 SSU/adult is 66061 a figure that will be exceeded by 1980 if the population grows at only 2.2% p.a. The denial of access to the grazing afforded by the land in Ecological Zone II will therefore lead to the demands of the pastoral population exceeding the capacity of the land by 1980 rather than by 1990 as would otherwise be the case.

Table 16. Dry Season Livestock Capacity - Ecological Zone II land Cultivated  
(SSU)

UNIT	LIVESTOCK CAPACITY
West	101812
North	66575
South	62827
District	231214

Table 17 Capacity to Meet Grazing Demand 1980-1990-2000  
- Dry Season-Ecological Zone II land Unavailable.

UNIT	1980	1990	2000
West	11.1	-10.5	-37.4
North	-28.7	-60.0	-98.9
South	2.7	-21.0	-50.4
DISTRICT	-2.6	-27.6	-58.6

In order to test the sensitivity of the analysis to changes in the fundamental assumption, that is the number of hectares required per livestock unit, the data was tested under the following conditions i) average conditions - as per Table 5, ii) conditions of great seasonal differences - as per Table 7 and iii) under intermediate conditions where the number of ha./SSU were taken to be: Zone II 0.7, Zone III 1.4, Zone IV 4.75, and Zone V 15.

The results, summarised in the following table, demonstrate that while there is some variation in the date at which pastoral demands is projected to outstrip the capacity of the land - the earliest date is 1980 under conditions where Zone II land is not available to herders and the latest date 1998 if all land is available:



Table 18. Date at which Pastoral Demands exceed the Capacity of the Land under different rates of dry season livestock capacity.

LIVESTOCK CAPACITY	DATE	OF	DEMAND	EXCEEDING	CAPACITY
	All Land Available		Zone II Land Unavailable		
Average (Table 5)	1998		1993		
Pocr	1991		1983		
Very Poor (Table 7)	1986		1980		

#### SUMMARY

The data suggests therefore that in the period 1980 - 2000 a crisis will develop in both the pastoral and agricultural communities of Kajiado District over access to resources - even if those communities are at a subsistence level of livestock and land ownership. By 2000 AD. if present trends continue and if all available Ecological Zone II and Zone III land is cultivated under small holder agriculture there will be a shortage of cultivable land and over 30,000 adult equivalent pastoralists will be unable to gain a subsistence livelihood from the rangelands.

#### COMPATIBILITY OR CONFLICT OVER RESOURCES

The foregoing discussion suggests that Kajiado District can support a maximum of 76,500 adult equivalent pastoralists if the whole District is available for grazing activities. The Ecological Zone II land can support a maximum number of 40,000 adult equivalent farmers if the whole of the Zone II area is available for cultivation and assuming a farm size of 3.5 ha. and a family size of 6.4 adult equivalents. However if the Zone II land is cultivated and access denied to herders then the maximum number of herders that can be supported at a subsistence level is 66,000 adult equivalents.

Under contemporary conditions of land tenure and land use the two dominant economies - agriculture and pastoralism - are organised such that they compete for the available land resources. Pastoralists are prevented from grazing their livestock in the farmers' fields. The two economies are incompatible.



The maximum population of the District under incompatible conditions is 106,000 adult equivalents, 66,000 herders and 40,000 farmers. If however land use could be organised such that farmers produce crops during the wet season but permit access to their land by livestock during the dry season, and particularly during periods of drought,<sup>5</sup> then Kajiado District could support a much larger population of herders, 76,500 adult equivalents.

Such a system of compatibility between agriculture and herding might also permit expansion of cultivation into the riverine and swamp areas of Ecological Zone IV and V without necessarily endangering further the pastoral resource base. Cultivation is possible in a number of such locations during the wet season, particularly under irrigation, but the importance of access to these locations for livestock is increasing as farmers encroach upon the more traditional dry-season retreat areas on the hillsides.

If access to these resources can be guaranteed to the herders, possibly through a system of land use zoning whereby the land is zoned for seasonal use - cultivation in the wet season; herding in the dry season - , then a more flexible land use system may evolve which maximises the use of available resources and permits the simultaneous development of agricultural and pastoral activities.

In the absence of such zoning or control of land use a situation of deteriorating subsistence systems will result in which the conflict over land which already exists in many parts of the district may become more violent and widespread.

There are however a number of constraints to the implementation of such a scheme. The Kenyan ethos vis a vis land ownership mitigates against flexibility of land use. Tension between Maasai and non-Maasai over the access to and control of land resources is already great and the degree of trust necessary to achieve a more flexible land use may not be forthcoming. A more feasible approach may be to encourage the pastoralists themselves to cultivate the land with agricultural potential. Many Maasai are taking up farming and as they understand the dry season requirements of the livestock herds they are

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5. Such interactive systems are found elsewhere in Africa. For example the Fulani herders and Hausa farmers of N. Nigeria have a long tradition of sharing resources. The Fulani herd livestock belonging to the Hausa and themselves and drive them into the Sahelian zone during the rains. In the dry season the herds retreat to the Sudan zone arriving (ideally) after the harvest and grazing on the stubble remaining in the fields and on the fallow lands. The herders obtain grazing and the farmers gain the manure which the animals leave in their fields. This is part of a complex interaction between the two economies which also includes the exchange of livestock products for grain. (Van Raay. 1975).

more likely than some of the other farming groups to permit the evolution of a flexible, seasonal, land use system.

It is also evident that even if such a measure were to be successfully introduced it would offer only a temporary reprieve from the imminent situation of subsistence demands exceeding the land's capacity. The crisis might be delayed by a decade. Probably by 1990 and almost certainly by 2000 Kajiado District will be unable to support its population at a subsistence level at current levels of technology.

If a major deterioration in the resource base, high unemployment, landlessness and or livestocklessness and high rates of rural-urban migration are to be avoided then alternative patterns of resource exploitation, land use and employment will have to evolve before the turn of the century. The pressures for these alternatives already exist and active steps to support and diversify the existing economy are necessary to reduce future problems. A land use policy which emphasises compatibility rather than conflict between herding and farming could "buy" a sufficient amount of time within which an integrated development policy for the area, within a national framework, might be formulated and implemented.

#### POSSIBILITIES FOR DEVELOPMENT IN KAJIADO DISTRICT.

The current trend in land use planning in Kajiado District is to encourage the expansion of the area under crops (Kajiado District Development Plans 1974-78) and to encourage pastoralists to evolve a herding strategy which will reduce land degradation and increase the commercial aspects of the livestock economy. There is great concern, particularly among non-Maasai range managers, about the effects of overstocking upon the quality of the range resources and one of the anticipated outcomes of the group ranch policy is that the Maasai will be able to improve their herds so that their subsistence requirements may be met from fewer, more productive livestock. This will permit a higher off-take and thus reduce the number of livestock in the District which may allow rehabilitation of the rangeland.

Campbell and Migot-Adholla (1979) found that the Maasai are not overstocked relative to their subsistence needs but the problem of overstocking relative to the land's resources is a very real one. The Maasai cannot be expected to reduce their livestock holdings however, until reliable and adequate alternative sources of food are available. The experience of the recent drought period suggests that the Maasai are increasingly using grains as food, a finding supported by Meadows and While (1979), and it is necessary that the system of distribution and marketing of these foodstuffs be sufficiently efficient to permit the Maasai to be confident in the ability of the system to function when it is most needed, in time of drought. If this efficiency can be demonstrated then the herders may become less resistant to the idea of reducing livestock numbers.

A second requirement is that the Maasai should have the means to purchase these foodstuffs. Livestock not only represents a source of food but also the capital resources of the herder. During a drought animals are sold and the proceeds used to buy food etc. If the livestock are not available, having been sold prior to the drought, then the herder will have a means of saving some of his cash income from the sale of livestock in order to provide for his needs in a time of drought. Banking facilities are urgently required throughout the District if this is to be achieved.

The primary focus of the contemporary strategies for rangeland development is to improve both the ability of the herders to meet his subsistence needs and to upgrade the quality of the rangeland. While these are laudable objectives the strategies by which they are to be achieved are often resisted by the herders who associate them with "destocking" and with attempts to undermine the Maasai way of life. They are seen as seeking to change rather than build upon the human and material resources of the Maasai.

The analysis presented earlier in this paper suggests that even were the objectives of contemporary range policies to be achieved, that livestock numbers were to be drastically reduced to the minimum required for subsistence (making little allowance for drought losses, social needs etc.), the requirements of an increasing population will still outstrip the capacity of the land by 2000 AD. While these policies may lead to short term gains if they were accepted by the Maasai, their achievements would be



eradicated by the turn of the century.

In order to try to avoid this situation a much more adventurous development strategy is required which seeks to overcome the major problem - the inability of the District to provide for the needs of its population while the people are engaged in primarily subsistence activities -/building<sup>by</sup> upon the available human, natural, livestock and infrastructural resources of the area such that employment opportunities outside the subsistence sector are made available hence reducing the population directly dependent upon subsistence production for its livelihood. About four thousand jobs will be required in the District by 2000 AD to support those unable to provide their own subsistence.

Of the districts of Kenya which are predominantly semi arid ~~and~~ dependent largely upon a pastoral economy Kajiado District probably offers the best basis for development. Its road infrastructure is relatively well-developed, it has mineral resources which are being exploited at Magadi, Amboseli and in various marble quarries, the actual and potential earnings from tourism and wildlife are high but above all it has a vast relatively untapped resource in its livestock sector. Western and Thresher (1973) have outlined development proposals for the tourist industry based on Amboseli National Park. They envisage an increase in the numbers employed in the tourist industry and related activities associated with Amboseli National Park from nearly 500 in 1975 to over 2200 in 1988. The Magadi Soda Company and Kenya Marble Quarries employ a couple of hundred people but there is clearly a need for activities to stimulate the dominant economy of the area - the livestock-based economy.

#### POTENTIAL FOR THE DEVELOPMENT OF LIVESTOCK-RELATED ACTIVITIES IN KAJIADO DISTRICT

At present Maasailand is an exporter of hides, skins and meat. It is an area of primary production; its renewable raw material, livestock, is to a large extent processed outside the district and thus the employment opportunities in processing and the value added in manufacture accrue elsewhere.



The lowest estimate of livestock units able to be supported in Kajiado District is 231214 (Table 16). At a ratio of 1 head of cattle to 1.3 shoats<sup>6</sup>, and assuming that 1SSU is equivalent to 2 cattle and 20 shoats, 231214 SSU is equivalent to 367000 cattle and 954000 shoats. Compared with actual livestock numbers<sup>7</sup> this may be a slight underestimate in terms of cattle, but the number of sheep and goats may be slightly overestimated.

For the purposes of this discussion a cattle population of 400,000 and a shoat population of 800,000 is assumed. If a 15% annual offtake is made<sup>8</sup> the total number of hides<sup>9</sup> available in the district is 60,000 and the number of skins is 120,000. If it is further assumed that 75% of these may be purchased as raw material for a leather tanning and handicraft industry this would provide 45,000 hides and 90,000 skins. Assuming that only 90% of these are in suitable condition then such an industry would be based on 40,500 hides and 81,000 skins per annum, or about 800 hides and 1500 skins per week.

The processing of this amount of leather from tanning to finished leather products could provide employment for a large number of people. The tanning and leathercraft section of the Maasai Rural Training Centre at Isinya may be used as a model from which the potential district employment may be estimated.<sup>10</sup>

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6. This is the ratio of cattle: shoats found in the author's 1977 survey in Kajiado District.

7. Estimates of the cattle population of Kajiado District are very variable. For example for 1977-78 KREMU estimated it to be 414,000 while Meadows and White (1979) provide an estimate of 547,700. The Provincial Range Management Officers Report for 1976 estimated the shoat population of Kajiado District at 850,000 (Ministry of Agriculture, 1976).

8. Meadows and White (1979, p. 3) indicate that offtake varied in the period 1962-63 to 1977-78 from a high of 38.4% during the drought period 1975-76 to a low of 11.8% in 1965-66. The trend over this period is for the percentage offtake to increase and thus the 15% offtake assumed in this paper is probably an underestimate of the actual current offtake.

9. "Hides" refer to the skins of cattle and "skins" to those of sheep and goats.

10. I am grateful to Mr. Tom Matianyi, the Administrator of the Centre and Mr. Charles Kaberethi, Head of the Tanning Unit, for this information.

In the tanning section four people are able to process 60 skins and 30 hides per week. The district total of 1500 skins and 800 hides would thus occupy about 100 people. The leathercraft industry is however more consumptive of labour. A large article consumes about 2 hides or 1 hide and two skins and a craftsman can complete such an article in 3 days. Thus one person can process 2 hides and 4 skins per week. This amounts to about 400 people to process the available hides and skins. The tanning and working of the raw materials would thus provide about 500 full time jobs in the district.

Leather tanning and leathercraft are however but two of the processes associated with livestock. Slaughtering, meat dressing, meat preparation, biproduct processing (bones, horns, hooves etc.) and possibly canning are associated activities which have a high employment potential. It is probable that were an integrated livestock industry promoted in the area, over 1000 full-time jobs could be provided.<sup>11</sup>

The administration at Isinya recognises one major constraint upon expansion of leathercraft industries - the lack of a market for the products. At present most of the production is aimed at tourists in Kenya but little exploration of the potential for export sales has been done. It is probable that with good overseas promotion and with quality control in Kenya such products could be sold overseas. A bulk exporting centre for the products of a number of factories located at the major livestock centres - Illassit, Emali, Ngong, Kajiado etc. would be necessary. The business would require good organisation both within the District and in regard to exports but the potential benefits in terms of employment generation would appear to make such efforts worthwhile.

A major advantage of such an industry is that it would maintain the traditional basis of the area's economy - livestock - and would use this resource not only to provide employment outside the subsistence sector but also to provide a commercial outlet for the products of those who remain predominantly pastoralists or farmers. It would provide a commercial basis for the whole economy while being compatible with the environmental and cultural characteristics of the area.

11. Part-time job possibilities also exist. At Isinya over 200 Maasai women are employed on a piecework basis to produce beadwork such as belts, bags, keyrings, tablemats and a variety of traditional decorations.

Ideally such integrated livestock activities should be organized on a cooperative basis by a number of group ranches. There are pressures in Kajiado District, as elsewhere in Maasailand, for the group ranches to be broken up into individual holdings because they are too small to support the herds of a growing population. Were ranches to cooperate in such industries then some members could specialise in raising livestock while others would be employed in the industries. The ranches could also share the seasonally available grazing and water resources, setting aside some of the better land for drought-retreat pasture and some as a fattening ground for livestock before slaughter. The economic returns to the ranches would then accrue from the subsistence production of the herds, from the sale of milk products, from the sale of livestock and from the incomes earned by those engaged in the various aspects of the industry.

The benefits would not be limited to the herders however. One of the problems cited by farmers in the area is that when rainfall is good they have little market for the surplus which they produce. Meadows and White (1979 p. 13ff) provide evidence that the Maasai are consuming grains and other foodstuffs/<sup>in</sup>increasing quantities. It is likely that/<sup>the</sup>growth in the industrial population that would occur if such livestock-related industries were created would provide commercial outlets for farm products in the area.

There are constraints upon the ability of the farmers of the area to produce and store their surplus. Interviews with farmers of the area suggest that substantial gains would proceed from relatively minor infrastructural investments such as improved water supplies and the provision of grain stores. These facilities would enable the farmers to be more reliable suppliers of food crops.

Such proposals are consonant with the expressed goals of the Government of Kenya with regard to promoting rural development. The location of a number of industrial sites could act as local centres of rural development. A greater settled population might provide an incentive for the location of schools, dispensaries, markets and other facilities demanded by the Maasai. The objectives of the range managers might be achieved through building upon rather than threatening the traditional economy and the contemporary changes in



Maasai attitudes to development would suggest that such proposals are more acceptable than those associated with "destocking" and "rangeland improvement".

#### SUMMARY AND CONCLUSION

The analysis presented above suggests that Kajiado District is entering a critical period during which the subsistence demands of a growing population will outstrip the district's capacity to provide. There are a number of processes contributing to this situation. The underlying process is that of population growth. At conservative estimates of the rate of increase the Maasai population will double between 1969 and 2000 and the population of farmers is growing more rapidly due to both a higher rate of natural increase and to immigration. Eventually, probably by around the turn of the century, the population's subsistence needs will be greater than the capacity of the resources of the district to provide for them.

Other processes are likely to accelerate the imbalance between the needs of the population and the capacity of the land and water resources. There are limited amounts of high potential (Ecozone II) land in the District. This land is increasingly being brought under cultivation and if present trends continue it will be entirely cultivated by about 2000AD unless legislative action is taken to preserve specific areas. The use of these high potential areas by farmers alone has the effect of reducing the quality and quantity of the district's dry-season grazing resources as contemporary patterns of land tenure do not allow for flexibility in the use of the land resources. Under these circumstances pastoral resources will become insufficient to meet the demands for them sometime between 1980 and 2000.

There is therefore a need for immediate action to be taken to remedy the situation. Present development strategies are primarily aimed to improve subsistence production. While these activities are necessary they are not adequate to deal with the underlying problem. There is a need for a much bolder approach to pastoral development which aims to create secondary activities based upon the livestock resources and the skills of the herders.



The preparation and implementation of such strategies will take time. Under contemporary conditions of incompatibility of land use between herding and farming the available time is limited. Encouragement of a more flexible pattern of land use, possibly through enactment of zoning legislation, which would permit farmers to grow crops in the higher potential areas during the rains but also provide access to these areas for herders during the dry seasons may delay the time at which demands exceed supply for a decade or so. This might be sufficient time for an integrated development plan which aims to provide employment opportunities in livestock related as well as in the tourist industry to be prepared and implemented.

Conditions in Kajiado District are ripe for such developments. Many Maasai are realising the need to diversify their economy; the recent drought period demonstrated that dependence upon livestock alone was not sufficient to overcome the shortages faced by many people. The need to save cash, sell livestock and grow crops was expressed by many respondents in the author's 1977 survey. These are strategies based on improving subsistence but they involve major changes in attitude to livestock - they are prepared to sell to raise cash - ; to their traditional occupation many wish to grow crops; and to their diet - many now eat grains as well as livestock products. It is this change of attitude which should be seen as providing the potential for a bolder approach to livestock development, one which uses livestock products as a raw material for relatively small-scale industrial developments at selected locations in Kajiado District.

Such industries would complement the activities of the Ministry of Tourism and Wildlife in encouraging more people in the district to engage in tourist-related occupations. Together these industries would enable many people to leave the subsistence sector and find work in activities based upon the wildlife and livestock resources of the district. The growth of a non-subsistence economy would also enable the subsistence sector to sell its products and would encourage tertiary activities..

There is an urgent need for action to be taken to transform the economy of Kajiado District from a primarily subsistence one to a more productive one based upon the district's resources and human skills. The proposal outlined above for the development of an integrated livestock industry is compatible with both the cultural values of the people and with the nature of the district's environment. The people have developed great skill in livestock management and a great understanding of the environment. These provide opportunities for development while one of the traditional constraints - the supposed unwillingness of the Maasai to view his herd in commercial terms, - is clearly declining. Livestock-related industries located in Maasailand would provide a large number of jobs without necessarily radically transforming the Maasai way of life. There would still be a need for herders while those now seeking jobs outside of herding would have greater opportunities.

In the absence of more ambitious development strategies than those currently being considered, the decline in the productivity of the population and of the environment of Kajiado District is inevitable and increased rural to urban migration with its attendant problems will occur.